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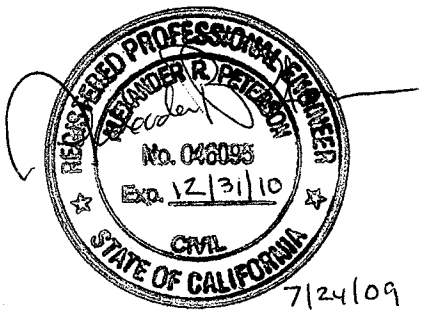
Del Paso Manor Water District Master Plan

24 July 2009



Prepared for

Del Paso Manor Water District
4268 Lusk Drive
Sacramento, California 95864

K/J Project No. 0870017*00

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Section 1: Executive Summary

1.1 Introduction and Purpose of Master Plan

The Del Paso Manor Water District (District) has long been committed to providing a safe and reliable water supply, while at the same time maintaining low water rates. This Water System Master Plan is the first District master plan and documents planning strategies developed to address aging infrastructure and changing water supply pressures. This Master Plan has been prepared as a working document capturing engineering evaluations and recommendations while also allowing for adaptation as conditions and policy changes.

This Water System Master Plan documents the Del Paso Manor Water District policy regarding policy, vision and direction for the District and does not commit the rate-payers to a specific discretionary action to implement the policy goals. Evaluation of funding and rate impacts, California Environmental Quality Act (CEQA) review, and possibly construction implementation will flow from the vision of this Master Plan and reflect the next steps in the process of renewing the infrastructure of the District.

1.2 Master Planning Process and Documents Prepared

The District is located in the Arden area of unincorporated Sacramento County serving approximately 1.3 square miles, 1,800 residential, commercial, and institutional customers with an estimated average water usage of 1,680 acre feet per year over the last 10 years. The District is fully built-out and there is no growth area available.

The District's water system is comprised of buried water mains, eight (8) groundwater supply wells, and individual service connections, and has generally been in continuous service for over 50 years. There is an increasing infrastructure liability as the aging pipelines and wells reach the end of their useful life over the next 5 to 30 years. The District's elected Board of Directors, recognizing that the aging system and water supply reliability impact water service reliability, commissioned this Water System Master Plan.

The Master Plan focuses on a 25-year horizon with specific recommendations developed for the 5-, 10-, and 25-year milestones. This Master Plan was prepared building on a series of technical memoranda documenting the detailed evaluations for review and discussion with the District management and Board. The evaluation, findings and recommendations of the Technical Memoranda (TMs) are presented in this Master Plan and the TMs provided as appendices under separate cover.

The Master Plan includes a detailed Planned System Maintenance schedule for replacement of facilities similar to what has traditionally been titled a Capital Improvement Plan. Given that the District is fully developed, there are no true capital improvements needed for the current use. There are, however, significant liabilities facing the District in maintaining high quality water supply and level of service and the liabilities are addressed with the PSM plan.

1.3 Executive Summary

This Executive Summary provide a brief overview of the evaluation undertaken, key findings and recommendations. Additional discussion and date are provided in the body of this Master Plan and in the Technical Memoranda provided as appendices under separate cover.

1.3.1 Water Demands and Planning Criteria

The existing water use in the District was evaluated with the following findings:

- The District has a mixture of residential (94.3% of services), multi-housing (0.6% of services), commercial (3.7% of services) and institutional, irrigation and fire protection (1.3% of services) customers.
- The water demand is disproportionately skewed towards the non-residential water customers with 44% of the annual water being used by non-residential accounts.
- The District records indicate a 24% reduction in system water use over the period 2004 to 2007. The estimated per capita water use in 2004 was 227 gallons per capita per day (gpcd) and in 2007 was estimated at 173 gpcd.
- The District average 10-year water use is estimated to be below similar communities in the Sacramento area and was assumed to increase to match similar communities.

The water demands in the District are shown in Table 1 and are dominated by a small number of non-residential customers with a regional benefit. Conservation will be encouraged with these large water users as part of managing the Districts resources. The District has large landscape lots and water use reductions will require changes in customer landscape practices.

Table 1: Peak Demands and Factors

Demand Period	Water Demand		Peaking Factor	Basis for Calculation
Average Day	1.50 MGD	1,042 gpm	1.0	District Records (1998 – 2007)
Maximum Month Daily Average	2.93 MGD	2,035 gpm	1.95	Maximum monthly demand from the last 10 years of supply operation divided by number of days where maximum monthly demand occurred
Maximum Day Demand	4.40 MGD	3,056 gpm	2.93	Max Month Daily Average Demand times 1.5 peaking factor
Peak Hour Demand	6.60 MGD	4,580 gpm	4.40	Estimated Max Day Demand times 1.5 peaking factor divided by 24 hours

1.3.2 Water Supply Planning

The District is 100% groundwater and the groundwater basin in not in overdraft. The District maintains eight existing wells with an installed capacity capable of meeting maximum day demand (with single largest well off line), peak hour demand and a maximum day demand with a residential fire flow. The existing system supply is insufficient to meet a maximum day demand and the single largest fire flow of 3,500 gallons per minute without low pressure conditions in the system. The initial phase planned system improvements include a new well to address this shortfall.

The District has an agreement with the City of Sacramento to make available sufficient surface water to meet the District water supply needs. The District does not have facilities or approvals to use this water at this time. Obtaining approvals for surface water use will trigger installation of water meters within the District.

1.3.3 Conjunctive Use Planning

Conjunctive use is the balancing of surface water and groundwater to maximize the benefits of both. Two options for conjunctive use were evaluated. One option is the use of City of Sacramento surface water supplies either directly or wheeled through Sacramento Suburban Water District and the second option is the use of surface water diverted at the Carmichael Water District Bajamont Water Treatment Plant. This second option provides for a beneficial water supply plan for both the Carmichael Water District (CWD) and Del Paso Manor Water District with a joint project option to pump groundwater back to CWD in the event they have lost surface water supply due to drought or groundwater supply due to contamination.

The recommendation is to continue to investigate the joint CWD water supply project while maintaining the City surface water supply agreement.

1.3.4 Facilities Replacement Planning

The facilities replacement plan is presented in detail and provided for five new wells and a complete reconstruction of all pipelines. The planned replacement was evaluated using a hydraulic model and confirmed system pipe and supply capacity to fully support existing water use and fire flow criteria.

1.3.5 Organizational Structure and Management Planning

The District currently employs four full-time and one part-time employee to operate the system. The District maintains agreements with neighboring agencies for assistance in the event of an emergency and maintains annual contracts with water and water well contractors for on-call response as needed.

The proposed planned system maintenance, addition of metering, additional conservation requirements and increased distribution and treatment operator coverage will require additional staffing in the future. Two approaches to addressing possible future staffing needs are provided.

1.3.6 Meter Retrofit Planning

The District is a small water agency and does not currently fall under recent legislation regarding mandatory water metering. The District has agreed through the Water Forum process to begin metering at such time a discretionary surface water supply decision is required.

This Master Plan recommends proceeding with installation of new services, meter boxes and meter idlers concurrent with the pipeline

1.3.7 Planned System Maintenance

The planned system maintenance (PSM) schedule is presented in detail with summary cost estimate tables, project descriptions and project time table. The work is presented in four year periods with the initial effort including a new well and system electrical improvements. The work includes wells, pipes, meters, and the CWD conjunctive use project and provides for full replacement of the system with conjunctive use and meters by the end of the planning period.

The existing distribution system is primarily in the backyards of the residential area and this Master Plan recommends relocating the system to the public right of way as part of replacing the aging pipe network.

1.3.7.1 Summary Estimated Cost and Phasing

The detailed breakdown and development of cost estimates for the projects is provided in the body of this Master Plan. The summary of the estimated cost and planned system maintenance phasing is provided in Table 2.

Table 2: Cost Summary for Planned System Maintenance 2010-2030 (Meter Installation by 2025)

PSM Phase	Scheduled	Baseline	Optional	Total
1	2010-2014	$4,393,400	$0	$4,393,400
2	2014-2018	$4,928,200	$1,147,000	$6,075,200
3	2018-2022	$2,438,400	$2,184,800	$4,624,200
4	2022-2026	$6,910,100	$5,628,300	$12,538,400
5	2026-2030	$1,744,300	$617,400	$2,361,700
Estimated Cost				$29,992,900
Total Cost Rounded to:				$29,993,000

Section 2: Introduction

Del Paso Manor neighborhood is a well maintained quiet post World War II residential and commercial development in the unincorporated Arden/Arcade are of Sacrament County whose water system has served it well since first delivering water in the late 1940's.

2.1 Purpose of the Water Master Plan

The Del Paso Manor Water District (District) has long been committed to providing a safe and reliable water supply, while at the same time maintaining low water rates. This Water System Master Plan is the first District master plan and documents planning strategies developed to address aging infrastructure and changing water supply pressures. This Master Plan has been prepared as a working document capturing engineering evaluations and recommendations while also allowing for adaptation as conditions and policy changes.

This Water System Master Plan documents the Del Paso Manor Water District policy regarding policy, vision and direction for the District and does not commit the rate-payers to a specific discretionary action to implement the policy goals. Evaluation of funding and rate impacts, California Environmental Quality Act (CEQA) review, and possibly construction implementation will flow from the vision of this Master Plan and reflect the next steps in the process of renewing the infrastructure of the District.

2.2 Background

The District is located in the Arden area of unincorporated Sacramento County, northeast of the City of Sacramento, as shown in the vicinity and location maps provided in Figures 1 and 2. The District service area is approximately 1.3 square miles and the District provides drinking water to approximately 1,800 residential, commercial, and institutional customers. The District is bounded on all sides by Sacramento Suburban Water District (SSWD), a large water purveyor in the Sacramento region that was formed in 2002 by the merger of the former Arden and Northridge Water Districts. Figure 3 provides a map of the region and the District's location relative to neighboring water purveyors.

The District is fully built-out and is facing an increasing infrastructure liability as the aging pipelines and wells reach the end of their useful life over the next 5 to 30 years. The District's water system is comprised of buried water mains, eight (8) groundwater supply wells, and individual service connections, and has generally been in continuous service for over 50 years. Figure 4 provides the location of each of the existing District wells, and approximate locations and diameters of existing buried water distribution pipelines. The District's elected Board of Directors, recognizing that the aging system and water supply reliability impact water service reliability, commissioned this Water System Master Plan.

Kennedy/Jenks Consultants (Kennedy/Jenks) specializes in water system master planning, infrastructure planning, water resources planning, as well as design and practical application of engineered solutions for safe and reliable systems and has prepared this Master Plan. The Master Plan will focus on a 25-year horizon with specific recommendations developed for the 5-, 10-, and 25-year milestones. The Plans will consider infrastructure replacement beyond the

25-year period for pipelines and groundwater wells, as appropriate, and provide general recommendations for the longer-term issues.

2.3 Scope of Work

This Master Plan was prepared building on a series of technical memoranda documenting the evaluation of conjunctive use water supply strategies and facilities replacement planning. In addition, facility management review for future District staffing needs and metering installation planning were developed through meetings with the staff.

The Master Plan includes a detailed Planned System Maintenance (PSM) schedule for replacement of facilities similar to what has traditionally been titled a Capital Improvement Plan. Given that the District is fully developed, there are no capital improvements associated with growth or development and instead the investment of capital is to maintain the system as needed for the current use. The significant liabilities facing the District in maintaining high quality water supply and level of service and the liabilities are addressed with the PSM plan.

2.4 Acknowledgements

The team and Kennedy/Jenks wishes to acknowledge the efforts and input of the following Del Paso Manor Staff and Elected Board for their participation in the work, consideration of the issues and leadership and charting the future for the District.

Del Paso Manor Water District – Board of Directors

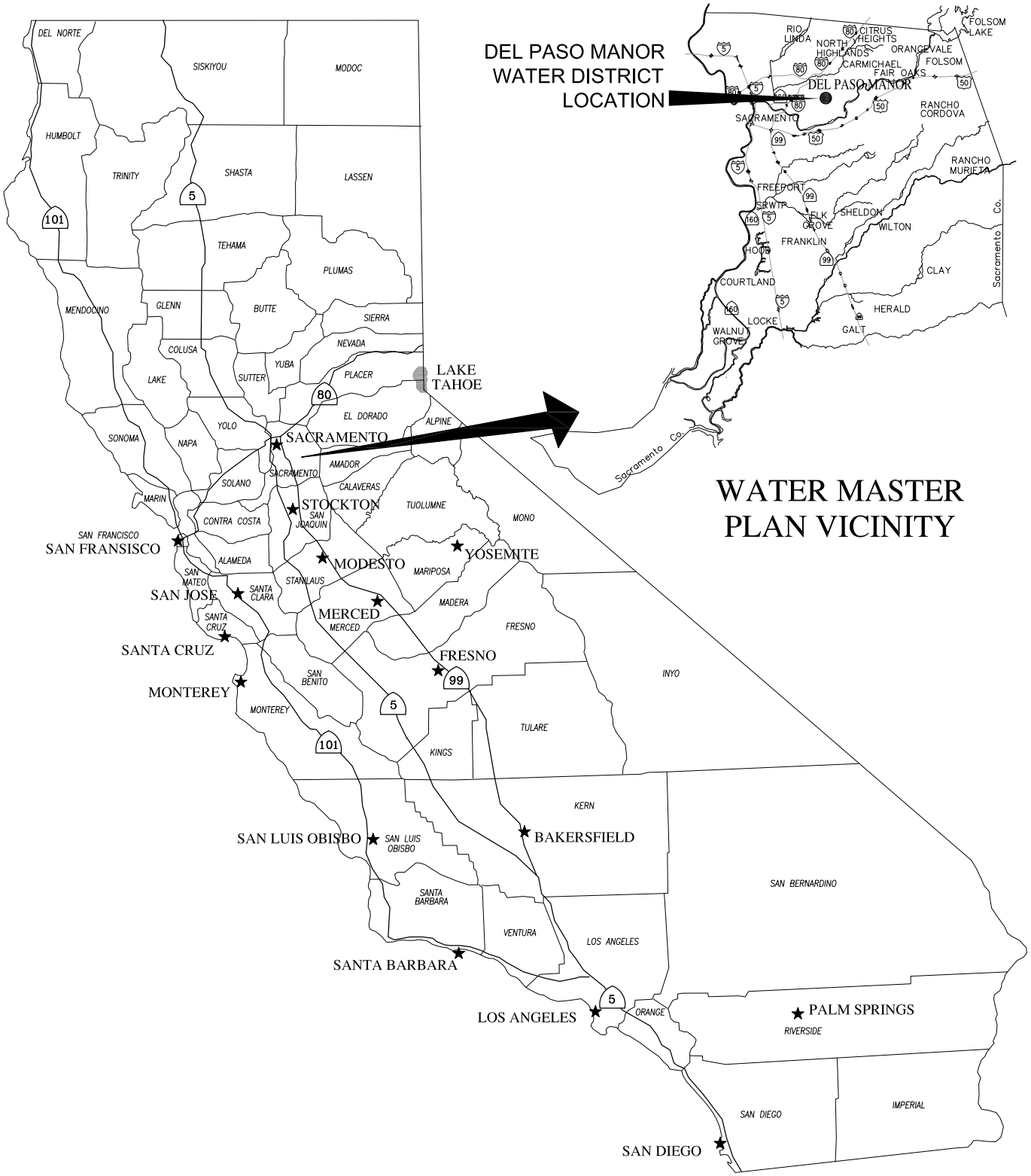
Richard Allen, President
John Downing, Vice President
Michael Clohossey, Director
Philip Ripplinger, Director
Roy Wilson, Director

Del Paso Manor Water District – Administration and Staff

Debra Sedwick, General Manager
Richard Bolton, Field Manager
Lori Hensley, Office Assistant
Ken Ingle, Operation and Maintenance Technician

In addition, we would like to acknowledge the efforts of the Kennedy/Jenks team as follows:

Sean Maguire, P.E., Project Engineer
Sherly Rosilela, EIT, Staff Technical Support
Alex Peterson, P.E., Project Manager



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DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

DISTRICT VICINITY MAP

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FIGURE 1

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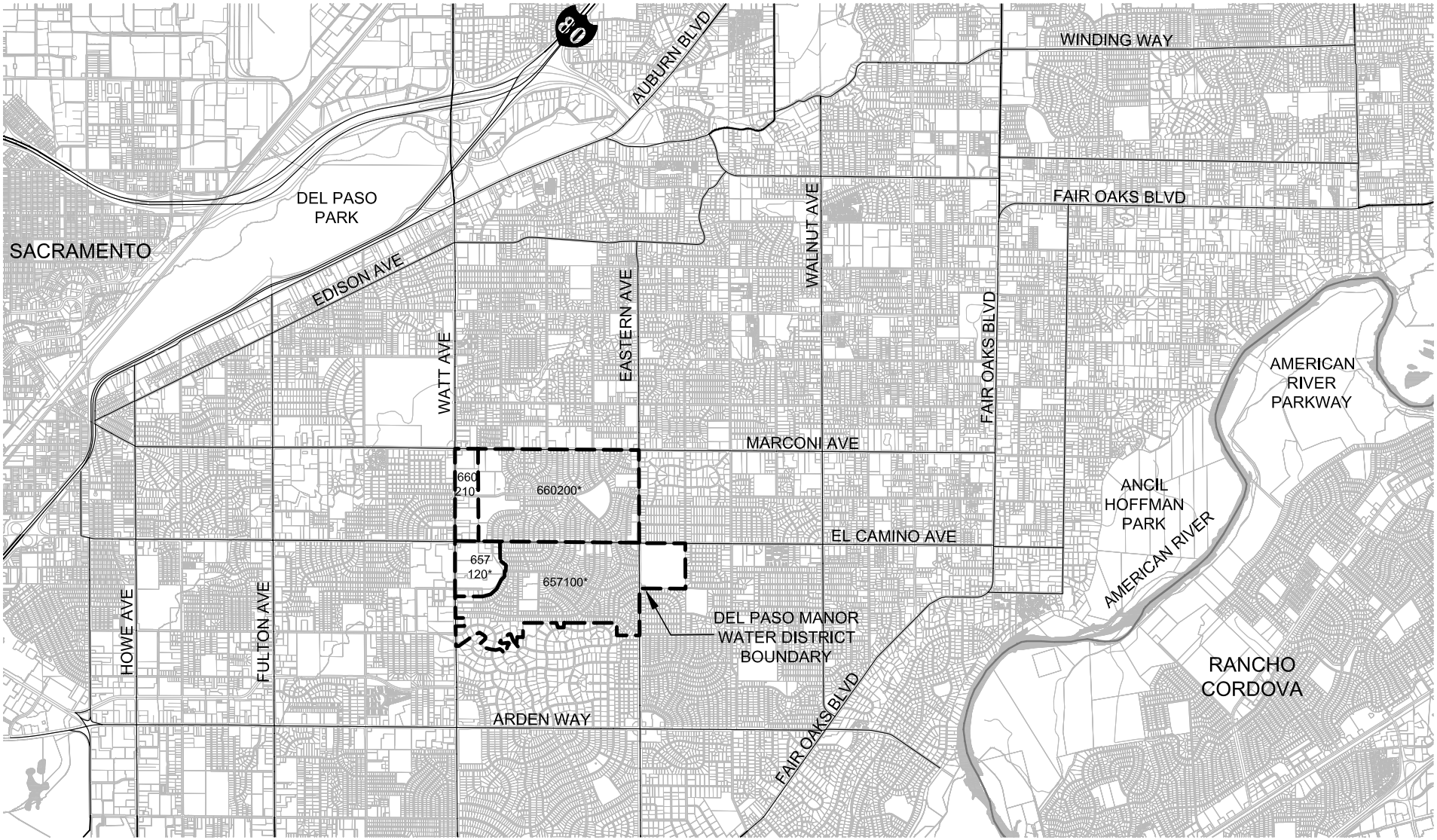

*NOTE: SACRAMENTO AREA COUNCIL OF GOVERNMENT MINOR ZONES BOUNDARIES SHOWN WERE USED FOR POPULATION AND GROWTH PROJECTION.

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DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

DISTRICT LOCATION MAP

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FIGURE 2

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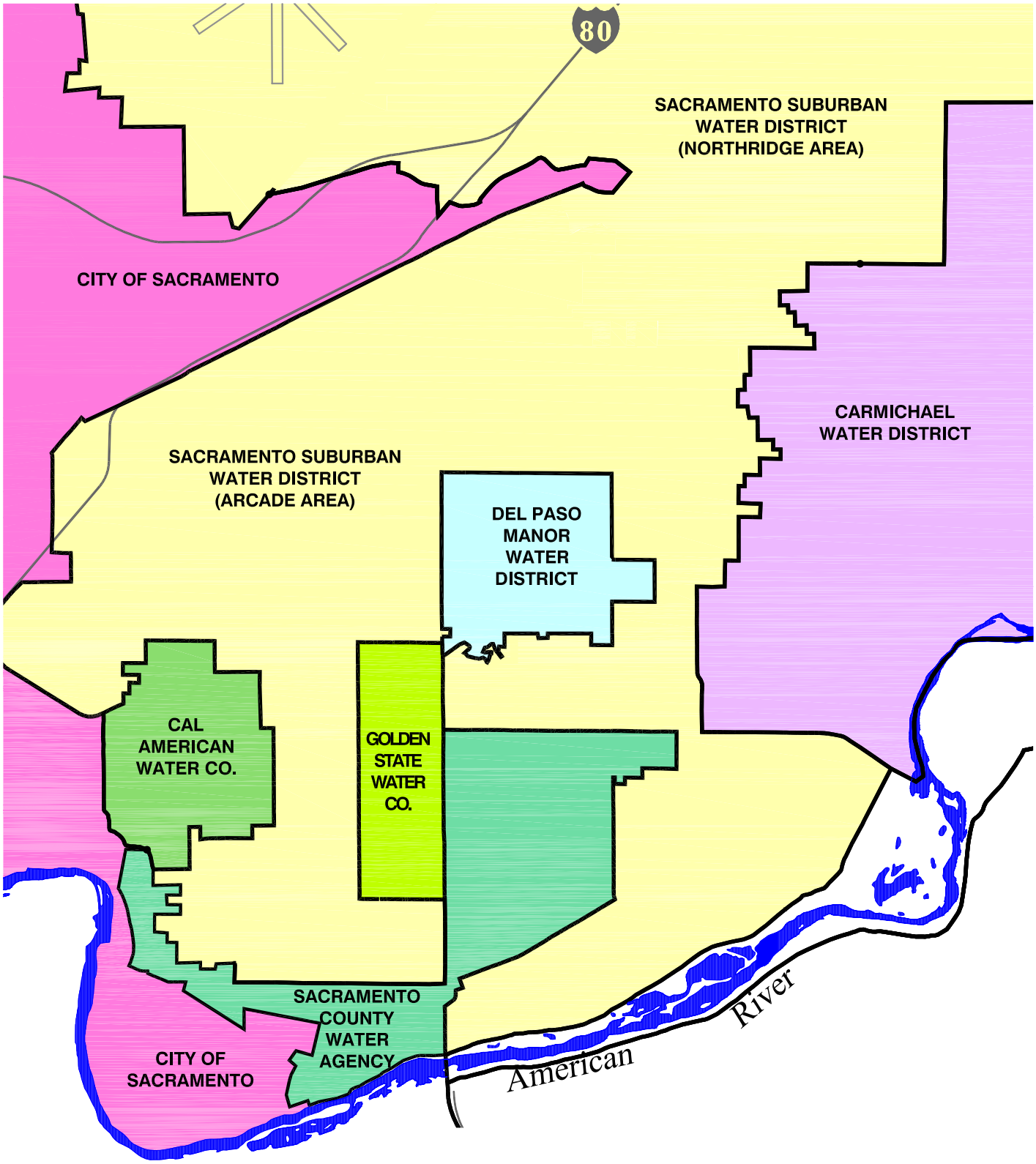

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DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

ADJACENT WATER DISTRICTS

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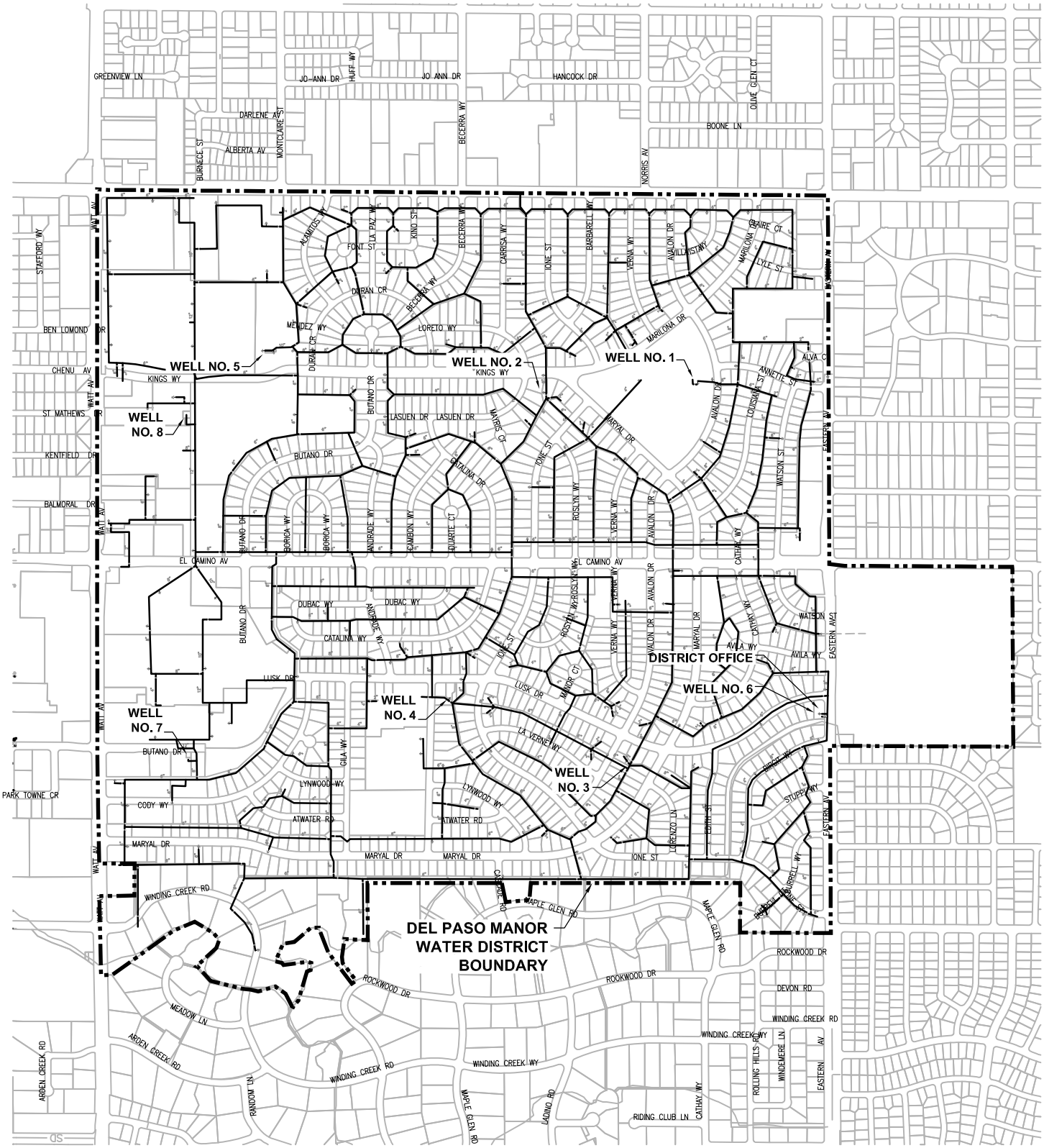
FIGURE 3



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DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

DISTRICT SERVICE AREA BOUNDARY

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FIGURE 4

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Section 3: Water Demands and Planning Criteria

The District customers have benefited from low cost and abundant water supply supporting park like suburban landscapes and continuous commercial water consumption practices that are trending to be inconsistent with state conservation policies, presenting challenges for the District in maintaining the high level of service, low cost and consistent regulatory policy compliance.

3.1 Introduction

This section presents the District historical water demands and planning criteria that will be used for planning of water supply and distribution system improvements.

3.2 Population and Growth

In order to estimate the population and residential units within the District service area was obtained from two data sources: The Sacramento Area Council of Governments (SACOG) Regional Data Center and the US Census Bureau. With the District already at its build out capacity, the population is expected to remain steady for the next 25 years. The following population estimate data was used to prepare per capita water use estimates.

The District boundaries concur with four (4) minor zone boundaries 657100, 657120, 660200, and 660210 in the SACOG Regional Analysis District 9 Arden Arcade. The SACOG minor zones are shown in Figure 2. The SACOG data from 1995 – 2001 shows a general zero growth across the minor zone boundaries, which confirms that the District service area has been fully developed and reached build out. Table 3 shows estimated population and housing units for minor zones within District Boundaries and tabulated estimate of population per housing unit. The estimated 2.2 persons per household using the SACOG data is low for similar land use and density in Sacramento County and we assumed would trend upward during the planning period of the Master Plan.

Table 3: Population and Housing Estimates and Tabulated Density (a)

Minor Zone	Estimated Population	Housing Units
660200	2,421	1,188
660210	49	20
657100	2,520	1,043
657120	0	0
Total	4,990	2,251
Estimated Population/Housing Unit (b)		**2.22**

(a) Based on SACOG. Population and Housing for Sacramento County, by Minor Zone: 2002
(b) Rounded to nearest 0.01 unit

The data in Table 4 shows the population and housing unit density for the geographic area as prepared by the US Census Bureau national census data 2000. Population and housing unit density projections for several Census Data Places (CDP) in Sacramento County were reviewed to develop an average for similar land use and development density.

The CDPs shown in the table below were selected based on their similar socio-economic and geographical characteristics with the District.

Table 4: Population and Housing Units Density

Geographic Area	Housing Units Per Square Mile	Population Per Square Mile	Population Per Household
Arden Arcade CDP	5084.9	2373.3	2.14
Carmichael CDP	4622.2	1987	2.33
Citrus Heights City	5929.3	2432.3	2.44
Fair Oaks CDP	2832.7	1159.2	2.44
Foothill Farms CDP	7528.2	2950.6	2.55
Florin CDP	4896.1	1700.8	2.88
Gold River CDP	3011.1	1229.1	2.45
La Riviera CDP	5649.1	2467.9	2.29
Orangevale CDP	2663.5	1007.2	2.64
Rio Linda CDP	1911.2	656.7	2.91
Del Paso Manor WD estimated Population/Household			**2.51**

(a) Based on US Census Bureau GCTPH1. Population, Housing Units, Area, and Density: 2000

Nine out of the ten (10) similar census data areas indicated higher population per household than Del Paso Manor. The District, although fully built out, could experience an increasing trend with water use due to increasing population per household. The future District persons per dwelling projection assumes the residential neighborhoods will tend to see a transition from older single and two person residential profile to three to four person per household families. For this reason the composite value of 2.51 persons per household is used for future water projections and reflects a potential increase of 13 percent.

Existing water use values have been reviewed based on the estimated 2.22 persons per household discussed above.

3.3 Water Use

This section presents historical water use and the development projected District water demands based on existing water use patterns.

3.3.1 Historical Annual Water Use

The annual historical District water demands and average gallons per capita day (gpcd) usage for 1998 - 2007 are provided in Table 5 based on groundwater supply well production records. Since the District does not have water meters installed at each connection to provide a full account of actual water demand, water supply data as provided in Section 3.2.1 is assumed to be equal to water demand. Typically there is a loss factor resulting from leaking pipes or illicit connections that causes actual customer demand to be lower than the supplied flow. Since the District is at a build out condition, the average day demand used for calculating Maximum Day and Peak Hour demand is 1.50 MGD.

Table 5: Historical Water Use 1998 - 2007

	Annual Water Use		
Year	**Acre-Feet**	**Million gallons per day (MGD)**	**Average Day Demand (gpm)**
1998	1,545	1.38	958
1999	1,794	1.60	1,111
2000	1,801	1.61	1,118
2001	1,793	1.60	1,111
2002	1,693	1.51	1,049
2003	1,476	1.32	917
2004	1,747	1.56	1,083
2005	1,657	1.48	1,028
2006	1,654	1.48	1,028
2007	1,638	1.46	1,014
Average	**1,680**	**1.50**	

Based on the historic water use the Average Day Demand is estimated to be 1.50 MGD (1,042 gpm) with an annual total water use of approximately 1,680 acre-feet.

3.3.2 Water Use and Customer Service Type

Water use calculations are reported several different ways depending on the intended use of the estimates. For example, in a land use planning document a generalized water duty by land use type might be used to estimate long range water demands associated with a county General Plan update. In this example you could expect to see a water duty for residential, multifamily residential, commercial, industrial, park, etc. Water districts however do not govern over land use and commonly assess water demands based on the existing community development profile lumping together the residential and all the services, business, professional, recreational, industrial and public water use as a composite of the water needed to support a given population. The future projects are then based on estimates of population growth with the assumption that the corresponding services, employment and recreation needed to support the standard of living associated with growth will result in similar water use. Sacramento County for example used a blanket 3 acre feet per acre water use estimate regardless of land use for many years in estimating long term water needs.

Water use and water conservation are becoming much more closely reviewed as limited water resources and escalating storage, treatment and conveyance costs push for greater management of our water resources.

The District annual water use is estimated at 1,680 acre-feet and the population is approximately 4,990 persons. Dividing total water used by total population served produces a water use number of 300 gallons per capita per day (gpcd) as an average day water use. This however ignores the impact of high water use types that include for the District two regional resources, County Club Plaza Mall and the AT&T western US telephone switching center. Backing out all the non-single family and duplex water use results in a lower per capita water use of 208 gpcd for purely the residential customer.

The United States Geologic Survey (USGS) *Circular 1268 Estimated Use of Water in the United States in 2000* compiled statewide water use values for public water supplies. USGS defined the Public Supply as follows.

> *Public supply refers to water withdrawn by public and private water suppliers that furnish water to at least 25 people or have a minimum of 15 connections. Public-supply water may be delivered to users for domestic, commercial, industrial, or thermoelectric-power purposes. Some public-supply water may be delivered to other public suppliers or used in the processes of water and wastewater treatment. Public-supply water is used for such public services (public uses) as pools, parks, and public buildings; or be unaccounted for (losses) because of system leaks or such non-metered services as firefighting or the flushing of water lines.*

The USGS 2000 water use numbers provide the basis for our calculating an estimated California statewide average, weighted by population, of 203 gpcd for the public water supply.

Table 6 provides a summary of selected counties and calculated per capita water use using the USGS Circular 1268 data.

The District composite water use number of 300 gpcd appears high when compared to the statewide average of 203 gpcd and the county by county number shows above. However, the relative contribution of water use from the regional mall and western US call center equipment cooling towers must be taken into account in considering realistic conservation opportunities and goals.

Table 6: Residential Water Use 2004 - 2007

County Name	Water Use – Public Supplied (gpcd)	Percent of Total Water Used in California
Sacramento County	261	5%
Placer County	267	1%
Yolo County	299	1%
San Francisco County	109	1%
San Diego County	185	7%
San Bernardino County	273	6%
Orange County	190	8%
Los Angeles County	185	26%
Riverside County	294	7%

The following sections present a further review of District water use by customer type.

3.3.2.1 Customer Service Type

Water use varies by customer type, class and practice. The District's largest customers include AT&T, schools and parks and reflect <1% (14 services) of the service connections consume approximately 44 percent (730 acre feet per year). The summary below breaks out water use based on District meter data by customer type. Residential single family and duplex service type is metered and the values are estimated.

The District has approximately 1,796 total water service connections reflecting all classes of service. The District service profile breakdown is as follows:

- 1,611 connections (94.4%) Residential Use
- 92 (0.6%) Multi-Housing Use (81 flat rate and 11 metered)
- 69 (3.7%) Commercial Use
- 24 (1.3%) combinations of institutional, irrigation, and fire protection

The estimated water use per connection type is presented in the following sections.

3.3.2.2 Residential

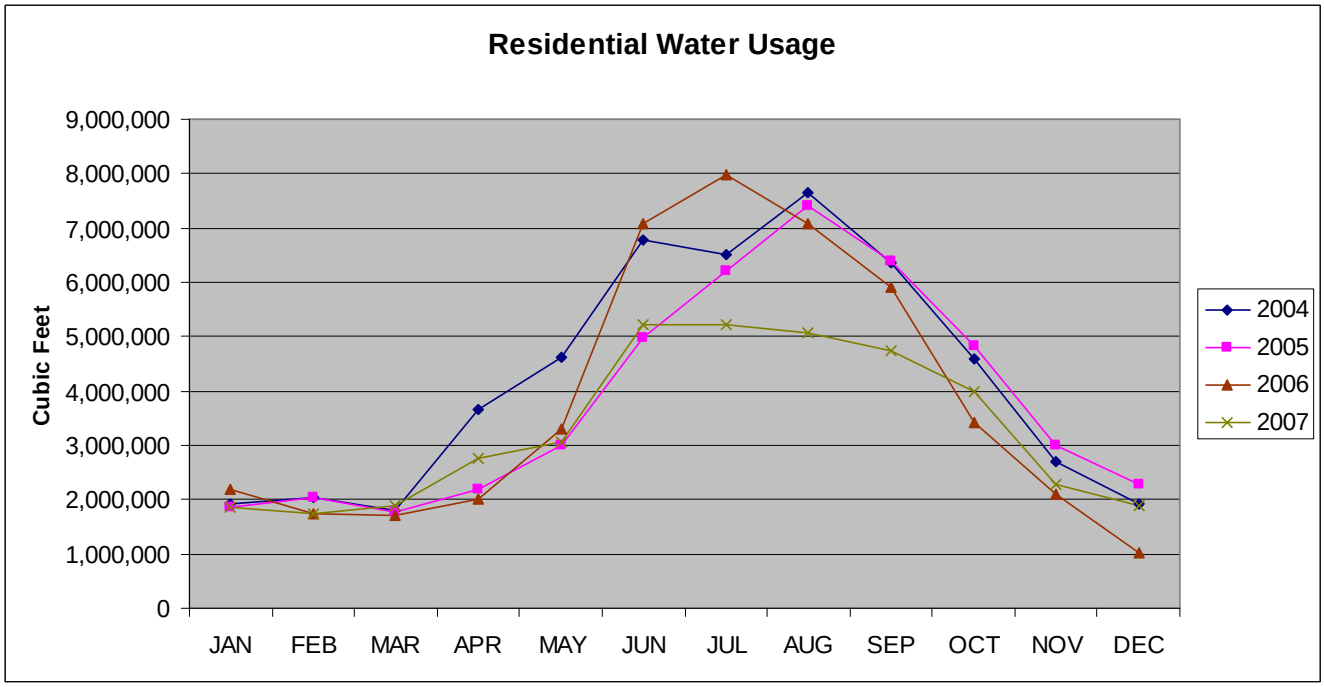
The population served within the District is estimated at 4,990 occupying 2,251 housing units. The total number of housing units includes apartments, duplex and single family accounts. The total metered water use was used as the starting point for developing the estimates below by backing out non-residential water use and apartment water use figures.

The non-metered water use was adjusted for a 10% unaccounted for water loss prior to assigning the remaining unmetered production for single family and duplex unit water consumption. The estimated single family and duplex unit water use is presented in Table 7 below.

Table 7: Residential Water Use 2004 - 2007

Description	2004	2005	2006	2007
Residential Water Use (gpd)	891,860.4	787,791.6	772,455.3	677,732.8
Number of Residential Accounts: SFR	1,611	1,611	1,611	1,611
Number of Residential Accounts: Duplex	81	81	81	81
Total Number of Households	1,773	1,773	1,773	1,773
Residential Water Use (gallons/household)	503.0	444.3	435.7	382.3
Average Population (persons/household)	2.21	2.21	2.21	2.21
Residential Water Use (gpcd)	227	201	197	173

The estimated water use in gallons per capita per day (gpcd) value is often used to compare water use of different agencies. The District records indicate a declining per capita water use over the period from 2004 to 2007 of almost 24% (54 gpcd). The review of the monthly data presented below shows a marked decline in summer water use for 2007 that is uncharacteristic of the typical demand pattern for the District and we have disregarded the 2007 water use numbers in estimating the average per capita water demand.



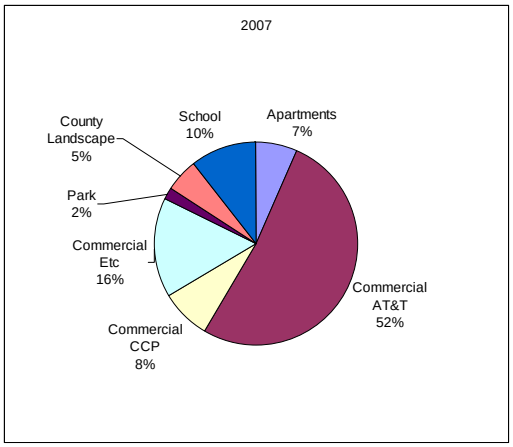
The estimated average per capita water demand is 208 gallons per capita per day based on estimated water use for the period 2004 through 2006.

3.3.2.3 Non-residential, Commercial and Institutional/Parks

The commercial water use is predominantly serving cooling tower equipment operated by AT&T for cooling of their telephone service centers. The summer maximum month water use for AT&T complex is approximately a 460 gpm contribution to Maximum Day Demand. The winter demand goes a low as 12 gpm in January- February when evaporative cooling demands are down. For the purposes of estimating water demand for this master plan we have assumed an average annual water use of 300 acre feet per year and a Maximum Day Demand of 460 gpm.

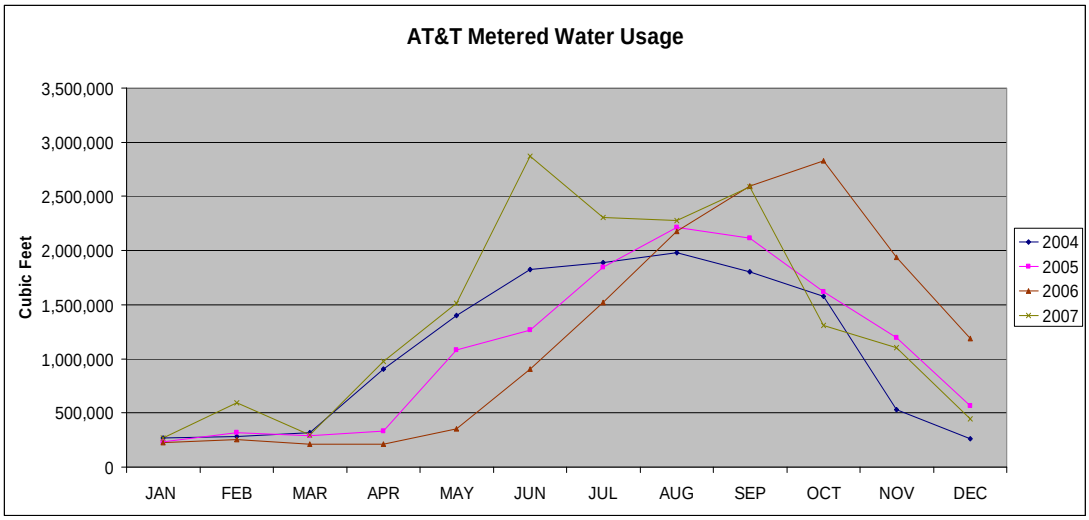
The chart below presents an overview of the non-residential water distribution within the District for 2007.

Historically institutional and park water use come from three schools and one park. The County of Sacramento added two metered accounts starting in 2006 for the Watt Ave Beautification project median landscape irrigation. District water use records indicate 88 acre-feet per year and an increase starting in 2006 of approximately 12 acre-feet per year for the County project. The estimated total for this class is 100 acre-feet per year. This equates to approximately 62 gpm average day demand.



The estimated maximum day water demand from non-residential demands is 522 gallons per minute (460 gpm AT&T plus 62 gpm institutional and park demand.) The total estimated maximum day demand is estimated at 3,056 gpm. The non-residential demand reflects approximately 17 percent of the instantaneous water demand during a maximum day use condition.

The annual water use from non-residential demands is approximately 44% of the total water used in the District. The annual water use, measured in cubic feet per month in the graph below, shows how water use increases from March through December and produces a high total annual water. This seasonal water use corresponds to the increased equipment load needed for the AT&T cooling towers.



3.3.3 Water Meters

The District has meters installed at approximately 90% of its commercial accounts, one park, and three schools. Private residences are not currently metered and it is the Goal of the District to install meters at each District service connection by 2030, or sooner depending on the District's potential future agreements with surface water providers.

The Water Forum agreement includes requirements for the District when discretionary approval is required for new or expanded surface water supplies. In this case, the District would be required to annually retrofit 3.3%-5% of the total number of unmetered residential connections and read and bill in accordance with the Water Forum Conservation Element.

The existing District water lines are located along the back lot lines and are generally inaccessible without entry into the individual residential yards. The existing back lot pipelines are fifty plus years old and the PSM recommendations include replacement of these pipeline with new pipelines in the front right of way by the meter deadline of 2030. It is therefore recommended that the installation of meters in the backyards be avoided and that meter setters be installed with the pipeline replacement projects. Upon completion of the pipeline replacement projects the entire District can be converted to a metered district with the installation of all meters at once. The installation will coincide with the start of conversion to a commodity based water rate.

3.4 Water Demand Criteria

The following provides an evaluation and determination of water use date for determination of water supply needs. The demand criteria is based on historic water use within the District and with similar water agencies in Sacramento County.

3.4.1 Demand Projections

Water demands fluctuate throughout the year and day with changes in weather, landscape irrigation practices, and other activities. For this reason, water demands under varying conditions are calculated to provide the basis for the District's water supply and distribution system capacity.

The key water demand periods used for planning purposes are as follows:

- Average Day Demand: The average of total water consumption over a year. For the District, the Average Day Demand over the past ten years is 1.5 MGD.

- Maximum Day Demand: The highest daily demand in a one year period. This demand period typically occurs during hot summer weather.

- Peak Hour Demand: The average water use during the highest hour of use in the year. Peak hour demand may or may not occur on the same day of Maximum Day Demand.

The peak factors used in this Master Plan are developed further in Section 3.4.4.

3.4.2 Fire Protection, Jurisdiction and Estimated Fire Flow Criteria

This section of the Master Plan addresses the existing District water system flow capacity and provides a source capacity targets for planning future water system Planned System Maintenance projects.

The existing District water system is used by the Sacramento Metropolitan Fire Department (SMFD) for water supply during testing and when responding to a structure fire within the District. The District requirements for water supply are defined in Title 22 of the California Code of Regulations (CCR) Chapter 16 California Water Works Standards. Title 22 does not require a public water system to provide fire flow as a minimum condition of service. Fire protection requirements for building permit approvals is in the jurisdiction of the SMFD and the not the District.

The SMFD conducts periodic fire hydrant testing in the District including high demand locations such as Country Club Plaza. The SMFD has not advised the District of any deficiencies with the existing system providing a level of service consistent with SMFD expectations. Title 22, although not requiring a minimum supply for fire flow, does stipulate a minimum operating pressure of 20 pounds per square inch, including under a fire flow condition.

Review of existing SMFD records by the District identified a 3,500 gpm fire demand for the 3540 Kings Way AT&T Building and was the maximum value discovered during the review. Kennedy/Jenks review of the residential demand resulted in a range from 1,500 gpm for the

bulk of the District's neighborhoods and 2,750 gpm for the larger residential homes in the Winding Creek area of the District. Based on this research, 3,500 gpm has been used as the maximum fire flow demand that can be expected and this have been included in the minimum source capacity calculations of this Master Plan. The planned system replacement will result in a water supply and system capable of meeting or exceeding the fire flow criteria presented above.

3.4.3 Unaccounted-for Water

Unaccounted-for water is the difference between water production and the metered demand. A portion of this water may be from system leaks. Underground leaks could be located in lines, service lines, residential meter boxes, valves, and they are usually associated with excessive pressures, ground settlement, improper installation, or improper materials. According to American Water Works (AWWA) Water Audit and Leak Detection Guidebook, water losses other than leakage can generally be attributed to hydrant flushing of pipelines for O&M purposes, fire hydrant flows for fire fighting, construction practices, illegal connections, malfunctioning distribution system controls, reservoir seepage and leakage, and theft.

In a Municipal Leak Detection Program Loss Reduction document prepared for the state of California Department of Water Resources, Office of Water Conservation, it is estimated that the average unaccounted-for water in the State of California is 9.5 percent.

Currently, water usage is accounted for by metering the District's largest water users: commercial, multi-family residential, and park/landscaping accounts. Once the residential water use is metered as discussed in earlier section of this document, the District will be able to more accurately track the losses throughout the system.

For purposes of the Water Master Plan, unaccounted-for water usage has not been included in the average day water demands and per capita water usage.

3.4.4 Peaking Factors

The water system peaking factors were calculated based on the District's average historical water use from 1998 – 2007 using the provisions provided in the current edition of the Title 22 California Code of Regulations Chapter 16 California Waterworks Standards §64554 (Waterworks Standards). The Waterworks Standards prescribes methods to be used for calculating peaking factors when daily or monthly data is available. The calculated water demands are shown in Table 8. With the District reaching its build out capacity, it is anticipated that the District water demands will undergo little or no change.

Table 8: Peak Demands and Factors

Demand Period	Water Demand		Peaking Factor	Basis for Calculation
Average Day	1.50 MGD	1,042 gpm	1.0	District Records (1998 – 2007)
Maximum Month Daily Average	2.93 MGD	2,035 gpm	1.95	Maximum monthly demand from the last 10 years of supply operation divided by number of days where maximum monthly demand occurred
Maximum Day Demand	4.40 MGD	3,056 gpm	2.93	Max Month Daily Average Demand times 1.5 peaking factor
Peak Hour Demand	6.60 MGD	4,580 gpm	4.40	Estimated Max Day Demand times 1.5 peaking factor divided by 24 hours

3.5 Water Conservation

Water conservation requirements continue to change in California. Water use restrictions for dry years have been in place for water suppliers relying on surface water. The District relies solely on groundwater for supply and is not subject to surface water conservation requirements. The District Conservation regulation document provides for guidelines as follows:

- When outside watering is required, residents or businesses with odd address numbers may water only on Tuesdays, Thursdays, or Saturdays. Even numbers may water only on Wednesdays, Fridays, or Sundays. Watering on Mondays is prohibited.
- Open hoses are not permitted. Automatic shut-off nozzles are required.
- Car washing may be done only with a bucket. Rinsing may be done with a hose equipped with a shut-off nozzle.
- Washing down of sidewalks, driveways, parking lot, or other paved surfaces is prohibited.
- All swimming pools, ponds, fountains and evaporative coolers shall be equipped with recirculating pumps.

The existing policy provides for the District Board implementing, by resolution, some or all of the above conservation requirements.

Enforcement includes oral warning for the first offense, written violation notice for the second offense and citation for the third offense. Citation penalties may include a fine, a requirement for meter installation, and/or termination of water services as determined by the General Manager.

Future baseline non-conservation water use goals may approach or exceed twenty percent (20%) in the coming years as the State of California continues to take a harder look at water use sustainability, climate change and pursues an active role in local water use patterns. The District

can expect to be exempt from some requirements due to the size of the District but can expect increasing pressure to reduce water use over time. Water conservation should continue to be a key element of managing the District supply.

3.6 Reliability and Redundancy

Water system reliability and redundancy are generally defined by the California Code of Regulations, Title 22 Water System Standards to include the following:

- The system must have sufficient supply capacity to meet the Maximum Day Demand (MDD).
- A Community water systems using only groundwater shall have a minimum of two approved sources before being granted an initial permit and the system shall be capable of meeting MDD with the highest-capacity source off line.

The District currently operates 8 wells with a pumping capacity of 4,275 gpm with the largest well offline. The MDD is approximately 3,056 gpm. The District meets the minimum required water source capacity as identified above. The existing well condition and capacity is discussed further in Section 4.

The peak hour demand (PHD) exceeds the MDD and water systems can meet this daily peak usage through additional supply pumping capacity or through storage. In addition, emergency and fire protection water supplies can be provided using additional supply pumping capacity of storage. The District relies on additional supply through well capacity to meet peak hour demand. Use of peaking wells avoids the need for surface tanks and booster pumping capacity within the District. The PHD is estimated at 4,580 gpm and with the installed pumping capacity of 5,375 gpm the District meets the PHD.

Fire protection water demand ranges from a low based on typical residential criteria of 1,500 gpm to the higher commercial and multifamily fire flow of 3,500 gpm. The District supply may not be sufficient to provide fire protection supply in excess of 2,500 gpm.

Hydropneumatic tanks are designed to maintain system pressure and do not provide significant storage. A 5,000 gallon District hydropneumatic tank volume provides approximately 1,650 gallons net storage when full and there are 5 tanks for a net maximum stored volume of less than 10,000 gallons. Although five (5) wells are equipped with hydropneumatic tanks this onsite volume of water is minimal and is not considered storage. A typical minimum storage volume a similar district would be calculated as follows:

- 880,000 Gallons Peak Equalization based on 20% of the Maximum Day Demand, and
- 960,000 Gallons Fire Protection Supply based on 4,000 gpm for 4 hours, and
- 1,100,000 Gallons Emergency Supply for reliability.

The estimated minimum storage for a similar district without well capacity to exceed the MDD would be 3 million gallons.

An additional element of redundancy that improves reliability is access to alternative power supply of mechanical engine drivers to continue operating the wells during a power outage. The District maintains two backup systems as follows:

- Natural Gas Engine Drive Well Nos. 6 and 8, and
- Portable electrical generator capable of starting Well No. 2 or 4.

Based on the backup systems the District has approximately 2,700 gpm and should be able to maintain system water pressure in the event of an extended regional power outage. Additional redundancy exists in the electrical grid due to the three substation circuits serving the District. Historical power outages rarely extend to more than two (2) substations servicing the District at any given time.

3.7 Water System Standards and Design Criteria

The water system design criteria presented in this section are recommended to maintain a high level of service and to ensure adequate flow and pressure characteristics throughout the distribution system. Ongoing efforts to manage system hydraulics will help to minimize operation and maintenance activities and costs. The minimum recommended design standards for the water distribution system include the following:

- Design all piping, valves and appurtenances for a minimum pressure of 150 pounds per square inch (psi). This will allow for the system to accommodate normal operating pressures and transient surges.
- Design or select water system materials and components to meet or exceed American Water Works Association (AWWA) standards.
- Loop the distribution system to the greatest extent practical to avoid dead end pipes. Where dead ends are unavoidable, such as on some dead end streets, a minimum water main line size of 6 inches be used to reduce system residence time in the dead end line.
- The minimum distribution system pipe loop diameter should be 8-inch to help ensure that minimum fire flows to hydrants are achievable.
- Design water mains so that the velocities under average day, maximum day, and peak hour conditions are less than 3 fps, 5 fps and 7 fps, respectively. This will reduce damage to pipe linings and valves and minimize excessive head loss. Ultimately, this will help preserve the life of the pipeline and will contribute to lower maintenance costs.
- Design pipes for a target velocity under a fire flow of 10 foot per second and a maximum velocity under maximum day plus fire flow of 13 foot per second.
- Size all mains to limit head loss to three feet per 1,000 feet of length under average day conditions per AWWA recommendations. This is based on an analysis of optimum pipe sizes for lowest total cost of pipeline and pumping costs.

Table 9 summarizes additional distribution system design criteria. The pressure values presented are consistent with existing operating conditions. Friction coefficient values decline with pipe age and it is reasonable to assume that the existing system is operating at between 110 to 120 “C” value for the asbestos pipe and perhaps 90 to 110 “C” value for the steel lines. Steel lines tend to accumulate deposits and the combination of reduced inside diameter from accumulations and increased roughness results in the lower “C” value estimate.

Table 9: Water Distribution System Design Criteria

Item	Criteria
Hazen-Williams “C” factor (Friction Coefficient)	130 for all new pipes
Average water system pressure	50 psi
Minimum water system pressure under peak hour water demand conditions	40 psi
Minimum water system pressure under maximum day water demand conditions	40 psi
Minimum water system pressure under maximum day plus fire water demand conditions	20 psi
Maximum water system pressure	80 psi

Section 4: Water Supply Planning

4.1 Introduction

This section provides documentation of the water supply availability in the District, and provides recommendations for new supply.

4.2 Groundwater Supply

The District currently maintains eight (8) wells to meet all of the District water demands. The District has been pumping on average 1,680 acre-feet per year using Wells 1 and 8 as lead producers. Wells 2, 3 and 4 provide peaking demand and Wells 6 and 7 are the last wells to come on line to meet system demand.

The District is a member of the Sacramento Groundwater Authority (SGA) and Regional Water Authority (RWA) and active participant in regional and groundwater basin planning efforts. The aquifer utilized as the pumping resource by the District is identified by SGA/RWA as not being in overdraft and there are no indications that continued pumping by the District at approximately 1,680 acre-feet per year is unsustainable.

The locations of the District wells are shown in Figure 5. Table 10 below provides a summary of the estimated capacity of the District's wells based on the original installed pump design operating point and current operating observations from District staff.

Table 10: Well Production Capacity Summary

Well No.	Pumping Capacity
1	500 gpm
2	460 gpm
3	580 gpm
4	500 gpm
5[(a)]	460 gpm
6	1,100 gpm
7	675 gpm
8	1,100 gpm
Total Capacity	5,375 gpm
Total Capacity with Redundancy[(b)]	4,275 gpm

(a) Well No. 5 is the last well to come on line.
(b) Redundancy is total system capacity with largest District well (1,100 gpm) offline.

4.3 Surface Water Supply

The District and the City of Sacramento (City) executed an agreement in 1968 establishing conditions for transfer of up to 6.8 cubic feet per second, or 2,460 acre-feet annually of the City's surface water supply to the District through the Area D water service area. This maximum delivery flow is 3,048 gpm and is equivalent to the District MDD of 3,056 gpm. The City has planned for supplying Area D with surface water through their Fairbairn Water Treatment Plant and 54-inch diameter Howe Avenue transmission main.

The District completed a Conjunctive Use Plan evaluating alternatives for developing a surface water supply and participating in groundwater wheeling with neighboring districts in September 2008. The initial findings of the evaluation are the basis for preliminary implementation cost estimates presented in Section 5 of this report.

4.3.1 Interties with Other Districts

The District is active in the water supplier community participating in the Regional Water Authority, Sacramento Groundwater Authority and Water Forum and successor activities. The District has two (2) existing interties and multiple locations for potential interties with Sacramento Suburban Water District (SSWD) and has participated in planning additional connections associated with new pipeline installations by SSWD.

4.3.1.1 Mutual Aid Agreements

The District maintains Mutual Aid Agreements with SSWD and the Carmichael Water District to provide technical and emergency support as part of providing redundancy in District resources to address unforeseen events.

4.3.1.2 Surface Water Supply Agreements

The District and the City of Sacramento executed an agreement over 40 years ago allocating City surface water supply for District use in the future. The specifics of this agreement are discussed in greater detail in the Conjunctive Use Plan.

4.4 Findings and Recommendations

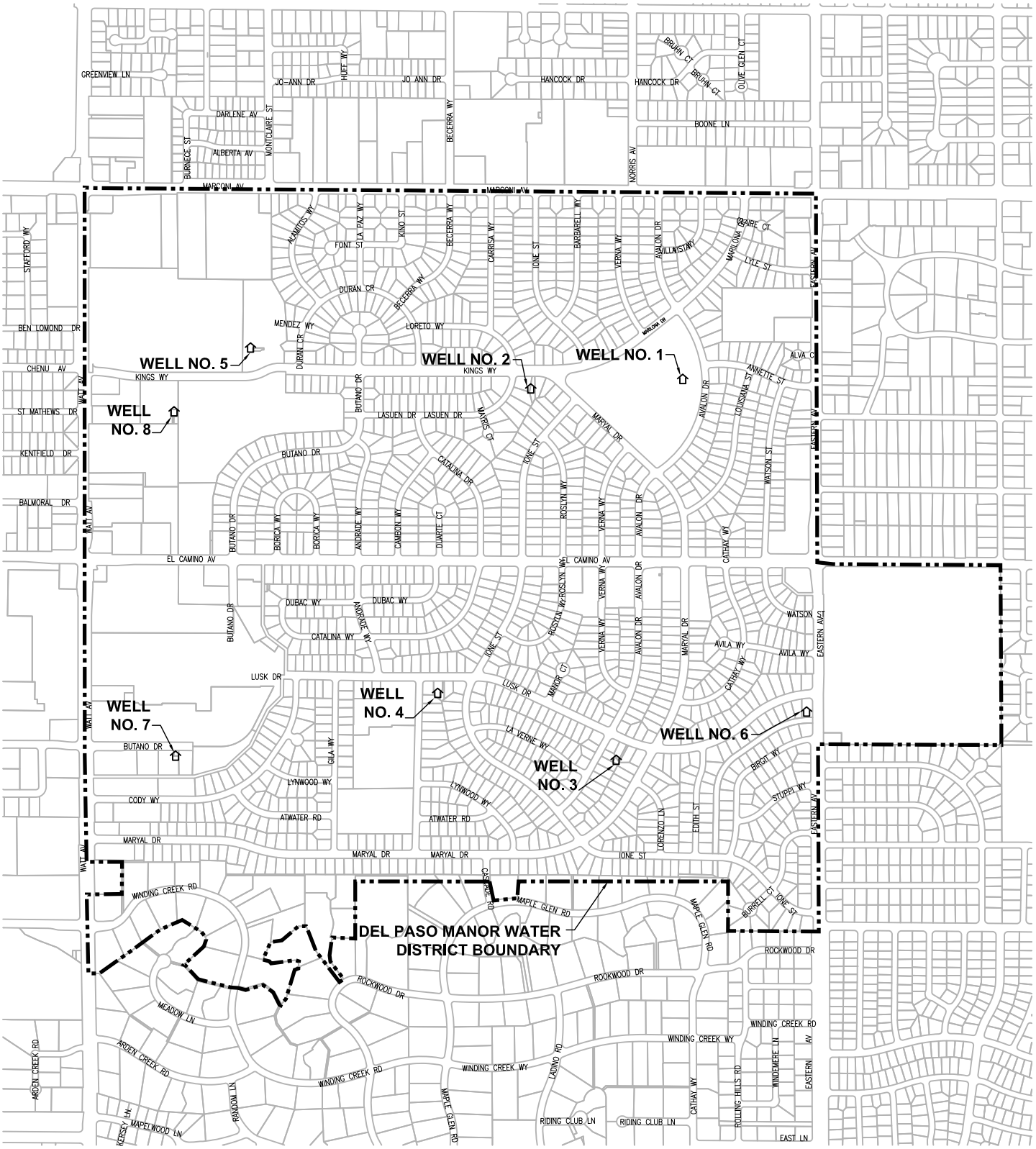
The District is capable of meeting system demands for all normal operating conditions. Although the District relies solely on groundwater, indications are that the groundwater basin is not in overdraft and the continued water use at the historic extractions is a sustainable operating practice.

Table 11 provides a summary of the water supply availability with associated demand conditions. The water system demand criteria is discussed further in Section 3.4 and Table 8.

Table 11: Water Supply Availability

Demand Condition	Demand (gpm)	Water Availability (gpm)	Surplus or <Deficit> (gpm)
Average Day	1,042	5,375	4,333
Maximum Day[(a)]	3,056	4,275	1,219
Maximum Day Plus Fire [(b)]	6,556	5,375	<1,181>
Peak Hour	4,580	5,375	<795>

(a) Maximum Day supply assumes the single largest well offline as shown in Table 10.
(b) Maximum Day plus Fire flow demand are based on a maximum fire flow demand of 3,500 gallons per minute for a minimum for four hours.



Kennedy/Jenks Consultants

DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

EXISTING WELL SITES

K/J 0870017.00
APRIL 2009

FIGURE 5

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Section 5: Conjunctive Use

5.1 Introduction

Kennedy/Jenks has provided the District with a Conjunctive Use Plan to present recommendations for implementing a conjunctive use program, whereby the District will continue to utilize its groundwater resources and supplement with imported surface water, either through existing or new contract mechanisms to help accomplish the following objectives:

- Enhance water supply reliability and redundancy for District customers by maintaining both groundwater and surface water source supplies.
- Participate in regional management efforts to ensure the continued sustainability of the groundwater basin.

The Conjunctive Use Plan includes a discussion of the many factors that impact local and regional groundwater resources, and consideration of their potential implications on the District. The discussion includes a summary of efforts to manage historical declining groundwater elevations and migrating groundwater contamination plumes, and partnering agreements that have moved the Sacramento region towards implementation of a managed conjunctive use effort to ensure a sustainable water supply.

After the groundwater resources setting, a focused review of the District's conjunctive use considerations is provided including the following:

- Survey of potential surface water/groundwater use ratios and justification for each case.
- Comparison of several potential surface water supply alternatives to import surface water from neighboring water purveyors (including the City of Sacramento, Sacramento Suburban Water District, and Carmichael Water District).
- Alternatives for infrastructure improvements that would be required to import surface water into the District, depending on the surface water supply alternative that is selected.

5.2 Findings Summary

The following presents a list of findings presented in the Conjunctive Use Plan:

<u>District Water Supply</u>

1. The District desires to provide a safe and reliable drinking water supply to its customers.
2. The District's average annual water demand is approximately 1,680 acre-feet/year.
3. The District's existing source capacity is dependant on 8 groundwater wells ranging in age from 30 years to in excess of 60 years old.

Groundwater Resources

1. The sustainable yield of the aquifer, as estimated by the Water Forum is 131,000 acre-feet per year. Historical groundwater pumping in the north Sacramento groundwater basin has ranged between 80,000 to 100,000 acre-feet per year.

2. Recent conjunctive use efforts (by SSWD to import PCWA surface water and CWD's Bajamont WTP) has decreased groundwater pumping and appears to have contributed to the stabilization of regional groundwater elevations.

3. Groundwater quality is threatened by both regional groundwater contaminant plumes to the west and east of the District as well as localized historical and ongoing potential contaminating activities (PCAs).

4. The District has participated in regional efforts, including the Sacramento Groundwater Authority and Water Forums to establish measures to ensure reliable water supplies region-wide. For this reason, the District would like to participate in conjunctive use efforts and import surface water to balance groundwater pumping.

5. The District has committed to implementing Water Forum Best Management Practices for water conservation.

Conjunctive Use Planning

1. The District does not have an established conjunctive use numerical goal.

2. In 2004, SGA staff proposed a conjunctive use allocation. The proposal was not successful in getting adopted, however it identified a possible conjunctive use goal of 300 acre-feet/year for the District.

3. Surface water may be more readily available in the winter, non-peak water demand months. Approximate average District water demand during the period between October and April is 640 acre-feet per year.

4. There are several possible groundwater banking opportunities if the District imports surface water. Opportunities include in-lieu groundwater recharge as well as aquifer storage and recovery.

Surface Water Alternatives

1. The District has access to surface water through a 1968 agreement with the City of Sacramento for up to 2,460 acre-feet per year of the City's Area "D" water.

2. There are several alternatives available to the District for importing Area "D" water into the District. Options include diverting and treating the water at the City of Sacramento and conveying the water through the City through SSWD to the District or diverting and treating the Area "D" water at Carmichael Water District and transferring the water directly from CWD to the District.

3. SSWD's north service area surface water from PCWA does not include the District in its Place of Use.

4. See Tables in Section 4 for additional detailed findings on surface water alternatives.

Interconnections

1. There are currently two recommended interconnection options for the District: construct an intertie with SSWD or CWD.

2. SSWD has built pipelines through and adjacent to the District, and as a result, an intertie would require only a metering station and short pipeline to connect to the District's distribution system.

3. An intertie with CWD would require an approximately 3,000 linear foot pipeline, metering station and pump station.

4. A permanent interconnection to SSWD would require the District to install fluoridation on its groundwater supply. A permanent interconnection with CWD would not require fluoridation.

5.3 Recommendations Summary

Following is a list of the recommendations that have been provided in the Conjunctive Use plan:

Section 2: Conjunctive Use Setting

1. The District should continue to participate in the Water Forum Successor Effort and support the agreement among the member agencies, and work cooperatively in solving the remaining water resources challenges being addressed in the Water Forum. It is also recommended that the District review and confirm it is implementing its BMP commitments, and develop a plan to complete any outstanding elements.

2. The District should continue its active role in the SGA and support the implementation of the regional management of the groundwater resources to achieve the goals defined in the Water Forum Agreement.

3. The District become more active in its role in the RWA and support the implementation of the regional management of the water resources to achieve District objectives the goals defined in the Water Forum Agreement.

4. The District should monitor and participate in the upcoming and subsequent future efforts to update the Integrated Regional Water Management Plan, and seek funding opportunities for conjunctive use and water management improvements.

5. The District should continue to participate in efforts to collectively manage and protect the North Area Groundwater basin from an overdraft condition.

6. The District should have a contingency surface water supply resource in place, and maintain mutual aid agreements with neighboring purveyors to offset lost groundwater supply resulting from contamination and other emergency conditions.

7. The District should be diligent about monitoring regional contaminant plume remediation, and work collaboratively with neighboring agencies to help ensure that the necessary measures are implemented to contain and remediate the plumes to the extent feasible. One possible avenue could be participation in the SGA's groundwater contamination task force.

8. Continue to monitor potential localized contaminating activities and implement wellhead protection measures as warranted.

Section 3: Conjunctive Use Goals

1. Establish an interim conjunctive use baseline goal of 300 acre-feet/year. Confirm goal would be in accordance with Water Forum Agreement groundwater management commitments pending future determination of conjunctive use objectives by the Water Forum Successor Effort or SGA Water Accounting Framework.

2. Any new surface water interties with neighboring water districts and infrastructure improvements should be sized to accommodate at minimum a 50/50 conjunctive use split.

3. Evaluate potential rate impacts for varying levels and sources of surface water through preparation of a rate study.

4. The District should continue to implement Water Forum Agreement demand conservation measures as warranted. Investigate means for measurable demand reduction as a component of the District's conjunctive use efforts.

5. It is recommended the District continue to explore participation in a groundwater banking program, either through the SGA efforts or a partnership with a neighboring agency.

6. Evaluate participation in local or regional groundwater banking partnerships. Monitor progress of SGA's Water Accounting Framework and proposals for a model groundwater banking program.

Section 4: Surface Water Supply Alternatives

1. The District should continue to explore opportunities to develop agreements with either the City of Sacramento and SSWD (for transmission) or CWD to import Area "D" surface water. Considerations should include the reliability of the water supply sources, required institutional arrangements and regulatory approvals, and evaluation of the annual costs of the water transfer and any capital improvement requirements.

Section 5: Surface Water Supply Infrastructure Improvements

1. For a surface water supply intertie with SSWD, provide a minimum 12-inch connection at the existing intertie stubout of SSWD's existing 24-inch pipeline near Maryal Drive and Gila Way.

2. For a surface water supply intertie with CWD, provide a 12-inch interconnection near the intersection of Eastern Avenue and Lusk Drive.

3. Interconnection locations should be finalized once the surface water alternative is selected. It is recommended that a new intertie should be constructed to connect to a new 12-inch distribution system "backbone" located within the District. Specific intertie location recommendations will be refined after completion of the draft Facilities Replacement Plan.

5.4 Direction Based on Board Review

The District Board review of the summaries above resulted in the direction to prioritize the process as follows:

- Begin Negotiations with Carmichael Water District for implementation of using surplus winter surface water treatment plant capacity at the Bajamont membrane plant. This would include resolution of the beneficial use of the 600 gpm remediated groundwater discharge to the American River at the Bajamont site as an offsetting flow allowing consideration for diversion of City of Sacramento water at the Carmichael Water District point of diversion using the existing river infiltration facilities.

- Begin Negotiations with the City of Sacramento to obtain support for the approach and to proceed with obtaining the regulatory water supply and diversion approvals needed to allow diversion of City surface water supplies at the Carmichael Water District point of diversion.

- Explore additional well construction potential within the District as a secondary water supply for Carmichael Water District to use in periods of low river flow and in the event the GenCorp/Aerojet groundwater contamination plume impacts existing Carmichael groundwater production.

The effort to bring the use of surface water to the District using this approach will be a multi-year process. The estimated costs of these alternatives are discussed in the Conjunctive Use Technical Memorandum and are opinions as to the order of magnitude of cost. Additional detail, discussions and planning are recommended as part of refining the costs as the negotiations and process moves forward.

Section 6: Facilities Replacement Planning

6.1 Introduction

All facilities wear out and need to be replaced over time. The useful period of service for equipment varies with the process, maintenance, and service conditions. For example, a submersible well pump will typically not last as long an aboveground vertical turbine well pump. Small equipment wears out faster than larger equipment, fixed assets such as wells and tanks last longer than equipment with moving parts such as pumps.

This evaluation includes consideration of the current overall age and condition of the District's groundwater facilities, pipes, and tanks. This section provides a summary of the existing state (capacity and condition) of the District's groundwater supply production capacity and recommendations for supplementing and replacement of the supply sources. Pipeline assets are reviewed and recommendations to replace provided.

6.2 Production Capacity Considerations

The District currently relies on eight existing groundwater wells to meet water demands. In a condition with the highest capacity production well offline, it appears that the District is able to meet Maximum Day demand as required by the California Waterworks Standards, but would not be able to meet Maximum Day plus Fire demand, and would marginally not be able to meet Peak Hour demands. Because Maximum Day plus Fire is the highest demand period criteria, it is the controlling factor.

6.3 Existing Well Ages and Condition

All of the existing wells exceed a typical well useful life expectancy of 30 to 50 years. While the useful life expectancy is not a steadfast time period, it does serve as a general indicator for when one may expect to begin to see signs of wear and failure of the well. Typical signs may include pumping sand, diminished water production, casing or screen collapse, and pump and motor failure. Specific well replacement recommendations, detailed well site investigations, and other considerations are provided in the separate Draft Facilities Replacement Plan document.

Table 12: Well Age and Current Production Capacity Summary

Well No.	Year Built	Age in Years	Projected Useful Life	Remaining Useful Life	Notes
1	1946	62	30	<32>	Recent inspection and in fair condition
2	1948	60	30	<30>	No recent inspection
3	1949	59	30	<29>	No recent inspection
4	1951	57	30	<27>	No recent inspection
5	1953	55	30	<25>	Recent inspection – poor condition and now out of service
6	1956	52	30	<22>	No recent inspection
7	1956	52	30	<22>	No recent inspection
8	1977	31	30	1	Recent inspection and in good condition

The following is an assessment of Well Nos. 1 – 8. The well assessment is based on evaluation of the District's record of pump test reports for Well Nos. 1 – 8. The oldest and newest available data for standing water level, drawdown, discharge head, and efficiency were reviewed and tabulated to capture the change in groundwater level, well's performance by specific capacity, and impact to well motor over time.

The well pump motor horsepower required estimates presented below are based on observed well drawdown data and reflect the impact of declining groundwater tables over the last 50 years since the majority of the well pumps were installed. These estimates are for predicting stress on the electrical elements of the motor and possible impacts to reliability of equipment under increased operating loads. The estimated motor load assumes a low 70% motor/pump efficiency value associated with the older motors.

6.3.1 Well No. 1

Well No. 1, built in 1946, has a 12-inch diameter casing constructed to a total depth 500 feet. The well was initially pump tested at 1,200 gpm with a 62 feet drawdown during pumping. Well No. 1 is equipped to provide 500 gpm and is the second lead system supply well following lead well, Well No. 8.

- Recorded Static Water Level – The 1946 static water level was not recorded but first water identified at 55 feet. The driller reported 1,200 gpm at 62 feet of drawdown demonstrating a high specific capacity. Pump test report data from 1956 shows a recorded static water level of 64.60 ft and data from 2000 recorded a static water level is 118 ft below the pump discharge level. This indicates a 53.4 foot decline in the water table at this well site.

- Recorded Specific Capacity - Pump test report dated 1956 shows a recorded specific capacity of 68.10 gallons per minute per foot of drawdown (gpm/ft). Pump testing in 2000 documented a specific capacity of 42.30 gpm/ft.

- Change in Specific Capacity - Between 1956 and 2000 data, specific capacity decreased by 37.9%. Data shows a generally consistent declining trend.

- Impact to Motor/Pump - According to pump test data recorded in 1956, total HP required to pump at 500 gpm well capacity is 37.73 HP. In 2000, the total HP increased to 50.93 HP. Assuming that Well No. 1 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 1 pump exceeds the name plate horsepower but does not exceed the service capacity as of 2000.

- This well has been equipped with a variable frequency drive (VFD) for reduced flow at start up to reduce drawing sand through the wall slots. The VFD allows the well pump to match demands in the vicinity by speed up and slowing down based on system demand. This has resulted in a consistent system pressure in the northeast District area.

This well was serviced in 2007 with the casing hole bailed to total depth and video inspected. The video review showed considerable cascading metal scale and a mottled surface characteristic of generally uniform corrosion across the surface of the casing. The well casing perforations were consistent with a mills knife with visible enlargement of the slots. Increased sand production has been observed, consistent with the slot enlargement.

6.3.2 Well No. 2

Well No. 2 was constructed in 1948 with maximum pumping capacity of 460 gpm.

- Recorded Static Water Level – Well measurements in 1959 recorded a static water level of 59.80 ft below the pump discharge level. Data in 2000 documented a water table decreased by 64.70 ft and the recorded static water level was 124.50 ft below the pump discharge level. This indicates a 59.8 foot decline in the water table at this site.

- Recorded Specific Capacity - Pump test report data from 1959 documents a specific capacity of 62.70 gpm/ft while data from 2000 shows a decrease to 33.30 gpm/ft.

- Change in Specific Capacity - Between 1959 and 2000 data, specific capacity decreased by 46.9%. Data shows a generally consistent declining trend.

- Impact to Motor/Pump - According to pump test data recorded in 1959, total HP required to pump at 460 gpm well capacity is 36.07 HP. In 2000, the total HP increased to 51.64 HP. Assuming that Well No. 2 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 2 pump exceeds the name plate horsepower capacity but does not exceed the service capacity as of 2000.

6.3.3 Well No. 3

Well No. 3 was constructed in 1949 with maximum pumping capacity of 580 gpm.

- Recorded Static Water Level – Well measurements in 1956 recorded a static water level of 50.40 ft below the pump discharge level. In 2000, the water table decreased by 64.60 ft and the recorded static water level was 115 ft below the pump discharge level.

- Recorded Specific Capacity - Pump test report dated 1956 shows a recorded specific capacity of 41.50 gpm/ft. In 2000 the specific capacity had decreased to 29.70 gpm/ft.

- Change in Specific Capacity - Between 1956 and 2000 data, specific capacity decreased by 28.4%. Data shows a generally consistent declining trend.

- Impact to Motor/Pump - According to pump test data recorded in 1956, total HP required to pump at 580 gpm well capacity is 40.62 HP. In 2000, the total HP increased to 56.45 HP. Assuming that Well No. 3 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 3 pump exceeds both of the name plate horsepower and the service factor as of 2000.

6.3.4 Well No. 4

Well No. 4 was constructed in 1951 with maximum pumping capacity of 500 gpm.

- Recorded Static Water Level – Measurements in 1956 shows a recorded static water level of 57.70 ft below the pump discharge level. In pump test report dated 1999, the water table decreased by 62.30 ft and the recorded static water level is 120 ft below the pump discharge level.

- Recorded Specific Capacity - Pump test report dated 1956 shows a recorded specific capacity of 64.70 gpm/ft. In pump test report dated 1999, the specific capacity increased to 85.70 gpm/ft.

- Change in Specific Capacity - Between 1956 and 1999 data, specific capacity increased by 32.5%. Data shows a generally increasing trend.

- Impact to Motor/Pump - According to pump test data recorded in 1956, total HP required to pump at 500 gpm well capacity is 38.90 HP. In 2000, the total HP increased to 54.84 HP. Assuming that Well No. 4 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 4 pump exceeds the name plate horsepower and service factor as of 1999.

6.3.5 Well No. 5

Well No. 5 was constructed in 1953 with maximum pumping capacity of 460 gpm.

- Recorded Static Water Level – Measurements in 1961 shows a recorded static water level of 67.60 ft below the pump discharge level. In pump test report dated 1999, the

water table decreased by 47.70 ft and the recorded static water level is 115.30 ft below the pump discharge level.

- Recorded Specific Capacity – A pump test report dated 1961 shows a recorded specific capacity of 67.60 gpm/ft. In pump test report dated 1999, the specific capacity increased to 115.30 gpm/ft.

- Change in Specific Capacity - Between 1956 and 1999 data, specific capacity increased by 70.6%. Data shows a generally consistent increasing trend.

- Impact to Motor/Pump - According to pump test data recorded in 1961, total HP required to pump at 460 gpm well capacity is 34.83 HP. In 1999, the total HP increased to 38.64 HP. Assuming that Well No. 5 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 5 pump is within the name plate horsepower as of 1999.

This well was serviced in 2009 with the casing hole video inspected. The video review showed considerable cascading metal scale and a mottled surface characteristic of generally uniform corrosion across the surface of the casing. The casing corrosion appears to have completely deteriorated the casing wall in several areas and the well contractor servicing the well advised that casing collapse was a possibility during cleaning. The well casing perforations were consistent with a mills knife with visible enlargement of the slots. Increased sand production has been observed, consistent with the slot enlargement and holes in the casing.

This well pump and electrical panel also require upgrading to place it back into reliable service and the District weighed the cost of completing the service, estimated at $60,000 to $80,000, with the risk and return. It is recommended that the District invest in a replacement well for Well No. 5 and not proceed with rehabilitation of the existing well.

6.3.6 Well No. 6

Well No. 6 was constructed in 1956 with maximum pumping capacity of 1100 gpm.

- Recorded Static Water Level – Measurements in 1961 shows a recorded static water level of 55.60 ft below the pump discharge level. In pump test report dated 1976, the water table decreased by 21.50 ft and the recorded static water level is 77.10 ft below the pump discharge level. More recent pumping water levels were not available.

- Recorded Specific Capacity – Pump test report dated 1961 shows a recorded specific capacity of 67.80 gpm/ft. In pump test report dated 1976, the specific capacity increased to 91.20 gpm/ft. No more recent test data was available.

- Change in Specific Capacity – Between 1961 and 1976 data, specific capacity increased by 34.5%. Data shows a generally consistent increasing trend contrary to regional trends and typical well performance profiles over time.

- Impact to Motor/Pump – This well is driven by a gas engine drive and no determination as to the drive ability to meet full capacity was made.

6.3.7 Well No. 7

Well No. 7 was constructed in 1956 with maximum pumping capacity of 675 gpm.

- Recorded Static Water Level – Measurements in 1961 shows a recorded static water level of 50.50 ft below the pump discharge level. In a 1997 pump test report the water table decreased by 42.50 ft and the recorded static water level is 93 ft below the pump discharge level.

- Recorded Specific Capacity – Pump test report dated 1961 shows a recorded specific capacity of 98.70 gpm/ft. In pump test report dated 1997, the specific capacity increased to 115.90 gpm/ft.

- Change in Specific Capacity – Between 1961 and 1976 data, specific capacity increased by 17.4%. Data shows a generally consistent increasing trend contrary to regional trends and typical well performance profiles over time.

- Impact to Motor/Pump – According to pump test data recorded in 1961, total HP required to pump at 675 gpm well capacity is 49.02 HP. In 1997, the total HP increased to 56.04 HP. Assuming that Well No. 7 pump has a built in service factor of 5% to a service capacity of 52.5 HP, the Well No. 7 pump exceeds the name plate horsepower and service capacities as of 1997.

6.3.8 Well No. 8

Well No. 8 was constructed in 1977 with maximum pumping capacity of 1100 gpm. Well No. 8 is the District's lead well and was recently upgraded to include a new VFD and electrical switchgear. The existing motor was not replaced and may be at risk from heat buildup under the VFD operating conditions. An enclosure and evaporative cooler has been added around the motor to address the heat buildup at this site.

- Recorded Static Water Level – Measurements in 1980 documented a recorded static water level of 86.75 ft below the pump discharge level. In a pump test report dated 2000, the water table decreased by 27.05 ft and the recorded static water level is 113.80 ft below the pump discharge level.

- Recorded Specific Capacity – Pump test report dated 1980 shows a recorded specific capacity of 39 gpm/ft. In pump test report dated 2000, the specific capacity decreased to 24.20 gpm/ft.

- Change in Specific Capacity – Between 1980 and 2000 data, specific capacity decreased by 37.9%. Data shows a generally consistent declining trend.

- Impact to Motor/Pump – According to pump test data recorded in 1980, total HP required to pump at 1100 gpm well capacity is 101 HP exceeding the pump rated capacity of 100 HP but within the motor service factor allowance for operation at up to 5% over the rated horsepower. Additional pump test data in 1998 indicated the motor drawing 115 HP and exceeding the motor service factor. The District has been operating an additional well to maintain Well No. 8 within acceptable operating ranges but a replacement with a larger motor may be required should the existing

motor fail. If the electrical service is upgraded this site should be considered for a 125 HP motor.

6.3.9 Groundwater Summary and Recommendations

6.3.9.1 Data Availability

Changes in specific capacity are not uniformly comparable for all eight wells due to sporadic data availability. Well Nos. 1, 2, 3, 4, 7, and 8 has data available from within the first 5 years of the well construction to District's latest available test data in 2000. Pump test data for Well No. 5 is unavailable for its first 5 years of operation.

6.3.9.2 Summary

Static water level decreased as observed on all well sites; however, changes in specific capacity for each well varies in trend. Well Nos. 1, 2, 3, and 8 exhibit more than 25% percent decrease in specific capacity, with Well No. 2 exhibits the highest decrease at 47%. Well Nos. 4, 5, 6, and 7 exhibits more than 15% increase in specific capacity, with Well No. 5 exhibits the highest increase at 70%.

Decreased static water level contributes to the total pumping head required for each well. Out of the eight (8) well motors, the following were observed:

- Well motors for Well Nos. 1 – 7 were adequately sized to accommodate the well maximum pumping capacity as exhibited in each of the 7 wells' earliest available pump test report.
    - Well Nos. 5 and 6 motors remained adequate to accommodate each well's maximum pumping capacity.
    - Well Nos. 1 and 2 motors exceeded the rated motor capacity at maximum pumping, although it is still below the service capacity.
    - Well Nos. 3, 4, and 7 motors were no longer adequate to handle each well's maximum pumping capacity.

Well No. 8 was the latest well built within the District and remained as the District's lead well to date. According to its earliest documented pump test report, required power to support maximum pumping is greater than the rated capacity of the well motor but is within the service factor. The latest pump test report shows Well No. 8 motor currently operating at a maximum pumping load on the motor that is exceeding both rated and service capacities.

6.3.9.3 Recommendations

The following recommendations are provided for operations/maintenance of the wells.

1. The District has not performed a pump test report in the last eight (8) years. Considering the ages of the well facilities, a current pump test report should be performed for all eight (8) wells to correctly capture the current well conditions. SMUD no longer provides this service and the District will need to hire a contractor to conduct this testing. The testing

should document static water level, pumping water level, flow volume, power draw and include a calculation of efficiency and well yield specific capacity in gallons per minute per foot of drawdown.

2. Well motor load at Well No. 8 exceeding the service factor could result in excessive motor heating and failure during peak usage periods. Calibrating the system wells to increase system pressure during peak periods will result in Well No. 8 operating within the normal power draw operating range.

    - Continue running an extra well to meet District's daily water demand to keep Well No. 8 operating within acceptable motor loads.

    - Replace existing motor and install a larger motor.

3. Well Nos. 3, 4, and 7 motors have reached the same condition with static water levels decreasing.

    - Monitor well motor load and output and track specific capacity against current measured well yield. The current specific capacity of each well is presented below and is based on the most recent pump efficiency testing where static water level, well drawdown and pump discharge flow and pressure were measured.

	Well No. 1	Well No. 2	Well No. 3	Well No. 4	Well No. 5	Well No. 6	Well No. 7	Well No. 8
Baseline Specific Capacity	60	60	40	60	65	68	100	40

Units are in gallons per minute per foot of water level drawdown in the well and indicate well capacity. Higher numbers reflect higher capacity.

Well cleaning and swabbing may be warranted if the structural condition of the well is suitable. An aquifer pump test is recommended following any well rehabilitation and should include the following steps:

1. Allow well to recover for 24 hours minimum prior to starting test
2. Measure static water level
3. Pump well for 24 hours, measure pumping rate at start of test
4. Measure well pumping rate at end of 24 hours
5. Measure pumping water level at end of 24 hour test

6.4 Groundwater Well Replacement Program

It is recommended that the District implement a program to replace its entire groundwater supply to continue to ensure a reliable drinking water supply. Construction of five (5) new wells at 1,500 gpm each will provide the District with 7,500 gpm of pumping capacity to meet system demands and fire flow. Select existing District wells could be placed in standby operation as redundant water supply sources. The remaining wells would be demolished in accordance with California Department of Water Resources standards.

6.4.1 Replacement Groundwater Supply

Due to the relatively high aquifer yield potential of a new well, it is expected that the District will be able to achieve a 1,500 gpm per well capacity. Through discussion with District staff, there are four (4) preliminary locations selected for future well sites as shown on Figure 6. A typical new well site layout is as shown on Figure 7.

6.5 Pipeline Replacement Planning

The District buried assets are also reaching the upper end of the typical lifecycle with the steel pipe in the northeastern District are most at risk of increasing failure. The balance of the District residential service area is asbestos cement (AC) pipe located in backyards. Although the backyard pipe is protected from traffic loads and other utility construction, AC is subject to damage and failure from tree root loading. Mature trees can either crush the pipe or pull it out of the ground if the tree falls over. Based on the existing age and condition it is reasonable to expect that the District will see increasing leaks and pipe failures over the next 15 years at which point significant replacement will need to be implemented. This forecast is consistent with the observations made by SSWD and one of the drivers behind their pipe replacement program.

A second consideration as to when to begin the pipe replacement program is that the District system is comprised of a well looped 6-inch diameter network. This system includes multiple small water supply wells that are integrated in the distribution system made up of small pipe diameter networks. Increasing well capacity and planning for a possible surface water single point of entry to the system will required a larger backbone distribution system. A computerized hydraulic model was developed to test the proposed water system and wells for meeting peak demands and fire flow requirements. The results of the hydraulic modeling are included in the appendix under separate cover.

This larger diameter system is proposed as 8-inch and 12-inch pipelines forming a single main loop tying into the existing 6-inch system to maintain service through existing residential connections. This approach will allow for relocation over several years of the distribution system from the back lot to the front public right of way consistent with District policy for new pipelines. Ultimately, the water services will be converted from back lot to front yard and meters installed. As discussed later in this Master Plan, meter setters could be installed at the time the pipes are replaced and actual meters installed system wide at one time. Conversion to a metered rate would occur at one time for residential customers and delay the capital outlay for the meters.

Meters are an additional driver as to timing for the pipeline replacement. Installation of meters in the backyards will require radio read meter or access by District staff to read the meters. The meters will ultimately end up in the front yards as the pipeline replacement is completed. We

have developed the replacement plan using the 2030 metering deadline as the completion date for full abandonment of back lot pipelines. This assumption provides a conservative approach to the planning impacts of both metering and pipeline replacement.

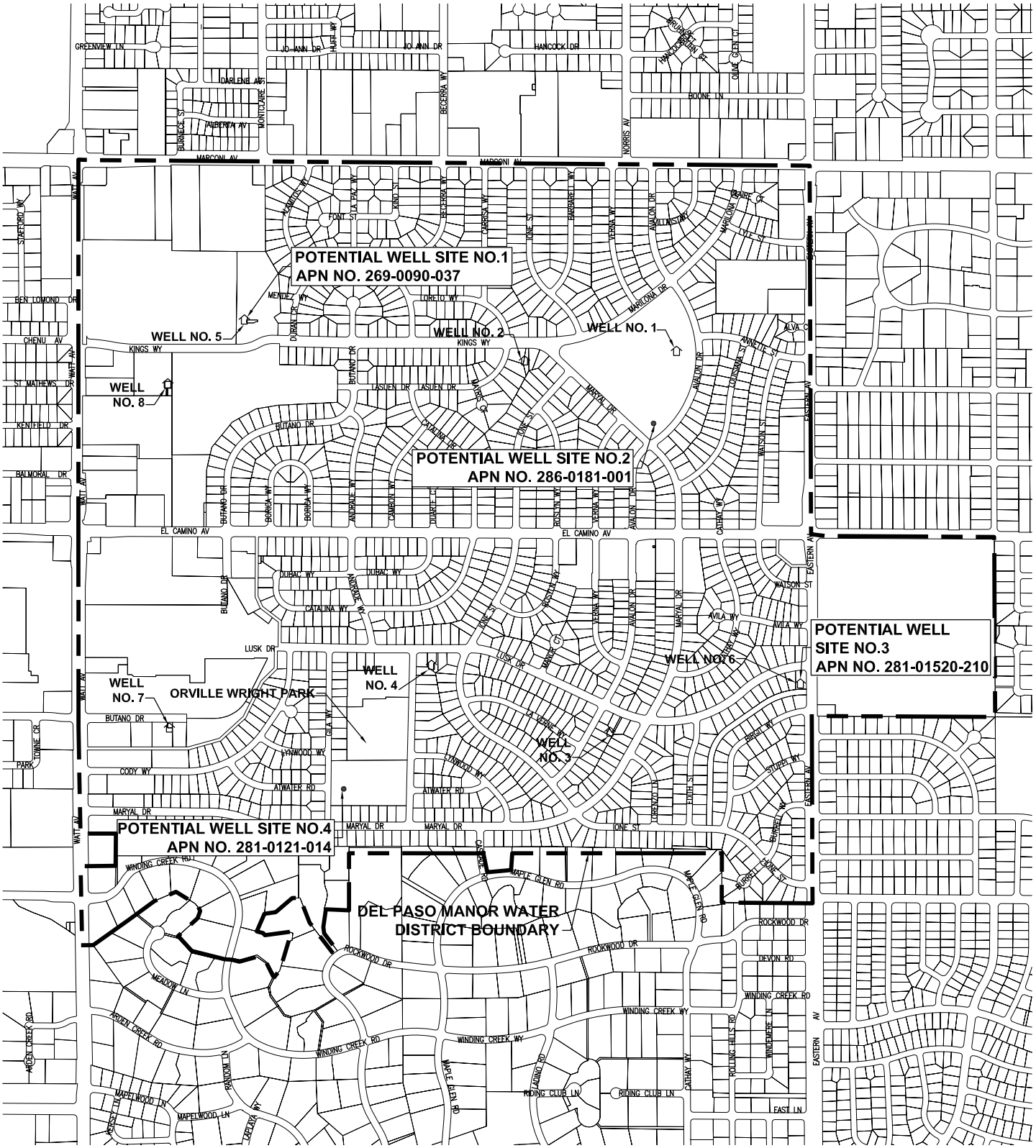
6.6 Corporation Yard and Office Building

The existing District office building and corporation yard is located on a residential lot on the east side of the District. The site also includes Well No. 6. Future District staffing and maintenance efforts for meters will require additional work space and a possible expansion of the District's building. Unfortunately the existing site is too small to accommodate a new well, possible CWD joint conjunctive use pump station and the expanded Office and Corporation Yard.

The District should monitor properties for sale and consider purchasing a new site for a joint use or single use facility. The options for joint use and single use facility are generally as follows:

- New Office and Corporation Yard site with existing site used for replacement Well No. 6 and CWD joint conjunctive use pump station.

- New site for replacement Well No. 6 and CWD joint conjunctive use pump station and new site for Office and Corporation Yard. New Office/Corporation Yard site could also provide property for a replacement well.



Kennedy/Jenks Consultants

DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

FUTURE WELL SITES

K/J 0870017.00
JUNE 2009

FIGURE 6

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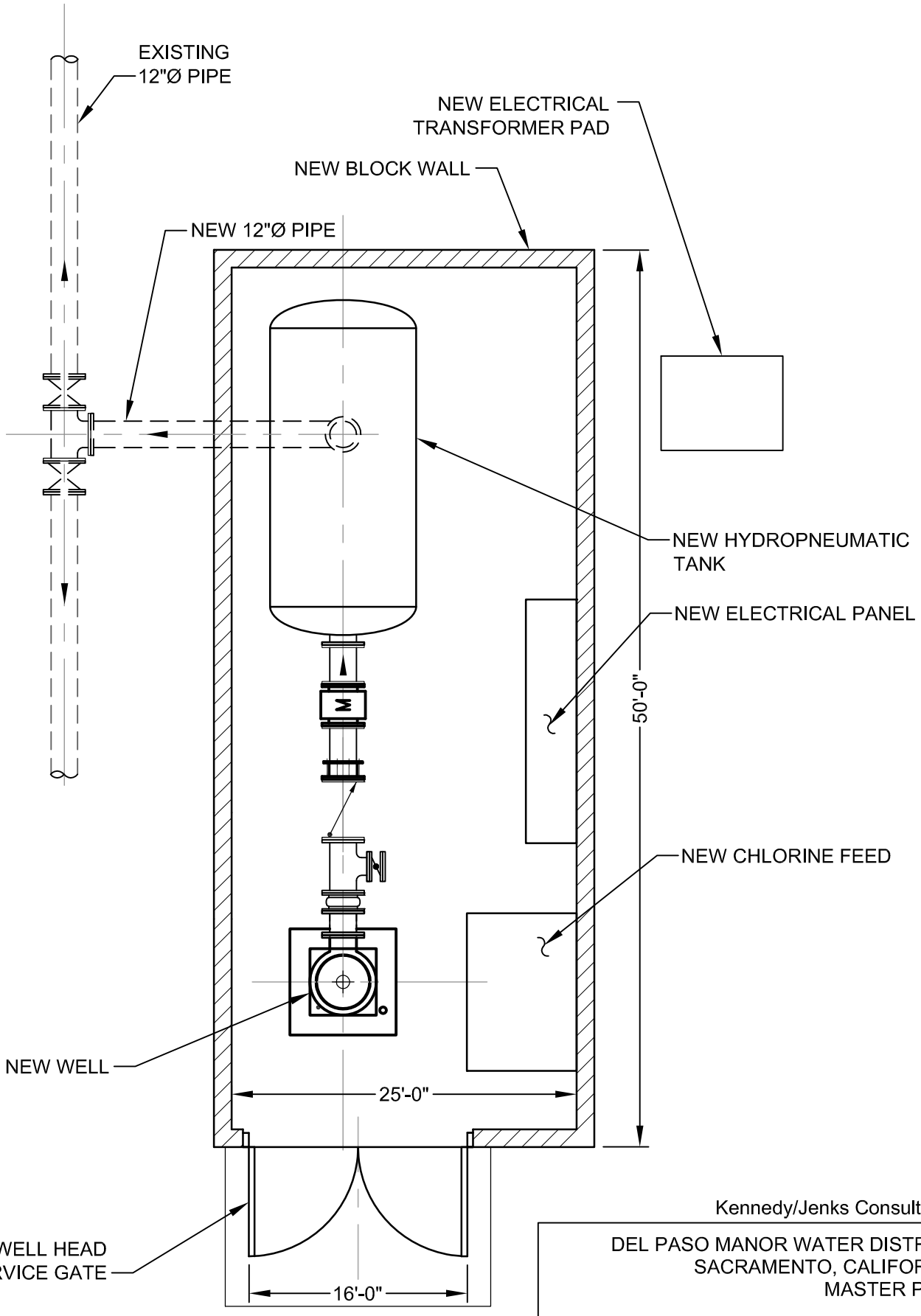

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Kennedy/Jenks Consultants

DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

TYPICAL NEW WELL SITE LAYOUT

K/J 0870017.00
APRIL 2009

FIGURE 7

Section 7: Facilities Management Planning

7.1 Introduction

This section discusses the organization of the District, operation and maintenance responsibilities, and general practices of the District and provides a general management plan.

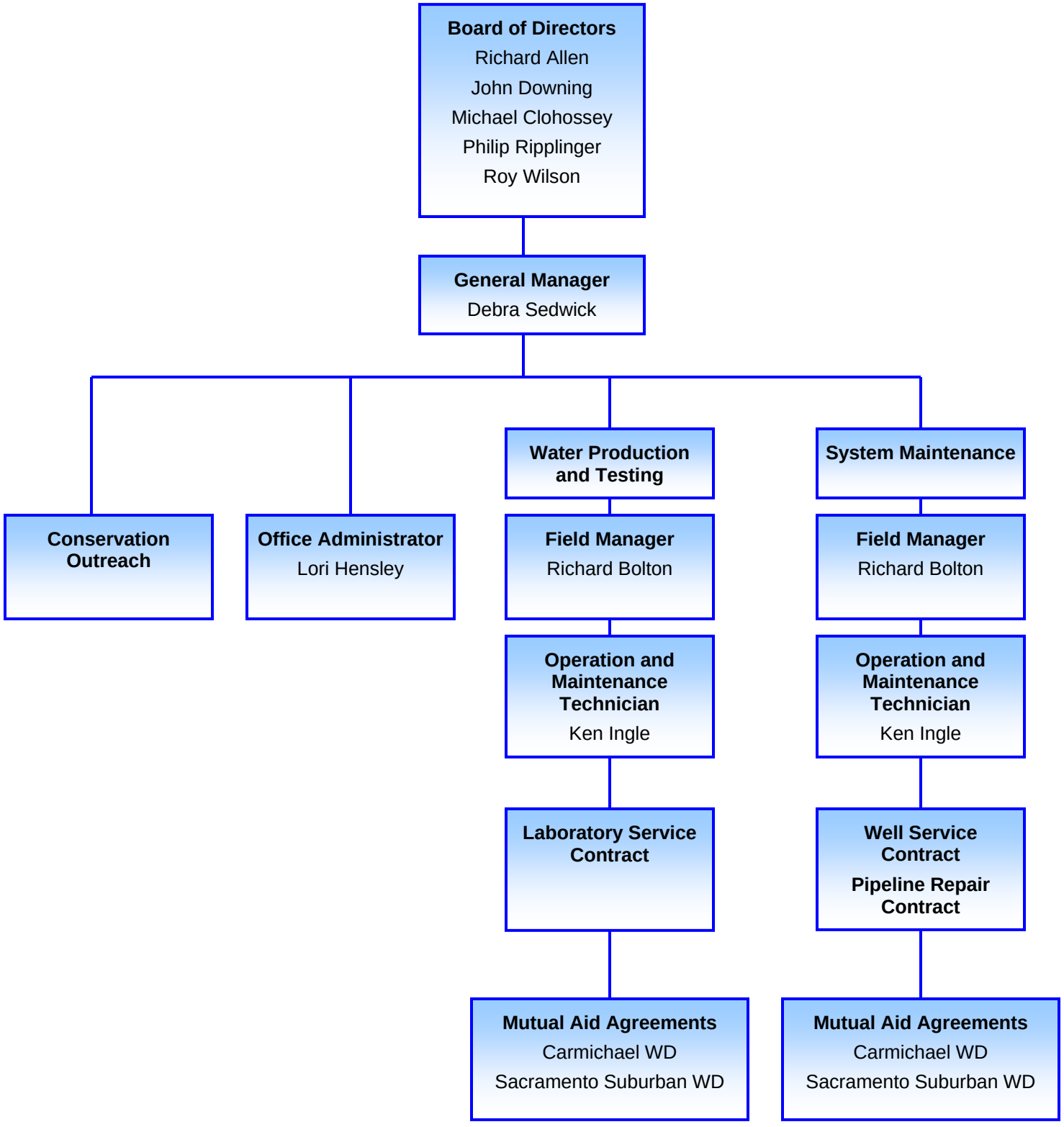
7.2 District Organizational Structure

Del Paso Manor Water District is a public agency governed by an elected five member Board of Directors. The Board is elected at large within the District service area. The District is a small water agency with a service area of approximately 1 square mile and under 3000 customers providing less than 3000 acre feet of water annually. As such the District does not meet the definition of an Urban Water Supplier under the California Water Code Section 10617, exempting it from many of the water resource management legislation of the State of California. The minimum agency size threshold helps to avoid placing a disproportionate cost for meeting planning, conservation and management activities on small agencies.

The District performs four principle activities including management and administration; water production and testing; system maintenance; and conservation outreach. The District currently employs four (4) individuals.

Figure 8 reflects the current Organization Chart.

Figure 8: District Current Organizational Chart



7.2.1 Management and Administration Activities

The management and administration activities are provided by the General Manager and Office Administrator providing the labor effort needed to keep the District operating including customer service (billing and collection), processing accounts payable, District business accounting, Board support, administrative support, as well as answering the telephones, preparing and filing regulatory compliance reports and maintaining customer outreach. Project/staff management also participate and represent the District customer interests in regional planning through the Water Forum, Regional Water Authority, Sacramento Groundwater Authority, and Sacramento Area Water Works Association. The staff also maintains outreach and provides community service through activities with the Del Paso Manor Homeowners Association and San Juan School District.

The key positions of the General Manager and Office Administrator are discussed below:

- General Manager – This person is responsible for all aspects of the District operation and is the key liaison between the elected Board and the District staff. The General Manager is responsible for implementing Board actions and policies and for providing outreach to the community as a visible representative of the organization. The General Manager is responsible for the daily operational decisions and is responsible for regulatory compliance monitoring, capital projects management, labor negotiations, and maintaining the people and resources needed to continues providing safe and reliable services on a daily basis. The General Manager is responsible for development of the annual budget alternatives following the direction of the Board of Directors.

- Office Administrator – This person is responsible for the administration of District accounts, payroll and purchasing processing and acts as the primary customer service representative. In addition, supports all the activities of the General Manager and employees of the District including, support of Administrative activities, document reproduction, emergency dispatch, and public outreach.

7.2.2 Water Production and Testing

The water production and testing staff provides for the groundwater pumping and testing of the District's water supply. District facilities include all District wells, well pumps and system interties with Sacramento Suburban Water District. State Certification as a Water Distribution Operator, Water Treatment Operator, and specialized training is required for the lead responsibilities of these activities for the District.

The existing District staff positions conducting these activities are as follows:

- Field Manager – This person is responsible for maintaining adequate water pressure in the system under all demand conditions and monitoring and maintaining water quality and testing demonstrating compliance with the Drinking Water Standards. This person is responsible for maintaining the mechanical aspects of equipment ranging from small chemical feed pumps through multiphase variable frequency drive pumps providing thousands of gallons per minute of supply. This person maintains District production and operations reports and plans and schedules maintenance

activities. This person is also responsible for emergency response planning and coordination of those activities needed to maintain a safe and reliable water supply.

- Operations and Maintenance Field Technician – This person supports all activities of the Field Manager and must be familiar with all production facilities, operation practices and procedures.

These people are responsible for preventative maintenance for all mechanical, electrical, chemical feed and control systems within the District. They also conduct the distribution system-flushing program, valve exercising, system monitoring and compliance with the California Department of Public Health (CDPH) water quality testing programs under the District Water Supply Permit.

The staff activities support the following four areas: maintenance, water quality, chemicals, and control.

Maintenance

Maintenance includes the electrical and electrical control system, chemical storage and feed equipment, and mechanical equipment, such as pump maintenance.

Electrical and electrical control system maintenance includes cleaning contacts; tightening connections; measuring voltage and amperage loads; and replacing starters, relays, circuit breakers and fuses.

Chemical feed equipment maintenance includes cleaning the pump Internals and solution lines; replacing diaphragms; and checking valves, chemical solution lines and injection point devices.

Mechanical equipment maintenance includes oil and filter changes; charging system check and replacement; efficiencies testing; bearing replacement; cleaning of Y strainers and diaphragms; and speed, travel and pressure adjustment for control valves.

Water Quality

Water quality is broken out into the following sub-categories: Distribution water quality testing, groundwater testing, flushing program, and water quality calls.

- Distribution water quality testing includes sampling at the wells and within the system for chlorine residual, coliform bacteria and periodic sampling for lead and copper at various locations in the District.

- Groundwater testing includes sampling for constituents and contaminants such as VOC, IOC, Gross Alpha, SOC, Gen. Mineral, Physical, Nitrate, Nitrite, Phase 2/5, Perchlorate, and MTBE, as well as other regulated and unregulated parameters required by law and as directed by CDPH.

- Flushing program includes flushing dead-end mains to reduce sedimentation and taste and odor complaints. This effort includes valve exercising and inspection as opportunities allow.

- Water quality calls – includes investigating water quality issues reported by customers.

Chemicals

Activities include ordering, receiving, loading and delivery of sodium hypochlorite to all sites; operation of feed systems; testing, training and emergency response planning.

Control System and Testing

The water system has a single chart recorder that monitors water pressure. The recorder is manually read. System alarms and automated emergency contact and reporting are not currently part of the District capabilities.

7.2.3 System Maintenance

The activities for system maintenance include all buried infrastructure providing transmission and distribution for delivery of water throughout the District. These activities include the inspection of all new construction, replacement and repair of water mains, fire hydrants, water services, meters, and valves. In addition, these people are responsible for inspection of all potential cross-connections and to administer the corrections on those cross-connections.

This activity includes responding to Underground Service Alerts calls for locating the buried water facilities, and maintaining the District water system maps.

The System Maintenance activities the following key Roles:

- Field Manager – This person is responsible for assignments of resources, project scheduling, training, inventory, equipment fleet and maintaining the corporation yard. This person is also responsible for the District record drawing files, contractor submittal review and comments, construction inspection support, and inspection records. In addition, this position coordinates plan checking, fire flow analysis requests and responds to requests for information by developers regarding the District facilities and physical connection requirements.

- Operations and Maintenance Field Technician – This person supports the activities of the Field Manager.

7.2.4 Conservation Outreach

The District maintains a part-time water conservation outreach person who travels the District during high water use periods contacting customers where water waste appears to be occurring. This person is responsible for informing the customer of the importance of avoiding water waste, of District water conservation policies currently in force and consequences for continued water waste.

7.3 Future Water District Organizational Structure and Management Plan

The District staffing provides for assignment of multiple activities to the four full-time employees and one part-time employee for conservation outreach duties. This approach has worked well for several years and will continue to work well; however, the following changes will impact the District staffing:

- District will be undertaking an increased Planned System Maintenance program for system wide replacement of the aging infrastructure resulting in a need for additional resources. This effort could result in an additional workload as follows:
    - 2010 – 2014: Up to 1/8 time senior manager requirement for managing PSM Program development, funding investigations, Proposition 218 rate considerations, and managing project design, bidding, construction, and startup.
    - 2014 to 2018: Up to 1/2 time senior manager requirement for managing PSM Program development, funding investigations, 218 rate considerations, and managing project design, bidding, construction, and startup.
    - 2018 to 2022 up to 1/2 time senior manager requirement for managing PSM Program development, funding investigations, Proposition 218 rate considerations, and managing project design, bidding, construction, and startup.
    - 2022 to 2026 up to 3/4 time senior manager requirement for managing PSM Program development, funding investigations, Proposition 218 rate considerations, and managing project design, bidding, construction, and startup.
    - 2026 to 2030 up to 1/8 time senior manager requirement for managing PSM Program development, funding investigations, Proposition 218 rate considerations, and managing project design, bidding, construction, and startup.
- Modernization to add computerized Supervisory Control and Data Acquisition (SCADA) would not require additional manpower but would require training for the Water Production Field Position in the system operation and in operator control programming. No additional staff recommended however a training budget should be considered.
- Changes in State laws may reach to the small water system providers and require additional labor effort for the following items:
    - Water Conservation BMPs – The District is not required based on its size to under take many of the BMPs. However, if a voluntary implementation of some or all of the BMPs is undertaken, there will need to be additional staffing. It is recommended that a 1/8 to 1/4 time person could manage this activity.
    - Certifications – Additional training and maintenance of Distribution Certifications need to be tracked and maintained. No additional staff is recommend, however a training budget should be considered.

- Chemical Feed System – Fluoridation may become a requirement should the District choose to practice Conjunctive Use. Subsequently, there will be additional operation and maintenance work load related with the fluoridation program. This work will require daily inspection and maintenance at each well adding up to 2 hours per week per site. This could result in between 1/4 and 1/2 time additional field staff.

- Changing Groundwater Quality – If the groundwater quality declines and treatment is required, the District will need to add a Grade 2 Water Treatment Plant Operator. It is recommended for this scenario that the District considers adding a new position and separating production from distribution field work.

- Meter Reading, Calibration, Maintenance, and Monthly Commodity Billing – This will result in a 1/2 time person associated with the meters and a part-time office administrator assistant to process monthly billing using the meter data. Use of auto/reading meters may reduce the meter reading work load, however a minimum number of re-reads, manual reads, and field checks are typically required as part of the normal billing quality control and in response to customer inquiries.

These changes may result in some reorganization and the need for additional staffing as reflected in the possible future organization chart shown in Figure 9 and Figure 10. Figure 9 reflects adding resources with no change to the existing organizational structure. Figure 10 reflects a revised structure adding and Assistant General Manager and maintaining the existing structure below the new manager role.

Figure 9: Proposed District Organizational Chart – Approach 1

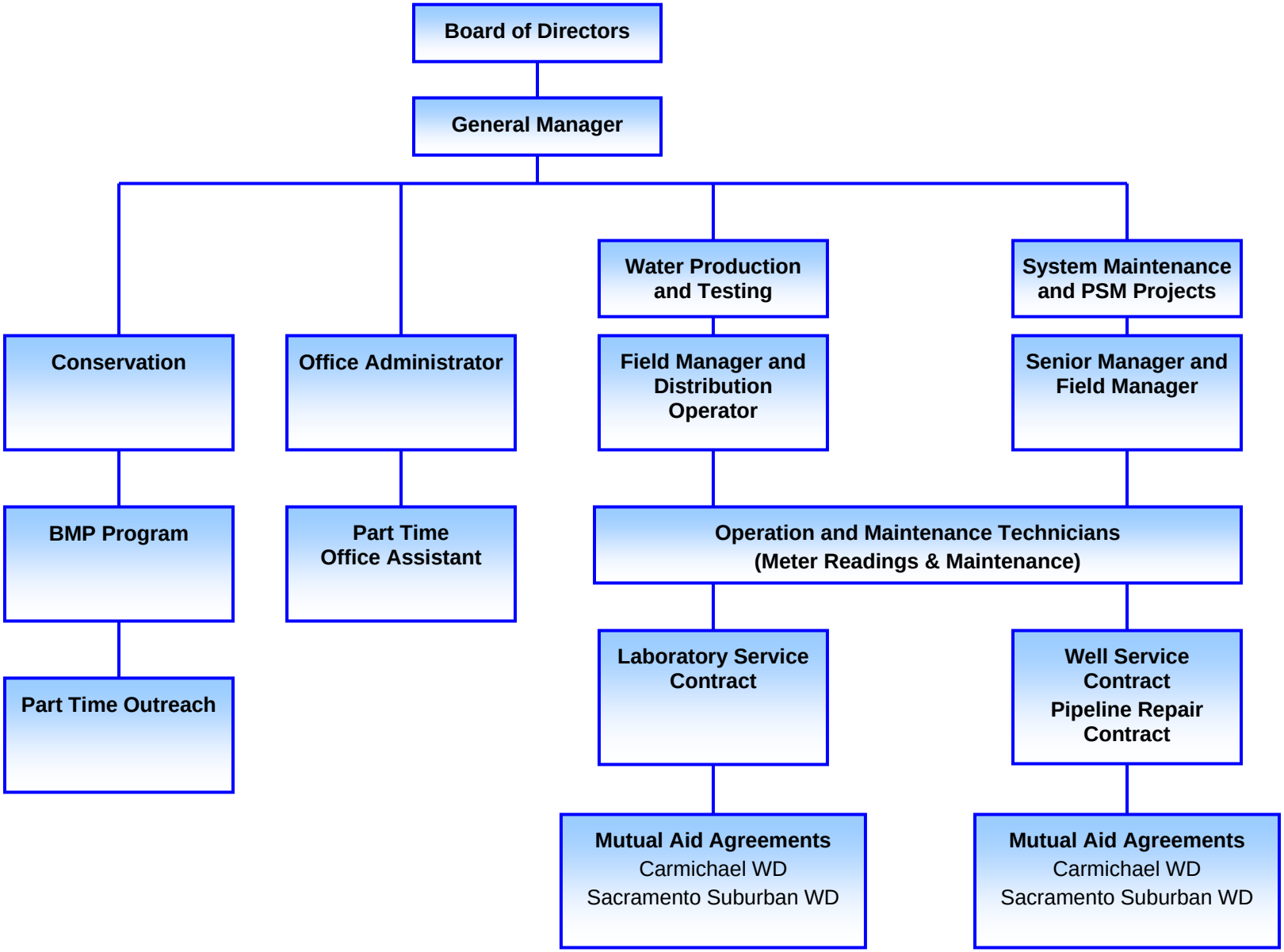
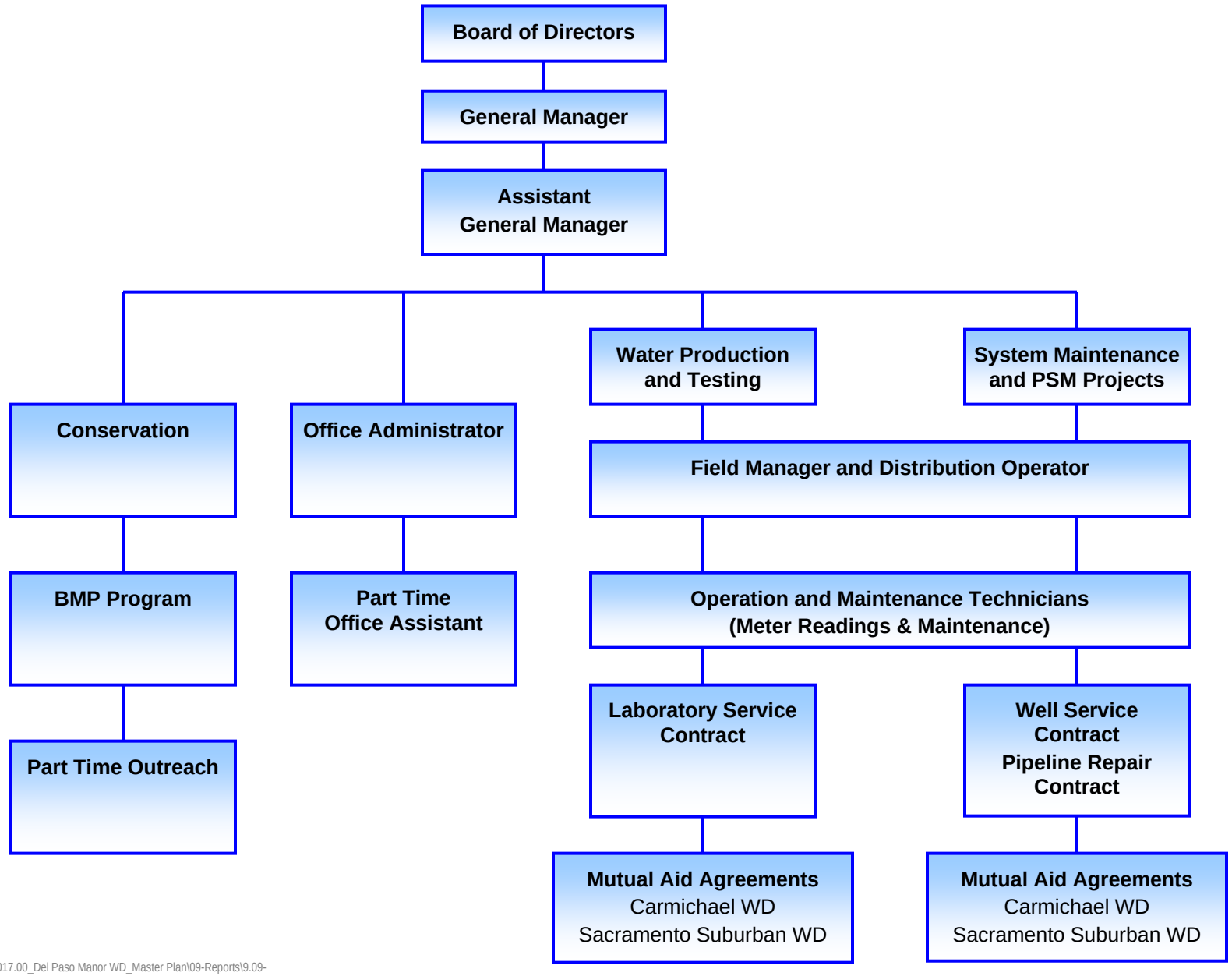


Figure 10: Proposed District Organizational Chart – Approach 2



Section 8: Meter Retrofit Planning

8.1 Introduction and Background

This Water Conservation and Meter Retrofit Plan reviews existing Del Paso Manor Water District (District) commitments for metering the District water system and frames the existing ongoing changes is local and state programs to encourage and enforce metering and billing using a metered rate.

The Metering Plan Technical Memorandum includes review of the following documents and are provided in Appendix 2:

- Assembly Bill No. 2572 Water Meters; Water Code Section 10617; Draft Water Forum Agreement – Water Conservation Element, 14 May 2009
- Del Paso Manor Water District (DPMWD) Water Forum Agreement and DPMWD Water Conservation Plan, January 2000 Appendix J
- Memorandum of Understanding Regarding Urban Water Conservation in California, California Urban Water Conservation Council, 10 December 2008
- California Urban Water Conservation Council – Best Management Practices (BMPs), 10 December 2008
- California Urban Water Conservation Council – BMP Cost-Effectiveness Workshop, June 2009
- Assembly Bill No. 1420 (AB 1420) Water Demand Management Measures: Water Management Grant or Loan Funds; AB 1420 Frequently Asked Questions; AB 1420 Self-Certification Statement Forms; Public Workshop Notes, AB 1420 Compliance/Eligibility Requirements, June 2009

The District is a signatory to the Water Forum Memorandum of Understanding (MOU), a member of the Regional Water Authority and participating in ongoing discussions with the Water Forum regarding updating the January 2000 MOU. This effort is part of an ongoing commitment to responsible management of the District and regional solutions to water supply planning.

8.2 Water Metering Commitments

Presented below is a summary of existing water metering commitments, current draft updated commitments and current state laws relating to water metering.

Existing Water Forum Best Management Practice 4 (BMP 4) Residential Meter Retrofit

The District Water Forum Purveyor Specific Water Conservation Plan (Appendix B) Best Management Practice 4 (BMP 4) Residential Meter Retrofit provides for the following commitment.

> "It is recognized that Del Paso Manor Water District is a relatively smaller water purveyor currently relying totally on groundwater and will not realize immediate water supply benefits from participating in the Water Forum Agreement. Therefore until such time as Del Paso Manor Water District needs discretionary approvals for new or expanded surface water supplies, an active voluntary meter retrofit with incentives is acceptable. Nothing in the Water Forum Agreement prevents purveyors from deciding to undertake a more rapid meter retrofit program.
>
> "At such time as Del Paso Manor Water District needs discretionary approvals for new or expanded surface water supplies it agrees to annually retrofit at least 3.3% - 5% of the total number of unmetered residential connections and read and bill as set for the in Appendix D of the Water Forum Agreement.
>
> "If in the future Del Paso Manor Water District receives benefits from another agency's conjunctive use program, it agrees to discuss its meter retrofit program with the Water Forum Successor Effort."

The District has 1692 (1611 single family and 81 duplex housing) services that are unmetered. The existing commitment is to install 56 to 85 meters per year as part of pursuing a discretionary approval for new or expanded surface water supplies. It is reasonable to assume that this commitment will be triggered by the following surface water supplies actions if undertaken by the District:

- Proceeding with City of Sacramento surface water deliveries whether directly, or through Sacramento Suburban Water District.
- Proceeding with a Point of Diversion effort for City of Sacramento surface water to be treated and wheeled through Carmichael Water District.
- Proceeding with a joint District and Carmichael Water District conjunctive use project for beneficial use of the remediated groundwater discharging at the Bajamont Water Treatment Plant.

The annual cost of installing 85 residential meters in 2009 construction dollars is approximately $100,000. This assumes retrofit to the existing pipelines using a service tap, corporation stop, 1-inch copper service, curb stop, meter box, meter, customer service shutoff valve and limited customer service retrofit. The District would be fully metered by 2030 if it proceeded at a rate of 5% (85) meters per year starting in 2010.

Assembly Bill 2572 and Water Forum Successor Effort

AB 2572 established requirements for Urban Water Suppliers to be fully metered by the year 2025 and begin billing all metered services within one seasonal year of having installed a water meter. An Urban Water Supplier under the California Water Code Section 10617 is any supplier serving more than 3,000 customers, or supplying more than 3,000 acre-feet per year of water. The District does not fall under the definition of an Urban Water Supplier and is therefore AB 2572 does not pertain to the District.

The Water Forum successor effort is negotiating an update Water Conservation Element and released a draft Water Conservation Element 14 May 2009 (Appendix A) that includes that same working as the original agreement (see above) for the District commitment to 3.3% - 5% triggered by the need for discretionary approvals for new of expanded surface water.

Assembly Bill 1420, California Urban Water Conservation Council Best Management Practices

The Water Forum draft update process is embracing the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (Appendix C) and the 10 December 2008 Best Management Practices while maintaining flexibility for unmetered members such as the District. Specifically, there is a Pre-Determined Deferral for Meter-Based BMPs that accepts the January 2000 Appendix J (Appendix B) schedule. As stated above, Water Forum Appendix J does not require the District to meter until a discretionary surface water approval is needed.

The CUWCC MOU provides advantages to local larger water purveyors in preparing Urban Water Management Plans. The District does not exceed the minimum size threshold requiring an Urban Water Management Plan. Although alignment with the CUWCC approach and goals are recommended, the District should refrain from committing to accelerating meter installation until the distribution system replacement approach and timing is fully determined.

AB 1420 further tightens water conservation accountability to state grant and bond funding opportunities for Urban Water Suppliers. AB 1420 does not appear to change the California Water Code Section 10617 definition of an Urban Water Supplier and therefore the District does not meet the minimum size threshold to require compliance with AB 1420. This is important because AB 1420 ties back to the CUWCC BMPs and metering.

At this time, based on the evaluation above, it appears that the District is under no obligation to proceed with installation of water meters until such time as a surface water need is acted upon. The District Master Plan is providing recommendations on system-wide pipeline replacement from the back lot line to the street and metering the system in a phased approach at that time. This approach is discussed further in the following sections, but, appears consistent with existing meter installation obligation commitments.

8.3 Current Meter Retrofit Status

The District is partially metered with 95 metered accounts as show in Table 13. There are six (6) accounts that are non-residential that are currently on a flat rate as shown in Table 14 and are assumed to not be metered. There are also four (4) stand-by fire protection accounts that are not metered and are billed at as-needed basis. No residential water meters have been installed in the District.

Table 13: Water Meter Accounts Summary

Type	No. of Accounts
Multi-Family	11
Commercial	64
Institutional	5
Irrigation	15
TOTAL	95

Table 14: Commercial Flat Rate Accounts

Account No.	Customer	Service Size
50004	Eastern Mini Market	1”
50005	SI Investment Trust	8” FP, (5) 1”, 2”
50038	Phuong Ngo	5/8”
50055	Sam Co Systems	1”, 6” FP
50070	Ben Davis Enterprises	1½”
50112	Eastern Manor Care Home	1”, 4” FP

8.4 Meter Installation Options

The District has adopted a policy to proceed with relocation of the water mains from the backyards to the street frontage at such time as the pipelines have reached the end of their useful life. Concurrent with the need to address the aging pipelines is the desire to proceed with installing water meters. The Master Plan provides a Planned System Maintenance program for both replacing the pipes, retrofitting water services during pipe replacements, and installing meters.

The District has expressed targeting a 2025 completion year for all meter installation. The District can choose from the following installation approaches:

1. Annual meter installation of approximately 113 meters per year starting in 2010. This would result in installing meters to existing backyard services and the later relocation of

meters with the planned pipeline system replacement. The estimated annual cost would be approximately $135,000. Under this option the meters would be installed as the work proceeded and there would be a phased conversion from flat rate to a metered rate on an annual schedule.

2. Installation of meters concurrent with the Planned System Maintenance pipeline replacement projects starting in 2010 and continuing through 2025. Installation of meter setters would proceed concurrently with pipe replacement and all meters are installed in 2025. Meters would be installed at one time and the entire District residential customer group converted to a metered rate at one time. The cost of metering will be reduced from approximately $1,200 per meter installation to approximately $700 per installation. This represents a savings of 47% or $1,200,000 over preceding with the installation of meters annually and in backyards.

8.5 Findings and Recommendations

The findings of this review are that the District has the option to postpone installing meters until such time as the law changes or there is a need for surface water use within the District. The District would face an annual cost of approximately $100,000 for installing 5% (85) of the total unmetered per year at that time and this would require 20 years to complete should a surface water use be needed.

The District could proceed with installation of meters in advance of the pipeline at a cost of approximately $135,000 per year and be complete by 2025. This approach would require relocating meters to the front yards when the pipelines are relocated from the backyard easements to the public right of way.

The District could proceed with installing meters as they replace the pipelines at a cost savings of approximately 47% or $1,200,000 over the life of the projects.

It is recommended that the District proceed with the concurrent pipeline and meter replacement/retrofit program. Installation of meters as an annual element of the pipeline replacement plan could be reconsidered as the pipeline projects are completed.

Section 9: Planned System Maintenance

9.1 Introduction

Kennedy/Jenks has discussed with the District a Facilities Replacement Plan, which includes the evaluation of District water demands and condition assessment of production and distribution facilities. The District currently practices a sufficient day-to-day maintenance practices. Assets are identified as generally in a good working condition but are currently at or exceeding their useful lives. It is reasonably assumed that replacements of production and distribution facilities are necessary by the end of 2030. The system-wide District assets replacements will be executed as Planned System Maintenance (PSM) projects. The PSM projects will be executed through five (5) phases of four (4) year durations.

In addition to production and distribution facilities, the District acknowledged the necessity to modernize the District facilities to bring the District to a standard industry practices, this includes work associated with upgrading electrical facilities at all existing production facilities, installation of computerized supervisory control and data acquisition (SCADA) system, and building new District office and corporation yard. The PSM will also include efforts to meet all residential meters installation by 2025.

Elements of the PSM can be categorized into the following:

1. Production facilities
2. Buried infrastructures
3. Modernization of operation and maintenance
4. Programmatic element, i.e. metering.

9.2 Planning and Phasing Recommendations

Scope of PSM projects outlined in this section reflects revisions made according to inputs and discussions with District staff. Work associated in the PSM planning for each phase is generally grouped into two different types of efforts:

1. Baseline efforts are triggered by aging production facilities. Systematically, existing production facilities will be abandoned and replaced along associated installation of a typically 12” diameter backbone piping that connects through the District’s quadrants. Priorities are placed first on hydraulically critical regions of the District and age second.
2. Optional efforts address the District’s goal to achieve full residential meter installation by 2025. The distribution facilities replacement includes mainly pipelines with diameters smaller than 12”.

The PSM Summary and Phasing are as presented in the following subsections:

9.2.1 Summary of PSM

An approach for planning a PSM project is shown in Table 15 below. Conditions for each individual project will most likely varying, however, it is recommended for the District to research or complete the following activities in the process of decision making.

Table 15: Typical Construction Projects Preparation

Year	Activities
1	Planning, Right of Way, Funding, Preliminary Design
2	Funding, CEQA, Design
3	Funding, Bidding, Construction
4	Construction, Facilities Start-Up

Summary of cost with related phases and components for the PSM project is provided with description of work for each phase as shown in Table 16 and Table 17.

Table 16: Planned System Maintenance Project Description

Project	Description of Work
1A	Demolish (E) Well No. 5; Construct (N) Well No. 5.
1B	Electrical upgrade for Well Nos. 1–8; Demolish (E) Well No. 7.
1C	Install (N) 2,610 LF of 12” pipelines and appurtenances; Retrofit 46 water service connections to front yards and install meter setters.
1D	Intertie with Carmichael Water District: (N) 3,000 LF of 12” intertie pipelines and appurtenances, meter station, and booster pump station.
2A	Demolish (E) Well No. 1; Construct (N) Well No. 1 and new pump station building; Demolish (E) Well No. 6.
2B	Construct/Purchase (N) 3,600 SF District Office.
2C	Install (N) 5,200 LF of 12” pipeline and appurtenances; Retrofit 96 water service connections to front yards and install meter setters.
2D	Install (N) 900 LF of 12” pipeline, (N) 17,230 LF of 8” pipeline, (N) 300 LF of 6” pipelines and appurtenances; Retrofit 341 water service connections to front yards and install meter setters.
3A	Construct (N) Well No. 6.
3B	Install (N) 4,900 LF of 12” pipeline and appurtenances; Retrofit 84 water service connections to front yards and install meter setters.
3C	Install (N) 14,040 LF of 8” pipeline, (N) 1350 LF of 6” pipelines and appurtenances; Retrofit 262 water service connections to front yards and install meter setters.
4A	Demolish (E) Well No. 2; Demolish (E) Well No. 3; Demolish (E) Well No. 4; Construct (N) Well near Country Club Plaza area.
4B	Install (N) 6,880 LF of 12” pipeline, (N) 35,500 LF of 8” pipeline, (N) 1,550 LF of 6” pipelines and appurtenances; Retrofit 407 water service connections to front yards and install meter setters.
4C	Install (N) 4,500 LF of 12” pipeline, (N) 20,000 LF of 8” pipeline, (N) 100 LF of 6” pipelines and appurtenances; Retrofit 381 water service connections to front yards and install meter setters; Retrofit existing 75 water service at front yards and install meter setters.
4D	Install 1,692 water meters.
5A	Demolish (E) Well No. 8; Construct (N) Well at an undetermined site
5B	Install (N) 4,500 LF of 12” pipelines and appurtenances.

Table 17: Planned System Maintenance Summary of Cost by Phase

Phase	Period	Project	Baseline / Optional	Wells	Pipelines	Pipelines (Meter Installation)	Facilities	Conjunctive Use	Total Cost
1	2010-2014	1A	Baseline	$1,617,000	-	-	-	-	$1,617,000
		1B	Baseline	$451,000	-	-	-	-	$451,000
		1C	Baseline	-	$453,000	-	-	-	$453,000
		1D	Baseline	-	-	-	-	$831,000	$831,000
2	2014-2018	2A	Baseline	$1,925,000	-	-	-	-	$1,925,000
		2B	Baseline	-	-	-	$1,700,000	-	$1,700,000
		2C	Baseline	-	$956,000	-	-	-	$956,000
		2D	Optional	-	-	$1,147,000	-	-	$1,147,000
3	2018-2022	3A	Baseline	$1,562,000	-	-	-	-	$1,562,000
		3B	Baseline	-	$878,000	-	-	-	$878,000
		3C	Optional	-	-	$2,185,000	-	-	$2,185,000
4	2022-2026	4A	Baseline	$1,756,000	-	-	-	-	$1,756,000
		4B	Baseline	-	$5,154,000	-	-	-	$5,154,000
		4C	Optional	-	-	$3,401,000	-	-	$3,401,000
		4D	Optional	-	-	$1,880,000	-	-	$1,880,000
5	2026-2030	5A	Baseline	$1,744,000	-	-	-	-	$1,744,000
		5B	Optional	-	$617,000	-	-	-	$617,000

9.2.2 PSM Phase 1: 2010-2014

Phase 1 is scheduled for 2010 – 2014. The District has expressed the need for addressing priority improvements on facilities that requires immediate attention. In this case, replacement of Well No. 5 and electrical facilities upgrade for Well Nos. 1 – 8. District's Well No. 5 operation has reprioritized to be called last due in the well operation lineup. A downhole well video inspection was performed in February 2009 validates that Well No. 5 replacement is imminent. The well feeds AT&T demands, the District's single largest commercial user. Electrical facilities upgrade for Well Nos. 1 – 8 are necessary to bring the facilities to current industry and safety standards. Backbone pipeline installed in association with new Well No. 5 hydraulically connects north westerly portion of the District with the north easterly portion of the District. An intertie with Carmichael Water District is included in this Phase to address the implementation of Conjunctive Use as discussed in Section 5 of this Master Plan. The work for PSM Phase 1 is as shown on Figure 11. Discussion and summary of cost for PSM Phase 1 is included in Section 9.3.

Recommended baseline work includes the following:

<u>Production Facilities</u>

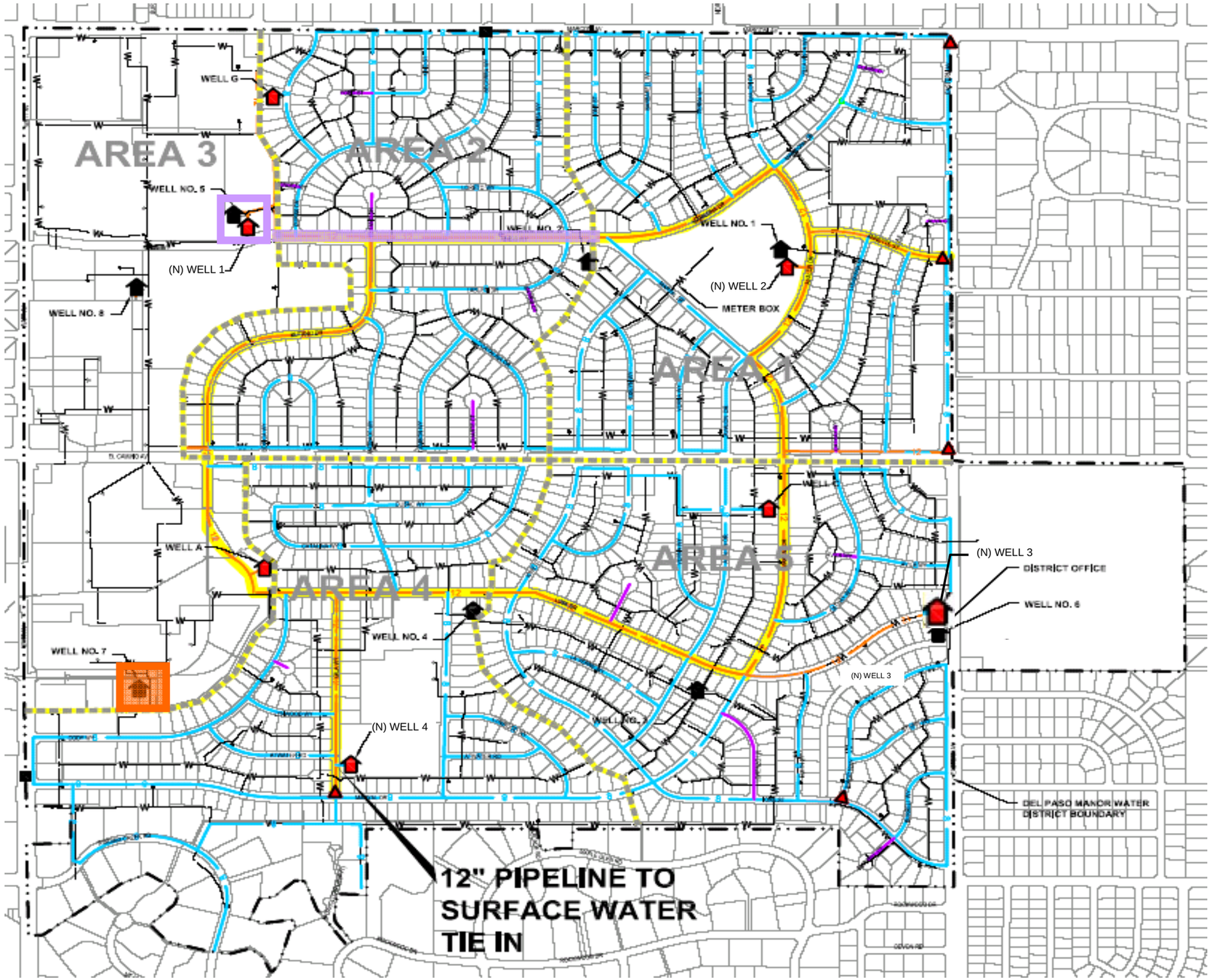
1. Demolish (E) Well No. 5
2. Construct (N) Well No. 5
3. Upgrade electrical facilities Well Nos. 1–8
4. SCADA installation
5. Demolish (E) Well No. 7

<u>Distribution Facilities</u>

1. Install (N) 2,610 LF of 12" pipeline and appurtenances
2. Retrofit 46 water service connections to front yard and install meter setters

<u>Conjunctive Use</u>

1. Intertie with Carmichael Water District: Install (N) 3,000 LF of 12" pipeline and appurtenances, meter station, and booster pump station



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DEL PASO MANOR WATER DISTRICT
SACRAMENTO, CALIFORNIA
MASTER PLAN

WATER SYSTEM PSM 2010-2014

K/J 0870017.00
APRIL 2009
FIGURE 11

9.2.3 PSM Phase 2: 2014-2018

Phase 2 is scheduled for 2014-2018. The District's Well No. 1 is the District's oldest lead well. The District's Well No. 6 is the only natural gas fueled engine located inside a vault to the rear of District office building. Demolition of Well No. 6 will concurrently take place with moving the District office to a new location. Extension of the backbone pipeline installed in association with new Well No. 1 hydraulically connects north easterly portion of the District with the south easterly portion of the District. The optional efforts related to installation of new distribution facilities begin to take place on this phase. The work for PSM Phase 2 is as shown on Figure 12. Discussion and summary of cost for PSM Phase 2 is included in Section 9.3.

Recommended baseline work includes the following:

Production Facilities

1. Demolish (E) Well No. 1
2. Construct (N) Well No. 1
3. Demolish (E) Well No. 6

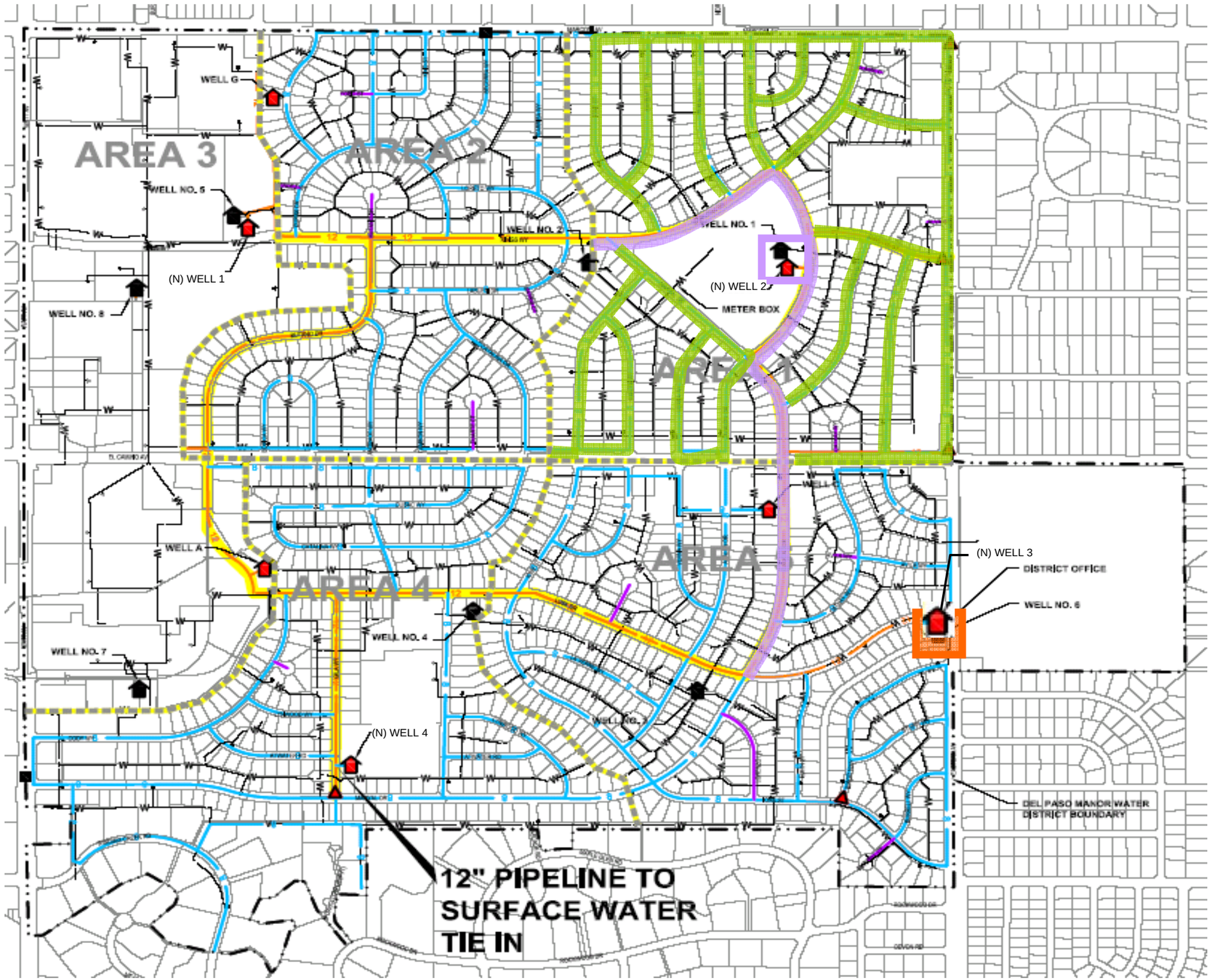
Distribution Facilities

1. Install (N) 5,200 LF of 12" pipeline and appurtenances
2. Retrofit 96 water service connections to front yards
3. Construct/Purchase (N) 3,600 SF District Office

Recommended optional work, driven by meter installation includes the following:

Distribution Facilities

1. Install (N) 900 LF of 12" pipeline, (N) 17,230 LF of 8" pipeline, (N) 300 LF of 6" pipelines and appurtenances
2. Retrofit 341 water service connections to front yards



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WATER SYSTEM PSM 2014-2018

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FIGURE 12

9.2.4 PSM Phase 3: 2018-2022

Phase 3 is scheduled for 2018-2022. The production facilities replacement continues with construction of new Well No. 6. The extension of the backbone pipeline installed in association with new Well No. 6 hydraulically connects south easterly portion of the District with the south westerly portion of the District. The work for PSM Phase 3 is as shown on Figure 13. Discussion and summary of cost for PSM Phase 3 is included in Section 9.3.

Recommended baseline work includes the following:

Production Facilities

1. Construct (N) Well No. 6

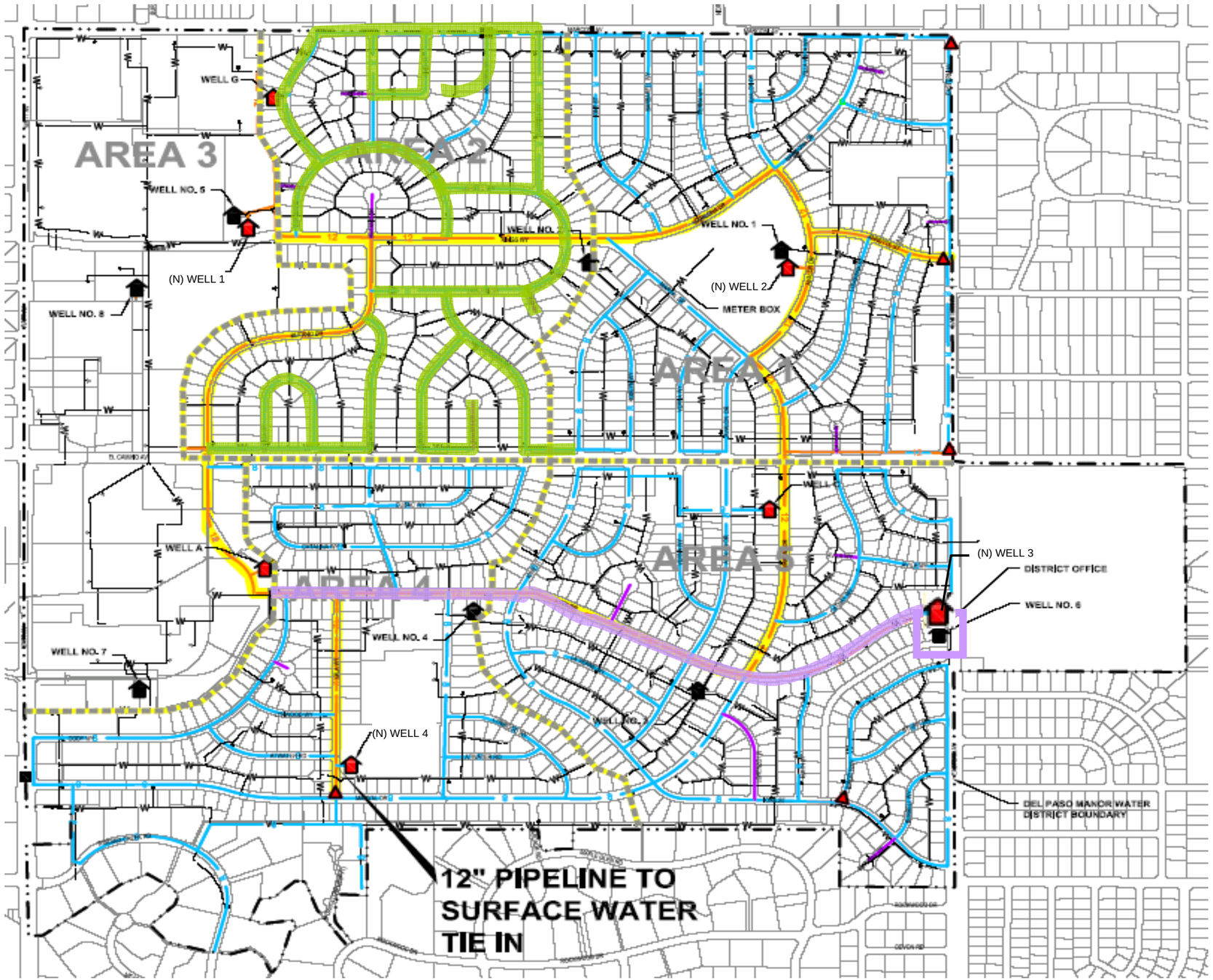
Distribution Facilities

1. Install (N) 4,900 LF of 12” pipeline and appurtenances
2. Retrofit 84 water service connections to front yards

Recommended optional work, driven by meter installation includes the following:

Distribution Facilities

1. Install (N) 14,040 LF of 8” pipeline, (N) 1350 LF of 6” pipelines and appurtenances
2. Retrofit 262 water service connections to front yards



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WATER SYSTEM PSM 2018-2022

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FIGURE 13

9.2.5 PSM Phase 4: 2022-2026

Phase 4 is scheduled for 2022-2026. The production facilities replacement continues with demolition of Well Nos. 2, 3, and 4 and construction of a new well at a site near the Country Club commercial area. The extension of the backbone pipeline installed in association with the new well hydraulically connects south westerly portion of the District with the north westerly portion of the District. Non backbone pipelines are included in the baseline to help meeting deadline for meter installation. Work for PSM Phase 4 is as shown on Figure 14. Discussion and summary of cost for PSM Phase 4 is included in Section 9.3.

Recommended baseline work includes the following:

Production Facilities

1. Demolish (E) Well No. 2
2. Demolish (E) Well No. 3
3. Demolish (E) Well No. 4
4. Construct (N) Well at Country Club site

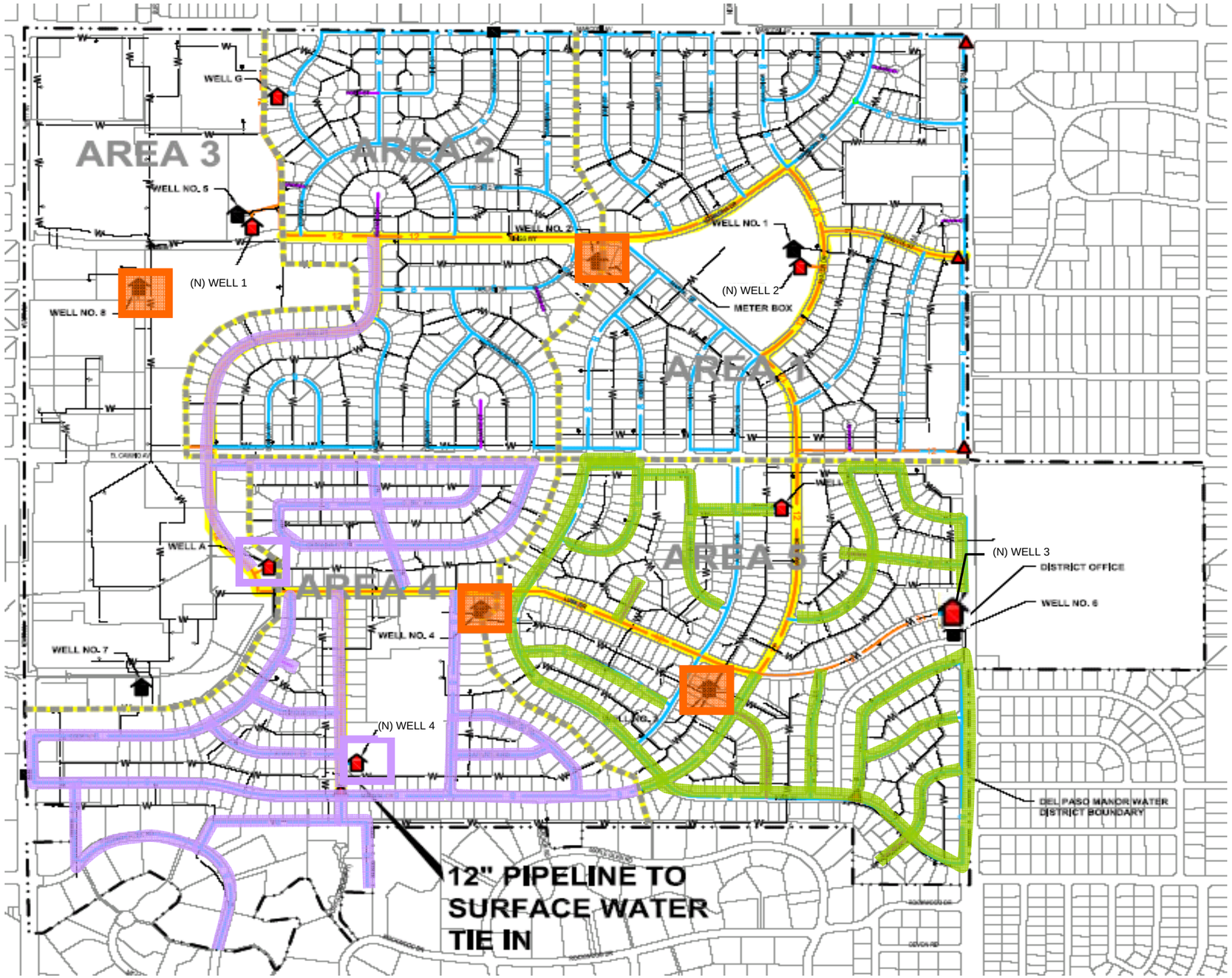
Distribution Facilities

1. Install (N) 6,880 LF of 12” pipeline, (N) 35,500 LF of 8” pipeline, (N) 1,550 LF of 6” pipelines and appurtenances
2. Retrofit 407 water service connections to front yards

Recommended optional work, driven by meter installation includes the following:

Distribution Facilities

1. Install (N) 4,500 LF of 12” pipeline, (N) 20,000 LF of 8” pipeline, (N) 100 LF of 6” pipelines and appurtenances
2. Retrofit 381 water service connections to front yards
3. Retrofit existing 75 water service at front yards
4. Install 1692 water meters



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MASTER PLAN

WATER SYSTEM PSM 2022-2026

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APRIL 2009
FIGURE 14

9.2.6 PSM Phase 5: 2026-2030

Phase 5 is scheduled for 2026-2030. The production facilities replacement finishes with demolition of Well 8 and construction of a new well at a site that is not yet determined. At this time, all the backbone pipeline has been installed to accommodate full capacity of the District's new wells. A distribution facility replacement for a segment in the commercial area is included as optional work. The work for PSM Phase 5 is as shown on Figure 15. Discussion and summary of cost for PSM Phase 5 is included in Section 9.3.

Recommended baseline work includes the following:

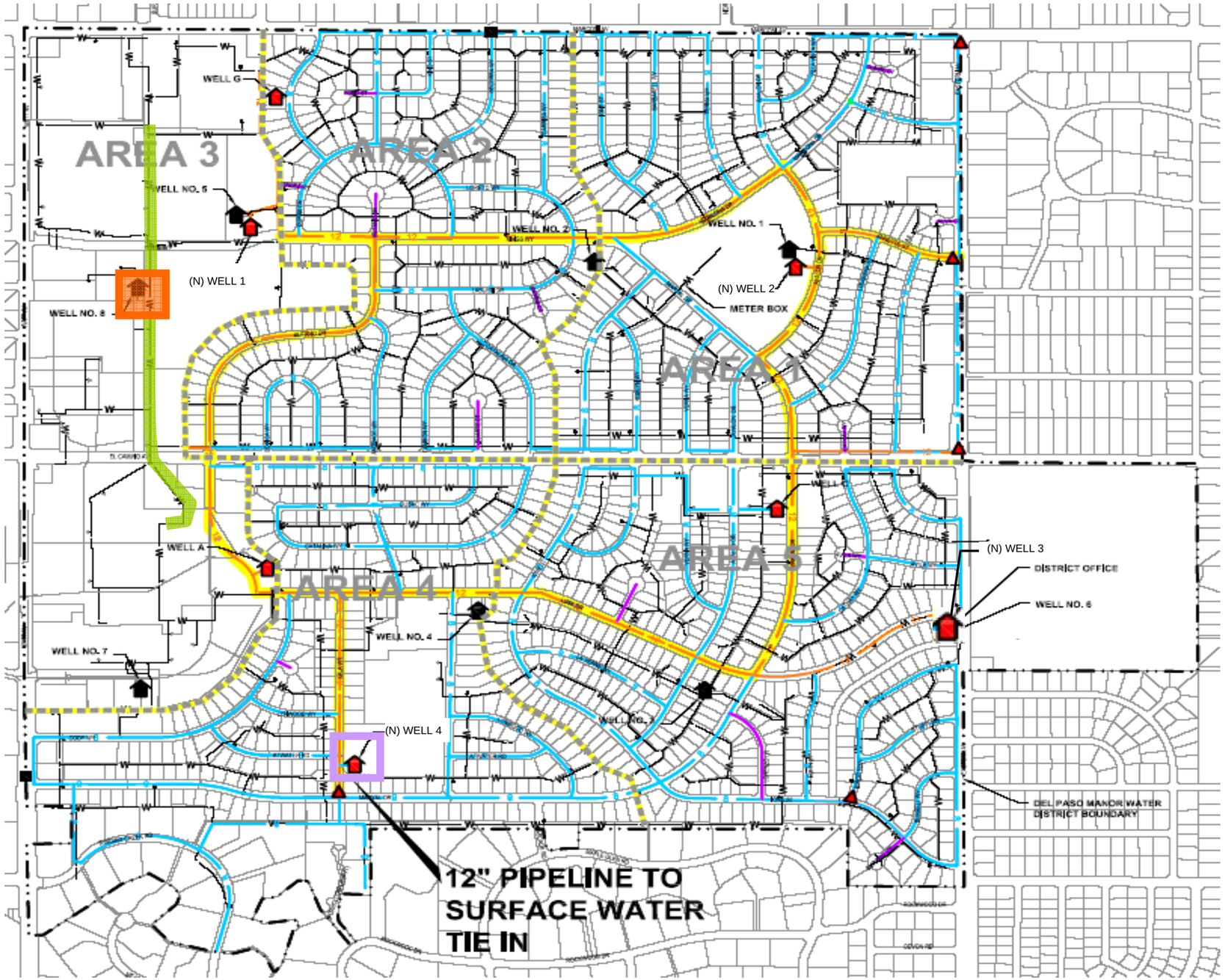
Production Facilities

1. Demolish (E) Well 8
2. Construct (N) Well at a site to be determined

Recommended optional work includes the following:

Distribution Facilities

1. Install (N) 4,500 LF of 12" pipelines and appurtenances



BASELINE, NEW BASELINE, DEMO OPTIONAL

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SACRAMENTO, CALIFORNIA
MASTER PLAN

WATER SYSTEM PSM 2026-2030

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FIGURE 15

9.3 Cost Estimate

The cost estimates were prepared using prior construction bids, current materials pricing, estimating guides, and engineering judgment. The costs are opinion of probable cost and reflect a conceptual level of accuracy. The estimates include a 25 percent contingency for unforeseen conditions, a 10 percent cost for engineering, administrative, and legal costs, a 1 percent cost for environmental review. In this case, it is assumed that District's Planned System Maintenance projects qualify for CEQA Categorical Exemption. Opinions of cost are in current 2009 dollars and are based on Engineering News Records for West Coast Cities - San Francisco Index of 9757.

The estimated new well construction costs include new well drilling and associated improvements, such as site work, mechanical, electrical and instrumentation. The estimated new pipeline cost is per lineal foot of trench installed. The appurtenances include blow-off assembly, fire hydrants, connection to existing distribution system, and abandonment of existing pipeline. Land costs for new wells are included at an estimated $250,000 per site and may vary based on actual sites.

Total cost for PSM Phases 1 – 5 in current 2009 is approximately $28.3 M. The Cost Summary is shown by phase, schedule, and baseline and optional costs. Optional costs reflect costs of distribution pipelines that are driven by District wide completion of service retrofits and meter setters installation for all residential meters installed by 2025. Cost estimate is prepared to reflect options of completing meter installation as an optional effort in phase 4 (2022-2026). The breakdown of cost estimate by individual projects is also included as example of potential staging completion of each PSM phase.

A cost impact calculation was prepared assuming a 4 ½ percent interest rate over 30 years allocated by estimated water use. The estimate provides a monthly residential service cost associated with each PSM phase.

Del Paso Manor Water District
Planned System Maintenace
2010-2030
Meter Installation by 2025
Cost Summary

PSM Phase	Scheduled	Baseline	Optional	Total
1	2010 - 2014	$4,393,400	$0	$4,393,400
2	2014 - 2018	$4,928,200	$1,147,000	$6,075,200
3	2018 - 2022	$2,439,400	$2,184,800	$4,624,200
4	2022 - 2026	$6,910,100	$5,628,300	$12,538,400
5	2026 - 2030	$1,744,300	$617,400	$2,361,700
Estimated Cost				$ 29,992,900
		Rounded to:		**$ 29,993,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 1- Summary
2010-2014

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 5	1	LS	$ 50,000.00	$ 50,000.00
Construct (N) Well 5	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00
Well Electrical Upgrade/SCADA	1	LS	$ 250,000.00	$ 250,000.00
Demolish (E) Well 7	1	LS	$ 75,000.00	$ 75,000.00
PIPELINES				
12" Piping	2610	LF	$ 87.22	$ 227,640.00
8" Piping		LF	$ -	$ -
6" Piping		LF	$ -	$ -
Appurtenances [a]	1	LS	$ 20,000.00	$ 20,000.00
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	46	EA	$ 1,700.00	$ 78,200.00
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
CONJUNCTIVE USE				
Carmichael WD Intertie				
Pipeline and System Intertie	1	EA	$ 360,624.00	$ 360,624.00
Booster Pump Station	1	EA	$ 237,600.00	$ 237,600.00
Additional Environmental	1	LS	$ 250,000.00	$ 250,000.00
Land/Right of Way				
Well 5	1	LS	$ 250,000.00	$ 250,000.00
CWD Intertie	1	LS	$ 250,000.00	$ 250,000.00

Subtotal		$ 3,163,624.00
Contingencies	25%	$ 790,906.00
Subtotal		$ 3,954,530.00
Engineering, Admin, and Legal	10%	$ 395,453.00
Subtotal		$ 4,349,983.00
Environmental (Categorical Exemption)	1%	$ 43,499.83
Estimated Cost		$ 4,393,482.83

Rounded to: $ 4,393,400.00

Economic Impacts	
Outlay 2014	$ 4,393,400.00
Annual Cost Factor 30 years @ 4.5% (0.0614)	$ 269,754.76
Cost per Acre Foot Water/Year	$ 160.57
Cost per Single Family ResidentialMonth	$ 7.28

Del Paso Manor Water District
Planned System Maintenance
Phase 1
2010-2014
Project 1A

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 5	1	LS	$ 50,000.00	$ 50,000.00
Construct (N) Well 5	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00

Subtotal		$ 1,164,560.00
Contingencies	25%	$ 291,140.00
Subtotal		$ 1,455,700.00
Engineering, Admin, and Legal	10%	$ 145,570.00
Subtotal		$ 1,601,270.00
Environmental (Categorical Exemption)	1%	$ 16,012.70
Estimated Cost		$ 1,617,282.70

Rounded to:	**$ 1,617,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 1
2010-2014
Project 1B

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Well Electrical Upgrade/SCADA	1	LS	$ 250,000.00	$ 250,000.00
Demolish (E) Well 7	1	LS	$ 75,000.00	$ 75,000.00
Subtotal				$ 325,000.00
Contingencies			25%	$ 81,250.00
Subtotal				$ 406,250.00
Engineering, Admin, and Legal			10%	$ 40,625.00
Subtotal				$ 446,875.00
Environmental (Categorical Exemption)			1%	$ 4,468.75
Estimated Cost				$ 451,343.75
		Rounded to:		**$ 451,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 1
2010-2014
Project 1C

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
PIPELINES				
12" Piping	2610	LF	$ 87.22	$ 227,640.00
8" Piping		LF	$ -	$ -
6" Piping		LF	$ -	$ -
Appurtenances [a]	1	LS	$ 20,000.00	$ 20,000.00
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	46	EA	$ 1,700.00	$ 78,200.00
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		$ 325,840.00
Contingencies	25%	$ 81,460.00
Subtotal		$ 407,300.00
Engineering, Admin, and Legal	10%	$ 40,730.00
Subtotal		$ 448,030.00
Environmental (Categorical Exemption)	1%	$ 4,480.30
Estimated Cost		$ 452,510.30

Rounded to:	**$ 453,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 1
2010-2014
Project 1D

Project Element	Quantity	Unit	Unit Cost	Extension
CONJUNCTIVE USE				
Carmichael WD Intertie				
Pipeline and System Intertie	1	EA	$ 360,624.00	$ 360,624.00
Booster Pump Station	1	EA	$ 237,600.00	$ 237,600.00
Additional Environmental	1	LS	$ 250,000.00	$ 250,000.00

Subtotal		$ 848,224.00
Contingencies	25%	$ 212,056.00
Subtotal		$ 1,060,280.00
Engineering, Admin, and Legal	10%	$ 106,028.00
Subtotal		$ 1,166,308.00
Environmental (Categorical Exemption)	1%	$ 11,663.08
Estimated Cost		$ 1,177,971.08

Rounded to: $ 1,178,000.00

Del Paso Manor Water District
Planned System Maintenance
Phase 2 - Summary
2014-2018

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 1	1	LS	$ 90,000.00	$ 90,000.00
Construct (N) Well 1	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Pump Station Building	1	LS	$ 106,000.00	$ 106,000.00
Demolish (E) Well 6	1	LS	$ 90,000.00	$ 90,000.00
PIPELINES				
12" Piping	5200	LF	$ 87.46	$ 454,800.00
8" Piping		LF	$ -	$ -
6" Piping		LF	$ -	$ -
Appurtenances [a]	1	LS	$ 70,350.83	$ 70,350.83
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	96	EA	$ 1,700.00	$ 163,482.01
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
NEW DISTRICT OFFICE				
Building Acquisition	3600	SF	$ 250.00	$ 900,000.00
Tenant Improvement	3600	SF	$ 90.00	$ 324,000.00
Land/Right of Way				
Well 1	1	LS	$ 250,000.00	$ 250,000.00
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	900	LF	$ 88.00	$ 79,200.00
8" Piping	17230	LF	$ 57.90	$ 57.90
6" Piping	300	LF	$ 46.00	$ 46.00
Appurtenances	1	LS	$ 167,249.17	$ 167,249.17
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	341	EA	$ 1,700.00	$ 579,417.99
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
Subtotal				$ 4,374,603.90
Contingencies			25%	$ 1,093,650.98
Subtotal				$ 5,468,254.88
Engineering, Admin, and Legal			10%	$ 546,825.49
Subtotal				$ 6,015,080.37
Environmental (Categorical Exemption)			1%	$ 60,150.80
Estimated Cost				$ 6,075,231.17
			Rounded to:	**$ 6,075,200.00**

Economic Impacts	
Outlay 2014	$ 6,075,200.00
Annual Cost Factor 30 years @ 4.5% (0.0614)	$ 373,017.28
Cost per Acre Foot Water/Year	$ 222.03
Cost per Single Family ResidentialMonth	$ 10.07

Del Paso Manor Water District
Planned System Maintenance
Phase 2
2014-2018
Project 2A

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 1	1	LS	$ 90,000.00	$ 90,000.00
Construct (N) Well 1	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Pump Station Building	1	LS	$ 106,000.00	$ 106,000.00
Demolish (E) Well 6	1	LS	$ 90,000.00	$ 90,000.00

Subtotal		$ 1,386,000.00
Contingencies	25%	$ 346,500.00
Subtotal		$ 1,732,500.00
Engineering, Admin, and Legal	10%	$ 173,250.00
Subtotal		$ 1,905,750.00
Environmental (Categorical Exemption)	1%	$ 19,057.50
Estimated Cost		$ 1,924,807.50

Rounded to:	**$ 1,925,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 2
2014-2018
Project 2B

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
NEW DISTRICT OFFICE				
Building Acquisition	3600	SF	$ 250.00	$ 900,000.00
Tenant Improvement	3600	SF	$ 90.00	$ 324,000.00
Subtotal				$ 1,224,000.00
Contingencies			25%	$ 306,000.00
Subtotal				$ 1,530,000.00
Engineering, Admin, and Legal			10%	$ 153,000.00
Subtotal				$ 1,683,000.00
Environmental (Categorical Exemption)			1%	$ 16,830.00
Estimated Cost				$ 1,699,830.00
		Rounded to:		**$ 1,700,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 2
2014-2018
Project 2C

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
PIPELINES				
12" Piping	5200	LF	$ 87.46	$ 454,800.00
8" Piping		LF	$ -	$ -
6" Piping		LF	$ -	$ -
Appurtenances [a]	1	LS	$ 70,350.83	$ 70,350.83
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	96	EA	$ 1,700.00	$ 163,482.01
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		$ 688,632.84
Contingencies	25%	$ 172,158.21
Subtotal		$ 860,791.05
Engineering, Admin, and Legal	10%	$ 86,079.10
Subtotal		$ 946,870.15
Environmental (Categorical Exemption)	1%	$ 9,468.70
Estimated Cost		$ 956,338.86

Rounded to:	**$ 956,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 2
2014-2018
Project 2D

Project Element	Quantity	Unit	Unit Cost	Extension
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	900	LF	$ 88.00	$ 79,200.00
8" Piping	17230	LF	$ 57.90	$ 57.90
6" Piping	300	LF	$ 46.00	$ 46.00
Appurtenances [a]	1	LS	$ 167,249.17	$ 167,249.17
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	341	EA	$ 1,700.00	$ 579,417.99
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		$ 825,971.06
Contingencies	25%	$ 206,492.77
Subtotal		$ 1,032,463.83
Engineering, Admin, and Legal	10%	$ 103,246.38
Subtotal		$ 1,135,710.21
Environmental (Categorical Exemption)	1%	$ 11,357.10
Estimated Cost		$ 1,147,067.32

Rounded to: $ 1,147,000.00

Del Paso Manor Water District
Planned System Maintenance
Phase 3 - Summary
2018-2022

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Construct (N) Well 6	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00
Landscape	1	LS	$ 10,000.00	$ 10,000.00
PIPELINES				
12" Piping	4900	LF	$ 85.96	$ 421,200.00
8" Piping	0	LF	$ -	$ -
6" Piping	0	LF	$ -	$ -
Appurtenances [a]	1	LS	$ 68,763.43	$ 68,763.43
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	84	EA	$ 1,700.00	$ 142,049.29
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	0	LF	$ -	$ -
8" Piping	14040	LF	$ 57.88	$ 812,640.00
6" Piping	1350	LF	$ 43.33	$ 58,500.00
Appurtenances [a]	1	LS	$ 125,636.57	$ 125,636.57
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
AC Pipe Removal	1300	LF	$ 34.00	$ 44,200.00
Trenchless Installation	1300	LF	$ 66.25	$ 86,125.00
SERVICES				
Service Retrofit to Front Yard	262	EA	$ 1,700.00	$ 446,150.71
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		$ 3,329,825.00
Contingencies	25%	$ 832,456.25
Subtotal		$ 4,162,281.25
Engineering, Admin, and Legal	10%	$ 416,228.13
Subtotal		$ 4,578,509.38
Environmental (Categorical Exemption)	1%	$ 45,785.09
Estimated Cost		$ 4,624,294.47
Rounded to:		**$ 4,624,200.00**

Economic Impacts	
Outlay 2014	$ 4,624,200.00
Annual Cost Factor 30 years @ 4.5% (0.0614)	$ 283,925.88
Cost per Acre Foot Water/Year	$ 169.00
Cost per Single Family ResidentialMonth	$ 7.66

Del Paso Manor Water District
Planned System Maintenance
Phase 3
2018-2022
Project 3A

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Construct (N) Well 6	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00
Landscape	1	LS	$ 10,000.00	$ 10,000.00

Subtotal		**$ 1,124,560.00**
Contingencies	25%	$ 281,140.00
Subtotal		$ 1,405,700.00
Engineering, Admin, and Legal	10%	$ 140,570.00
Subtotal		$ 1,546,270.00
Environmental (Categorical Exemption)	1%	$ 15,462.70
Estimated Cost		$ 1,561,732.70

Rounded to:	**$ 1,562,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 3
2018-2022
Project 3B

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
PIPELINES				
12" Piping	4900	LF	$ 85.96	$ 421,200.00
8" Piping	0	LF	$ -	$ -
6" Piping	0	LF	$ -	$ -
Appurtenances [a]	1	LS	$ 68,763.43	$ 68,763.43
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	84	EA	$ 1,700.00	$ 142,049.29
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		**$ 632,012.72**
Contingencies	25%	$ 158,003.18
Subtotal		$ 790,015.89
Engineering, Admin, and Legal	10%	$ 79,001.59
Subtotal		$ 869,017.48
Environmental (Categorical Exemption)	1%	$ 8,690.17
Estimated Cost		$ 877,707.66

Rounded to:	**$ 878,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 3
2018-2022
Project 3C

Project Element	Quantity	Unit	Unit Cost	Extension
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	0	LF	$ -	$ -
8" Piping	14040	LF	$ 57.88	$ 812,640.00
6" Piping	1350	LF	$ 43.33	$ 58,500.00
Appurtenances [a]	1	LS	$ 125,636.57	$ 125,636.57
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
AC Pipe Removal	1300	LF	$ 34.00	$ 44,200.00
Trenchless Installation	1300	LF	$ 66.25	$ 86,125.00
SERVICES				
Service Retrofit to Front Yard	262.441597	EA	$ 1,700.00	$ 446,150.71
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		**$ 1,573,252.28**
Contingencies	25%	$ 393,313.07
Subtotal		$ 1,966,565.36
Engineering, Admin, and Legal	10%	$ 196,656.54
Subtotal		$ 2,163,221.89
Environmental (Categorical Exemption)	1%	$ 21,632.22
Estimated Cost		$ 2,184,854.11

Rounded to:	**$ 2,185,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 4 - Summary
2022-2026

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish/Abandon (E) Well 2	1	LS	$ 50,000.00	$ 50,000.00
Demolish/Abandon (E) Well 3	1	LS	$ 50,000.00	$ 50,000.00
Demolish/Abandon (E) Well 4	1	LS	$ 50,000.00	$ 50,000.00
Construct (N) Well near Country Club	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00
PIPELINES				
12" Piping	6880	LF	$ 86.44	$ 594,720.00
8" Piping	35500	LF	$ 56.81	$ 2,016,800.00
6" Piping	1550	LF	$ 43.55	$ 67,500.00
Appurtenances [a]	1	LS	$ 340,310.17	$ 340,310.17
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	407	EA	$ 1,700.00	$ 691,900.00
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	4500	LF	$ 87.20	$ 392,400.00
8" Piping	20000	LF	$ 56.96	$ 1,139,200.00
6" Piping	100	LF	$ 48.00	$ 4,800.00
Appurtenances [a]	1	LS	$ 175,089.83	$ 175,089.83
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	381	EA	$ 1,700.00	$ 647,700.00
Services Existing Front Yard	75	EA	$ 1,200.00	$ 90,000.00
Meters	1692	EA	$ 800.00	$ 1,353,600.00
Land/Right of Way				
Well 4	1	LS	$ 250,000.00	$ 250,000.00

Subtotal		$ 9,028,580.00
Contingencies	25%	$ 2,257,145.00
Subtotal		$ 11,285,725.00
Engineering, Admin, and Legal	10%	$ 1,128,572.50
Subtotal		$ 12,414,297.50
Environmental (Categorical Exemption)	1%	$ 124,142.98
Estimated Cost		$ 12,538,440.48
Rounded to:		**$ 12,538,400.00**

Economic Impacts	
Outlay 2014	$ 12,538,400.00
Annual Cost Factor 30 years @ 4.5% (0.0614)	$ 769,857.76
Cost per Acre Foot Water/Year	$ 458.25
Cost per Single Family ResidentialMonth	$ 20.77

Del Paso Manor Water District
Planned System Maintenance
Phase 4
2022-2026
Project 4A

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish/Abandon (E) Well 2	1	LS	$ 50,000.00	$ 50,000.00
Demolish/Abandon (E) Well 3	1	LS	$ 50,000.00	$ 50,000.00
Demolish/Abandon (E) Well 4	1	LS	$ 50,000.00	$ 50,000.00
Construct (N) Well near Country Club	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Block Wall	140	LF	$ 104.00	$ 14,560.00

Subtotal		$ 1,264,560.00
Contingencies	25%	$ 316,140.00
Subtotal		$ 1,580,700.00
Engineering, Admin, and Legal	10%	$ 158,070.00
Subtotal		$ 1,738,770.00
Environmental (Categorical Exemption)	1%	$ 17,387.70
Estimated Cost		$ 1,756,157.70
Rounded to:		**$ 1,756,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 4
2022-2026
Project 4B

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
12" Piping	6880	LF	$ 86.44	$ 594,720.00
8" Piping	35500	LF	$ 56.81	$ 2,016,800.00
6" Piping	1550	LF	$ 43.55	$ 67,500.00
Appurtenances [a]	1	LS	$ 340,310.17	$ 340,310.17
a] Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	407	EA	$ 1,700.00	$ 691,900.00
Services Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -

Subtotal		$ 3,711,230.17
Contingencies	25%	$ 927,807.54
Subtotal		$ 4,639,037.71
Engineering, Admin, and Legal	10%	$ 463,903.77
Subtotal		$ 5,102,941.48
Environmental (Categorical Exemption)	1%	$ 51,029.41
Estimated Cost		$ 5,153,970.90
Rounded to:		**$ 5,154,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 4
2022-2026
Project 4C

Project Element	Quantity	Unit	Unit Cost	Extension
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	4500	LF	$ 87.20	$ 392,400.00
8" Piping	20000	LF	$ 56.96	$ 1,139,200.00
6" Piping	100	LF	$ 48.00	$ 4,800.00
Appurtenances [a]	1	LS	$ 175,089.83	$ 175,089.83
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	381	EA	$ 1,700.00	$ 647,700.00
Services Existing Front Yard	75	EA	$ 1,200.00	$ 90,000.00

Subtotal		$ 2,449,189.83
Contingencies	25%	$ 612,297.46
Subtotal		$ 3,061,487.29
Engineering, Admin, and Legal	10%	$ 306,148.73
Subtotal		$ 3,367,636.02
Environmental (Categorical Exemption)	1%	$ 33,676.36
Estimated Cost		$ 3,401,312.38
Rounded to:		**$ 3,401,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 4
2022-2026
Project 4D

Project Element	Quantity	Unit	Unit Cost	Extension
METER INSTALLATION EFFORT				
SERVICES				
Meters	1692	EA	$ 800.00	$ 1,353,600.00
Subtotal				$ 1,353,600.00
Contingencies			25%	$ 338,400.00
Subtotal				$ 1,692,000.00
Engineering, Admin, and Legal			10%	$ 169,200.00
Subtotal				$ 1,861,200.00
Environmental (Categorical Exemption)			1%	$ 18,612.00
Estimated Cost				$ 1,879,812.00
		Rounded to:		**$ 1,880,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 5 Summary
2026-2030

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 8	1	LS	$ 50,000.00	$ 50,000.00
(N) Well at an undetermined site	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Pump Station Building	1	LS	$ 106,000.00	$ 106,000.00
PIPELINES				
12" Piping	0	LF	$ -	$ -
8" Piping	0	LF	$ -	$ -
6" Piping	0	LF	$ -	$ -
Appurtenances [a]	0	LS	$ -	$ -
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				
SERVICES				
Service Retrofit to Front Yard	0	EA	$ 1,700.00	$ -
Service Existing Front Yard	0	EA	$ 1,200.00	$ -
Meters	0	EA	$ 800.00	$ -
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	4500	LF	$ 84.00	$ 378,000.00
Appurtenances [a]	1	LS	$ 66,600.00	$ 66,600.00
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				

Subtotal		$ 1,700,600.00
Contingencies	25%	$ 425,150.00
Subtotal		$ 2,125,750.00
Engineering, Admin, and Legal	10%	$ 212,575.00
Subtotal		$ 2,338,325.00
Environmental (Categorical Exemption)	1%	$ 23,383.25
Estimated Cost		$ 2,361,708.25
Rounded to:		**$ 2,361,700.00**

Economic Impacts	
Outlay 2014	$ 2,361,700.00
Annual Cost Factor 30 years @ 4.5% (0.0614)	$ 145,008.38
Cost per Acre Foot Water/Year	$ 86.31
Cost per Single Family ResidentialMonth	$ 3.91

Del Paso Manor Water District
Planned System Maintenance
Phase 5
2026-2030
Project 5A

Project Element	Quantity	Unit	Unit Cost	Extension
BASELINE EFFORT				
WELLS				
Demolish (E) Well 8	1	LS	$ 50,000.00	$ 50,000.00
(N) Well at an undetermined site	1	LS	$ 1,100,000.00	$ 1,100,000.00
(N) Pump Station Building	1	LS	$ 106,000.00	$ 106,000.00

Subtotal		$ 1,256,000.00
Contingencies	25%	$ 314,000.00
Subtotal		$ 1,570,000.00
Engineering, Admin, and Legal	10%	$ 157,000.00
Subtotal		$ 1,727,000.00
Environmental (Categorical Exemption)	1%	$ 17,270.00
Estimated Cost		$ 1,744,270.00

Rounded to:	**$ 1,744,000.00**

Del Paso Manor Water District
Planned System Maintenance
Phase 5
2026-2030
Project 5B

Project Element	Quantity	Unit	Unit Cost	Extension
METER INSTALLATION EFFORT				
PIPELINES				
12" Piping	4500	LF	$ 84.00	$ 378,000.00
Appurtenances [a]	1	LS	$ 66,600.00	$ 66,600.00
a| Appurtenances include valves, fire hydrants, blow off assemblies and fittings				

Subtotal		$ 444,600.00
Contingencies	25%	$ 111,150.00
Subtotal		$ 555,750.00
Engineering, Admin, and Legal	10%	$ 55,575.00
Subtotal		$ 611,325.00
Environmental (Categorical Exemption)	1%	$ 6,113.25
Estimated Cost		$ 617,438.25

Rounded to: $ 617,000.00