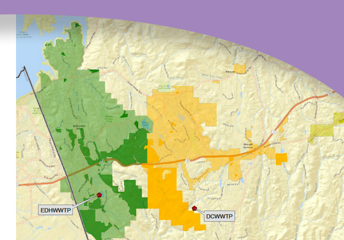

El Dorado Irrigation District

Integrated Water Resources Master Plan

July 2013

HDR

Wastewater Facilities Master Plan

El Dorado Irrigation District

July 31, 2013

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EXECUTIVE SUMMARY

This Wastewater Facilities Master Plan (WWFMP) provides a long-term program for the collection and treatment of wastewater and the use of recycled water resources for the El Dorado Irrigation District (District). A separate report was prepared for the Integrated Water Resources Master Plan (IWRMP). Together, these plans provide a roadmap for development of future infrastructure and maintenance of existing water, wastewater, and recycled water facilities. This executive summary provides an overview of the background, existing systems, and the recommended program described in this WWFMP.

ES-1 Background

Located on the western slope of the Sierra Nevada mountains in El Dorado County, the District provides wastewater collection, treatment, and recycled water services, as well as water for municipal, industrial, and irrigation uses to meet the growing needs of its customers. As such, the District is one of the few California districts that provide a full complement of water-related services.

ES-1.1 Project Vision and Objectives

The primary goal of this WWFMP was to develop an integrated water resources plan and wastewater facilities master plan that optimizes the use of the District's water resources and provides a roadmap for cost-effective development of future infrastructure and maintenance of existing water, wastewater, and recycled water facilities. This goal, combined with California's current economic situation, limited water supply, environmental constraints, and climate change, necessitates the need for a unified project vision. The vision of this WWFMP is:

> *Similar to many water agencies in California, the El Dorado Irrigation District desires to maintain its current level of service while preparing for future growth in an environmentally and fiscally responsible manner, while also considering the impacts of aging infrastructure systems and the uncertainties of climate change. The District sees the Integrated Water Resources Master Plan and Wastewater Facilities Master Plan Project as*

being the mechanism to address future water supply, infrastructure, and replacement needs in an integrated fashion.

To achieve the project vision, the following specific objectives have been established with respect to wastewater and recycled water:

- Define, balance, and integrate the District's water resources.
  - Define the long-term role of recycled water within the District's water resources portfolio.
- Identify the steps needed to support the recommended wastewater facilities master plan.
  - Develop integrated and prioritized water, wastewater and recycled water system capital improvements that are consistent with the District's long-term goals and objectives.
  - Coordinate water, wastewater and recycled water system improvements with recommended replacement activities to provide the basis for an affordable sustainable and complete capital improvement program.
  - Identify triggers which may cause the District to adjust the recommended program.

ES-1.2 Key Issues

The following key issues were addressed in the development of the WWFMP:

- Wastewater Discharge Alternatives and Future Role of Recycled Water
- Future Regulatory Requirements
- Aging Infrastructure

ES-1.3 Stakeholder Involvement

Stakeholder workshops were conducted in 2009, 2010, and 2012 to inform and involve stakeholders interested in the project. These workshops included discussion of the project vision, objectives, and key issues, and provided interested parties with an overview of the project's basis of planning and assumptions. Stakeholders were also invited to provide input which was then incorporated into the planning process.

ES-2 Existing Wastewater Systems

The District has the following four permitted wastewater collection systems: El Dorado Hills, Deer Creek, Camino Heights, and Gold Ridge Forest.

The District's two largest collection systems, shown in Figure ES-1, are the El Dorado Hills and Deer Creek Collection Systems. These systems are served by a series of lift stations, force mains, and gravity mains that convey wastewater to the El Dorado Hills Wastewater Treatment Plant (EDHWWTP) and the Deer Creek Wastewater Treatment Plant (DCWWTP), respectively. Together, the El Dorado Hills and Deer Creek wastewater treatment plants serve approximately 22,000 connections as described below:

- **El Dorado Hills Wastewater Treatment Plant.** With an existing capacity of 4.0 million gallons per day (mgd), the EDHWWTP serves the community of El Dorado Hills, with an estimated population of approximately 42,100[1] people, including approximately 12,000 wastewater service connections. Treated effluent is discharged to Carson Creek or recycled for beneficial use in the District's recycled water system.
- **Deer Creek Wastewater Treatment Plant.** With an existing capacity of 3.6 mgd, the DCWWTP provides treatment for approximately 10,000 wastewater service connections in the communities of Cameron Park, Shingle Springs, and Diamond Springs, which collectively have an estimated population of approximately 33,700[1] people. Treated effluent is recycled or discharged to Deer Creek. The District is required to discharge a minimum of 1.0 mgd to Deer Creek any time the treated effluent flow is 2.5 mgd or higher.

The District's two remaining collection systems are smaller systems serving the communities of Camino Heights and Gold Ridge Forest.

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[1] 2010 U.S. Census http//:quickfacts.census.gov

ES-3 Existing Recycled Water System

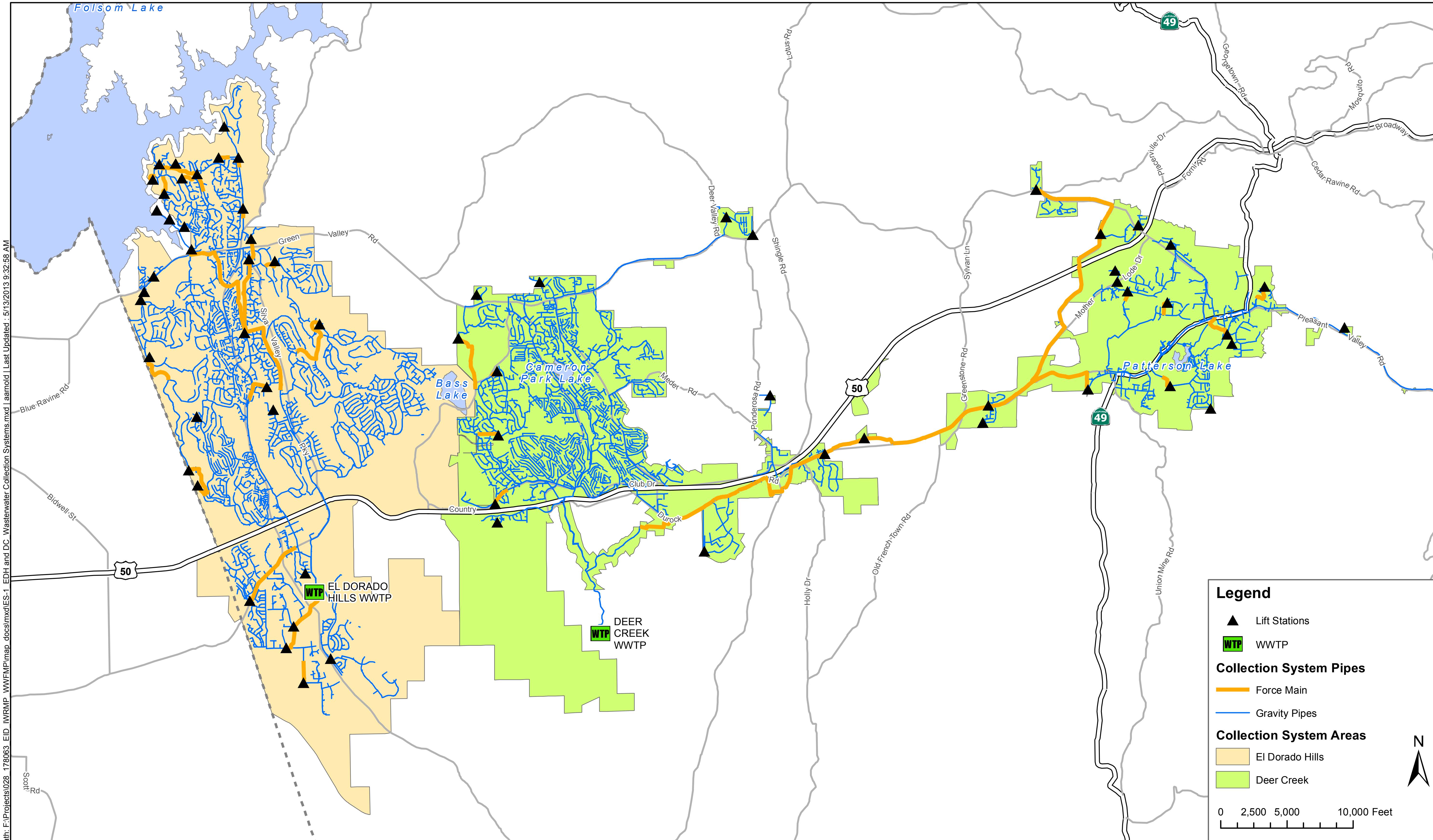
The District has been producing recycled water for over 30 years at the EDHWWTP. The first recycled water deliveries were made to the Wetsel-Oviatt Lumber Company for log deck irrigation, and the El Dorado Hills Executive Golf Course, for turf irrigation.

Today, recycled water is produced at both the EDHWWTP and the DCWWTP and delivered to recycled water customers through an interconnected network consisting of transmission and distribution pipelines, pump stations, storage tanks, pressure reducing stations, and appurtenant facilities located within the communities of EI Dorado Hills and Cameron Park, as shown in Figure ES-2.

Annual recycled water production capabilities are based on the total wastewater flow entering the DCWWTP and EDHWWTP, uses and/or losses which occur within each wastewater treatment plant, infiltration and inflow (I/I), and the minimum discharge of 1.0 mgd of treated effluent to Deer Creek. In order to meet maximum day demands in the recycled water system, the District has historically supplemented the recycled water supply with potable water. Between 2008 and 2012, the average recycled water production was approximately 2,600 acre feet per year (AFY), which was supplemented with an average of 420 AFY of potable water to meet demand in the recycled water system.

ES-4 Projected Wastewater Flows and Recycled Water Supply

Wastewater flow and recycled water supply projections provide a basis for planning future capital improvements. Projected wastewater flows will impact both the extent and timing of wastewater collection, treatment plant, and treated effluent disposal improvements, as well as the availability of additional recycled water supplies.



El Dorado Hills and Deer Creek Wastewater Collection Systems

FIGURE ES-1

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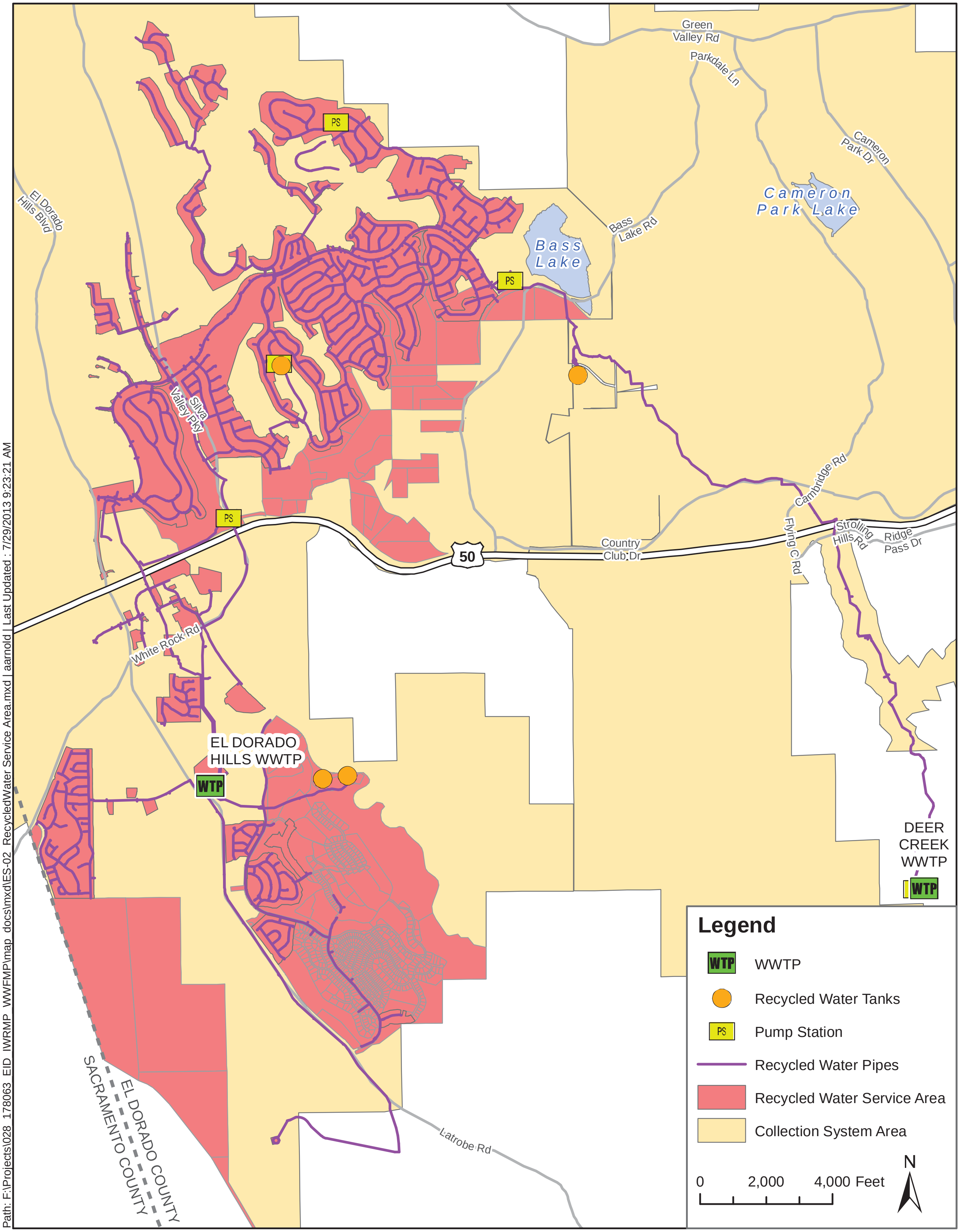


Recycled Water Service Area

FIGURE ES-2

Projected wastewater flows for the District's El Dorado Hills and Deer Creek Collection Systems, summarized in Table ES-1, are based on the County's General Plan Land Use designations and the number of planned connections included in the Specific Plans for the communities of Bass Lake Hills, Carson Creek, El Dorado Hills, Northwest El Dorado Hills, Promontory and Valley View. The land uses reflect the County's plans and policies and they have been through rigorous public and environmental review. This information was combined with the District's wastewater generation rates to project future flows.

Table ES-1. Future Flow Projections

	EDHWWTP (mgd)	DCWWTP (mgd)
Existing Average Dry Weather Flow[a]	2.65	2.64
Future Additional Flow at Buildout	2.80	2.36
Total Projected Average Dry Weather Flow	5.45	5.00

(a) Equal to the average of 2006 through 2009 average dry weather flow (ADWF). Per the District's discharge permits, ADWF is based on the average daily flow over three consecutive dry months (e.g., July, August, and September).

Based on buildout capacities of 5.0 mgd at DCWWTP and 5.45 mgd at EDHWWTP, as described above, the annual influent flow to the District's wastewater treatment plants is estimated to be 12,380 AFY which could be used to produce recycled water. However, much of that water is available during the wet season, when the recycled water demand is very low. In the early spring, demand for outdoor irrigation starts to increase slowly. Then in June through September, demand for recycled water is high, after which it begins to decline again in October.

Considering the seasonality of the recycled water demand, the future recycled water supply was projected based on actual recycled water produced and delivered to the recycled water system. Using that approach, it is estimated that approximately 4,900 AFY of recycled water could be produced, at buildout of the wastewater collection systems, to meet seasonal demands in much the same way the system is currently operated today.

The District is also actively pursuing the reduction or elimination of the 1 mgd discharge requirement to Deer Creek. If the District is successful in reducing that discharge to only 0.5 mgd in the future, approximately 5,180 AFY of recycled water could be produced at buildout and if the discharge requirement was eliminated, approximately 5,640 AFY of recycled water could be available at buildout.

Figure ES-3 illustrates the projected growth in recycled water supply availability through buildout of the El Dorado Hills and Deer Creek Collection Systems.

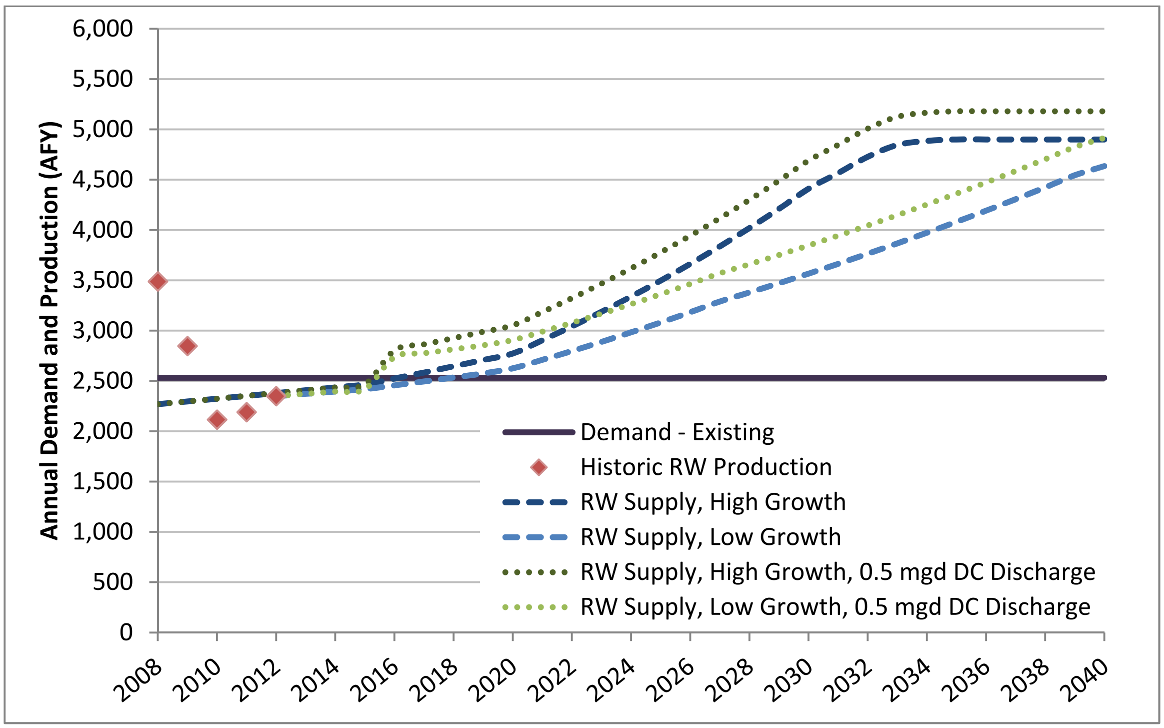


Figure ES-3. Projected Recycled Water Supply

In addition to existing demand, the Valley View, Serrano, and Carson Creek developments are expected to construct new homes with dual-plumbed services. With these future connections, the total recycled water demand is estimated to increase to approximately 3,630 AFY, which is well within the projected buildout recycled water supply.

ES-5 Collection System

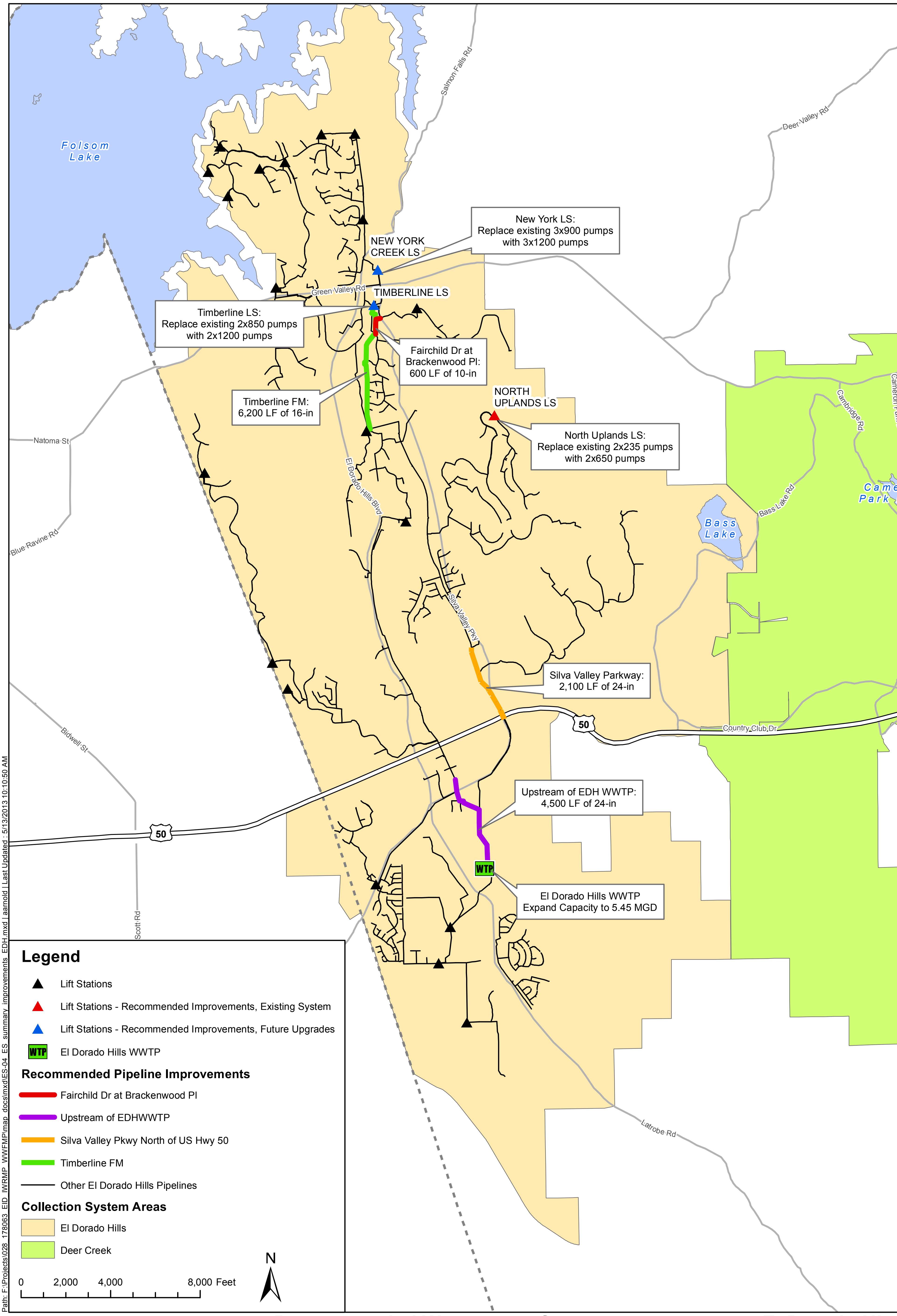
The evaluation of the El Dorado Hills and Deer Creek Collection Systems focused on the existing system and improvements needed to provide capacity for both existing and buildout conditions, as well as improvements needed to address condition related issues. Current and future regulatory requirements were also considered.

The recommended plan for the District's wastewater collection systems includes improvements to address existing capacity and condition related deficiencies, as well as upgrades to accommodate future growth, as summarized in Table ES-2. The recommended upgrades for the El Dorado Hills and Deer Creek Collection Systems are illustrated in Figure ES-4 and Figure ES-5, respectively.

Table ES-2. Summary of Collection System Recommendations

Facility Description	Estimated Quantity	Deficiency Type
El Dorado Hills Collection System		
Pipeline: Fairchild Dr at Brackenwood Place, Replace with 10- inch	600 LF	Existing Capacity
Pipeline: Upstream of EDHWWTP, Replace with 24- inch	4,500 LF	Existing Capacity
Silva Valley Parkway, Parallel with 24-inch	2,100 LF	Future Capacity
Timberline Force Main, Replace with 16- inch	6,200 LF	Future Capacity
North Uplands LS, Replace existing pumps with 2x650 pumps[a]	1	Existing Capacity
New York Creek LS, Replace existing pumps with 3x1200 gpm pumps[b]	1	Future Capacity
Timberline LS, Replace existing pumps with 2x1200 gpm pumps[b]	1	Future Capacity
Deer Creek Collection System		
Pipeline: Blanchard Rd downstream of East Rd LS, Parallel with 8-inch	1,300 LF	Existing Capacity
Pipeline: Strolling Hills Rd, Upsize to 24-inch	10,700 LF	Existing Capacity and Condition
Mother Lode Force Main Phase 6, Replace with 20-inch[c]	5,600 LF	Existing Condition and Future Capacity
Mother Lode Force Main Phase 7, Replace with 20-inch[c]	11,800 LF	Existing Condition and Future Capacity
El Dorado "Y" Upgrades, Replace with 10-inch[c]	13,770 LF	Existing Condition and Future Capacity
Pioneer Place LS, Replace existing pumps with 2x400 pumps[a]	1	Existing Capacity
El Dorado LS, Add standby 2000 gpm pump[d]	1	Future Capacity

(a) Condition improvements should be included with capacity upgrade.
(b) New York Creek LS and Timberline LS are coupled. Future improvements should be planned together.
(c) Condition assessment will confirm the full extent of required improvements.
(d) Recommended capacity improvement based on addition of the largest pump as a standby unit (for redundancy).



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Recommended Wastewater System Improvements, El Dorado Hills

FIGURE ES-4

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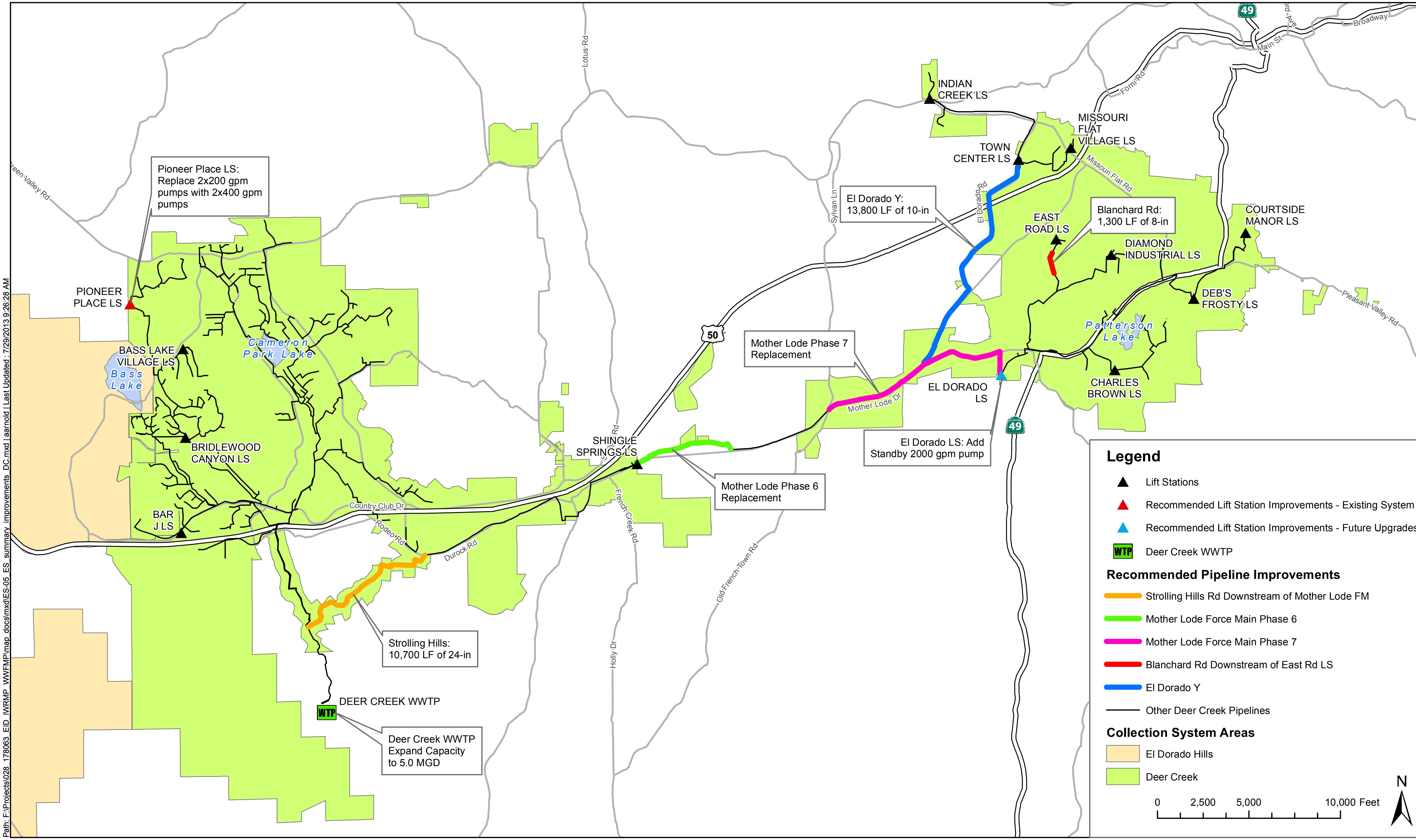

Recommended Wastewater System Improvements, Deer Creek

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FIGURE ES-5

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In addition to the recommendations summarized in Table ES-2, the District's ongoing Lift Station Condition Assessment Program has identified nine lift stations that require upgrades before 2018. It is recommended that the District continue to update and refine the lift station condition assessment and identify new lift stations requiring condition related upgrades in the future.

ES-6 Wastewater Treatment

Evaluation of the District's wastewater treatment facilities included an analysis of potential future regulatory permitting changes as well as expansion of treatment facilities to serve future development in the El Dorado Hills and Deer Creek Collection Systems.

The projected ADWF in the El Dorado Hills Collection System is expected to approach the existing EDHWWTP rated capacity in approximately 2026, as shown in Figure ES-6. To accommodate future growth in the collection system, the recommended plan includes the expansion of the EDHWWTP to 5.45 mgd. The District is currently planning to have the upgrades completed in 2025; however, the timeframe for expansion should be reviewed and refined based on actual growth in the system.

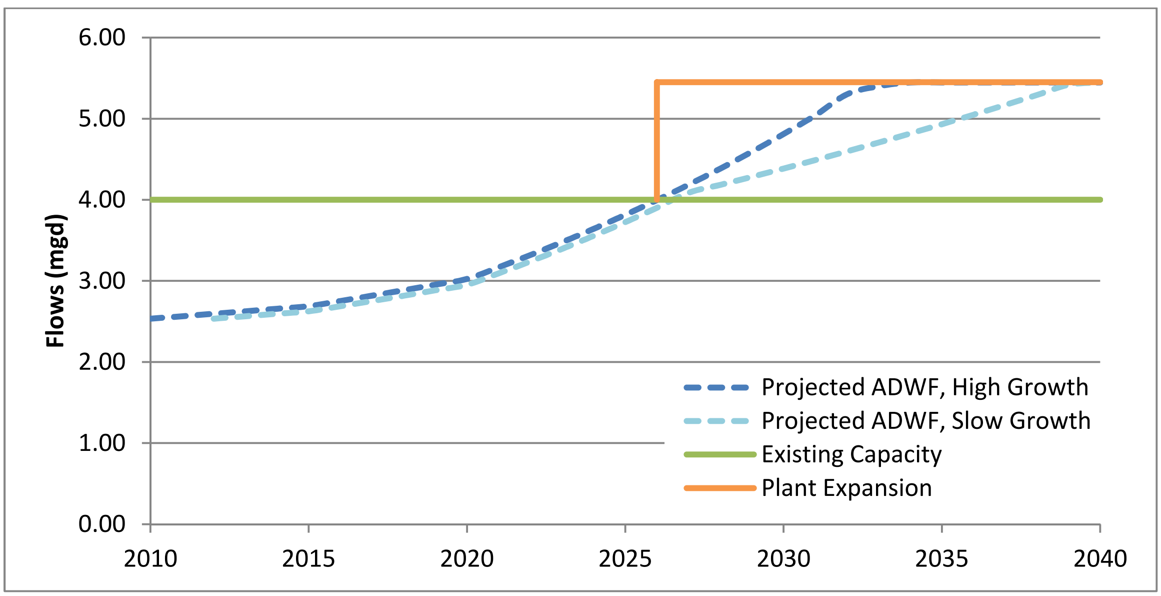


Figure ES-6. Projected Flows and Expansion for EDHWWTP

To accommodate future growth in the Deer Creek Collection System, the recommended plan includes the expansion of the DCWWTP to 5.0 mgd. The Deer Creek Collection

System is expected to reach the current rated capacity between 2022 and 2032, as shown in Figure ES-7. Thus, it is recommended that the District plan to expand the DCWWTP by 2029.

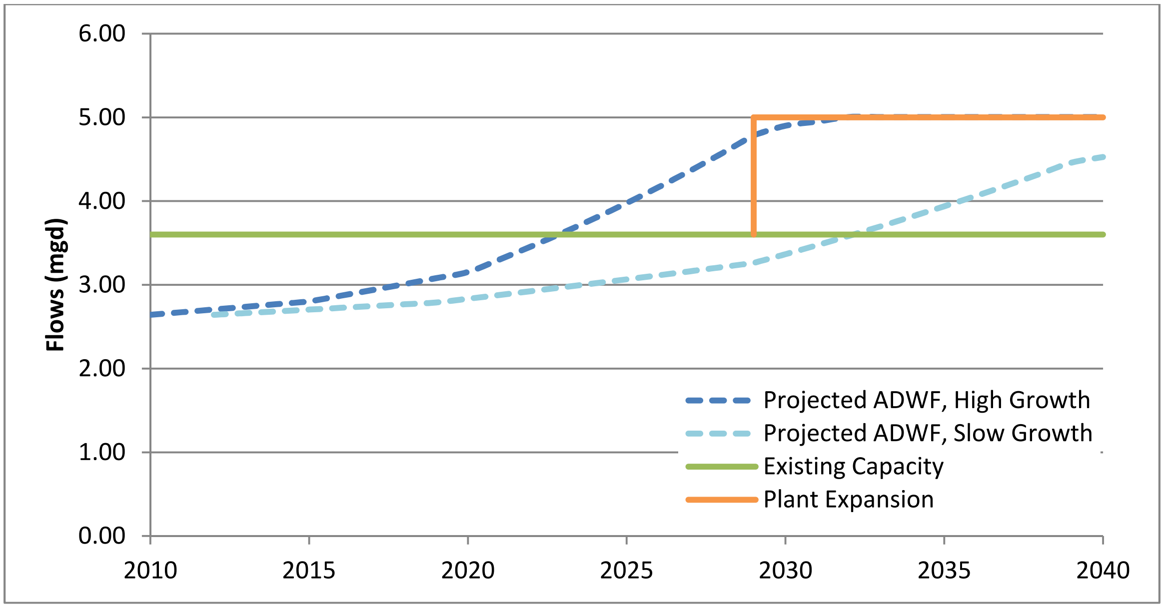


Figure ES-7. Projected Flows and Expansion for DCWWTP

Specific process improvements have not been identified as part of the expansions of the EDHWWTP and DCWWTP. However, the District should monitor the following regulatory issues, as they could impact future process upgrades and/or monitoring and reporting requirements:

- Nutrients
- Ammonia and Nitrate
- Chronic Toxicity
- Constituents of Emerging Concern
- Biosolids
- Metals
- Industrial Pretreatment

Depending on the outcome of these regulatory issues, the District may need to make future capital investments at the wastewater treatment plants to comply with future regulatory requirements. Costs for process upgrades to address potential future requirements have not been included in this Master Plan.

ES-7 Effluent Disposal and Reuse

Recycled water is used to offset potable water supply for irrigation of residential developments, schools, parks, golf courses, and commercial/industrial landscaping. As development occurs in the El Dorado Hills and Deer Creek Collection Systems, the production and supply of recycled water will increase.

The additional recycled water demand introduced by the Valley View, Serrano, and Carson Creek developments can be met without any potable water supply augmentation once the El Dorado Hills and Deer Creek Collection Systems are built out. However, prior to build out, supplementation will be required to meet demands during peak days. The exact timing for when the recycled water demand and supply will reach equilibrium is difficult to project. However, it is expected to occur sometime between 2023 and 2031. At buildout, there will be approximately 1,270 to 1,550 AFY of additional recycled water supply available to serve additional developments if desired.

It is recommended that the District further evaluate the future of the recycled water program and determine the desired extent of future expansion considering the operational constraints associated with potable water supplementation, particularly during peak demand periods.

At this time, seasonal storage is not recommended. However, the District may want to reconsider it, and its benefits, in the future. The seasonal storage reservoir would allow the District to divert and store 2,500 AFY of recycled water that would otherwise be discharged during the wet months. The additional recycled water supply could offset other potable supplies, which could then be used for other purposes, such as groundwater banking or water transfers. Therefore, as conditions change and evolve (e.g., financing becomes available), the District should reconsider the feasibility of the seasonal storage reservoir.

ES-8 Recycled Water

The analysis of the recycled water system included regulatory considerations; infrastructure needs to serve new connections in the Valley View, Serrano, and Carson Creek developments; and system operations.

The recommended plan for the District's recycled water system includes upgrades to accommodate future growth. The recommended upgrades are summarized in Table ES-3.

Table ES-3. Summary of Recycled Water System Recommendations

Facility Description	Estimated Quantity
Recycled Water Tank, Elevation 720 (a)	2.5 MG
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 1(b)	1
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 2(c)	1
Deer Creek Recycled Water Pump Station Expansion from 2.5 to 4.5 MGD(d)	1

(a) Tank is sized for 100 percent of max day demand for Carson Creek.
(b) Phase 1 includes an analysis of pump and pipeline capacity and addition of a pump at the existing pump station.
(c) Phase 2 is based on doubling the capacity of the existing pump station to accommodate max day demands and supply water from the 70 MG storage reservoir at the EDHWWTP.
(d) Existing pump station is unable to meet buildout requirements at the future head condition and all pumps at the existing pump station will require replacement.

In addition to the capital facilities summarized in Table ES-3, it is also recommended that the District continue to monitor peak demand conditions in the recycled water system and work with developers, homeowner associations, and other customers to distribute recycled water demand evenly over the day. This will help to mitigate pressure oscillations that increase pipe fatigue in the system, reduce the peak hour demands and future capacity requirements for any new pipelines and pump stations.

ES-8 Implementation of the Recommended Plan

The previous subsections presented the facilities and programs included in the recommended plan of this WWFMP. These recommendations provide a comprehensive program that includes improvements for the existing collection and recycled water systems, as well as future upgrades needed for the collection, wastewater treatment, effluent discharge, and recycled water systems.

The following subsections describe facility phasing, financing, and a recommended implementation schedule and next steps.

ES-8.1 Phasing of Recommended Facilities

The facilities included in the recommended plan will be time-phased to correspond with projected development in the El Dorado Hills and Deer Creek Collection Systems and resulting increases in wastewater flows. Consistent with the IWRMP, the following phases have been established for addition of facilities and implementation planning:

- Phase 1: 2012 - 2020
- Phase 2: 2021 - 2025
- Phase 3: 2026 - Buildout

ES-8.2 Financing

The estimated capital costs by phase are summarized in Table ES-4. All costs are presented in 2012 dollars. The recommended facilities should be incorporated into the Districts five-year capital improvement program in accordance with the proposed phasing plan. Specific project financing can then be addressed as part of the District's regular budgeting, rates, and facility capacity charges program updates.

ES-8.3 Implementation Schedule

A recommended implementation schedule is presented in Figure ES-8. This implementation schedule covers 2013 through 2030. Future updates to this WWFMP will provide opportunities for refining the timing of facilities beyond 2020 based on growth trends and other factors.

As Figure ES-8 illustrates, Phase 1 facilities generally include improvements to existing facilities to correct existing deficiencies. The respective timing of these upgrades for the existing system has been adjusted, such that the highest priority upgrades are implemented first.

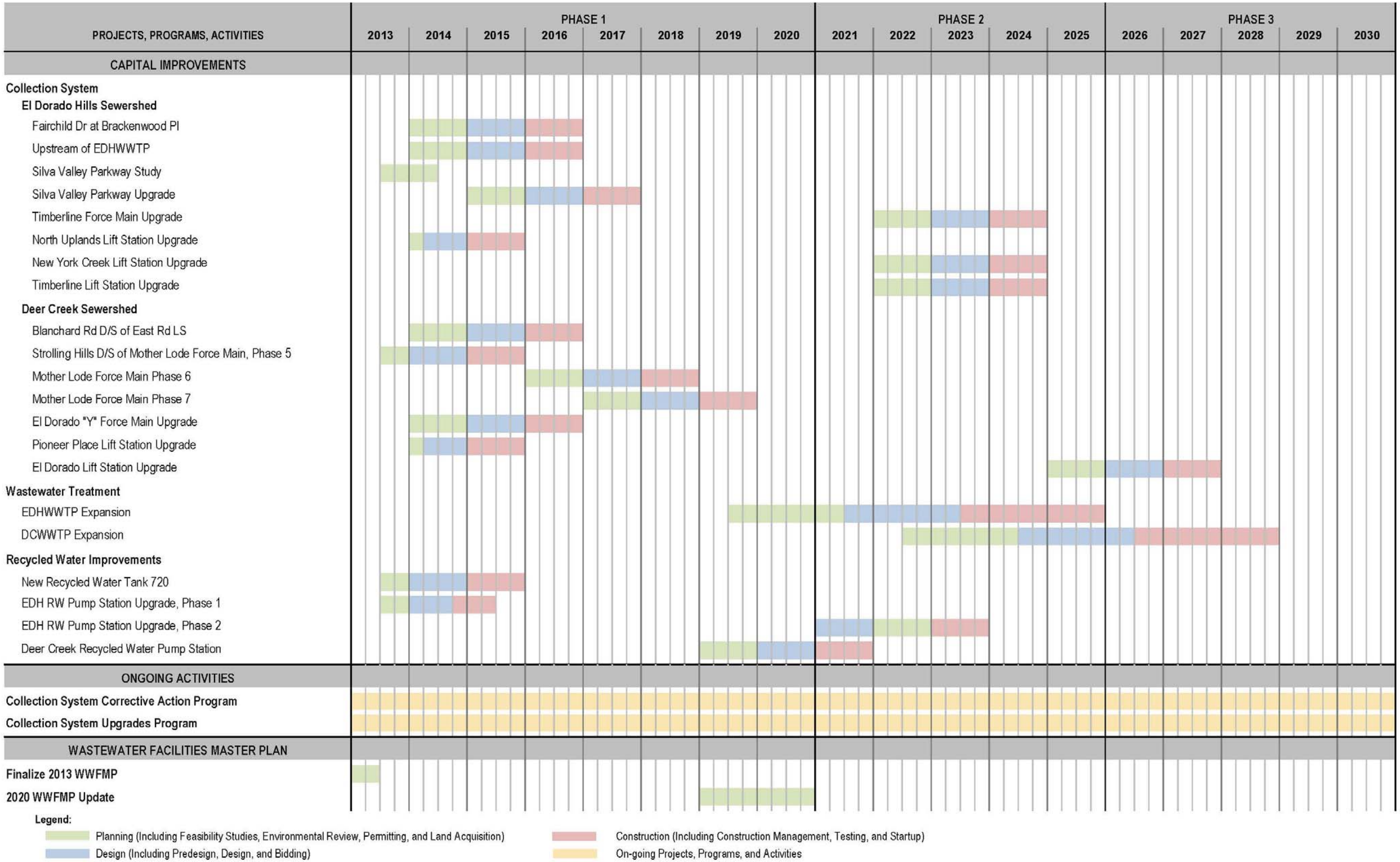
Table ES-4. Estimated Capital Costs by Phase for the Recommended Plan

Facility, Study, Program	Phase 1 2013-2020[a]	Phase 2 2021-2025[a]	Phase 3 2026-Buildout[a]	Estimated Capital Cost[a]
Collection System				
El Dorado Hills	$3,671,000	$2,920,000	$0	$6,591,000
Deer Creek	$15,516,000	$16,800	$151,200	$15,684,000
Ongoing Corrective Action Program[b]	$1,400,000	$875,000	$875,000	$3,150,000
Ongoing Upgrades Program[c]	$15,500,000	$10,000,000	$10,000,000	$35,500,000
Studies[d]	$200,000	$0	$0	$200,000
Collection System Subtotal	*$36,287,000*	*$13,811,800*	*$11,026,200*	*$61,125,000*
Wastewater Treatment				
EDHWWTP Expansion to 5.45 mgd	$5,317,500	$65,582,500	$0	$70,900,000
DCWWTP Expansion to 5.0 mgd	$0	$11,008,000	$57,792,000	$68,800,000
Wastewater Treatment Subtotal	*$5,317,500*	*$76,590,500*	*$57,792,000*	*$139,700,000*
Recycled Water Improvements[e]				
EDH RW Pump Station Upgrade, Phase 1	$150,000	$0	$0	$150,000
EDH RW Pump Station Upgrade, Phase 2	$0	$1,765,000	$0	$1,765,000
DC RW Pump Station Upgrade	$320,940	$1,462,060	$0	$1,783,000
Recycled Water Subtotal	*$470,940*	*$3,227,060*	*$0*	*$3,698,000*
Future WWMP Updates	$250,000	$0	$250,000	$500,000
Total Capital Cost	$42,325,440	$93,629,360	$69,068,200	$205,023,000

(a) Estimated capital costs based upon ENR 20 City Average CCI of 9437 (January 2013). Capital costs include estimated construction costs and allowances for contingency, engineering, administration, and permitting.
(b) Includes the Wastewater Pipeline Replacement Program, and El Dorado Hills and Deer Creek Corrective Action Plans through 2017. Includes an estimate of $175,000 per year through 2030.
(c) Includes lift station replacements through 2017 as identified in the District's 2013-2017 CIP. An estimate of $2 million per year is budgeted for 2018-2030 to continue the renewal and replacement of collection system facilities.
(d) Includes condition assessment studies for the El Dorado Y Force Main and remaining Phases of the Mother Lode Force Main.
(e) The 720 Tank will be developer provided. Thus, costs are not included.

As shown in Figure ES-8, the El Dorado Hills WWTP upgrade is scheduled to be complete in 2025 and online by 2026. The Deer Creek WWTP upgrade is scheduled to be complete in 2028 and online in 2029. If growth in the El Dorado Hills and/or Deer Creek Collection Systems occurs more quickly, the timing of future expansions should be adjusted to provide additional treatment capacity sooner.

Figure ES-8. Implementation Schedule



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The following next steps are recommended for the implementation of this WWFMP:

- **Financing**. The recommended facilities should be incorporated into the District's five-year capital improvement program in accordance with the proposed phasing plan. Specific project financing can then be addressed as part of the District's regular budgeting, rates, and facility capacity charges program updates.
- **Feasibility Studies and Engineering.** The technical work completed for this WWFMP provides a framework for the recommended facilities. Feasibility studies are required to finalize locations and alignments, refine design criteria and sizing, identify land requirements, and update cost estimates. Following completion of feasibility studies additional engineering will be required.
- **Environmental Compliance.** The recommended facilities will require compliance with the California Environmental Quality Act (CEQA) and possibly the National Environmental Policy Act (NEPA) to evaluate the environmental impacts of the projects. The required environmental compliance documents should be completed in conjunction with the engineering preliminary design studies.
- **Permitting.** Numerous federal, state and local permits will also be required for project implementation. The required permits will be identified during the preparation of the engineering preliminary design studies and environmental compliance documents. A permitting strategy should be developed to minimize project delays and potential mitigation costs.
- **Coordination with Ongoing Projects and Programs**. Implementation of the WWFMP should be coordinated with other ongoing projects and programs. Specifically, the implementation of the WWFMP recommendations should be coordinated with District's existing Collection System Corrective Action Plan and the Lift Station Condition Assessment Program, as well as other permit

requirements and renewal and replacement activities at the District's wastewater treatment plants and in the recycled water system.

- **Stakeholder Outreach**. Stakeholder workshops were conducted during preparation of this plan. Continued successful implementation of the WWFMP recommendations will require ongoing, proactive stakeholder outreach.

- **Future WWFMP Updates**. The WWFMP should be updated in 2020 to adjust recommendations for facilities and timing based on actual growth rates, progress made in implementation of the recommendations, and potential new issues and opportunities.

1.0 INTRODUCTION

This Wastewater Facilities Master Plan (WWFMP) provides a long-term program for the collection and treatment of wastewater and the use of recycled water resources for the El Dorado Irrigation District (District). A separate report was prepared for the Integrated Water Resources Master Plan (IWRMP). Together, these plans provide a roadmap for development of future infrastructure and maintenance of existing water, wastewater, and recycled water facilities.

1.1 Background

The District provides wastewater collection, treatment, and recycled water services, as well as water for municipal, industrial, and irrigation uses to meet the growing needs of its customers. As such, the District is one of the few California districts that provide a full complement of water-related services.

1.1.1 Service Area Description

The District's contiguous service area encompasses approximately 220 square miles on the western slope of the Sierra Nevada mountains in El Dorado County. The service area is bounded by Sacramento County to the west and the Pollock Pines to the east and ranges from 500 to more that 4,000 feet in elevation. Many customers who receive water from the District are not connected to the District's wastewater collection systems.

The District maintains four permitted collection systems, including the El Dorado Hills, Deer Creek, Camino Heights, and Gold Ridge Collection Systems. The District's two largest collection systems, shown in Figure 1-1, are the El Dorado Hills and Deer Creek Collection Systems. The Deer Creek Collection system includes the Western and Mother Lode Service Areas.

The collection systems are served by a series of lift stations, force mains, and gravity mains. Wastewater from both the Western and Mother Lode Service Areas is routed to the Deer Creek Wastewater Treatment Plant (DCWWTP), whereas wastewater from the El Dorado Hills Service Area is routed to the El Dorado Hills Wastewater Treatment

Plant (EDHWWTP). Together, these two wastewater treatment plants serve the communities of El Dorado Hills, Cameron Park, Shingle Springs and Diamond Springs, which collectively have an estimated population of approximately 75,800 people[2] .

The District's recycled water system distributes supply from the EDHWWTP and the DCWWTP through an interconnected network of transmission and distribution pipelines, pump stations, storage tanks, pressure reducing stations, and appurtenant facilities located within the communities of El Dorado Hills and Cameron Park. Figure 1-2 illustrates the recycled water service area.

1.1.2 Local Climate

The District is located in a region of sunshine in the summer, moderate to heavy precipitation in the winter, and wide temperature ranges. Strong flows of marine air in the winter from the Pacific Ocean result in heavy precipitation. Precipitation in the summer is generally limited to a few scattered thunderstorms during July. According to the Western Regional Climate Center Placerville Station, located centrally in the District, the historical annual average precipitation is approximately 38 inches, with an average monthly precipitation during winter months of about 6 inches. Temperatures throughout the service area range from warm in the summer to cold in the winter, with average monthly temperatures of 75° F in July and 42° F in January.

Evapotranspiration records, which measure the loss of water from the soil both by evaporation and by transpiration from the plants growing thereon, indicate average values ranging from 1.4 inches in the wet December, to 9.0 inches in much drier July. Low humidity usually occurs in the summer months, from May through September. The combination of hot and dry weather results in high water demands during the summer months.

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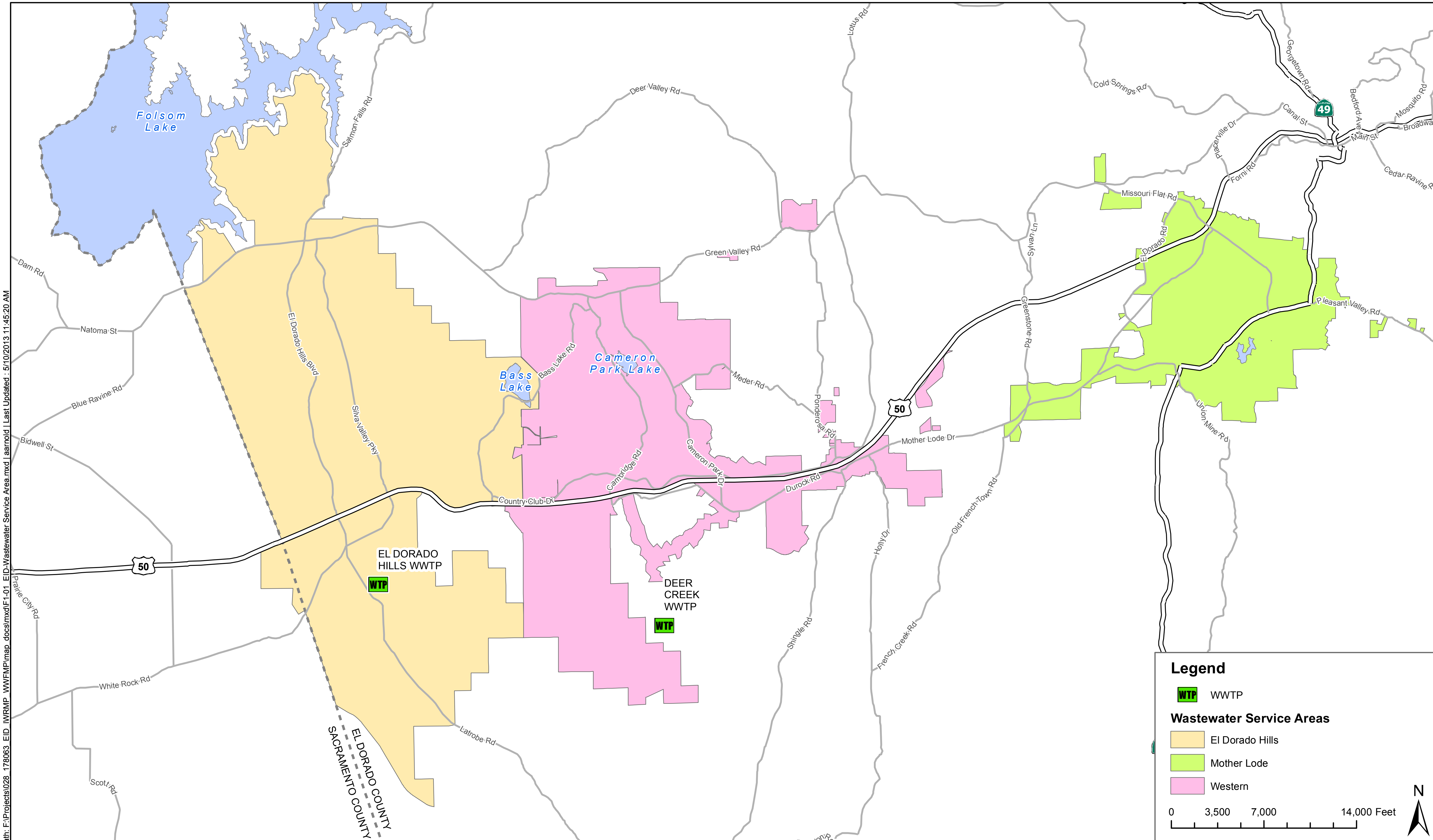
[2] 2010 US Census http//:quickfacts.census.gov. Note that many residences, particularly in the Shingle Springs and Diamond Springs areas, rely on septic systems and are not currently connected to the District's collection system.



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Wastewater Service Area

FIGURE 1-1

El Dorado Irrigation District Wastewater Facilities Master Plan

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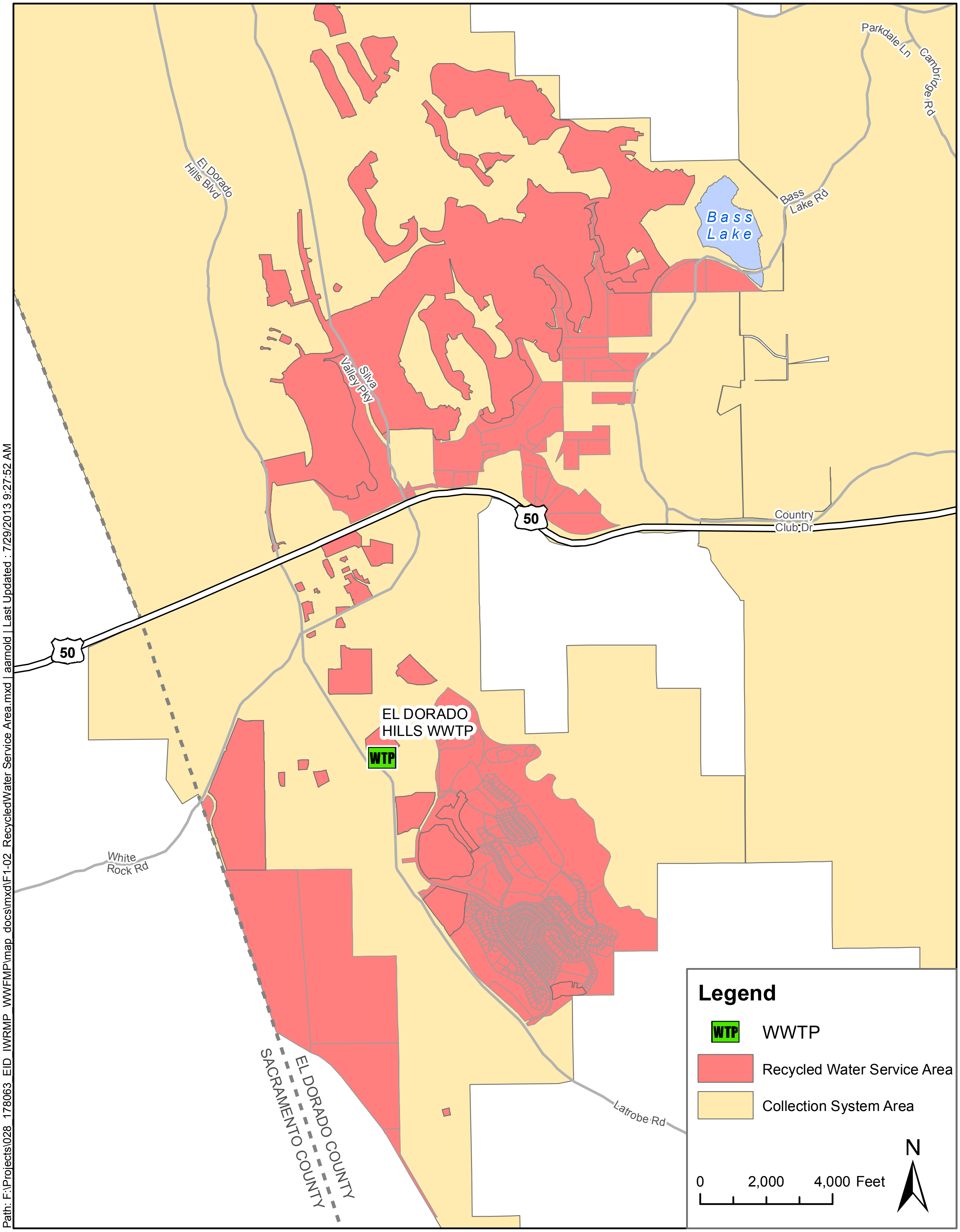

Recycled Water Service Area

FIGURE 1-2

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1.1.3 Population, Employment, and Housing

Over the years, the District has transitioned from serving mainly agricultural customers, to serving primarily residential, commercial, and industrial sectors, although agriculture remains a significant water user. The majority of growth in El Dorado County has occurred in the El Dorado Hills and Cameron Park areas, mirroring the steady increase in population growth of the Sacramento metropolitan area. From 2000 to 2010, the El Dorado County population increased by 17 percent from 155,702 to 182,019 residents. According to the El Dorado County 2010-11 Economic and Demographic Profile, El Dorado County's 2020 projected population is 225,429.

Sewer connection sales and active accounts have mirrored the housing market trends in the past decade. Table 1-1 provides the historical equivalent dwelling unit (EDU) connection data for the District's wastewater system. In the early and mid-2000's there was a steady increase in new home construction and increase in growth of the California economy. In 2008 and 2009 as the housing market began to weaken, there was a sharp decline in EDU sales. In late 2012 and early 2013, the District has recognized a renewed interest in development within its service area.

Table 1-1. Historical EDU Sales

Year	Wastewater System[(a)]		Recycled Water System[(a)]	
	EDU Sales	Customer Accounts	EDU Sales	Customer Services
2000	798	13,794	226	454
2001	2,189	14,433	664	906
2002	862	15,520	248	1,345
2003	1,185	16,712	313	2,078
2004	579	17,939	121	2,533
2005	823	18,515	335	3,151
2006	616	19,918	187	3,437
2007	941	20,201	466	3,681
2008	212	20,468	9	3,878
2009	19	20,650	1	3,814
2010	12	20,687	0	4,079
2011	19	20,744	22	4,095

(a) Data is taken from the District's 2011 Comprehensive Annual Financial Report. An Equivalent Dwelling Unit (EDU) represents the water usage equivalent to a typical single-family dwelling with a ¾-inch water meter.

El Dorado County residents employed within the District service area work in a variety of industries, including government, healthcare, retail trade, education, construction, manufacturing, agriculture, professional businesses, and hospitality services. The largest employers in El Dorado County are in the public sector, health care, data processing, and trade sectors. Most El Dorado County residents are within commuting distance of the greater Sacramento area, which offers employment in the defense and state government sector and more diversified employment opportunities such as computer technology, financial services, healthcare, and biotechnology. The largest percentage of the county employed civilian labor force works within El Dorado County.

1.2 Previous Studies and References

Numerous studies have been conducted regarding the District's water supplies, wastewater collection and treatment systems, and treated effluent disposal and reuse. To avoid a duplication of effort and to provide consistency with ongoing plans and programs, previous studies have been used in development of both the IWRMP and WWFMP. A selection of previous studies which form the basis for this Plan include:

- 2010 EID Urban Water Management Plan Update (July 2011)
- 2009 Water Resources and Service Reliability Report (July 2009)
- Sewer System Management Plan (July 2009)
- Recycled Water Seasonal Storage Basis of Design Report (June 2009)
- 2008 EID Consumption Report (June 2009)
- Recycled Water Seasonal Storage System Task 9 - Economic Evaluation (March 2009)
- El Dorado County Water Agency - Water Resources Development and Management Plan (April 2007)
- 2004 El Dorado County General Plan (July 2004)
- Recycled Water Master Plan (December 2002)
- Wastewater Master Plan Update (November 2001)

Pertinent information from these studies is utilized throughout this Plan. A complete list of references is included in Appendix A.

1.3 Project Vision and Objectives

The District's primary goal for this project is to develop an integrated water resources plan and wastewater facilities master plan that optimizes the use of the District's water resources and provides a roadmap for the cost-effective development of future infrastructure and the maintenance of existing water, wastewater, and recycled water facilities. This goal, combined with California's current economic situation, limited water supply, environmental constraints, and climate change, necessitates the need for a unified project vision.

The following vision statement was developed by the District, stakeholders, and the consultant team.

> *Similar to many water agencies in California, the El Dorado Irrigation District (District) desires to maintain its current level of service while preparing for future growth in an environmentally and fiscally responsible manner, while also considering the impacts of aging infrastructure systems and the uncertainties of climate change. The District sees the Integrated Water Resources Master Plan and Wastewater Facilities Master Plan Project as being the mechanism to address future water supply, infrastructure, and replacement needs in an integrated fashion.*

To achieve the project vision, the following specific objectives have been established with respect to wastewater and recycled water:

- Define, balance, and integrate the District's water resources.
    - Define the long-term role of recycled water within the District's water resources portfolio.
- Identify the steps needed to support the recommended wastewater facilities master plan.

- Develop integrated and prioritized water, wastewater and recycled water system capital improvements that are consistent with the District's long-term goals and objectives.
- Coordinate water, wastewater and recycled water system improvements with recommended replacement activities to provide the basis for an affordable sustainable and complete capital improvement program.
- Identify triggers which may cause the District to adjust the recommended program.

1.4 Key Issues

The following is a description of key issues that were addressed in the development of the WWFMP.

1.4.1 Wastewater Discharge Alternatives and Future Role of Recycled Water

Tertiary treated effluent from EDHWWTP and DCWWTP is either discharged to surface water or recycled for irrigation and industrial uses. Recycled water demand has steadily increased since 1999 when residential construction of a "dual pipe" system in the El Dorado Hills community of Serrano installed both water and recycled supply water for most homes.

When the DCWWTP produces a daily average treated effluent flow of 2.5 million gallons per day (mgd) or higher, the District must discharge a minimum of 1.0 mgd of treated effluent to Deer Creek. Continued efforts to develop and expand the recycled water program will increase the demand for recycled water. Consequently, future recycled water demands must be evaluated to consider long-term water supply and resource needs, anticipated future surface water discharge requirements, economic and environmental impacts, and District policies (e.g., BP 7010 Authorized and Mandated Use of Recycled Water). The 1 mgd discharge to Deer Creek represents a significant volume of water that could be used to meet recycled water demand and elimination or reduction of the surface water discharge requirement at DCWWTP would help to maximize the amount of recycled water available. The District is actively pursuing termination or reduction of the discharge requirement to Deer Creek.

In order to maximize beneficial reuse of recycled water, seasonal storage could be provided to match peak summer irrigation demands. Section 7 of this Master Plan include details of the Recycled Water Seasonal Storage System evaluation completed in 2009 to develop storage capacity and storage location alternatives to take advantage of recycled water availability.

1.4.2 Future Regulatory Requirements

Future regulatory requirements present some uncertainty for the District's wastewater treatment plants. Salinity, metals concentrations, and contaminants of emerging concern will continue to be monitored, and compliance with future regulatory developments may require additional advanced treatment processes. Biosolids disposal regulations continue to evolve, and in the future, it could be more difficult to land apply Class B biosolids. Potential impacts of these and other potential future regulatory requirements are discussed in the wastewater system evaluation in Section 6.

1.4.3 Aging Infrastructure

The District's collection systems date back to the 1960's and a number of lift stations and pipelines in the service area are reaching the end of their useful life. Overdue rehabilitation or replacement increases the likelihood of inflow and infiltration and associated sanitary sewer overflows, and less efficient pumping. To better understand the condition of the systems, the District initiated a condition assessment program . The new program allows the District to better understand the structural, mechanical, and electrical repairs necessary to maintain a safe and operable conveyance system. This WWFMP incorporates the results of the condition assessment program and provides recommendations for condition related upgrades for the collection systems.

1.5 Scope of Work

Detailed technical and economic analyses were completed to achieve the WWFMP objectives. The following tasks comprise the Scope of Services for this Master Plan:

- Project Vision and Basis of Planning
  - Kickoff Meeting
  - Summarize Related Work
  - Problem Definitions
  - Internal Stakeholder Workshop
  - Establish Planning Criteria
- Integrated Water Resources Master Plan
  - Description of Study Area and Existing Wastewater and Recycled Water Systems
  - Description of Current and Anticipated Regulatory Requirements
  - Current and Projected Wastewater Flows and Recycled Water Demands
  - Develop Recycled Water Supply Alternatives
- Develop and Implement Flow Monitoring Plan
- Develop Collection System Hydraulic Model
- Develop Recycled Water System Hydraulic Model
- Complete Lift Station Condition Assessment
- Develop Implementation Plan
  - Describe Recommended Plan
  - Finalize Institutional Requirements
  - Develop Preliminary Financial Plan
  - Define Permitting and CEQA Requirements
  - Develop Implementation Schedule
- Project Management

1.6 Stakeholder Involvement

Stakeholder meetings took place in 2009, 2010, and 2012 to inform and involve stakeholders interested in the project. These meetings included discussion of the project vision, objectives, and key issues, and provided interested parties with an overview of the project's basis of planning and assumptions. Stakeholders were also invited to provide input which was then incorporated into the planning process. Agendas, notes, and a list of stakeholders are provided in Appendix B.

1.7 Report Organization

This Master Plan is divided into sections covering major topics associated with master planning activities as follows:

- **Section 2.0 Existing Wastewater and Recycled Water Systems.** A discussion of existing wastewater collection, treatment, and recycled water facilities.
- **Section 3.0 Basis of Planning.** This section provides details of the study area and planning period, as well as design criteria for the collection system, recycled water system, and wastewater treatment plants.
- **Section 4.0 Existing and Projected Flows.** This section provides projected wastewater flows and recycled water supply, and compares current treatment capacity with projected flows.
- **Section 5.0 Wastewater Collection System Evaluation.** Includes a discussion of regulatory requirements, development of the collection system hydraulic model and flow monitoring, sewer overflow analysis, collection system improvements, and lift station condition assessment.
- **Section 6.0 Wastewater Treatment Plant Evaluation.** This section provides a discussion of regulatory considerations for the District's wastewater treatment plants and projects future expansion requirements.
- **Section 7.0 Wastewater Effluent Disposal and Reuse Evaluation.** This section includes a discussion of regulatory considerations, effluent disposal, recycled water expansion and seasonal storage alternatives, and an economic evaluation.

- **Section 8.0 Recycled Water Distribution System Evaluation.** This section provides a discussion of regulatory considerations and recycled water distribution system improvements.
- **Section 9.0 Recommended Wastewater Facilities Plan.** The final section presents the recommended master plan as well as institutional requirements, environmental compliance and permitting, financing, and the implementation schedule.
- **Appendices**. (Bound Separately.) Appendices A through H include a list of references, technical memoranda, details of cost estimates, and other relevant data and background information.

1.8 Abbreviations

To conserve space and improve text readability, the following abbreviations have been used in this document:

ac	Acre
ACP	asbestos cement pipe
ac-ft	acre-feet
AFY	acre-feet per year
ADWF	average dry weather flow
BMI	benthic macroinvertebrate
BMP	Best Management Practice
BOD	biological oxygen demand
BODR	Basis of Design Report
BP	Board Policies
CAFR	Comprehensive Annual Financial Report
CAO	Cleanup and Abatement Order
CAP	corrective action plan
CCR	California Code of Regulations
CCTV	closed circuit television
CDPH	California Department of Public Health Services
CEC	Contaminants of Emerging Concern

CEPT	chemically enhanced primary treatment
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHWWTP	Camino Heights WWTP
CIP	Capital Improvement Plan
County	El Dorado County
CSPA	California Sportfishing Protection Alliance
CTR	California Toxics Rule
d/D	Pipeline depth to diameter ratio
DAFT	Dissolved Air Flotation Thickener
DCWWTP	Deer Creek Wastewater Treatment Plant
District	El Dorado Irrigation District
EC	electrical conductivity
EDC	El Dorado County
EDCWA	El Dorado County Water Agency
EDHWWTP	El Dorado Hills Wastewater Treatment Plant
EDU	equivalent dwelling unit
ENR CCI	Engineering News Record Construction Cost Index
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCC	facility capacity charges
FSE	food service enterprises
ft	feet
GIS	geographic information system
gpd	gallons per day
gpm	gallons per minute
GRD	grease removal device
HOA	home owners association
HP	horsepower
I/I	infiltration and inflow
I&C	instrumentation and controls
IWRMP	Integrated Water Resources Master Plan
LF	linear foot

MG	million gallons
mgd	million gallons per day
mg/L	milligram per liter
ml	milliliter
MPN	most probable number
MSL	mean sea level
NEPA	National Environmental Policy Act
NNE	numeric nutrient endpoint
NPDES	National Pollution Discharge Elimination System
O&M	operations and maintenance
PLC	programmable logic control
PVC	polyvinyl chloride
RWMP	Recycled Water Master Plan
RWQCB	Regional Water Quality Control Board
SCCWRP	Southern California Coastal Water Research Project
SIU	significant industrial users
SRCSD	Sacramento Regional County Sanitation District
SSMP	Sanitary Sewer Management Plan
SSO	sanitary sewer overflow
SWRCB	State Water Resources Control Board
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
UWMP	Urban Water Management Plan
UV	ultra violet
VAR	vector attraction reduction
VTP	vertical turbine pump
WDR	Waste Discharge Requirements
WWTP	wastewater treatment plant

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2.0 EXISTING WASTEWATER AND RECYCLED WATER SYSTEMS

As previously described, the District provides wastewater collection and treatment services for four permitted collection systems, recycles water at two wastewater treatment plants, and distributes recycled water to customers in the El Dorado Hills and Cameron Park communities. These systems are described in the following subsections.

2.1 Existing Wastewater Service Areas

The District currently has four wastewater collection systems, including:

- El Dorado Hills
- Deer Creek
- Camino Heights
- Gold Ridge Forest

The District's two largest collection systems (El Dorado Hills and Deer Creek) are served by a series of lift stations, force mains, and gravity mains that convey wastewater to either the El Dorado Hills Wastewater Treatment Plant (EDHWWTP) or Deer Creek Wastewater Treatment Plant (DCWWTP). The Deer Creek Collection System is made up of the Western and Mother Lode Service Areas.

Together, the El Dorado Hills and Deer Creek wastewater treatment plants serve approximately 22,000 connections as described below:

- **El Dorado Hills Wastewater Treatment Plant:** Serves the community of El Dorado Hills, with an estimated population of approximately 42,100[3] people, including approximately 12,000 wastewater service connections.
- **Deer Creek Wastewater Treatment Plant:** Serves the communities from the Western and Mother Lode Service Areas through approximately 10,000 wastewater service connections. The area includes Cameron Park, Shingle

[3] 2010 U.S. Census http//:quickfacts.census.gov

Springs, and Diamond Springs, which collectively have an estimated population of approximately 33,700[4] people.

The two remaining collection systems are served by the following wastewater systems:

- **Camino Heights Wastewater Treatment Plant:** Serves the community of Camino Heights and has an estimated population of approximately 280 people and approximately 121 active sewer connections located within the sewershed.
- **Gold Ridge Forest:** Serves the community of Gold Ridge Forest, which is comprised of approximately 45 single family residential homes and has an estimated service population of approximately 120 people.

2.1.1 El Dorado Hills Wastewater System

The following subsections provide an overview of the existing wastewater facilities associated with the El Dorado Hills wastewater system including the collection, treatment, surface water discharge, and regulatory requirements.

Collection System

The El Dorado Hills sewershed encompasses approximately 24.9 square miles located between the western El Dorado County Boundary and Bass Lake Road and Folsom Lake and 3 miles south of Highway 50. Through 2012, there were approximately 12,000 sewer connections equating to approximately 13,600 EDUs located within the collection system.

The collection system, shown in Figure 2-1, is comprised of 34 lift stations and 285 miles of pipeline ranging between 2- and 36-inches in diameter, as summarized in Table 2-1. Pipelines are comprised of gravity sewers, force mains, and customer laterals owned by the District. Pipe materials consist of polyvinyl chloride (PVC), ductile iron, asbestos cement (AC), and vitreous clay and were installed between 1960 and 2012, as indicated in Table 2-2.

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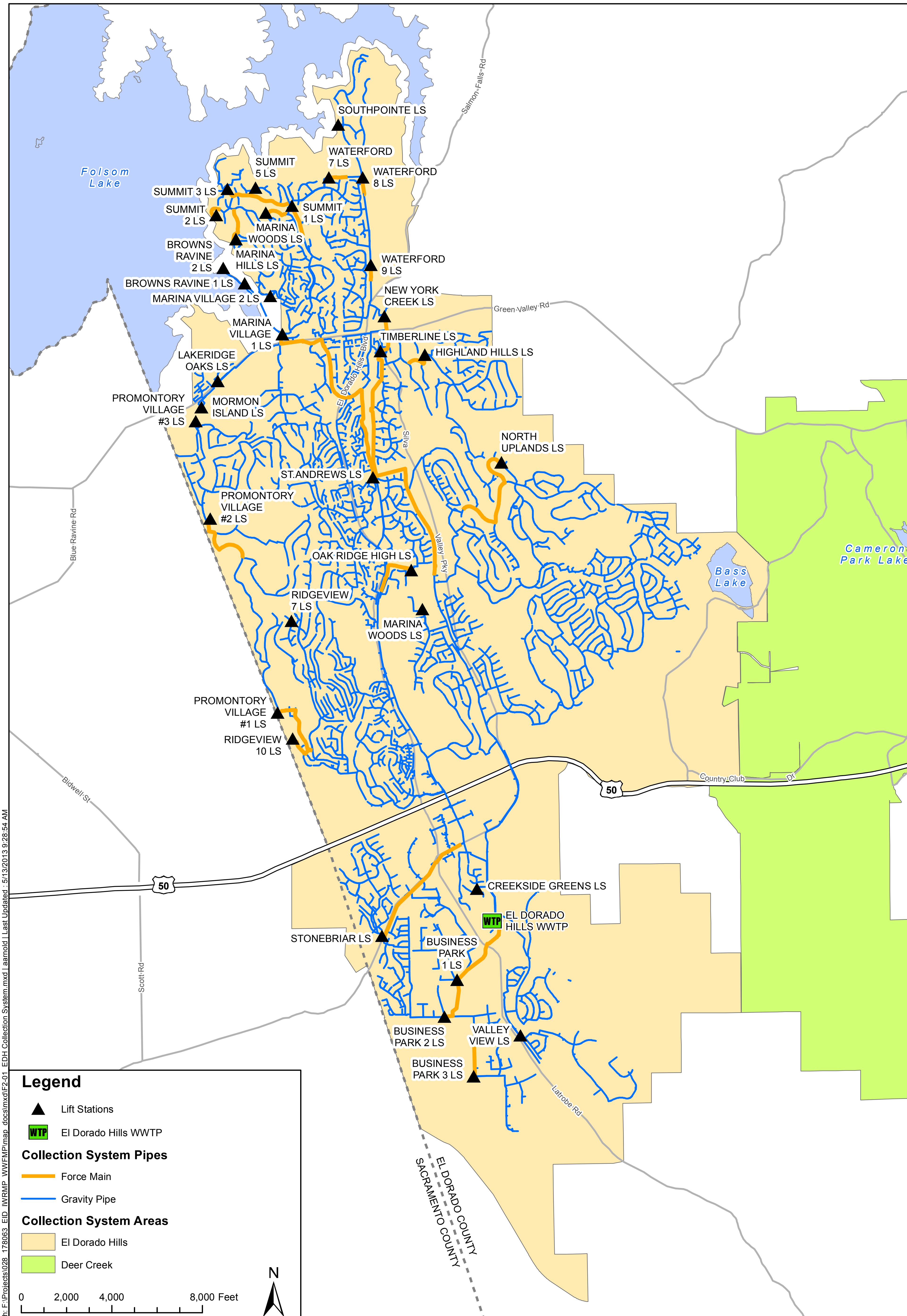
[4] 2010 U.S. Census http//:quickfacts.census.gov



El Dorado Hills Collection System

FIGURE 2-1

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Table 2-1. El Dorado Hills Collection System Inventory

Pipe Diameter (inches)	Force Main[a] (linear feet)	Gravity Sewer[a] (linear feet)	Total Pipe Length[b] (linear feet)
4	7,010		7,010
6	8,130	737,546	745,676
8	14,200	168,020	182,220
10	2,890	26,180	29,070
12	19,610	26,760	46,370
14	1,990	-	1,990
15	-	18,870	18,870
18	3,570	27,970	31,540
20	6,640	-	6,640
21	-	13,650	13,650
24	-	1,350	1,350
27	-	1,840	1,840
30	-	1,660	1,660
36	-	650	650
Total	64,040	1,024,496	1,088,536

(a) Length of pipe by diameter is based on the collection system hydraulic model for gravity pipelines 8 inches and larger and all force mains. Length of gravity pipeline less than 8 inches in diameter is estimated based on CAD data provided by the District.
(b) Total pipe length does not include District-owned laterals.

Table 2-2. El Dorado Hills Collection System Pipe Materials

Pipe Material	Length (ft)[a]	Percent of Total (%)	Approximate Year Installed
PVC	776,776	71	1960-2012
Ductile Iron	10,331	1	1985-1999
Asbestos Cement	126,333	12	1960-1999
Vitreous Clay	31,957	3	1961-1996
Unknown	143,149	13	1960-2012
Total	1,088,536	100	1960-2012

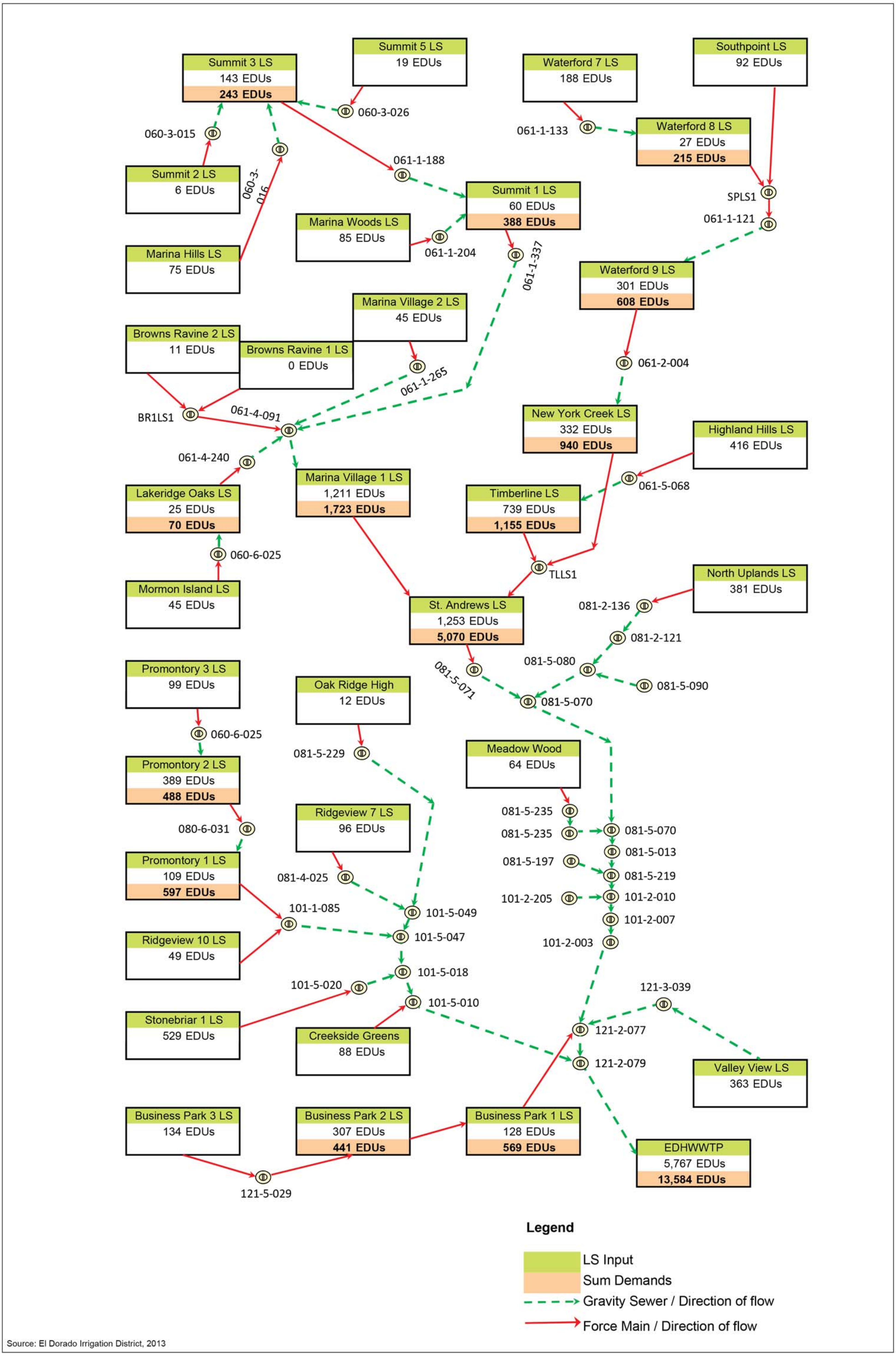
(a) Pipe length does not include District-owned laterals.

The El Dorado Hills Collection System includes 34 lift stations. The lift stations and their key attributes are presented in Table 2-3; additional information is provided in Appendix F. The estimated number of EDUs at each lift station and the EDHWWTP is illustrated in Figure 2-2.

Table 2-3. El Dorado Hills Lift Stations

Lift Station	Year Constructed	No. of Pumps	HP	Storage Capacity (gal) or Backup	Generator	Rehabilitation Performed or Scheduled
Brown's Ravine 1	1974	2	15	Wetwell only	NA	
Brown's Ravine 2	1974	2	1	Wetwell only	NA	
Business Park 1	1985	2	75	Standby Power	200kW Diesel	2013
Business Park 2	1985	2	50, 30	Standby Power	100 kW Diesel	2014/2015
Business Park 3	1985	2	50,30	Standby Power	100 kW Diesel	2015/2016
Creekside Greens	2002	2	3	Standby Power	10 kW Diesel	
Highland Hills	2003	2	30	Standby Power	60 kW Diesel	
Lakeridge Oaks	2012	2	5	2,700	NA	
Marina Hill	1995	2	40	Wetwell only	NA	
Marina Village 1	1973	4	88	20,000+ Standby Power	265 kW Diesel	
Marina Village 2	1980	2	10	16,000	NA	
Meadow Wood	2004	2	5	4,000	NA	
Mormon Island	1984	2	5	Standby Power	40 kW Diesel	(a)
New York Creek	1983	3	88	Standby Power	200 kW Diesel	2006
North Uplands	1994	2	60	Standby Power	209 kW Propane	
Oak Ridge High School	1981	2	5	Standby Power	40 kW Diesel	
Promontory No. 1	2001	4	84.48	Standby Power	240 kW Diesel	
Promontory No. 2	2001	4	75.77	Standby Power	240 kW Diesel	
Promontory No. 3	2001	4	14.1	Standby Power	60 kW Diesel	
Ridgeview No. 7	1987	2	75	Standby Power	110 kW Propane	(a)
Ridgeview No. 10	1988	2	15	Standby Power	35 kW Propane	
Saint Andrews	1985	6	70,70,140,140,140	4,000 + Standby Power	510 kW Diesel	
Southpoint	1991	2	75	Standby Power	100 kW Diesel	2015/2016
Stonebriar No. 1	2001	2	58	Standby Power	135 kW Diesel	
Summit 1	2009	2	25	Standby Power	75 kW Propane	(a)
Summit 2	1988	2	5	Standby Power	20 kW Propane	
Summit 3	1988	2	30	Standby Power	100 kW Diesel	2012
Summit 5	1988	2	4.5	Standby Power	40 kW Diesel	
Summit 6 (Marina Woods)	1996	2	15	10,000	NA	
Timberline	2011	2	75	Standby Power	480 kW Diesel	2013
Valley View	2006	3	15, 59, 59	Standby Power	150 kW Diesel	
Waterford 7	1988	2	30	Standby Power	100 kW Diesel	2014/2015
Waterford 8	1988	2	15	Standby Power	35 kW Propane	
Waterford 9	1988	2	15	Standby Power	35 kW Propane	

(a) The District is investigating the potential elimination of these lift stations. If not feasible, the stations will be scheduled for rehabilitation.



Source: El Dorado Irrigation District, 2013

El Dorado Hills EDU Schematic

Figure 2-2

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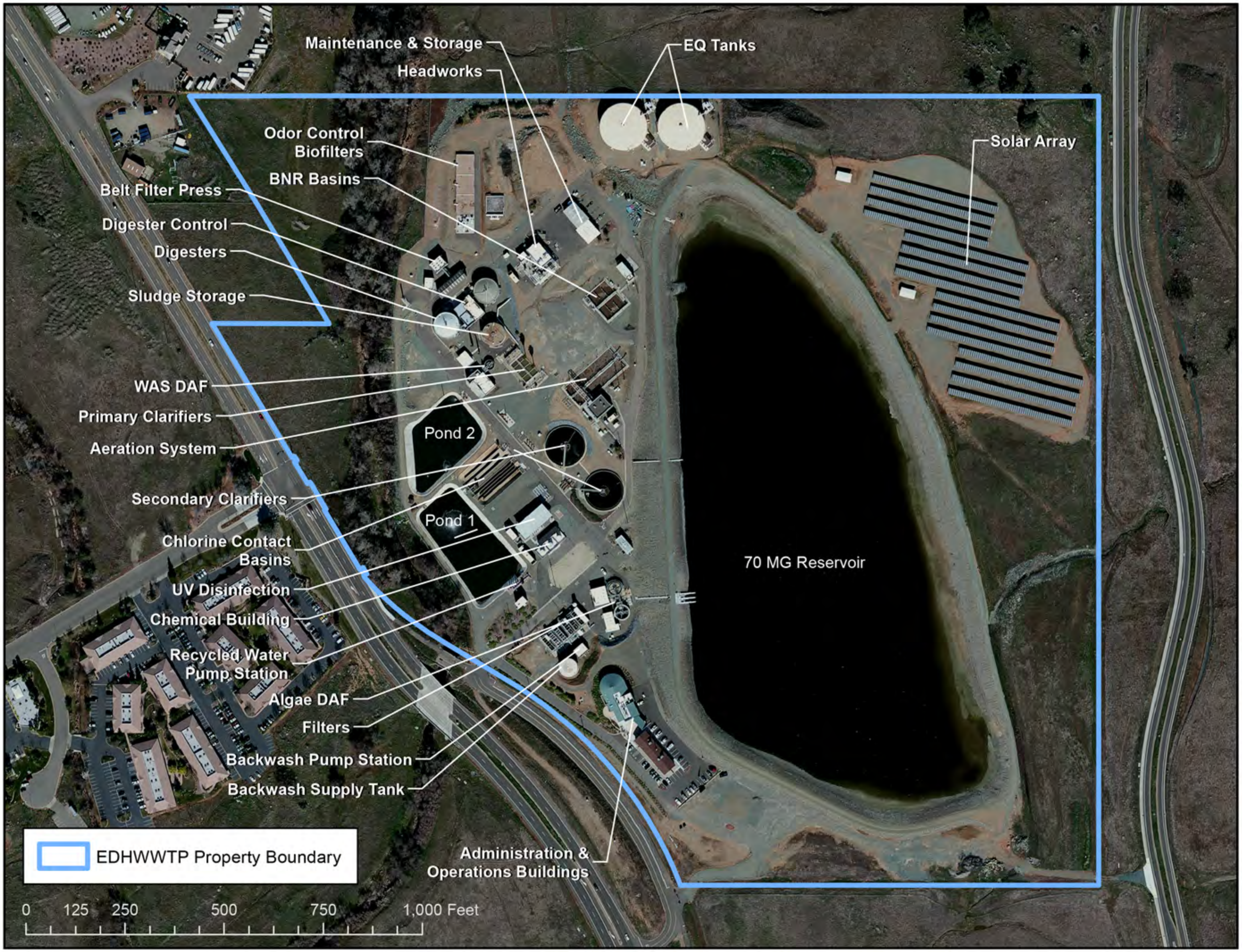
El Dorado Hills Wastewater Treatment Plant

The EDHWWTP is located approximately 1.25 miles south of Highway 50 on Latrobe Road in the El Dorado Hills business park area. The plant is adjacent to Latrobe Road with housing developments to the north and south and a business park to the west. Housing developments are also planned immediately to the east on the adjacent hillsides. As shown in Figure 2-3, the EDHWWTP is situated along a hillside with both Carson Creek and Latrobe Road bordering the plant to the west, and a 70 million gallon (MG) storage pond bordering the plant to the east.

A process flow diagram of the EDHWWTP is shown in Figure 2-4. Liquid treatment processes located within the EDHWWTP consist of headworks, screening and grit removal, primary clarifiers, biological nutrient removal basins, activated sludge basins with nitrification, secondary clarifiers, tertiary filters, and ultra violet light (UV) disinfection. Solids handling processes consist of waste activated sludge (WAS), dissolved air flotation thickeners, anaerobic digesters, and belt filter presses. Dewatered biosolids are hauled offsite for use in biosolids land application.

The EDHWWTP was expanded in 2010 and has a rated average dry weather flow (ADWF) capacity of 4.0 million gallons per day (mgd). Table 2-4 lists the historical ADWF at EDHWWTP.

Treated effluent is either recycled or discharged into Carson Creek, a tributary to the Cosumnes River, during the wet season. The EDHWWTP typically discharges to Carson Creek between November and April, and recycles all of the treated effluent for beneficial reuse between May and October. At times, there is intermittent discharge to Carson Creek during periods when the EHDWWTP is recycling the treated effluent for beneficial reuse.



El Dorado Hills WWTP

Figure 2-3

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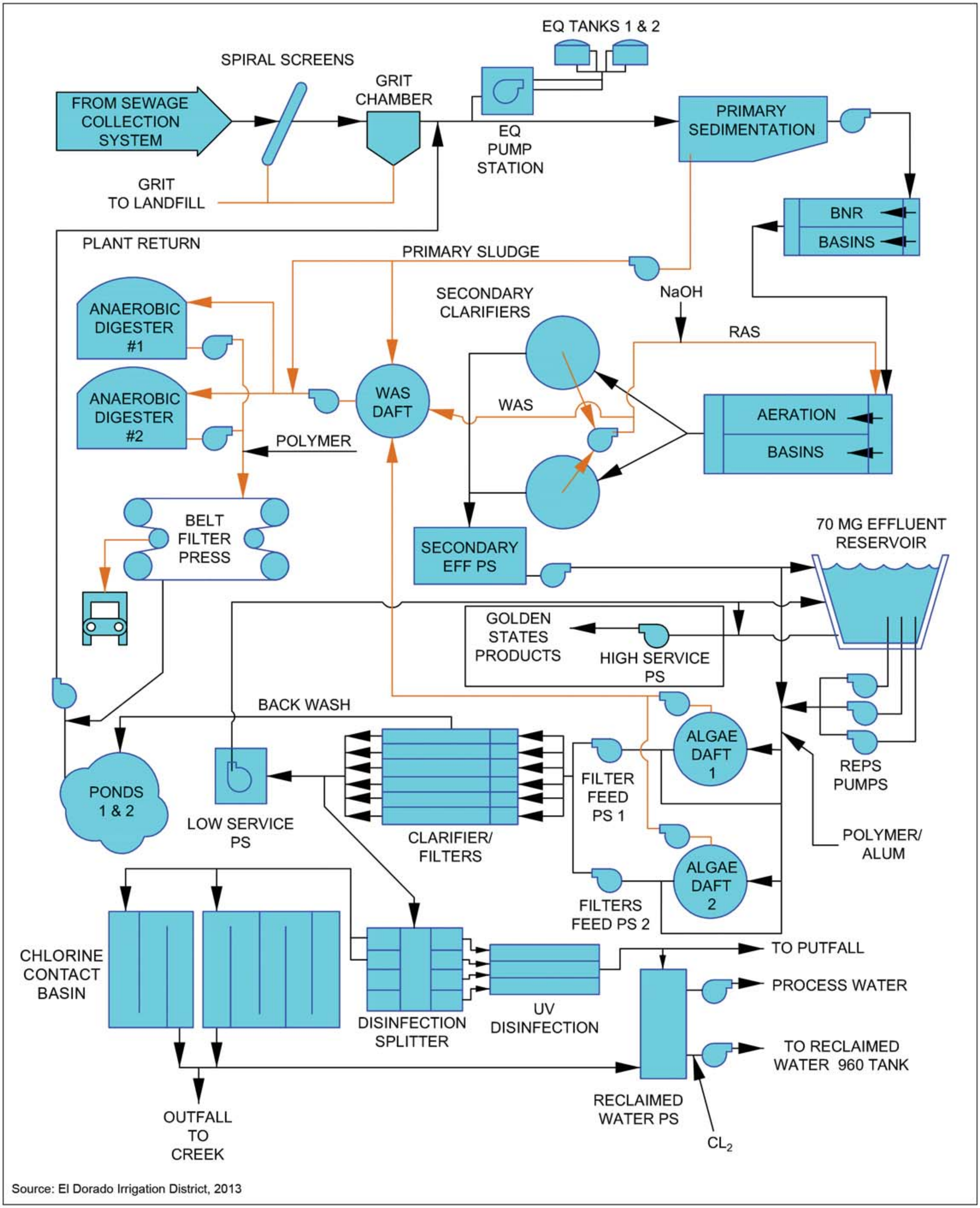

El Dorado Hills WWTP Process Diagram

Figure 2-4

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Table 2-4. EDHWWTP Historical ADWF

Year	ADWF[a] (mgd)
2000	1.52
2001	1.71
2002	1.70
2003	2.01
2004	2.54
2005	2.22
2006	2.72
2007	2.70
2008	2.74
2009	2.44
2010	2.13
2011	2.12
2012	2.17

(a) Average dry weather flow is based on the average daily flow over three consecutive dry weather months, per the District's discharge permit.

Effluent Disposal and Reuse

In 2008, approximately 65 percent of the treated effluent produced at the EDHWWTP was recycled. Disinfected, tertiary quality recycled water produced at the EDHWWTP is distributed for irrigation of residential landscape, commercial landscape, and recreational turf. Recycled water is also used in a few areas for fire suppression and dust control. Treated effluent specifications and the use of recycled water is permitted under Master Reclamation Permit Order No. 5-01-146 issued to the District in 2001 in accordance with Title 22 and the California Water Code.

The District's Carson Creek surface water discharge is currently regulated by Order No. R5-2013-0003 (NPDES Permit), which was adopted January 31, 2013 and became effective March 22, 2013. The NPDES Permit is anticipated to expire on March 1, 2018, at which time the District will be required to file for a renewal of the NPDES Permit. The permit renewal application is due 6 months prior to permit expiration.

The District obtains its potable water supply from surface water reservoirs located in the Sierra Nevada. Historically, electrical conductivity (EC) concentrations in the EDHWWTP treated effluent have ranged from 510 to 940 µmhos/cm. The most likely sources for this constituent in the EDHWWTP effluent are domestic and commercial wastewater, self regenerative water softeners, and the past practice of chemical additions that were used to treat the wastewater at the EDHWWTP. Sodium hydroxide (caustic soda, NaOH) is added to the primary effluent to provide sufficient alkalinity to allow the nitrification reaction to go to completion. A defoamer is used at the parshall flume to remove foam prior to treated effluent being discharged to the receiving stream.

2.1.2 Deer Creek Wastewater System

The following is an overview of the existing wastewater facilities associated with the Deer Creek wastewater system including the collection, treatment, surface water discharge and regulatory requirements. As previously mentioned, the Deer Creek wastewater treatment plant serves both the Western and Mother Lode Service Areas.

Collection System

The Western and Mother Lode Service Areas are approximately 15 and 8 square miles, respectively. Through 2012, there were approximately 10,000 sewer connections equating to approximately 12,350 EDUs located within the collection system.

The collection system, shown in Figure 2-5, consists of approximately 280 miles of pipeline, ranging from 4- to 36-inches in diameter, and 30 lift stations, as shown in Table 2-5. Pipelines are comprised of gravity sewers, force mains, and District owned laterals.

As shown in Table 2-6, pipe materials include asbestos cement, vitreous clay, PVC and high-density polyethylene and were installed between 1961 and 2012.

The Mother Lode Force Main (illustrated in Figure 2-5) is a critical District asset as it is the only means for routing wastewater from the Mother Lode Service Area to the DCWWTP for subsequent treatment and disposal. This pipeline begins at the El Dorado Lift Station in the town of El Dorado, continues west to Shingle Springs, and terminates at the 36-inch gravity pipeline that leads to the DCWWTP.

Table 2-5. Deer Creek Collection System Inventory

Pipe Diameter (inches)	Force Main[a] (linear feet)	Gravity Sewer[a] (linear feet)	Total Pipe Length[a,b] (linear feet)
4	670	-	670
6	16,450	604,162	620,612
8	19,830	161,220	181,050
10	-	27,460	27,460
12	43,240	30,110	73,350
14	-	780	780
15	70	4,520	4,590
18	-	14,050	14,050
20	1,080	-	1,080
21	-	3,070	3,070
24	-	22,580	22,580
27	-	1,550	1,550
30	-	870	870
36	-	6,370	6,370
TOTAL	81,340	876,742	958,082

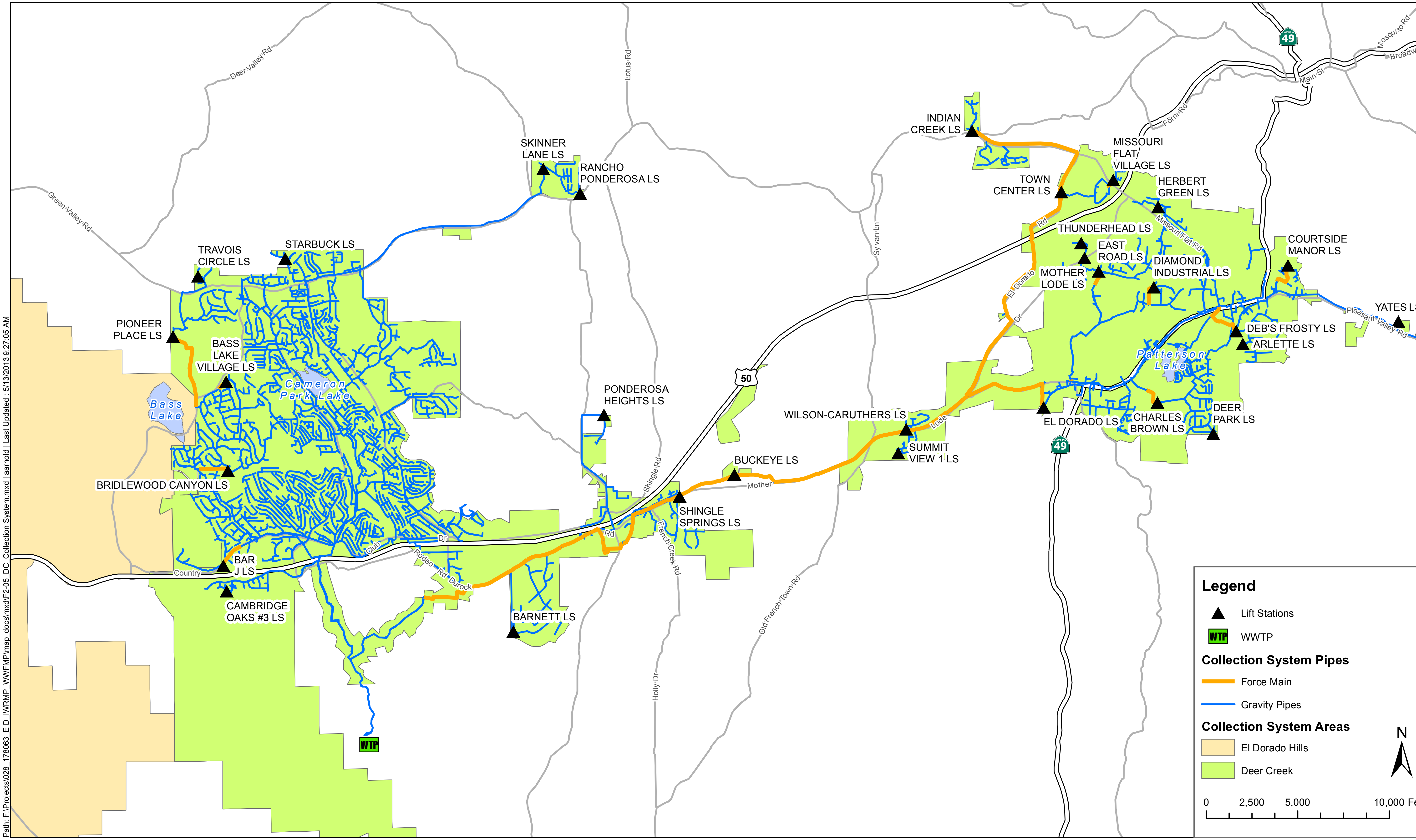
(a) Length of pipe by diameter is based on the collection system hydraulic model for gravity pipelines 8 inches and larger and all force mains. Length of gravity pipeline less than 8 inches in diameter is estimated based on CAD data provided by the District. Does not include District owned laterals.
(b) Total pipe length does not include District-owned laterals.

Table 2-6. Deer Creek Collection System Pipe Materials

Pipe Material	Length (ft)[a]	Percent of Total (%)
Asbestos Cement	409,706	43
Vitreous Clay	7,823	1
PVC	421,657	44
High-Density Polyethylene	106,297	11
Unknown	12,599	1
Total	958,082	100

(a) Pipe length does not include District-owned laterals.

The original 12-inch AC pipe was installed in the late 1970s. It experiences full pipe and open channel conditions making it susceptible to hydrogen sulfide corrosion as evident by the many deteriorating sections.



Deer Creek Collection System

FIGURE 2-5

El Dorado Irrigation District and Wastewater Facilities Master Plan

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There have been four pipeline breaks at hilltops and the District has determined that hydrogen sulfide gas has corroded the AC pipe resulting in long lengths of pipe that have lost their structural integrity. Although some of the pipe has been replaced in locations where failures have occurred in the past, the District is apprehensive of running the high lift pumps at the El Dorado Lift Station in fear that the higher pressures could lead to further breaks. In addition, flows routed through this pipeline are also approaching the pipe's rated capacity and in the future, the entire length of this force main will require replacement.

The District has already begun replacing the Mother Lode Force Main with larger 20-inch diameter pipe in the Shingle Springs area to accommodate approved growth and resulting increased flows.

To date, The District has replaced approximately 50 percent of the Mother Lode Force Main, including the following improvement projects which were recently completed or which are scheduled to be completed in 2013:

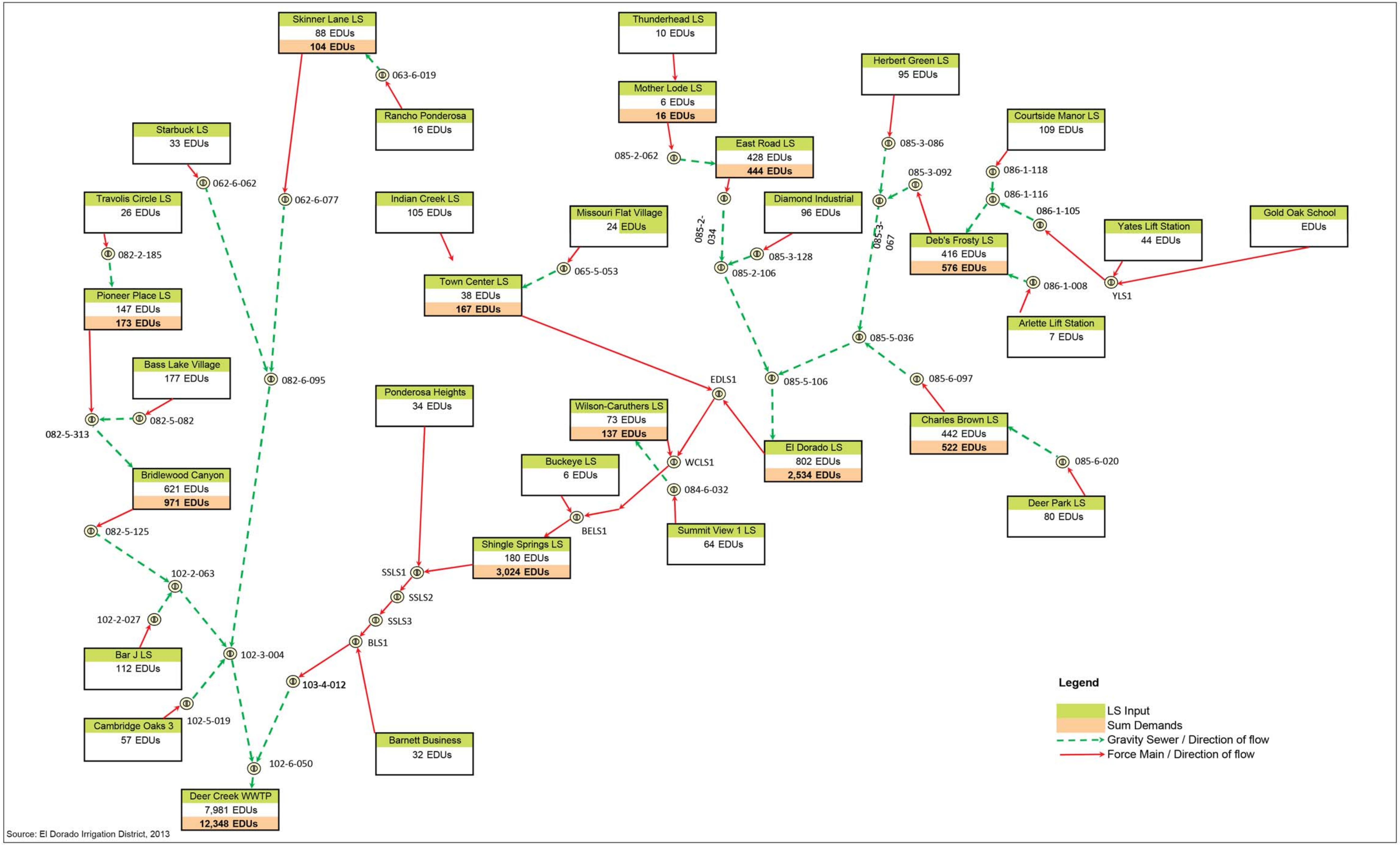
- **Phase 2B Mother Lode Force Main Replacement:** Replacement of 3,650 feet of existing pipeline located in the vicinity of South Shingle Springs.
- **Phase 2C Mother Lode Force Main Replacement:** Replacement of 2,500 feet of existing pipeline to be completed in 2013.
- **Phase 4 Mother Lode Force Main Replacement:** Replacement of approximately 6,250 feet of 12-inch AC pipe located between Old French Town Road and Rockinghorse Lane.

In addition to the replacement projects listed above, the District is also planning to replace the pipeline at the downstream end of the Mother Lode Force Main in Strolling Hill Road. The Strolling Hills pipeline includes approximately one half mile of 12-inch AC force main and one mile of 12-inch PVC gravity main. The replacement is currently scheduled for construction in 2015

The Deer Creek Collection System includes 30 lift stations. The lift stations and their key attributes are presented in Table 2-7; additional information is included in Appendix F. The estimated number of EDUs at each lift station is illustrated in Figure 2-6.

Table 2-7. Deer Creek Lift Stations

Lift Station	Year Constructed	No. of Pumps	HP	Storage Capacity (gal) or Backup	Generator	Rehabilitation Performed or Scheduled
Arlette	1996	2	2	960	NA	
Bar J	1987	2	15	Standby Power	40 kW Diesel	
Barnette	2009	2	26.8	Standby Power	62 kW Diesel	
Bass Lake Village	1994	2	11.3	Standby Power	30 kW Propane	
Bridlewood Canyon	1989	2	60	Standby Power	100 kW Propane	2014/2015
Buckeye	1977	2	7.5	--	NA	
Cambridge Oaks	2003	2	40		NA	
Charles Brown	1965	2	12	Standby Power	60 kW Diesel	
Courtside Manor	1999	2	15		NA	
Deb's Frosty	1989	2	23	Standby Power	80 kW Diesel	
Deer Park	1986	2	5	Standby Power	40 kW Diesel	
Diamond Industrial	1981	2	7.5	Standby Power	26 kW Diesel	
East Road	1965	2	23	Standby Power	80 kW Diesel	
El Dorado	1977	4	10,33.5,114,114	4,630,000	350 kW Diesel	2013 - 2015
Herbert Green	1967	2	33.5	Standby Power	100 kW Diesel	
Indian Creek	1988	2	40	Standby Power	75 kW Propane	
Missouri Flat	2004	2	10	6,390	40 kW Diesel	
Mother Lode	2008	2	6.2	2,400	NA	
Pioneer Place	2000	2	40	Standby Power	100 kW Propane	
Ponderosa Heights	2004	2	23	20,000	NA	
Rancho Ponderosa	1964	2	7.5		NA	2014/2015
Shingle Springs	2006	3	60,48,60	Standby Power	100 kW Propane	
Skinner Lane	2009	4	40.2	Standby Power	155 kW Diesel	
Starbuck	1982	2	3	6,900	NA	
Summit View No. 1	2009	2	5	18,800	NA	
Thunderhead	1979	2	4.5	1,900	NA	
Town Center	1993	2	20,11.3,25	38,900	NA	
Travolis Circle	1993	2	10		NA	
Wilson - Caruthers	2000	4	7.5,30,30,30	10,000	135 kW Propane	
Yates	1948	2	7.5	Standby Power	26 kW Diesel	2013



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Deer Creek EDU Schematic

Figure 2-6

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Deer Creek Wastewater Treatment Plant

The DCWWTP receives flow from the towns of Diamond Springs, El Dorado, Shingle Springs, and Cameron Park. The plant is located approximately two miles south of Highway 50 in the Cameron Park area, which is a relatively remote area with little development in the surrounding hills. A narrow, two-lane, access road leads to the plant from the main road. A two lane steel bridge crosses over Deer Creek just before entering the plant.

As shown in Figure 2-7, the plant is situated in a small valley bordered by Deer Creek to the north and a smaller seasonal tributary creek to the south. A process flow diagram of the DCWWTP is shown in Figure 2-8. Liquid treatment processes located within the DCWWTP include a headworks, screening, grit removal, primary clarifiers, flow equalization, activated sludge basins with anoxic selector, secondary clarifiers, tertiary filtration, and ultra violet disinfection. Solids handling processes include gravity thickeners, aerobic digestion/storage tanks, belt filter press dewatering, lime treatment, and sludge hauling. Dewatered biosolids are applied to local farmland or hauled to a landfill.

Currently, the DCWWTP has a rated ADWF capacity of 3.6 million gallons per day (mgd). Treated effluent from the plant is discharged to Deer Creek, and a portion of the flow is recycled for irrigation. Table 2-8 provides the historical flows for the DCWWTP.

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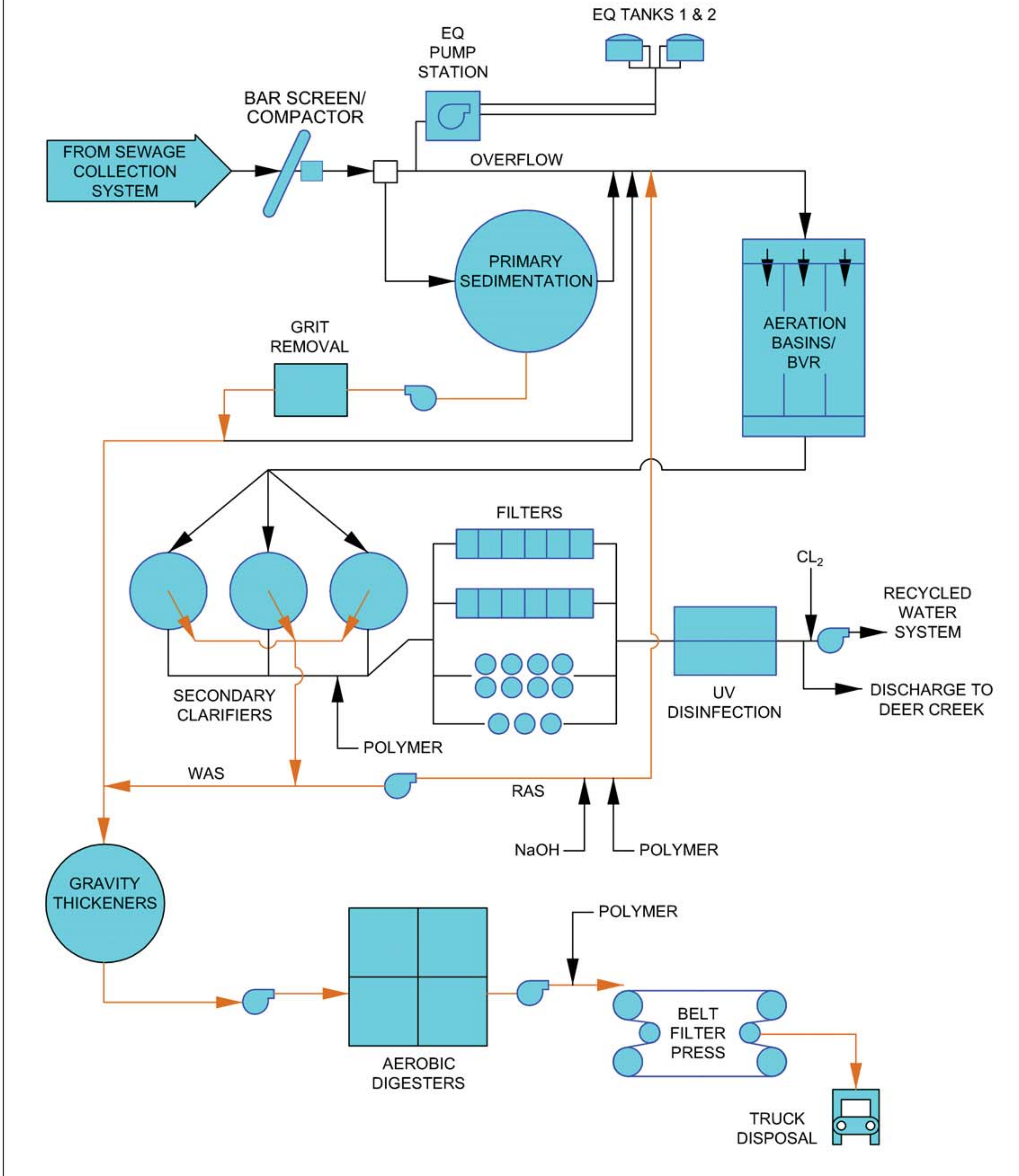
Deer Creek WWTP
Figure 2-7



Source: El Dorado Irrigation District, 2013

Deer Creek WWTP Process Diagram

Figure 2-8

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Table 2-8. DCWWTP Historical ADWF

Year	ADWF[a] (mgd)
2000	2.41
2001	2.39
2002	2.46
2003	2.59
2004	2.53
2005	2.51
2006	2.90
2007	2.69
2008	2.60
2009	2.39
2010	2.45
2011	2.47
2012	2.23

(a) Average dry weather flow is based on the average daily flow over three consecutive dry weather months, per the District's discharge permit.

Effluent Disposal and Reuse

The State Water Resources Control Board (SWRCB) adopted Water Rights Order No. WR 95-09 requiring the District to maintain specific quantities of treated effluent discharge to Deer Creek to maintain downstream riparian habitat and provide water for beneficial use. This specific order is a condition of operation of the DCWWTP and is referenced in the District's current WDR Order No. R5-2008-0173. According to Water Rights Order No. WR 95-09, whenever the DCWWTP produces a daily average treated effluent flow of 2.5 mgd or higher, the District must discharge a minimum of 1.0 mgd of treated effluent to Deer Creek. Per the Order, the District can only send 1.5 mgd into the recycled water system and the remaining treated effluent must be discharged to Deer Creek. However, the District is currently conducting a hydraulic stream model of Deer Creek. If the model results are favorable, the District will begin an environmental analysis in late 2013 and will file a change petition with the SWRCB once the environmental analysis is complete.

According to 2008 records, approximately 35 percent of the treated effluent produced at the DCWWTP was recycled. Disinfected, tertiary quality recycled water produced at the DCWWTP is distributed for irrigation of residential landscape, commercial landscape, and recreational turf. Recycled water is also used in a few areas for fire suppression and dust control. Treated effluent specifications and the use of recycled water are covered under Master Reclamation Permit Order No. 5-01-146 issued to the District in accordance with Title 22 and the California Water Code, which is described in greater detail Section 8.

The District's Deer Creek surface water discharge is currently regulated by Order No. R5-2008-0173 (NPDES Permit), which was adopted December 4, 2008 and became effective January 23, 2009. The discharge permit is anticipated to expire on December 1, 2013. The District will be required to file for a renewal of the NPDES Permit. The permit renewal application is due 6 months prior to permit expiration. The portions of the wastewater collection system owned and operated by the District are subject to provisions included in the General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems (State Water Board Order No. 2006-003 DWQ). The General WDRs for Sanitary Sewer Systems require a sewer system management plan (SSMP). The SSMP describes the operation and maintenance activities for the collection system and requirements for reporting and mitigating sanitary sewer overflows (SSOs).

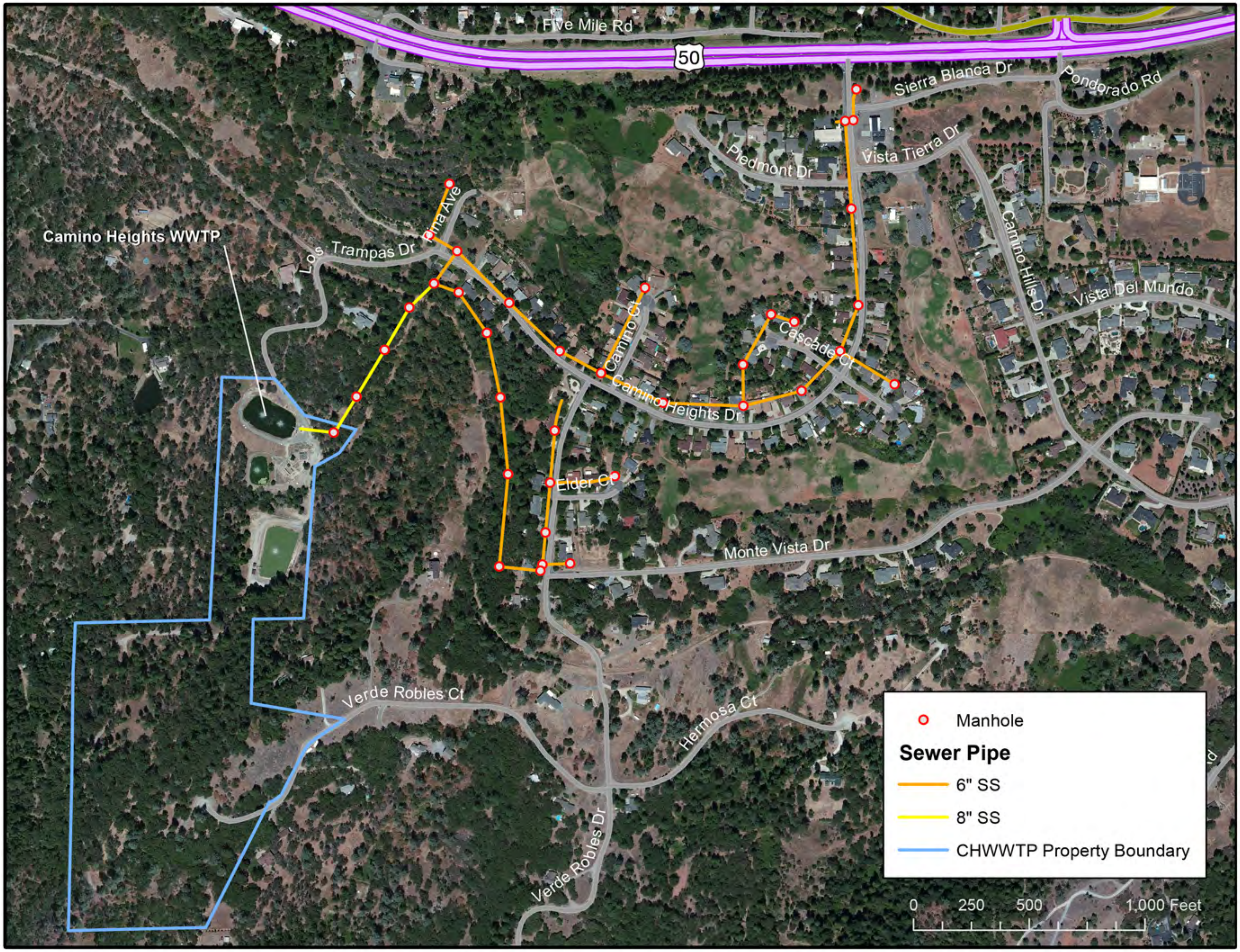
2.1.3 Camino Heights Wastewater System

The following is an overview of the existing wastewater facilities associated with the Camino Heights wastewater system, including collection, treatment, and disposal facilities.

Collection System

The Camino Heights sewershed encompasses approximately 0.3 square miles located along Highway 50, approximately 4 miles east of Placerville in El Dorado County. As of December 2008, there were 121 active sewer accounts located within this sewershed.

The collection system, shown in Figure 2-9, is comprised of approximately 9,000 feet of gravity sewers between 6- and 8-inches in diameter. There are no lift stations located within the Camino Heights service area. As shown in Table 2-9, pipe materials consist of PVC and asbestos cement, which were generally installed around 1964.



Camino Heights Collection System

Figure 2-9

Table 2-9. Camino Heights Collection System Pipe Materials

Pipe Material	Length (ft)	Percent of Total (%)
PVC	401	5
Asbestos Cement	8,201	95
Total	8,602	100

A hydraulic model of the existing Camino Heights collection system was developed as part of this Master Plan. An electronic copy of the model was delivered to the District on December 15, 2009.

Wastewater Treatment Plant

The Camino Heights Wastewater Treatment Plant (CHWWTP) is located approximately one-half mile south of Highway 50 on Los Trampas Drive in Camino Heights. The CHWWTP receives only domestic wastewater generated from residential homes located within Camino Heights and a few commercial establishments. Single family residential houses are located around the plant, with the highest housing densities occurring north and south of the treatment plant. The closest house is situated approximately 500 feet away from the plant perimeter.

An aerial photo of Camino Heights and the CHWWTP is shown in Figure 2-10. The CHWWTP currently has a rated ADWF capacity of 60,000 gallons per day (gpd) and a wet weather design flow of 76,000 gpd. Liquid treatment processes consist of mechanical screening followed by two oxidation and one polishing pond as described below:

- Pond 1: Approximately 3.7 ac-ft clay lined oxidation pond equipped with two 7.5 HP mechanical aerators.
- Pond 2: Approximately 1.3 ac-ft oxidation pond equipped with one 7.5 HP mechanical aerator.
- Pond 3: Approximately 6.8 ac-ft polishing pond equipped with one 7.5 HP mechanical aerator.

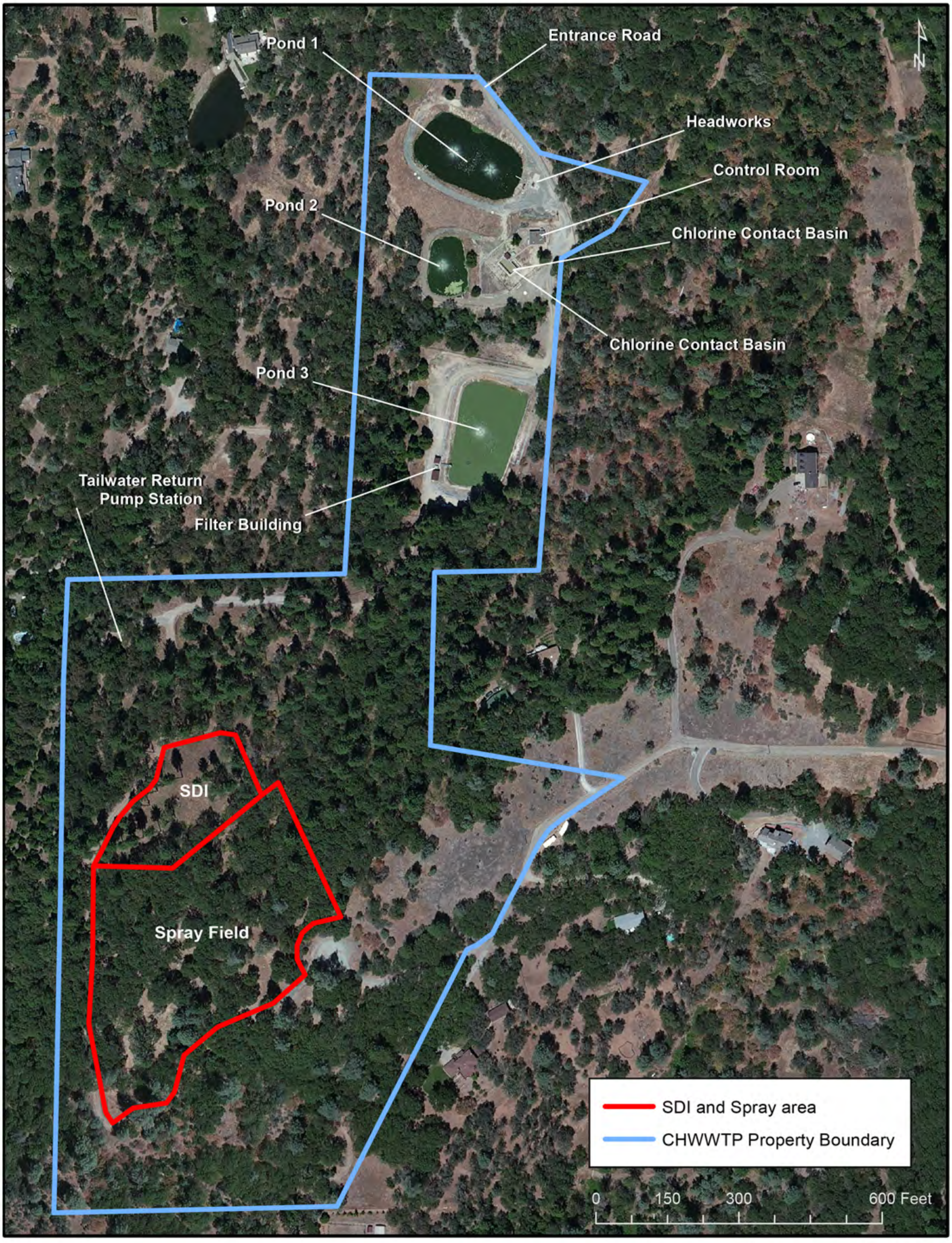
The ponds are operated in series; effluent from Pond 3 is pumped to a contact tank for disinfection by sodium hypochlorite. The disinfected wastewater flows through sand filters and treated effluent is then disposed of via application to a 4.4 acre spray field and a new 1.5 acre subsurface drip irrigation field. A tailwater collection system located at the downhill end of the spray field is used to collect surface run-off which is then returned to Pond 3.

The collection system, treatment plant, ponds and land application areas are regulated under Waste Discharge Requirements, Order No. R5-2012-0045, which was issued on June 8, 2012. The updated order prescribes requirements for the new subsurface drip irrigation system and other facility improvements that were completed to comply with Cleanup and Abatement Order (CAO) R5-2007-0711, which was issued in 2007. Prior to the CAO, the ponds received significant seasonal surface water runoff and groundwater seepage through highly permeable tertiary gravels and fractured bedrock from the area upslope of the unlined ponds and that resulted in inadequate wastewater storage capacity.

In addition, the updated order includes requirements to perform groundwater monitoring to determine if the wastewater treatment plant, particularly percolation in the ponds, is degrading the groundwater quality. If the monitoring determines that the CHWWTP is degrading the groundwater, the District will be required to add additional treatment or line the ponds within three years.

2.1.4 Gold Ridge Forest Wastewater System

The Gold Ridge Forest Subdivision is located approximately one-half mile north of Jenkinson Lake (Sly Park Reservoir) and about two miles southeast of Highway 50 in Pollock Pines. Homes in this area are relatively densely populated and are typically connected to individual septic tank leach field systems. However, a portion of this particular subdivision sits atop impervious agglomerate, locally called lava caprock. The adverse characteristics of this subsurface geology warranted a community leachfield outside of the caprock area to service the subdivision.



Camino Heights WWTP

Figure 2-10

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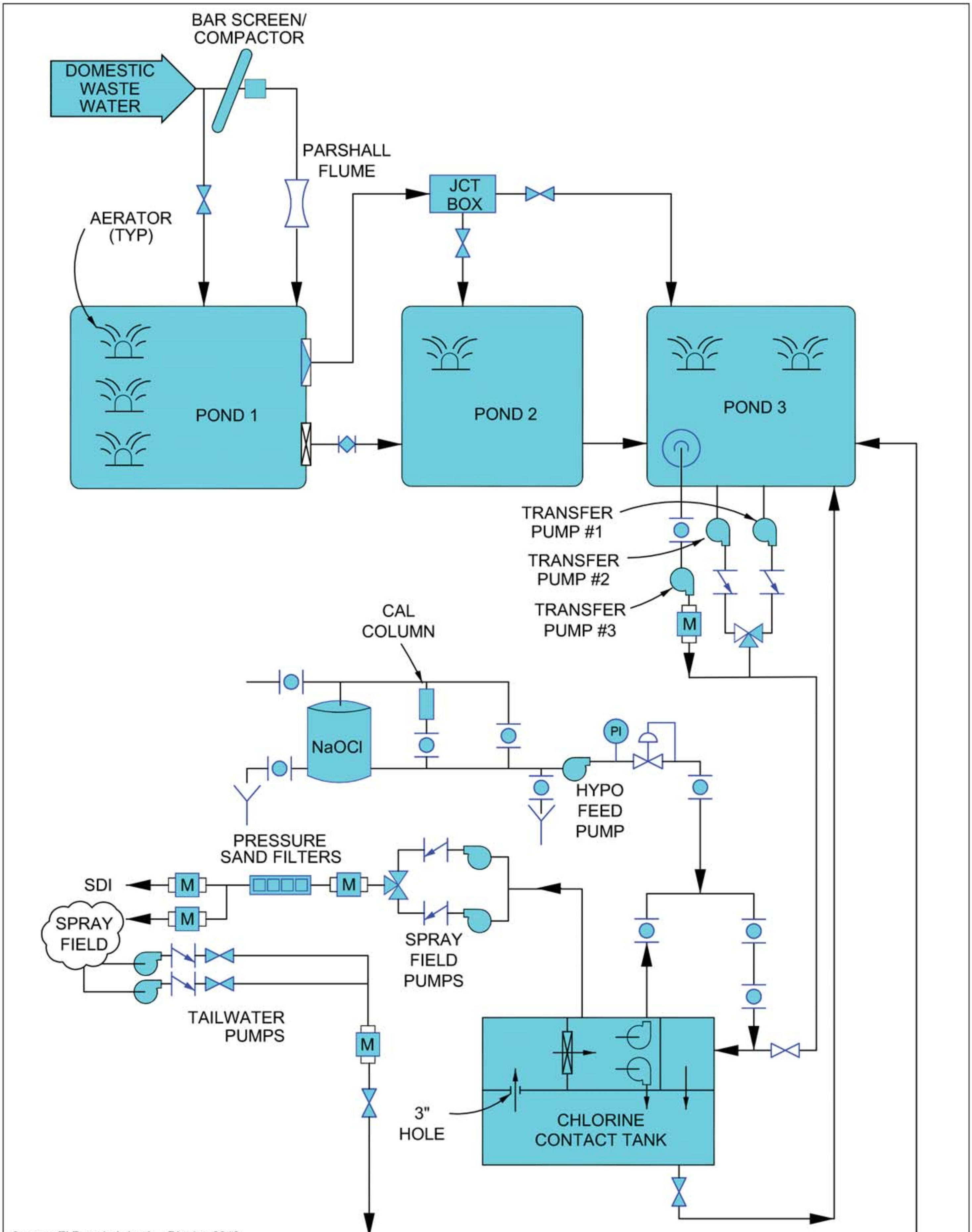


Source: El Dorado Irrigation District, 2013

Camino Heights WWTP Process Diagram

Figure 2-11

The Gold Ridge Forest wastewater system serves a total of 45 single family residential homes and is comprised of a gravity collection system, septic tank battery, and disposal facilities. The gravity collection system is designed to route wastewater to a 19,200 gallon septic tank battery. The tank battery is comprised of twelve, 1,600-gallon septic tanks arranged in three parallel trains. The tanks are designed to provide treatment prior to gravity flow to eight hundred linear feet of leach lines situated on an approximately 15-degree sloping hillside. Together, treatment and disposal facilities are estimated to provide a rated ADWF capacity of 12,500 gpd.

Dissimilar to the other three wastewater systems which are owned by the District, the Gold Ridge Forest Owners Association owns the land associated with the wastewater system and the District is only responsible for the operation of the wastewater treatment facilities (i.e., septic tanks and leach field).

The Gold Ridge Forest wastewater system is currently regulated by Order No 5-00-135, which was adopted June 1, 2000.

2.2 Existing Recycled Water System

The District's recycled water system includes two wastewater treatment plants (EDHWWTP and DCWWTP), an interconnected network of transmission and distribution pipelines, pump stations, storage tanks, pressure reducing stations, and appurtenant facilities located within the communities of EI Dorado Hills and Cameron Park.

The District began producing recycled water over 30 years ago at the EDHWWTP. The first recycled water deliveries were made to the Wetsel-Oviatt Lumber Company for log deck irrigation, and the El Dorado Hills Executive Golf Course, for turf irrigation. In the early 1990s additional facilities were constructed to convey recycled water from the DCWWTP to the Serrano Development in EI Dorado Hills. By 1997, the EDHWWTP had expanded its system and connected to the Deer Creek pipe network thereby creating one interconnected delivery system.

2.2.1 Existing Recycled Water Production

Annual recycled water production capabilities are based on the total wastewater flow entering the DCWWTP and EDHWWTP, uses and/or losses which occur within each wastewater treatment plant, infiltration and inflow (I/I), and a minimum discharge of 1.0 mgd of treated effluent to Deer Creek as mandated by the SWRCB. As shown in Table 2-10, the average recycled water supply between 2008 and 2012 was approximately 2,600 ac-ft.

Table 2-10. Historical Recycled Water Demand, Production, and Potable Supplementation

Year	Active Accounts[a]	Recycled Water Demand[a] (AFY)	Recycled Water Produced[b] (AFY)	Potable Water Supplementation[a] (AFY)
2008	3,461	2,904	3,489	455
2009	3,519	2,593	2,847	393
2010	3,785	2,063	2,116	379
2011	3,807	2,247	2,190	277
2012	4,077	2,853	2,349	596
Average	--	2,532	2,598	420

(a) Based on District Consumption Reports for 2008 through 2012
(b) Based on Recycled Water System Operations Spreadsheet maintained by District Staff and represents the actual volume of recycled water produced at the WWTPs.

Based on an average dry weather flows of approximately 2.6 mgd at the Deer Creek and EDH wastewater treatment plants, and using the methodology used for estimating recycled water production capabilities for the Seasonal Storage Project[5], it is estimated that a total of 6,135 acre-feet per year (AFY) could have been available if treated effluent was stored year round. Of this combined total, 2,830 and 3,305 ac-ft/yr could have been produced by the DCWWTP and EDHWWTP, respectively. By comparison, recycled water demands in 2012 were approximately, 2,850 AFY, which equates to approximately 46 percent of the potential supply.

[5] Recycled Water Seasonal Storage Basis of Design Report, June 2009.

2.2.2 Recycled Water Facilities

A schematic of the existing recycled water system is provided in Figure 2-12 illustrating the interconnections between the system components, including the locations of the wastewater treatment plants, recycled water pipelines, pump stations, storage tanks, and pressure zones for the recycled water system.

Recycled Water Pipelines

The District's recycled water transmission, distribution and storage facilities consist of approximately 290,000 lineal feet (54 miles) of pipeline, six pump stations, four storage tanks, and numerous pressure reducing stations, valves, and meters. The existing recycled water pipelines include:

- **Transmission Mains:** 8-, 10-, 12-, 14-, 16-, and 18-inch diameter pipelines.
- **Distribution Mains:** 2-, 3-, 4-, and 6-inch diameter pipelines.

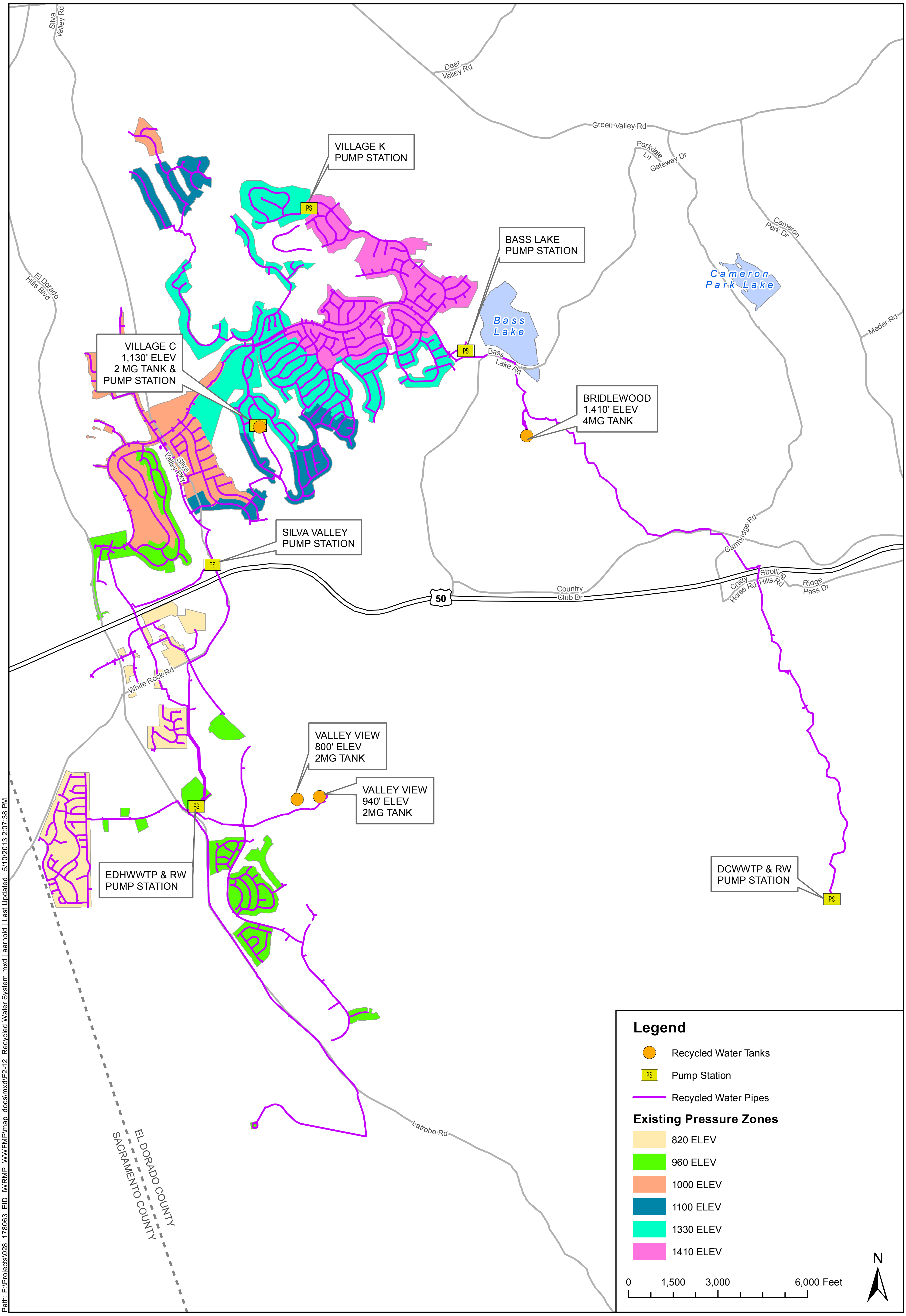
The recycled water pipelines from the EDHWWTP and DCWWTP form a loop through the Serrano Development. Recycled water can be conveyed to the Bridlewood Tank from either EDHWWTP or DCWWTP. The capacity of the pump station and the 12-inch transmission main located in Serrano Boulevard currently limit the amount of recycled water that can be pumped to the upper zones and between the two wastewater treatment facilities.

Recycled Water Pump Stations

The District’s recycled water system currently includes the following six pump stations:

- **EDHWWTP Recycled Water Pump Station:** This pump station is located at the EDHWWTP and is used to convey recycled water through an 8-, 10-, and 18-inch recycled water transmission mains that serve the lower- to mid-elevation recycled water use areas located throughout El Dorado Hills. This station consists of two, 200 HP vertical turbine pumps. Each pump is designed to pump between 1,000 and 1,900 gpm, each. (Pump Model No. Floway 12JKH, Serial Nos. 21165-1-2 and 35895-1-1, 6- and 7-stage, respectively).

- **DCWWTP Recycled Water Pump Station:** This pump station is located at the DCWWTP and is used to convey recycled water through the 18-inch recycled water transmission main that serves the high-elevation recycled water use areas located within the Serrano Development. This station consists of one, 100 HP and two, 200 HP vertical turbine pumps. The smaller pump is designed to pump between 350 and 700 gpm. (Pump Model No. Floway 10JKH, Serial No.92-01461, 12-stage). The two larger pumps are designed to pump between 750 and 1,250 gpm, each. (Pump Model No. Floway 12LKM, Serial No. 92-01462 and 92-01463, 9-stage).
- **Silva Valley Booster Pump Station:** This is one of two zone transfer booster pump stations that operate in the distribution system. It is located at Silva Valley and Highway 50. This station is capable of pumping a maximum of 3,900 gpm to the 1,140 ft pressure zone of the lower Serrano area based on its current configuration of three, 100 HP pumps. The station has room to accommodate a fourth pump in the future.
- **Village C Booster Pump Station:** The second zone transfer booster pump station in the distribution system is located in Serrano Village C. This station is capable of pumping a maximum of 2,600 gpm to the 1,350 ft pressure zone based on its current configuration of two, 200 HP and one, 125 HP pump in service. Assuming the directional flow control can be removed, the station has room to accommodate a fourth pump in the future.
- **Village K Booster Pump Station:** This booster pump station is located in Serrano Village K. This station is capable of pumping a maximum of 840 gpm based on its current configuration of one, 10 HP and two, 30 HP pumps.
- **Bass Lake Booster Pump Station:** This booster pump station is located near Bass Lake. This station is capable of pumping a maximum of 5,500 gpm based on its current configuration of two, 250 HP pumps.



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Recycled Water System

FIGURE 2-12

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Recycled water produced at the EDHWWTP is pumped through an 18-inch transmission main to the El Dorado Hills Golf Course, Vineyard Court, and Whiterock Village Apartments, the eastern portions of Town Center, customers along Silva Valley Parkway and the lower elevations within the Serrano Development. Recycled water is conveyed north through an 8-inch main that serves Creekside Greens, El Dorado Estates, and the western portion of Town Center. A 10-inch transmission main parallels Latrobe Road leading to the former Wetzel-Oviatt property and serves the Euer Ranch Development.

Recycled water produced at the DCWWTP is pumped through an 18-inch transmission main to Highway 50 then through a 16-inch main to the Bridlewood Tank. This particular tank serves areas located at the highest elevations within the Serrano Development.

Recycled Water Storage Reservoir

The District has a 70 million gallon storage reservoir located adjacent to the EDHWWTP to balance the rate of wastewater generation with recycled water demands and to allow the plant to operate without discharging to Carson Creek during the dry season. The reservoir is unlined and is contained on its west side by a rock berm, which is designated as a dam by the Department of Dam Safety. Secondary effluent is drawn from the reservoir and routed through a dissolved air floatation thickener (DAFT) for algae removal, tertiary filtration and UV disinfection. From this point, the recycled water is then pumped to the storage tanks or into the recycled water distribution system for beneficial reuse. A reservoir effluent pump station allows the reservoir to be drawn down to low levels and the majority of the storage capacity to be used.

Recycled Water Diurnal Storage Tanks

The use of recycled water for irrigation takes place primarily at night, thus peak recycled water demands occur during the night time period when wastewater influent flows are typically at their lowest. The District has installed several diurnal storage tanks to address this daily imbalance between recycled water production and demand. The storage tanks allow the EDHWWTP and DCWWTP to produce recycled water during the day when flow is available. As influent flow decreases during the night, and as recycled water demand increases, the demand is served from the storage tanks and potable water supplementation. Table 2-11 provides a listing of the four existing recycled water diurnal storage tanks.

Table 2-11. Recycled Water Diurnal Storage Tanks

Tank Location	Identification Number	Base Elevation (ft above MSL)	High Water Level (ft above MSL)	Tank Diameter (ft)	Volume (MG)
Valley View Tank	800	775.0	800.5	122	2.0
Valley View Tank	940	915	940.5	122	2.0
Village C Tank	1125	1,100	1,125.5	120	2.0
Bridlewood Tank	1410	1,380	1,408	150	4.0
Total Storage Capacity					10.0

2.2.3 Potable Water Supplementation

Peak summer recycled water demands cannot currently be met solely with treated effluent production at the EDHWWTP and DCWWTP, and thus supplemental water is required.

The District currently relies upon potable water supplementation to meet demands when they exceed available recycled water supply. The potable water supplies are introduced into the recycled water distribution system at the Bass Lake pump station wet well or at one of the four diurnal storage tanks.

In the past, the District had also used supplemental raw water obtained from Bass Lake Reservoir; however, that practice is no longer in operation due to the presence of high levels of iron and manganese, which resulted in discoloration of the water.

Table 2-12 presents a summary of recycled water demands and supplemental water supplies for 2008 through 2012. During this period, supplemental water supplies have accounted for 15 to 20 percent of the total recycled water demand. As shown, supplementation occurred on average 116 days per year.

Table 2-12. Recycled Water Demand and Supplemental Water Supplies

Year	Total Demand[a] (AFY)	Potable Supplementation[b] (AFY)	Supplemental Water (% of Total Demand)	Days of Supplementation[b] (No.)	Max Daily Supplementation[b] (mgd)
2008	2,904	455	16%	104	2.5
2009	2,593	393	15%	112	3.2
2010	2,063	379	18%	86	2.2
2011	2,247	277	12%	130	1.6
2012	2,853	596	21%	149	4.3
Average	2,532	420	17%	116	2.8

(a) Based on District Consumption Reports for 2008 through 2012
(b) Based on Recycled Water System Operations Spreadsheet maintained by District Staff and represents the actual volume of recycled water produced at the WWTPs.

The District has decided that the recycled water supply deficit will be met by potable water supplementation until additional recycled water supply is available. Maximum day potable water supplementation has ranged between 1.6 and 4.3 mgd over the past five years.

The District has considered building a recycled water storage reservoir to be able to accommodate recycled water demands without potable water supplementation. The District has completed preliminary design and environmental review of a seasonal storage reservoir. Subsection 7.4 provides an update of recycled water system expansion alternatives and the economic evaluation of these alternatives.

2.3 Existing Capital Improvement Plan

The District prepares a five year CIP each year. The 2013 CIP has approximately $85.8 million in improvements identified for 2013 through 2017, for an annual average of approximately $17.2 million. The District has more than twenty wastewater related capital improvement projects planned for the 2013-2017 time period, totaling more than $18 million. In addition, the District has planned to spend $25,000 for improvements to the recycled water system over the next five years. The remainder of the CIP is allocated to water, hydroelectric, recreation, and general District projects.

2.4 Integration with Water System

The District provides water to more than 100,000 people for municipal, industrial, and irrigation uses. Although the District has sufficient water supplies to meet existing demands, projected development within the service area will require augmentation of the District's water supplies. Recycled water is an important element of the District's water resources portfolio and was included in the IWRMP as a component of future water supplies. Common elements for program solutions within the water, wastewater, and recycled water facilities are integrated in both the IWRMP and the WWFMP. These common elements provide the framework for meeting the project vision and objectives described in Section 1.

3.0 BASIS OF PLANNING

This section provides the basic information used in the development of concepts and recommendations for the WWFMP. The basis of planning includes assumptions regarding the study area, planning period, land use, and cost estimates. In addition, this section summarizes pertinent District policies, District design criteria, and relevant studies.

3.1 Study Area

The project study area for the WWFMP includes lands that are currently served and those which are planned for future development that may require municipal and industrial collection and treatment and/or recycled water services.

Figure 1-1 illustrates the location of the wastewater collection areas for the El Dorado Hills and Deer Creek wastewater treatment plants. Figure 1-2 illustrates the location of the recycled water service area.

3.2 Planning Period

The project planning period extends 20 years, from 2010 through 2030. Although the planning horizon of the adopted General Plan for El Dorado County was to 2025, build out is expected to occur sometime after 2025.

3.3 Land Use

As described previously, project objectives include the development of recommended water, wastewater, and recycled water infrastructure needs to serve the growth defined by the County General Plan and the City of Placerville. The fundamental planning basis for developing water demands and projected wastewater flows is the planned land use presented in the County General Plan, including the Specific Plans developed for the communities of Bass Lake Hills, Carson Creek, El Dorado Hills, Northwest El Dorado Hills, Promontory and Valley View.

The General Plan land uses used to develop water demands and wastewater flows for the Master Plan are illustrated in Figure 3-1.

3.4 Ongoing Studies

The District is currently completing a complete condition assessment of its collection system lift stations (Subsection 5.9). This study is expected to be implemented over several years and will result in a prioritized list of lift station improvements. The prioritized list of lift stations improvements will be included in the District's five-year CIP and will be updated each year and included each subsequent CIP.

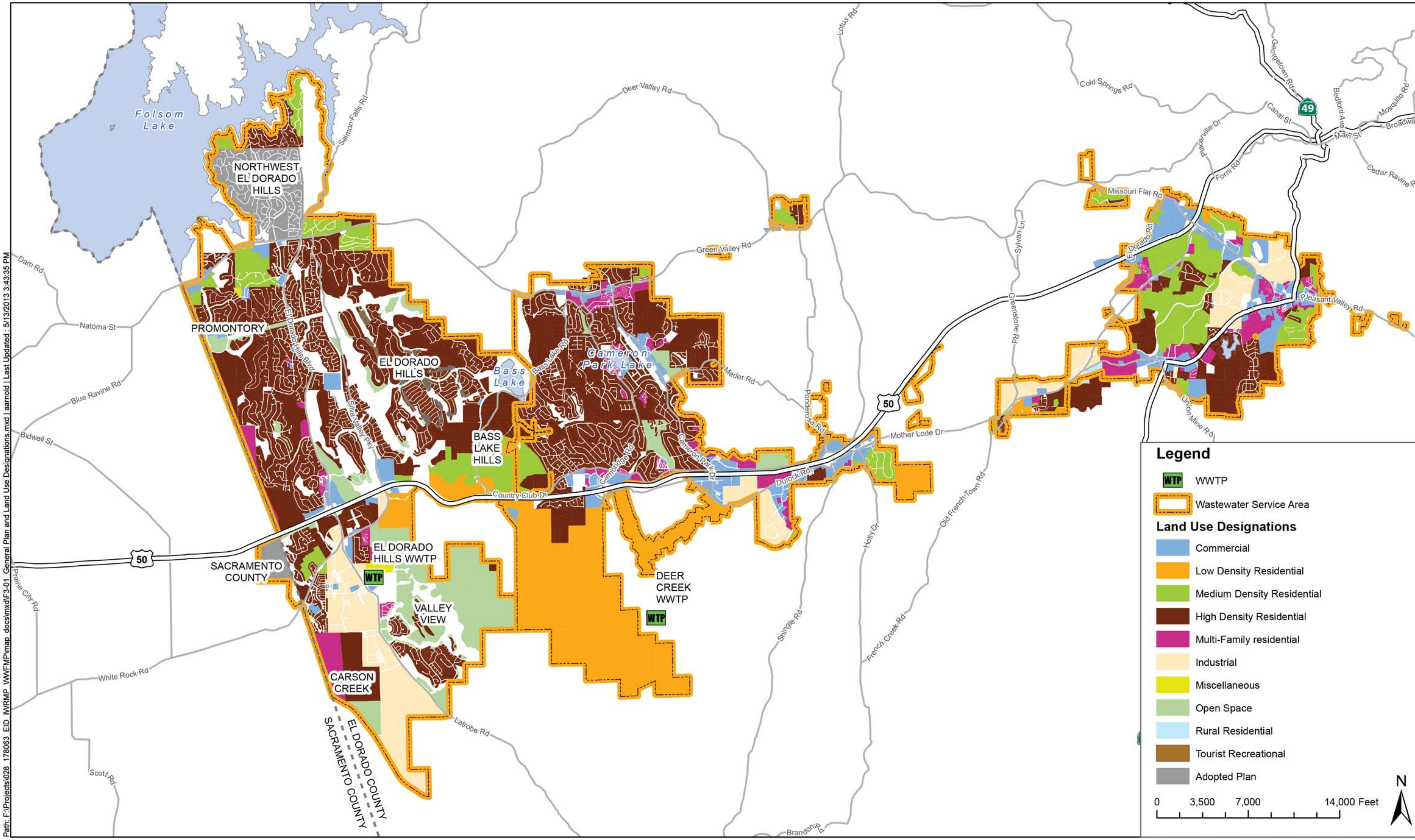
The District also has several other ongoing studies. Groundwater monitoring is underway at the Camino Heights WWTP as a condition of the WDR to determine if the wastewater treatment plant, particularly percolation in the ponds, is impacting the groundwater quality.

A nutrient study plan will be conducted in 2013 at the EDHWWTP to evaluate energy costs savings opportunities and enhance and implement consistent process operations. Similarly, an oxygen transfer efficiency testing is planned for 2013 at both the DCWWTP and EDHWWTP to evaluate process optimization opportunities and energy and cost savings. Additional solar energy production is being evaluated as well.

As previously described, the District is also studying the effluent discharge to Deer Creek and plans to pursue the termination or reduction of the existing 1.0 mgd discharge requirement to Deer Creek.

3.5 District Policies

The District is governed by a five-member Board of Directors (Board) pursuant to Irrigation District Law (Water Code §§20500, et seq.). The Board sets policy for the District and provides leadership on behalf of District customers. The purpose of these policies is to set forth the role of the Board and the responsibilities of the general manager and the general counsel in carrying out the terms and conditions under which the District provides services to its customers.



General Plan Land Use Designations

FIGURE 3-1

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In addition, the policies direct the operations and administration of the District in a way that ensures that services are provided at the lowest possible cost, consistent with District goals and objectives, and are equitably distributed among those benefited, or by another specific policy of the Board. The Board has the authority to interpret these policies and to rule on any point of contention that is not specifically covered herein.

The following are the District Board Policies (BP) related to the development of this Master Plan.

- **BP 6010 Wastewater System Management**
  The District will maintain a wastewater collection, treatment, and disposal system that complies with applicable state, and federal wastewater discharge requirements and regulations.
- **BP 7010 Authorized and Mandated Use of Recycled Water**
  The District mandates the future use of recycled water, wherever economically and physically feasible, as determined by the Board, for non-domestic purposes when such water is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and not injurious to plant life, fish, and wildlife. The type of use is defined in Title 22 of the California Code of Regulations. In general, the lands subject to mandatory recycled water use are defined in the most current version of the District's Recycled Water Master Plan.

3.6 Design Criteria

Specific criteria, units, and values for collection system and recycled water system design are provided online in the EID Document Library[6].

3.7 Basis of Cost Estimates

Preliminary cost estimates will be developed for the infrastructure needs identified in the plan. A present worth analysis will be used to compare the economic impacts of

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[6] http://www.eid.org/02_dist_info/di_doclib.htm

competing alternatives, including initial capital and annual operations and maintenance (O&M) costs using the parameters listed in Table 3-1.

Table 3-1. Basis of Cost Estimates

Item	Value	Comment
Interest Rate	5%	Average long-term value of money
Inflation Rate	3%	20-year average for State of California
Economic Life Cycle Duration	60 years	Consistent with Seasonal Storage Basis of Design Report
Engineering News Record, January 2013	9437	20 City Average Construction Cost Index

Capital cost estimates will be prepared by applying unit costs and cost curve data to the estimated quantities or capacities for proposed improvement projects. Allowances will be added for contingency (30 percent) and engineering, administration, and permitting (25 percent). For projects already in progress, actual bid data or established budgets developed by others will be utilized.

When possible, construction costs will be based on actual bid data or estimates presented in prior studies adjusted to reflect current dollars and the size of the proposed facility. Where prior bid results or previous estimates are not available, new facility costs will be developed using techniques deemed appropriate for a project planning-level cost estimate (i.e., +25 percent, - 15 percent).

Construction costs will include the following major facilities.

- **Wastewater:** Collection, treatment, disposal, and supporting facilities (e.g., lift stations) associated with the El Dorado Hills and Deer Creek Collection Systems.

- **Recycled Water:** Conveyance, diurnal storage, supporting infrastructure (e.g., pumping stations), and seasonal storage.

All preliminary cost estimates will be adjusted to represent current dollars. The basis for the estimates will be the Engineering News Record (ENR) 20 Cities Construction Cost Index.

3.8 Planning Approach

The approach for this Master Plan included evaluation of existing data, establishment of planning assumptions including future growth in the District's service area, developing or updating existing models, use of models to evaluate existing and future infrastructure needs, development of capital improvement recommendations, and identification of implementation steps and phasing.

The following section of this report (Section 4) addresses existing wastewater flows and forecasts of future flows, as well as existing recycled water production and projected recycled water supply. Section 5 of this report describes the analysis of the wastewater collection systems. Section 6 describes the evaluation of the wastewater treatment plants. Sections 7 and 8 present the wastewater effluent disposal and reuse evaluation and the analysis of the recycled water distribution system, respectively. Finally, Section 9 summarizes the recommended plan and implementation steps.

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4.0 EXISTING AND PROJECTED FLOWS

Wastewater flow and recycled water supply projections provide a basis for planning future capital improvements. Estimating future wastewater flows combines projected growth in the District, the County's General Plan Land use designations, and land use based wastewater generation rates to develop the total projected flow as summarized in the following subsections. Similarly, recycled water production is dependent on average dry weather flow at the District's DCWWTP and EDHWWTP.

Future recycled water demand is dependent on projected development of dual plumbed residential and commercial areas, and seasonal precipitation.

4.1 Projected Wastewater Flows

Projected wastewater flows for the District's El Dorado Hills and Deer Creek Collection Systems are based on the County's General Plan Land Use designations and the number of planned connections included in the Specific Plans for the communities of Bass Lake Hills, Carson Creek, El Dorado Hills, Northwest El Dorado Hills, Promontory and Valley View. This information was combined with the District's wastewater generation rates. Projected wastewater flows will impact both the extent and timing of wastewater collection, treatment plant, and treated effluent disposal improvements, as well as the availability of additional recycled water supplies.

The following subsections describe previous wastewater flow projections, the methodology used to develop flow forecasts, and the projected flows for the DCWWTP and EDHWWTP.

4.1.1 Previous Projections

The District's 2001 Wastewater Master Plan included future wastewater flow projections, as shown in Table 4-1. The methodology used to develop the flow projections presented in the 2001 Wastewater Master Plan Update was based on population projections for the collection systems and the District's wastewater generation rate of 240 gpd per EDU.

Table 4-1. Flow Projections from 2001 Wastewater Master Plan Update

Wastewater Treatment Plant	Projected EDUs	2025 Projected Flow (mgd)
El Dorado Hills	22,500	5.4
Deer Creek	15,100	3.6

Source: Wastewater Master Plan Update, November 2001

4.1.2 Wastewater Flow Projections

The methodology used to project future wastewater flows for this Master Plan is based on land use designations which are in accordance with the County's adopted General Plan and subsequent Specific Plans. The methodology includes the following steps:

- The boundaries the for the El Dorado Hills and Deer Creek Collection Systems were updated to include only those parcels which are expected to be served by the District in the future, as defined by the District.
- The boundaries were then layered over the General Plan land use parcel data to calculate the acres of land use for each collection system. The acreage within the Specific Plan boundaries was deducted from total acreage. The remaining acreage was then divided into existing (developed) land use and future (vacant) land use. General Plan land use types were converted to match District land use planning types, as shown in Table 4-2.

Table 4-2. Land Use Categories

District Land Use	General Plan Land Use
Low Density SF	Low Density Residential
Medium Density SF	Medium Density Residential
High Density SF	High Density Residential
Multi-Family	Multi-Family Residential
Commercial	Commercial Public Facility
Industrial	Industrial Research & Development
Miscellaneous	Rural Residential Tourist Recreation Open Space

- The number of connections identified in each of the Specific Plans was summarized and the number of existing (developed parcels) connections within the Specific Plan areas was determined and subtracted from the total. The difference was used to calculate the future flow for areas with known density (as defined in the respective Specific Plans), as summarized in Table 4-3.

Table 4-3. Flow Projections for Areas with Known Future Density (i.e., Specific Plan Areas)

Specific Plan	El Dorado Hills			Deer Creek		
	Total Dwelling Units	Estimated Remaining Units	Future WW Flow[a] (mgd)	Total Dwelling Units	Estimated Remaining Units	Future WW Flow[a] (mgd)
Bass Lake Hills	1,205	1,153	0.25	253	112	0.02
Carson Creek	1,700	1,343	0.29	-	-	-
El Dorado Hills	6,162	2,853	0.61	-	-	-
Promontory	964	437	0.09	-	-	-
Valley View	2,840	2,837	0.61	-	-	-
Other[b]	322	322	0.07	395	395	0.09
Total			1.92			0.11

(a) Unit factors (gpd/EDU) are presented in Table 4-4.
(b) Sacramento County (322 EDUs) in EDH, Marble Valley and Marble Ridge (395 EDUs) in Western.

- The District's design criteria, as shown in Table 4-4, and the future land use acreage was used to calculate future wastewater flows for areas with unknown density (i.e., the area outside of a Specific Plan boundary where specific number of future connections is unknown), as summarized in Table 4-5.

Table 4-4. ADWF Wastewater Generation Rates

Land Use Category	ADWF for Areas with Unknown Density[(a)] (gpd / acre)	ADWF for Areas with Known Future Density[(a)] (gpd/EDU or gpd/acre)
Low Density SF	34 gpd/acre	240 gpd/EDU
Medium Density SF	120 gpd/acre	240 gpd/EDU
High Density SF	600 gpd/acre	240 gpd/EDU
Multi-Family	2,200 gpd/acre	180 gpd/EDU
Commercial	500 gpd/acre	500 gpd/acre
Industrial	500 gpd/acre	500 gpd/acre

(a) Per Section 3 of the District's Design and Construction Standards, July 1999.

Table 4-5. Flow Projections for Areas with Unknown Future Density

District Land Use Category	El Dorado Hills		Deer Creek	
	Future Acreage (acres)	Future ADWF Flow (mgd)	Future Acreage (acres)	Future ADWF Flow (mgd)
Low Density SF	110	0.00[(b)]	2415	0.08
Medium Density SF	98	0.01	21	0.00[(b)]
High Density SF	635	0.38	1427	0.86
Multi-Family	31	0.07	369	0.81
Commercial	249[(a)]	0.13	515	0.26
Industrial	574	0.29	481	0.24
Miscellaneous	43	0.00	111	0.00
Total	1,846	0.88	5,339	2.25

(a) Includes 134 acres of commercial and industrial land in the Carson Creek, Valley View, and Sacramento County Specific Plans at 500 gpd/acre.

(b) Additional flow is insignificant.

- The future wastewater flows for both known and unknown density areas were then added to existing ADWFs for the EDHWWTP and DCWWTP to project the total future wastewater flow to each treatment plant. The projected flows are presented in Table 4-6.

Table 4-6. Future Flow Projections

	EDHWWTP (mgd)	DCWWTP (mgd)
Existing ADWF[(a)]	2.65	2.64
Future Unplanned Density ADWF (Table 4-6)	0.88	2.25
Future Planned Density ADWF (Table 4-4)	1.92	0.11
Total Projected ADWF	5.45	5.00

(a) Equal to the arithmetic average of 2006 through 2009 ADWFs.

As shown in Table 4-6, at full buildout, the required ADWF capacities of the DCWWTP and EDHWWTP are estimated to be 5.0 and 5.45 mgd, respectively, to accommodate the growth described in the General Plan. The buildout estimates represent increases of approximately 2.4 and 2.8 mgd, respectively for the DCWWTP and EDHWWTP compared to the ADWF in 2009.

The estimates presented in Table 4-6 were compared with those prepared for the District's 2001 *Wastewater Master Plan Update*, which as previously described, were based on projected population growth. While the projection for the EDHWWTP is essentially the same as the prior estimate, the project buildout capacity for the DCWWTP increased approximately 1.4 mgd from the previous estimate. This is likely due to the development projected for the Cameron Park and Shingle Springs areas in the County's 2004 General Plan Update that may not have been included in the population projections used for the 2001 *Wastewater Master Plan Update*.

4.2 Growth Rate Analysis

The following subsections describe the historical growth rates in the study area and the growth rates used to project the rate of development in the District's wastewater service areas.

4.2.1 Historical Growth Rates

As described in the IWRMP, water consumption for the historical period from 2000 to 2009 was evaluated to determine the average annual growth rate that could occur in the service area. The average growth rate for the District's water service area was determined to be 2.5 percent based on the period from 2000 to 2008. This growth rate is also consistent with that included in the District's 2005 UWMP.

The average annual growth rates for the District's three water supply regions were also evaluated for the period 2000 through 2008, are shown in Table 4-7.

Table 4-7. Historical Growth Rates by Region, 2000-2008

	Eastern (%)	Western (%)	El Dorado Hills/ Cameron Park (%)	District-wide (%)
Average Annual Growth Rate	0.61	1.70	4.83	2.5

The El Dorado County General Plan 2008 Housing Element had an average annual growth rate of approximately 2 percent through 2025. While this is lower than the rates presented in Table 4-7, it is expected that the average growth rate within the District's service area will be higher, particularly in the El Dorado Hills and Cameron Park areas, due to their proximity to Sacramento, as well as the population density and availability of water and sewer services when compared to other, more remote areas in the County.

The County's website[7] reports that the majority of El Dorado County's population growth since 1980 has been in the El Dorado Hills and Cameron Park area, and that the trend is expected to continue as transportation services and housing opportunities increase.

4.2.2 Future Growth Rates

Recognizing that growth has slowed in recent years and due to the uncertainty associated with the rate at which future development will increase, the historical growth rates were considered and two scenarios, high growth and low growth, were developed.

The growth rates used to project future development in the wastewater service areas, shown in Table 4-8, are consistent with those used to project future water demands in the

[7] "Studies show that 78.2% of population increase since 1980 is due to the overall growth of the Sacramento region with the majority of the growth in El Dorado County occurring in the El Dorado Hills/Cameron Park area. As transportation services and housing opportunities increase, this trend is expected to continue." http://www.eldoradocounty.org/demographics.html

IWRMP. Specifically, the growth rates for the EDHWWTP were based on the growth rates for the District's EDH Water Supply Region (includes El Dorado Hills). Similarly, the growth rates for the Deer Creek Collection System were based on the growth rates for the District's Western Water Supply Region (includes Cameron Park, Shingle Springs, and Diamond Springs).

Table 4-8. Projected Growth Rates

Annual Growth Rate	EDHWWTP		DCWWTP	
	High Growth Rate (%)	Low Growth Rate (%)	High Growth Rate (%)	Low Growth Rate (%)
2009 - 2015	1.19	1.19	0.82	0.78
2016 – 2020	2.38	2.38	1.65	0.78
Beyond 2020	4.75	2.4 – 4.75	3.29	1.5 – 3.29

The high growth scenario is based on historical growth rates, with a reduction through 2020 to reflect the uncertainty in the speed with which the economy and housing market will recover. The low growth scenario was developed with the expectation that growth throughout the service area will be slow for two to three more years while the economy continues to recover. Then growth will ramp up in the El Dorado Hills Region as already planned and approved developments build out. Following that, the growth rate in the El Dorado Hills Region will decrease as the remaining land may be more difficult to develop (e.g., further away from the urban area and existing infrastructure). Growth in the Western Water Supply Region is expected to increase in the coming years as new developments are planned, approved and constructed south of the Highway 50 corridor initially and then throughout the Western Water Supply Region.

4.2.3 Wastewater Growth Projections

Using the total projected buildout flows presented in Table 4-6 and the growth rates for each wastewater service area presented in Table 4-8, future flows were projected through buildout of the wastewater service areas. The results are illustrated in Figure 4-1 and Figure 4-2 for the EDHWWTP and DCWWTP, respectively.

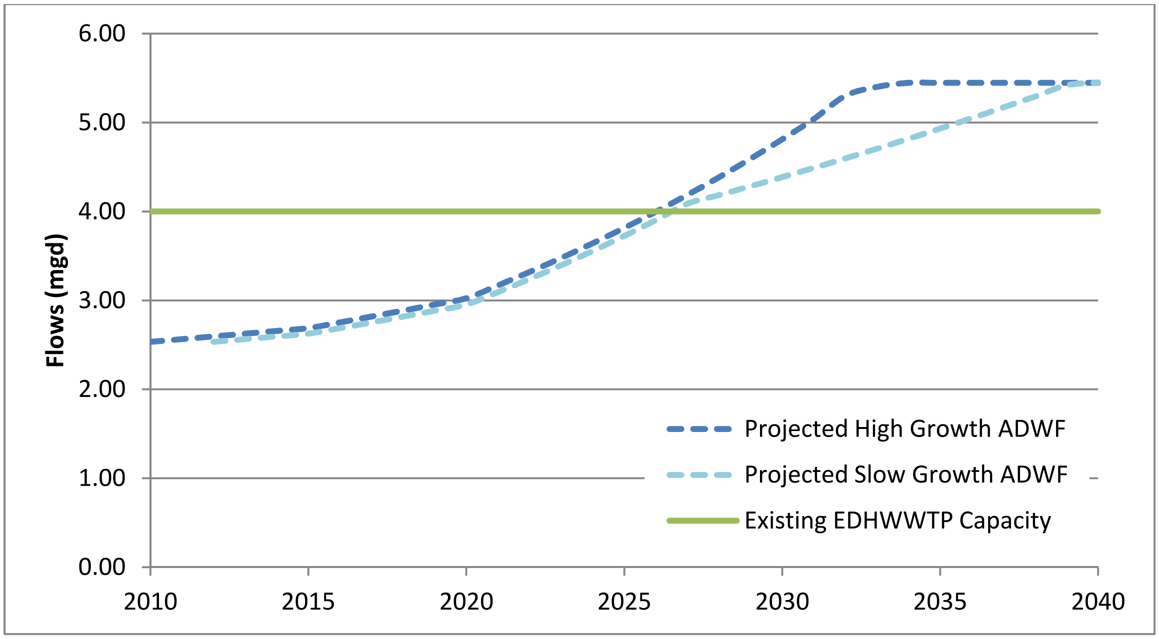


Figure 4-1. EDHWWTP Projected ADWF

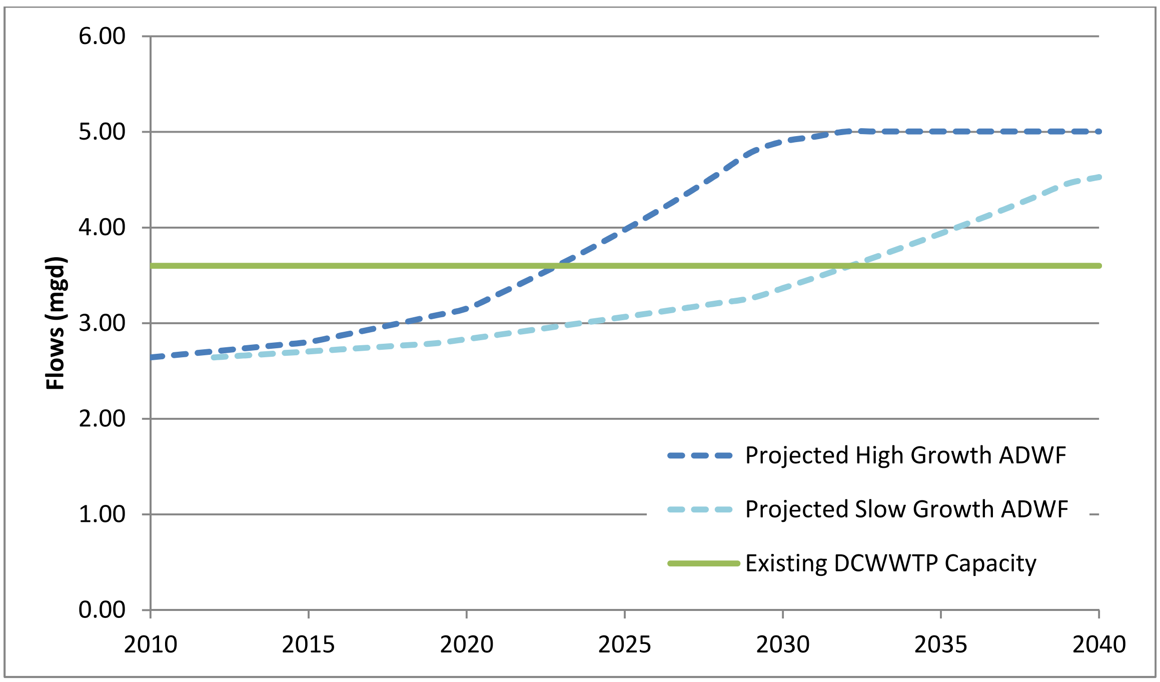


Figure 4-2. DCWWTP Projected ADWF

As shown in Figure 4-1, the ADWF at the EDHWWTP will approach the existing capacity in 2025. Buildout of the El Dorado Hills Collection System is expected to occur between 2032 and 2040.

Figure 4-2 illustrates that the ADWF at the DCWWTP will reach the existing capacity between 2022 and 2032. Buildout of the Deer Creek Collection System is expected to occur between 2032 and 2047.

4.3 Projected Recycled Water Supply and Demand

As previously described, recycled water supply is dependent on average dry weather flows at the District's DCWWTP and EDHWWTP. The following subsections describe the projected recycled water supply based on historical production rates and present the potential recycled water demand.

4.3.1 Recycled Water Supply Forecast

Based on buildout capacities of 5.0 mgd at DCWWTP and 5.45 mgd at EDHWWTP, as described above, the annual influent flow to the District's wastewater treatment plant is estimated to be 12,380 AFY which could be used to produce recycled water. However, much of that water is available during the wet season, when the recycled water demand is very low. In the early spring, demand for outdoor irrigation starts to increase slowly. Then in June through September, demand for recycled water is high, after which it begins to decline again in October.

Considering the seasonality of the recycled water demand, the future recycled water supply was projected based on actual recycled water produced and delivered to the recycled water system. Using that approach, it is estimated that approximately 4,900 AFY of recycled water could be produced, at buildout of the wastewater collection systems, to meet seasonal demands in much the same way the system is currently operated today. As previously noted, the District is also actively pursuing the reduction or elimination or reduction of the 1 mgd discharge requirement to Deer Creek. If the District is successful in reducing that discharge to only 0.5 mgd in the future, approximately 5,180 AFY of recycled water could be produced at buildout and if the discharge requirement was eliminated, approximately 5,640 AFY of recycled water could be available at buildout.

4.3.2 Recycled Water Supply Growth Projections

Using the projected buildout recycled water supply described above and the growth rates for each wastewater service area, as presented in Table 4-8, future recycled water supply was projected through buildout of the wastewater service areas. The actual recycled water produced in 2012 was used as the basis for projecting future growth. The results are illustrated in Figure 4-3.

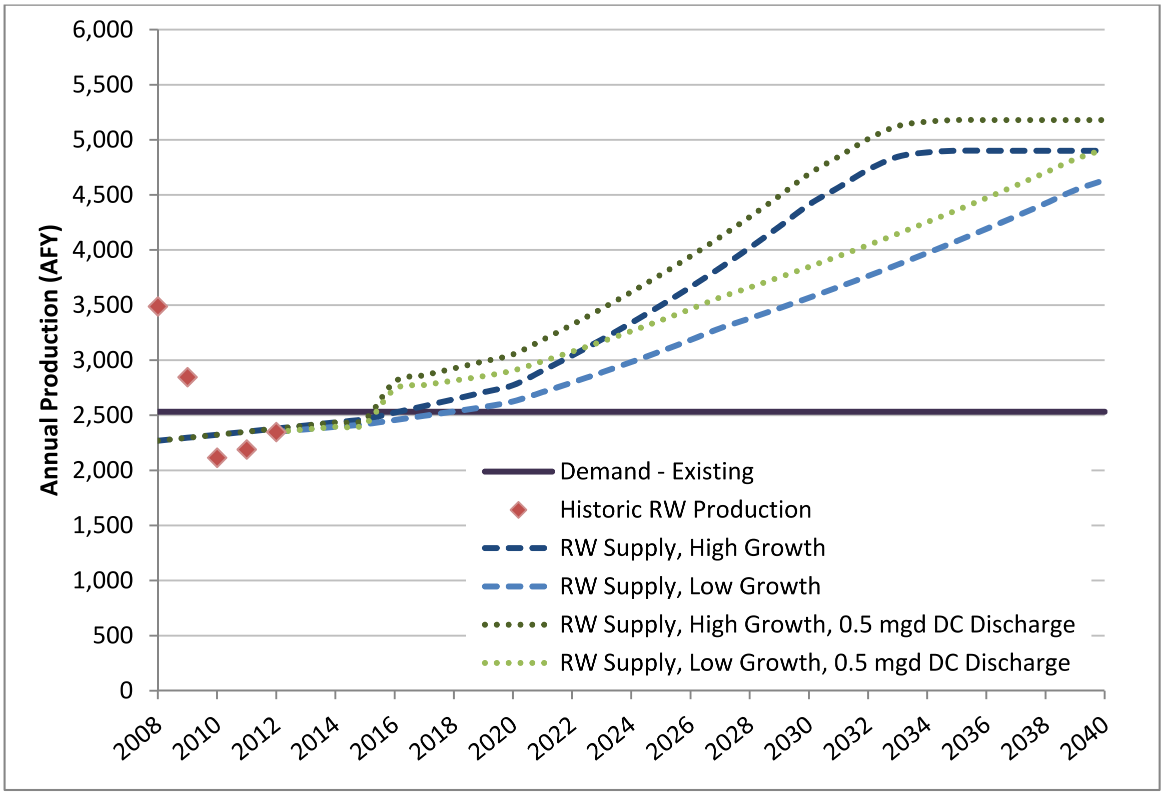


Figure 4-3. Projected Recycled Water Supply

As shown in Figure 4-3, the historical recycled water production decreased significantly between 2008 and 2010. The ADWF at the DCWWTP and EDHWWTP also decreased during that time, which is largely attributed to enhanced awareness and implementation of water conservation measures.

Since 2010, recycled water production has seen a modest increase. However, the recycled water supply is less than the existing demand, and as described in Subsection 2.2, the number of days in which supplementation is required each year has also increased. 2012 had the largest maximum day potable water supplementation within the last five years.

The existing recycled water demand is approximately 2,530 AFY, as shown in Figure 4-3. If no additional connections are made to the recycled water system, the production should surpass the demand between 2016 and 2018, particularly if the District is successful in reducing the mandatory discharge to Deer Creek from 1.0 mgd to 0.5 mgd.

4.3.3 Recycled Water Demand

As described above, and illustrated in Figure 4-3, the existing recycled water demand is approximately 2,530 AFY. The District has commitments to the following areas to provide future dual-plumbed service within the El Dorado Hills and Deer Creek service areas:

- Valley View: 738 EDUs expected to connect
- Serrano: 687 EDUs expected to connect
- Carson Creek: 1,200 EDUs expected to connect

In addition to those listed above, the District has also had discussions with Central El Dorado Hills regarding the potential to be dual-plumbed. However, commitments have not yet been made and construction has not started within the development:

- Central El Dorado Hills: potentially 1,028 EDUs to be connected

The Valley View, Serrano, and Carson Creek developments represent the addition of 2,625 EDUs, an estimated annual recycled water demand of approximately 1,100 ac-ft based on an annual demand of 0.42[8] ac-ft per EDU. The Central El Dorado Hills development represents an additional 430 AFY of recycled water demand at buildout.

With existing demands, Valley View, Serrano, and Carson Creek, the total recycled water demand is estimated to be approximately 3,630 AFY, which is well within the projected

[8] Per the 2007 Recycled Water Master, the recycled water unit demand is 0.42AF/DU.

buildout recycled water supply. However, the timing of these particular developments versus other, non-dual-plumbed developments, results in uncertainty regarding the timing of availability of the recycled water supply and need for potable supplementation. This uncertainty is illustrated in Figure 4-4, where it is shown that the equilibrium between supply and demand could occur between 2023 and 2031. Prior to reaching that equilibrium wherein supply is sufficient to meet demand, potable water supplementation would be required to meet demand in the recycled water system.

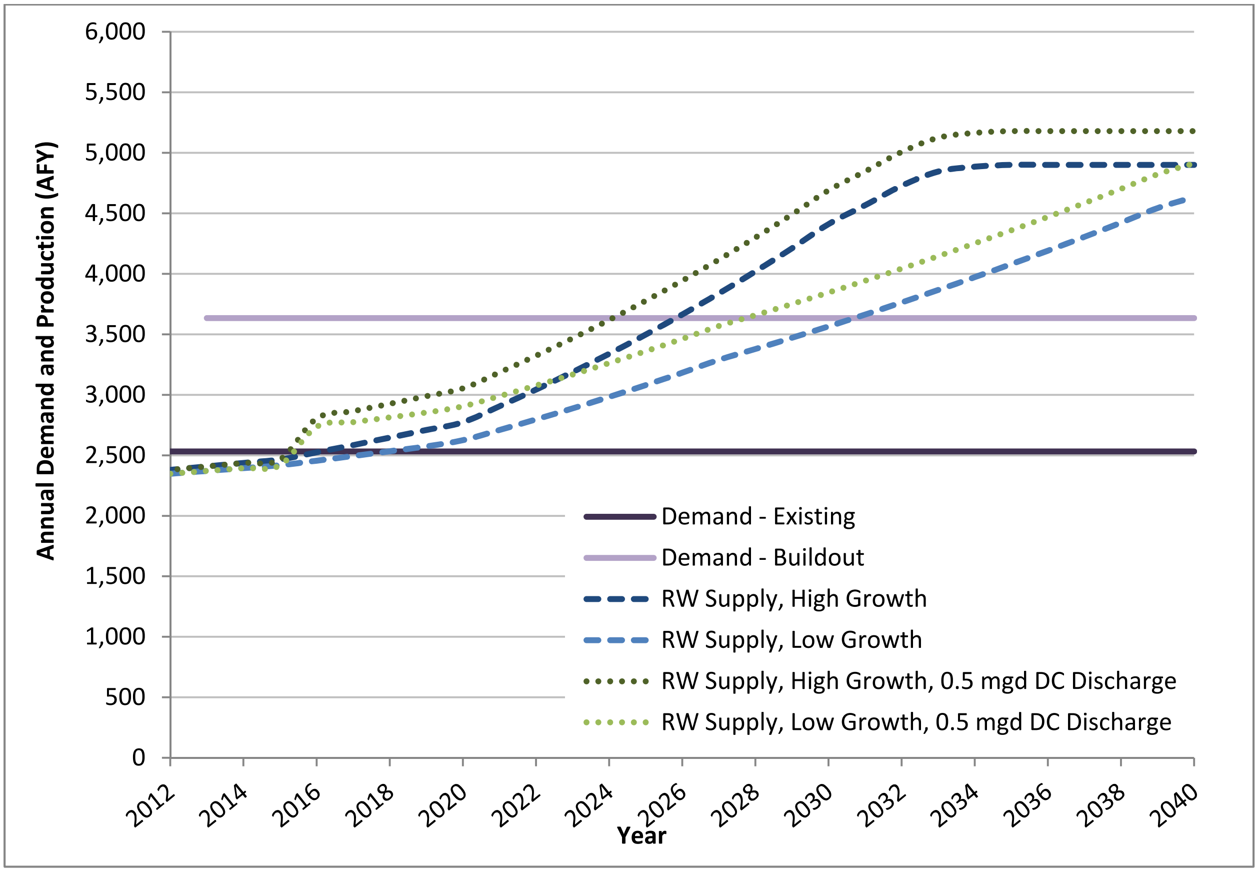


Figure 4-4. Projected Recycled Water Supply and Potential Demand

5.0 WASTEWATER COLLECTION SYSTEM EVALUATION

The evaluation of the wastewater collection system focuses on the existing system and improvements needed to provide capacity for both existing and buildout conditions, as well as improvements needed to address condition related issues. The two main existing collection systems are the El Dorado Hills and Deer Creek Systems, as described in Subsection 2.1.

This section presents a summary of regulatory considerations for the District's collection systems and an analysis of historical SSOs. In addition, the sewer system hydraulic model is described and the I/I and design storm analyses conducted using the model are described. Collection system deficiencies are also identified for the existing collection system infrastructure under existing and buildout scenarios. Finally, the condition of the District's lift stations is presented.

It is assumed that individual developers will be responsible for the planning, engineering, and construction of proposed sewer systems located within their respective developments.

5.1 Regulatory Considerations

Numerous regulatory activities are being developed by state and federal agencies that may affect the District. Development of new regulatory requirements can be a slow, iterative process with varied changes occurring up until the final approach is approved, adopted, and implemented. As such, this discussion is based on regulatory developments that are in progress or under consideration.

5.1.1 Collection System Operation

The SWRCB issued Statewide General Waste Discharge Requirements for Sanitary Sewer Systems in 2006 (Order No. 2006-0003, revised with Order No. WQ-2008-0002-EXEC). The intent of this permit is to facilitate proper funding and management of sanitary sewer systems and reduce the number of and effects of SSOs.

All public agencies that own or operate sanitary sewer systems must apply for coverage under the statewide general permit for sanitary sewer systems, prepare a Sewer System

Management Plan (SSMP), properly operate and maintain their sewer system, and report SSOs using a statewide public database. Compliance with the permit-required activities will be considered in any enforcement action undertaken by the Regional Water Quality Control Boards (RWQCB) or SWRCB. The District is in compliance with permit-required activities under Order No. 2006-0003 and No. WQ-2008-0002-EXEC.

The SWRCB is currently in the process of updating the Monitoring and Reporting Program (MRP) of the Statewide WDR. The Draft Amended MRP was released in January 2013 for stakeholder review and comment. Meetings were held with industry representatives in January and February. The revised Amended MRP was released in April 2013. Revisions include provisions relating to impact assessments for 50,000 gallon spills, photographic SSO documentation, recordkeeping, eliminating limits on amending SSO reports, and other related matters.

5.1.2 Sanitary Sewer Management Plan

The District's Sanitary Sewer Management Plan (SSMP) describes the activities the District undertakes to efficiently manage its wastewater collection system. The SSMP requires the District to identify and illustrate SSO trends, including frequency, location and volume, monitoring and SSMP performance evaluations. The collection system program components consist of preventative maintenance, repair and rehabilitation (asset management), capacity assessment, and public outreach. Board-approved goals described in the SSMP are to:

- Maintain and improve the condition of the collection system infrastructure in order to provide reliable service now and into the future,
- Minimize I/I in a cost-effective manner, and
- Minimize the number of and impact of SSOs.

The SSMP guidelines require that the District conduct monitoring, measurement, and program modifications as well as an audit every two years to determine the effectiveness of the SSMP in reducing SSOs. The audit will address the SSO issues in the collection system as well as review and provide recommendations on the preventative maintenance, asset management and public outreach programs.

5.1.3 CSPA Settlement Agreement

The District's Board of Directors approved the Settlement Agreement with the California Sportfishing Protection Alliance (CSPA) in May 2010. The Settlement Agreement settled a lawsuit that CSPA filed against the District for alleged violations (e.g. sewer spills) of the federal Clean Water Act.

The goal of the Settlement Agreement was to reduce the number of SSOs in the District's service area to less than five SSOs per 100 miles of pipe for two consecutive years. Following the Settlement Agreement the District purchased a hydro-cleaning truck and was able to reduce the number of SSOs to less than 5 per 100 miles for three consecutive years. This accomplishment allowed the District to terminate the CSPA agreement three years early, saving the District nearly $6,000 in compliance fees. Additionally, per the Settlement Agreement, the District was able to maintain control of operations, maintenance, and the funding of any necessary repairs and/or replacement of portions of the collection system.

5.2 Historical Sanitary Sewer Overflow Analysis

A key indicator of the performance of a collection system, with respect to both condition and capacity, is the number of SSOs that occur each year. As required under the Statewide WDR, the District monitors its collection system and reports SSOs.

The number and total volume of annual SSOs from 2007 through 2012 is summarized in Table 5-1 and Table 5-2 for the El Dorado Hills and Deer Creek Collection Systems, respectively. As shown in these tables, the total number of spills has decreased over time for both Category 1 and Category 2 spills, as well as the total volume of those combined spills.

Table 5-1. El Dorado Hills Collection System Number and Volume of Spills By Year

	2007	2008	2009	2010	2011	2012
Category 1[(a)]	2	2	4	3	0	2
Category 2[(b)]	13	12	12	6	1	0
Total SSOs	15	14	16	9	1	2
Total Volume	7,215	2,805	6,781	3,725	5	723
No. Per 100 Miles[(c)]	5.3	4.9	5.6	3.2	0.4	0.7

(a) A Category 1 SSO is defined as a failure in the sanitary sewer system that results in a (1) discharge of wastewater equal to or greater than 1,000 gal, or (2) discharge of wastewater to a surface water and/or drainage channel, or (3) discharge of wastewater to a storm drainpipe which was not fully captured and returned to the sanitary sewer system.
(b) A Category 2 SSO is defined as any discharge of wastewater from the sanitary sewer system that does not meet the criteria for a Category 1 SSO.
(c) Based on 285 miles of pipe in the El Dorado Hills Collection System.

Table 5-2. Deer Creek Collection System Number and Volume of Spills By Year

	2007	2008	2009	2010	2011	2012
Category 1	7	2	7	3	1	0
Category 2	43	45	27	12	8	6
Total SSOs	50	47	34	15	9	6
Total Volume	8,452	4,246	13,087	6,668	7,886	4,151
No. Per 100 Miles[(a)]	17.9	16.8	12.1	5.4	3.2	2.1

(a) Based on 280 miles of pipe in the Deer Creek Collection System.

Table 5-3 presents the total number of SSOs per 100 miles of pipe, including both the Deer Creek and El Dorado Hills Collection Systems. A general industry guideline is that well performing systems have fewer than five SSOs per 100 miles of pipe. As illustrated in Table 5-3, the District has made significant progress since 2009 in reducing the number of SSOs in its collection system.

Table 5-3. Number of SSOs per 100 Miles of Pipeline

	2007	2008	2009	2010	2011	2012
Total SSOs	64	62	57	24	12	11
No. Per 100 Miles	11.4	11.0	10.1	4.3	2.1	2.0

SSOs are often caused by blockages due to roots, grease, rocks, or other materials, but can also be the result of pipeline breaks whether due to deteriorated condition or excavation. In addition, mechanical failures (e.g., pump or power failure) can also result in an SSO. The causes of the District's SSOs are summarized in Figure 5-1 and Figure 5-2, for the El Dorado Hills and Deer Creek Collection Systems, respectively.

Figure 5-1. El Dorado Hills Collection System, SSOs by Cause, 2007-2012

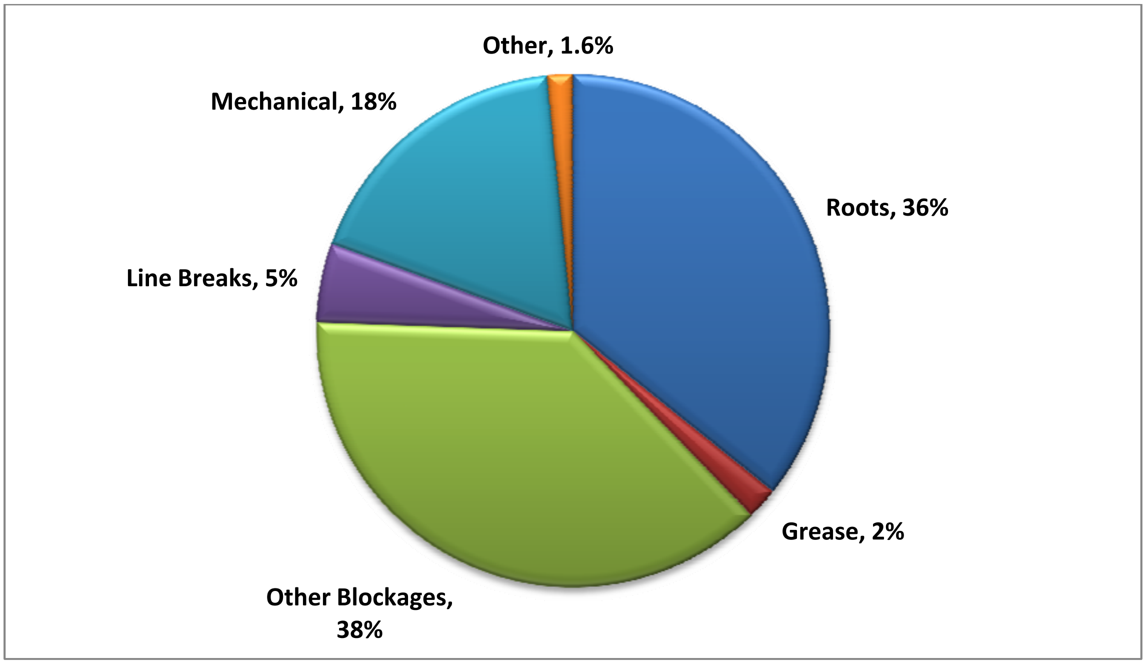
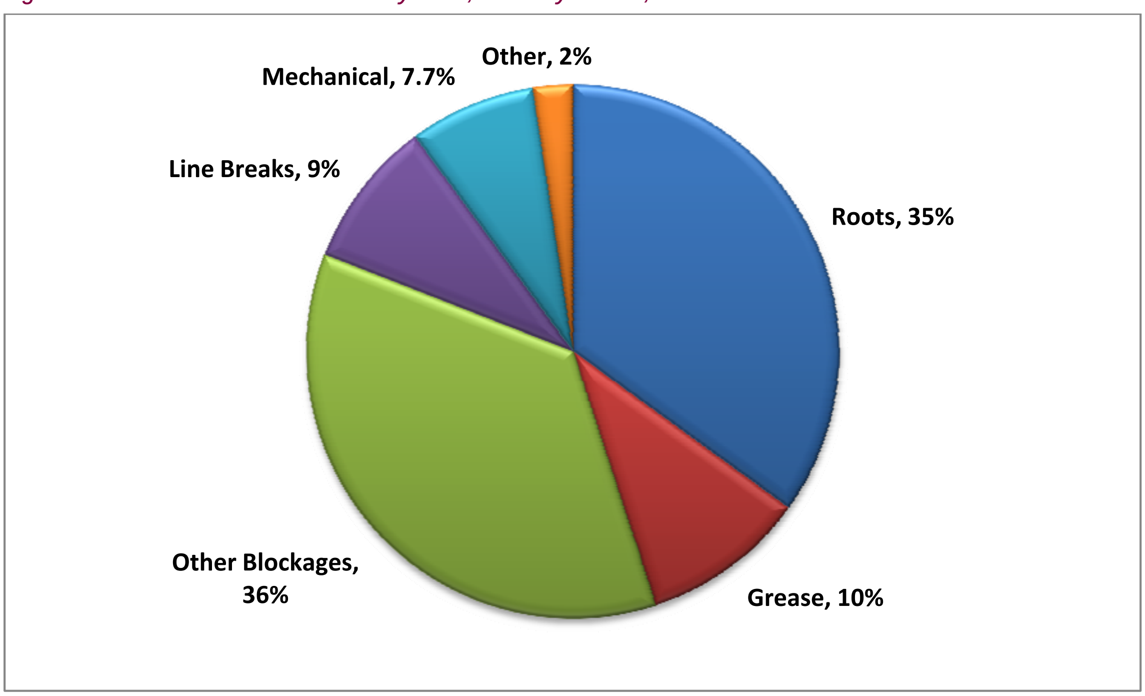


Figure 5-2. Deer Creek Collection System, SSOs by Cause, 2007-2012



As illustrated in Figures 5-1 and 5-2, the overwhelming majority of SSOs are due to blockages, mainly from roots and grease. As a result, the District's operations staff has increased their efforts on pipeline cleaning to address blockage issues in the collection system. Accordingly, the District's total number of SSOs has reduced substantially over the past five years.

Additional detail regarding the District's historical SSOs, including the number, volume, cause, and location of spills is included in Appendix E.

5.3 Collection System Model

As a requirement of the WDR, and as part of the WWFMP, a hydraulic model of the District's El Dorado Hills and Deer Creek Collection Systems was developed. This model of the two collection systems was built using information from the District's GIS database. The model includes pipelines 8-inches in diameter and larger, although some 6-inch diameter pipelines were included to maintain connectivity within the network. In addition, the model includes information on individual pumps, wet well dimensions and operational controls. Pump curves were used, where available, to define the performance of each individual pump. Wastewater flows were included based on current land use types and flow factors and were validated with flow monitoring data.

It is recommended that these models be regularly updated and serve as the basis for reviewing development-specific sewer system expansion proposals and determining system capacities, deficiencies, and optimum methods of expansion.

The collection system model was used to analyze the existing system to evaluate inflow and infiltration responses throughout the collection systems, to assess the relative impacts of various design storms in comparison to the District's existing design criteria (i.e., four times ADWF), and to evaluate capacity deficiencies and proposed upgrades for both the existing wastewater flow condition and the buildout condition.

As previously described in Subsection 2.1.3, a hydraulic model of the existing Camino Heights collection system was also developed as part of the WWFMP. An analysis of the existing system did not identify any capacity deficiencies in the Camino Heights Collection System and it was assumed that very few additional connections would be added to the small system in the future. Therefore, no collection system recommendations were identified for the Camino Heights Collection System.

5.4 Flow Monitoring and Infiltration/Inflow Study

A sanitary sewer flow monitoring, rainfall monitoring and infiltration and inflow (I/I) analysis was completed as part of the Master Plan. Flow and rainfall monitoring occurred over a 3-month period from February 7 through May 10, 2009 at 14 pipeline monitoring sites, 16 lift station monitoring sites, and seven rainfall monitoring sites within the El Dorado Hills and Deer Creek Collection Systems.

For each monitoring site the peaking factor and the depth to diameter (d/D) ratio were calculated. The detailed methodology, location of monitoring sites, and results are presented in Appendix C. The results of the flow monitoring study were used to calibrate the model and to evaluate the relative infiltration and inflow responses throughout the collection systems.

Figure 5-3 graphically depicts the results of the peak infiltration and inflow analysis for the various flow monitoring locations. The District's peak wet weather design criteria is four times the average dry weather flow; the factor of four represents an allowance for infiltration and inflow.

The results of the peak infiltration and inflow analysis indicate that there are several areas where actual peak wet weather flows are significantly higher than the District's design criteria. In general, these areas are located along the northern and southern perimeter of the El Dorado Hills Collection System and the eastern and western edges of the Mother Lode Sewershed.

The District approved depth over diameter (d/D) ratios are $d/D \leq 0.50$ for 6-inch diameter pipelines and $d/D \leq 0.67$ for 8-inch and larger pipelines. The d/D ratio for each monitoring site was computed based on the maximum depth of flow during rainfall events. The study indicates that four of the 14 pipeline sites had d/D ratios that were greater that the District's design criteria ratio, and approached surcharge conditions during the study.

In order to reduce peak flows and the potential for future SSOs as a result of high I/I, and to identify areas with general pipeline deterioration, the District should consider implementing a formal I/I reduction program. The program would consist of additional I/I investigation methods including:

- Smoke testing.
- Mini-basin flow monitoring.
- Night-time reconnaissance work to (1) investigate and determine direct point sources of inflow and (2) determine the areas and/or pipe reaches responsible for high levels of infiltration contribution.
- Closed circuit television (CCTV) inspection.

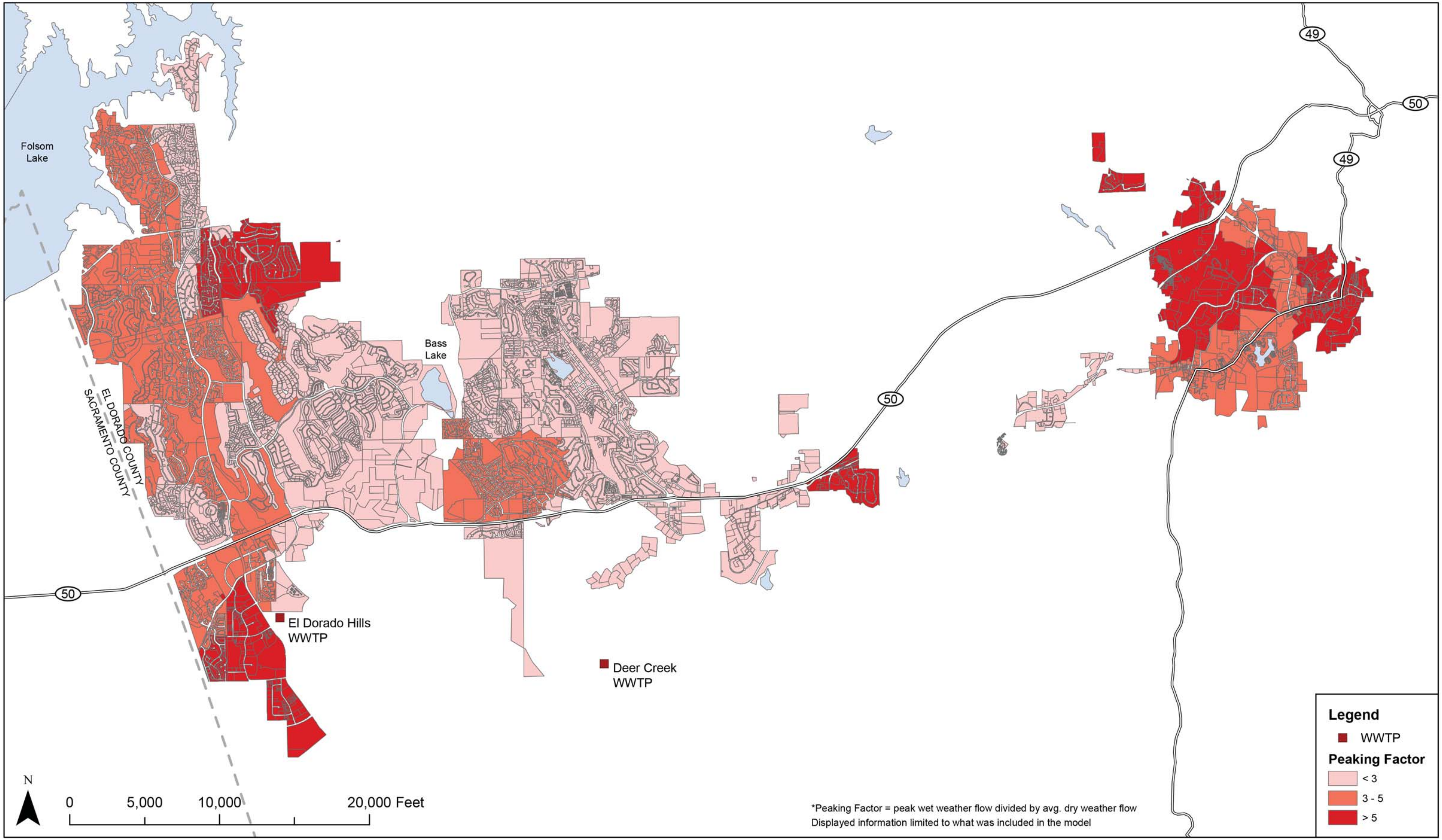
The I/I reduction program should be implemented in coordination with the District's ongoing Corrective Action Plan (CAP) for the Deer Creek and El Dorado Hills collection systems, as described in the District's CIP. The results of the analyses recommended above will help the District to identify and prioritize future CAP projects and expenditures.

5.5 Design Storm Analysis

A design storm analysis was also conducted to evaluate the capacity and performance of the District's existing system in the El Dorado Hills and Deer Creek Collection Systems during various design storm events. Using the hydraulic model, a SSO Assessment and a Performance Assessment were conducted. The details of the analysis methodology and results are included in Appendix D for reference.

5.5.1 Sanitary Sewer Overflow Assessment

The SSO Assessment is a theoretical assessment which estimated the location and volumes of SSOs based on 2-, 5-, 10-, 25-, and 50-year design storm events. The assumed duration for all storm events was 24 hours.



Peak Infiltration and Inflow

Figure 5-3

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The assessment included the identification of the specific lift stations and gravity mains expected to experience an SSO during specific design storm events. Table 5-4 presents a summary of the SSO analysis and Table 5-5 lists the specific facilities that experience flooding for the various design storm criteria. Results for the 25- and 50-year design storms are not included due to the high level of uncertainty associated with the extrapolation of available data to the large storm events.

Table 5-4. Design Storm Analysis, SSO Summary

Design Storm	Number of SSOs[a]	Total Volume (gallons)	Largest Spill	
			(gallons)	(% of Total)
2-yr	0	0	0	n/a
5-yr	2	23,400	18,100	77%
10-yr	4	229,200	141,500	62%

(a) Spills are capacity-related only.

Table 5-5. Design Storm Analysis, Modeled Spills

Facility	Design Storm		
	2-yr	5-yr	10-yr
El Dorado LS		X	X
East Road LS			X
North Upland LS		X	X

An "X" indicates a spill occurred under the modeled scenario.

As shown in the tables above, the District's existing system is expected to accommodate a 2-year, 24-hour design storm without experiencing a capacity-related SSO. During the 5-year, 24-hour design storm, SSOs occur at the District's El Dorado and North Upland Lift Stations, located in the Mother Lode and El Dorado Hills Sewersheds, respectively. During a 10-year, 24-hour design storm, the East Road Lift Station is also expected to have an SSO.

The spill at the El Dorado Lift Station is due to the current operation of the pumps rather than their actual capacity. As described later in this Section, the downstream force main, the Mother Lode Force Main, has sections in poor condition. As a result, the District operates the El Dorado Lift Station at a reduced capacity to avoid downstream line breaks in the Mother Lode Force Main. Once the Force Main is upgraded, the higher capacity pumps can be operated together, which will provide sufficient capacity for existing conditions during a 10-year, 24-hour design storm. As described later in this Section, the 10-year, 24-hour design storm was selected by the District and used as the basis for evaluating the existing system in order to identify high priority capacity upgrades for the existing system.

5.5.2 Performance Assessment:

The Performance Assessment evaluated the performance of the existing sewer system based on the District's approved d/D factors and the previously described design storms:

- For 6-inch diameter, d/D ≤ 0.50
- For 8-inch and larger, d/D ≤ 0.67

As described in Appendix D, this assessment identified pipelines which do not meet the District's current d/D design criteria for specific design storm events. The assessment also included a comparison of the District's d/D design criteria to other nearby agencies. Comparison results indicate that the District's selected d/D values appear to be more conservative when compared to other similar agencies.

5.6 Existing System Capacity Analysis

The preceding subsections presented various studies and reports that analyze and identify the cause, location, and severity of SSOs and the effects of storm events on the collection systems. This subsection describes the analysis of the existing system capacity deficiencies and recommended improvements to alleviate capacity issues.

The hydraulic model was used to identify and evaluate deficiencies in the existing collection systems based on a 10-year, 24-hour design storm event. A 10-year, 24-hour design storm event is commonly used to identify capacity deficiencies that could result in an SSO. In order to reduce the risk of SSOs in the existing collection system during a 10-year, 24-hour storm, improvements were identified for pipelines and pump stations expected to have an SSO and for pipelines surcharging to within 1 foot of the manhole rim.

The results and recommendations for the El Dorado Hills and Deer Creek Collection Systems are described in the following subsections.

5.6.1 El Dorado Hills Collection System

The existing collection system capacity-related deficiencies for the El Dorado Hills Collection System are summarized in Figure 5-4. In the El Dorado Hills Collection System, no overflows were identified at manholes. However, two gravity pipelines were found to be surcharging to within one foot of the ground surface elevation, including the pipeline near Fairchild Drive at Brackenwood Place and the pipeline just upstream of the EDHWWTP (18-inch diameter pipeline to the northwest of the plant).

Two alternatives were considered to correct the capacity deficiencies, including the installation of a parallel pipeline or replacement of the existing pipeline with a larger diameter pipeline. Although assumptions were made for the purposes of preparing the Master Plan, additional studies should be conducted to determine whether pipelines should be paralleled or replaced. Consideration should be given to existing utilities, pipeline condition and hydraulics, number of laterals along the segment, geology, and traffic in the area, among others.

The recommended improvements are summarized in Table 5-6 and illustrated in Figure 5-5. To improve the Fairchild Drive pipeline, a new 10-inch pipeline is recommended to replace the existing 8-inch pipeline. For the pipeline upstream (northwest) of EDHWWTP, a 24-inch pipeline is recommended to replace the existing 18-inch pipeline.

Table 5-6. Existing El Dorado Hills Collection System Capacity Deficiencies

Collection System Deficiency	Total Length (LF)	Existing Diameter (inch)	Recommended Diameter (inch)	Recommended Improvement
Fairchild Drive at Brackenwood Place	600	8	10	Replace with 10-inch
Upstream of EDHWWTP	4,500	18	24	Replace with 24-inch

In addition to the pipeline deficiencies describe above, and as shown in Figure 5-5, the North Uplands Lift Station was also found to be undersized; the existing pumps can not accommodate the inflow associated with the 10-year, 24-hour design storm. Replacement of the existing pumps (two 325 gpm pumps) with higher capacity pumps (two 650 gpm pumps) is recommended to reduce the potential for SSOs.

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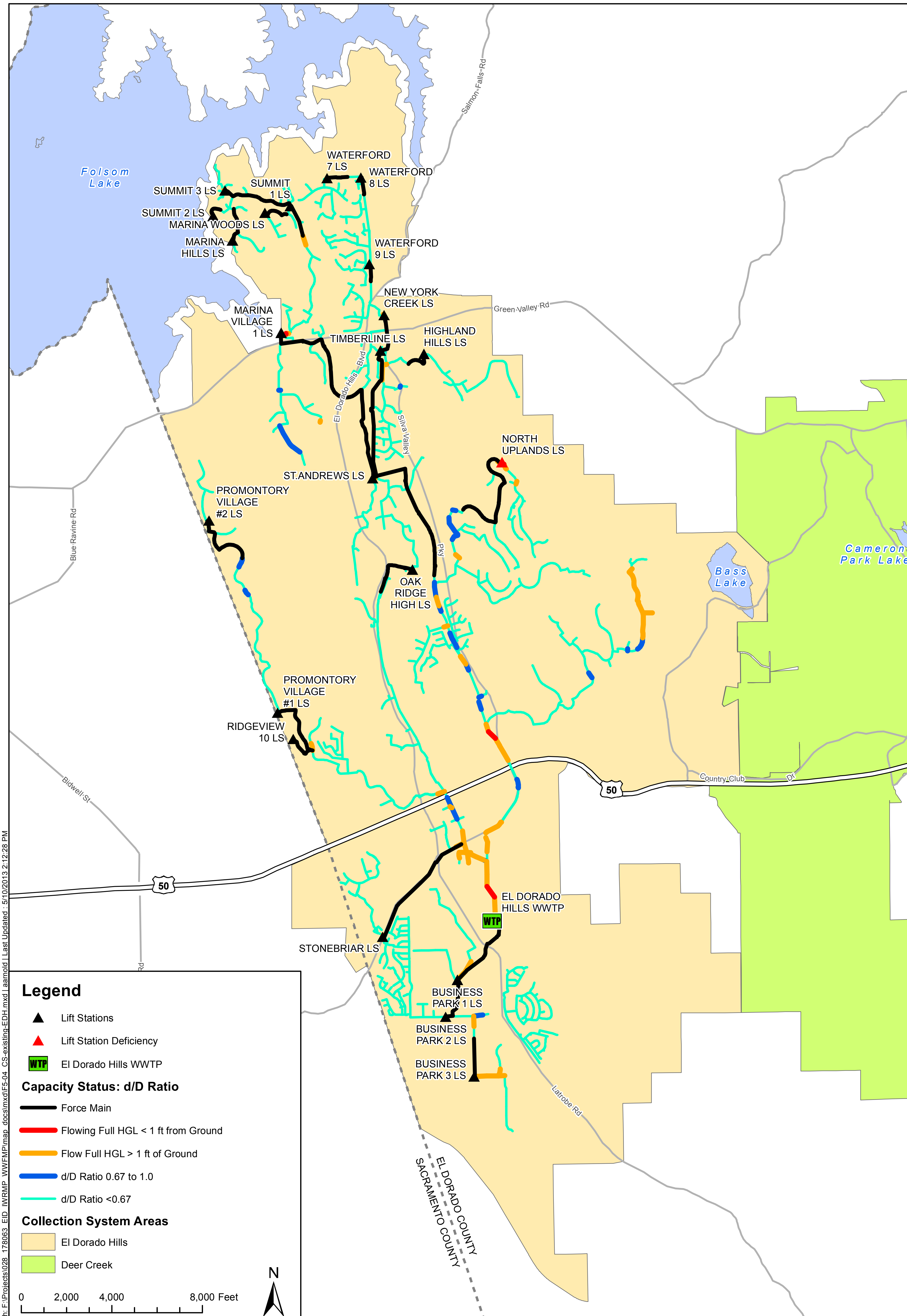

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Existing Collection System Capacity Deficiencies, El Dorado Hills
10 Year, 24 Hour Design Storm
FIGURE 5-4

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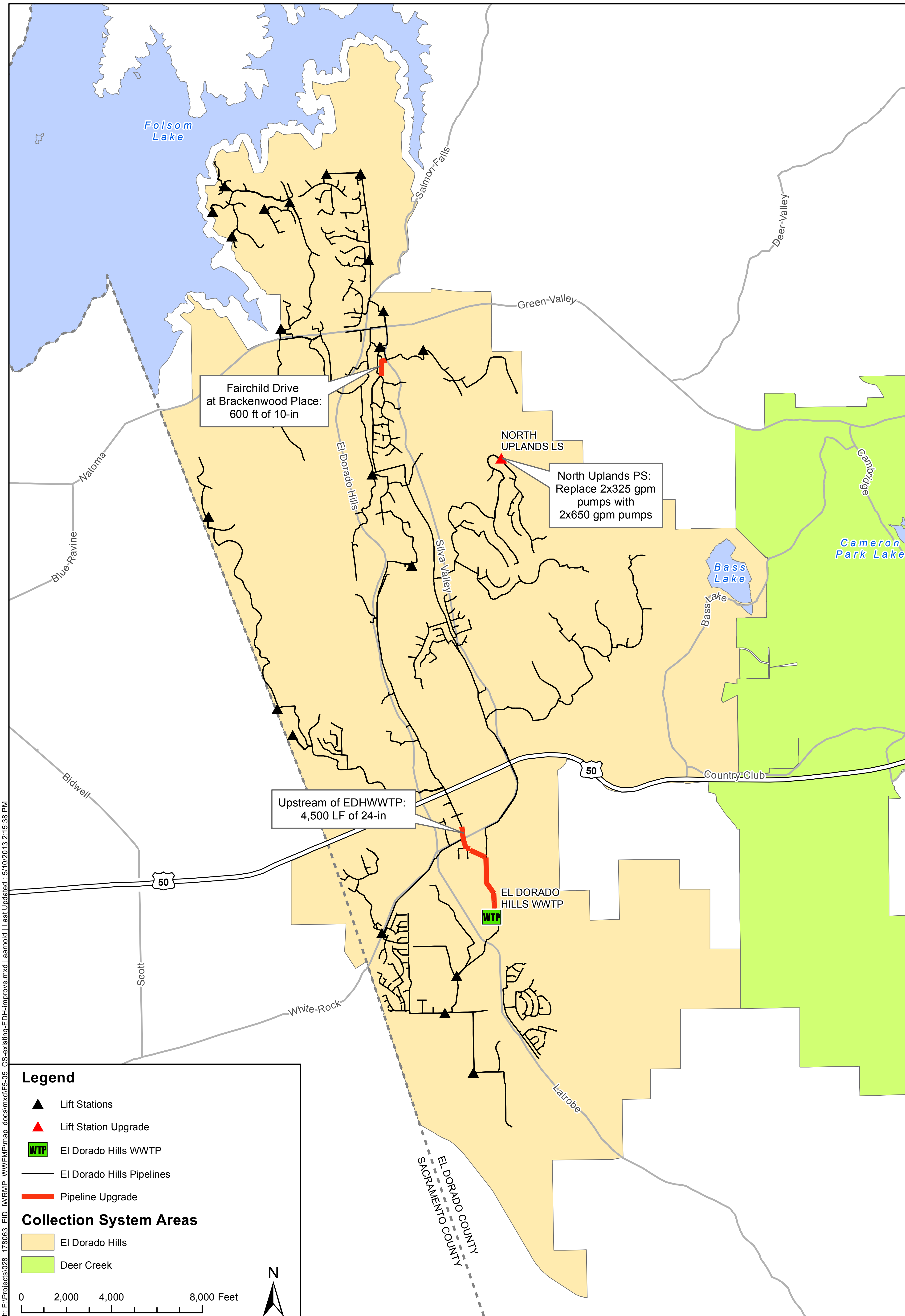

Recommended Improvements for El Dorado Hills - Existing System

FIGURE 5-5

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5.6.2 Deer Creek Collection System

The existing collection system capacity-related deficiencies for the Deer Creek Collection System are shown in Figure 5-6. Two gravity pipelines were found to be deficient, including the pipeline near Blanchard Road downstream of the East Road Lift Station and the gravity pipeline near Strolling Hills downstream of the Mother Lode Force Main. Both pipelines were found to surcharge to within one foot of ground surface elevation.

As summarized in Table 5-7 and in Figure 5-7, a new 8-inch pipeline parallel to the existing 6-inch pipeline is recommended to correct capacity deficiencies in Blanchard Road.

Table 5-7. Existing Deer Creek Collection System Capacity Deficiencies

Collection System Deficiency	Total Length (LF)	Existing Diameter (inch)	Recommended Diameter (inch)	Recommended Improvement
Blanchard Rd downstream of East Rd LS	1,300	6	8	Parallel with 8-inch
Strolling Hills Rd downstream of the Mother Lode Force Main	10,700	12	24	Replace with 24-inch

Portions of the Strolling Hills pipeline have already been included in the District's CIP for replacement in 2015. The existing 12-inch Strolling Hills pipe contains segments that are comprised of AC pipe. The CIP recommends full replacement of the Strolling Hills section with 24-inch pipe because of problems associated with deterioration of the older AC pipe. This improvement will also correct the existing capacity deficiency and, as described later, will provide capacity for future growth in the Mother Lode Sewershed.

In addition to the pipeline deficiencies described above, and shown in Figure 5-7, the Pioneer Place Lift Station was found to be undersized. The existing pumps at the Pioneer Place Lift Station are unable to keep up with the influent flow during the 10-year, 24-hour design storm. Replacement of the existing pumps (two 200 gpm pumps) with higher capacity pumps (two 400 gpm pumps), effectively doubling pump station capacity, is recommended to reduce the potential for SSOs. This recommended increase in pump capacity was anticipated during the original design of the lift station.

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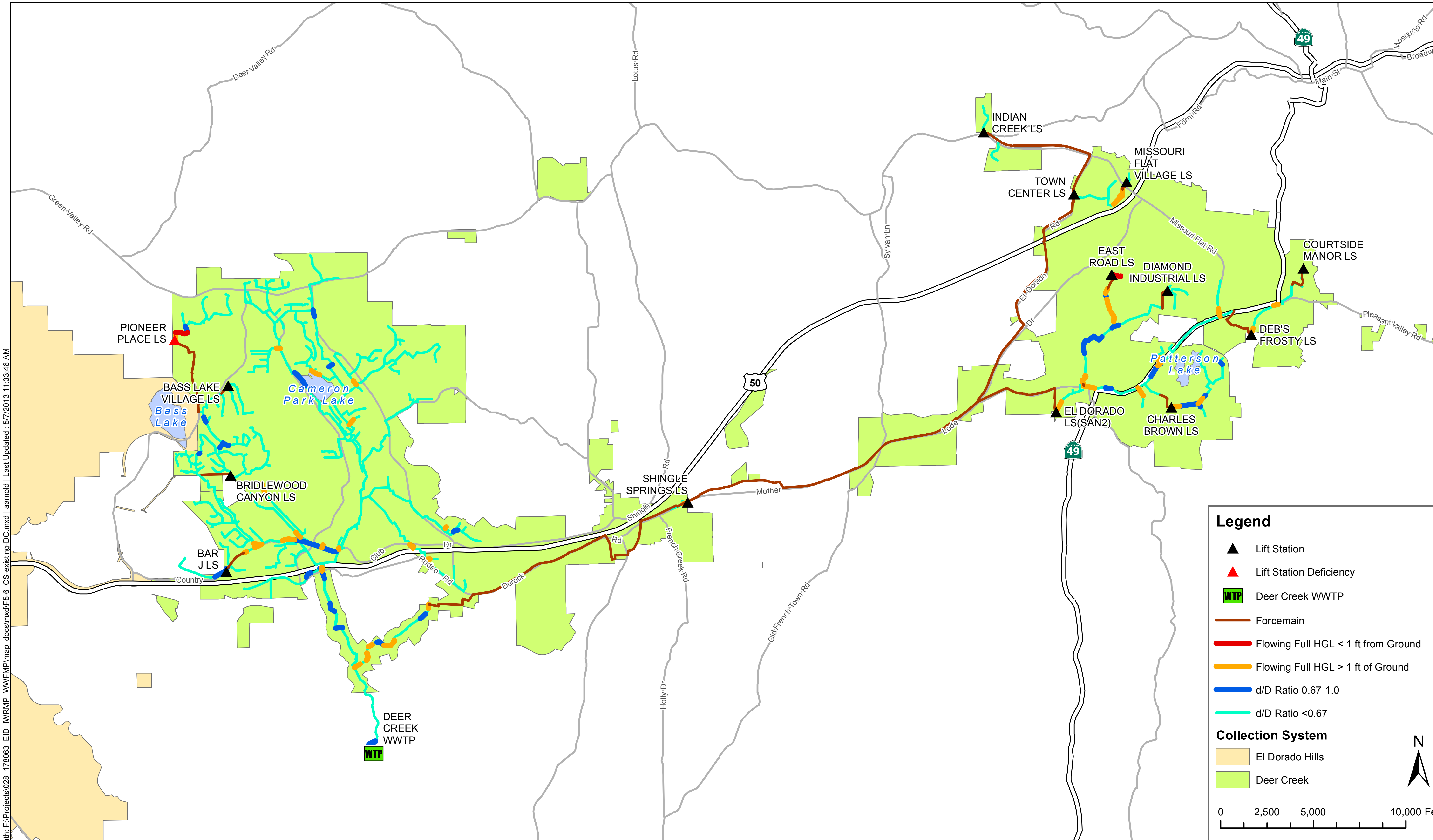

Existing Collection System Capacity Deficiencies, Deer Creek

10yr-24hr Design Storm

FIGURE 5-6

El Dorado Irrigation District and Wastewater Facilities Master Plan

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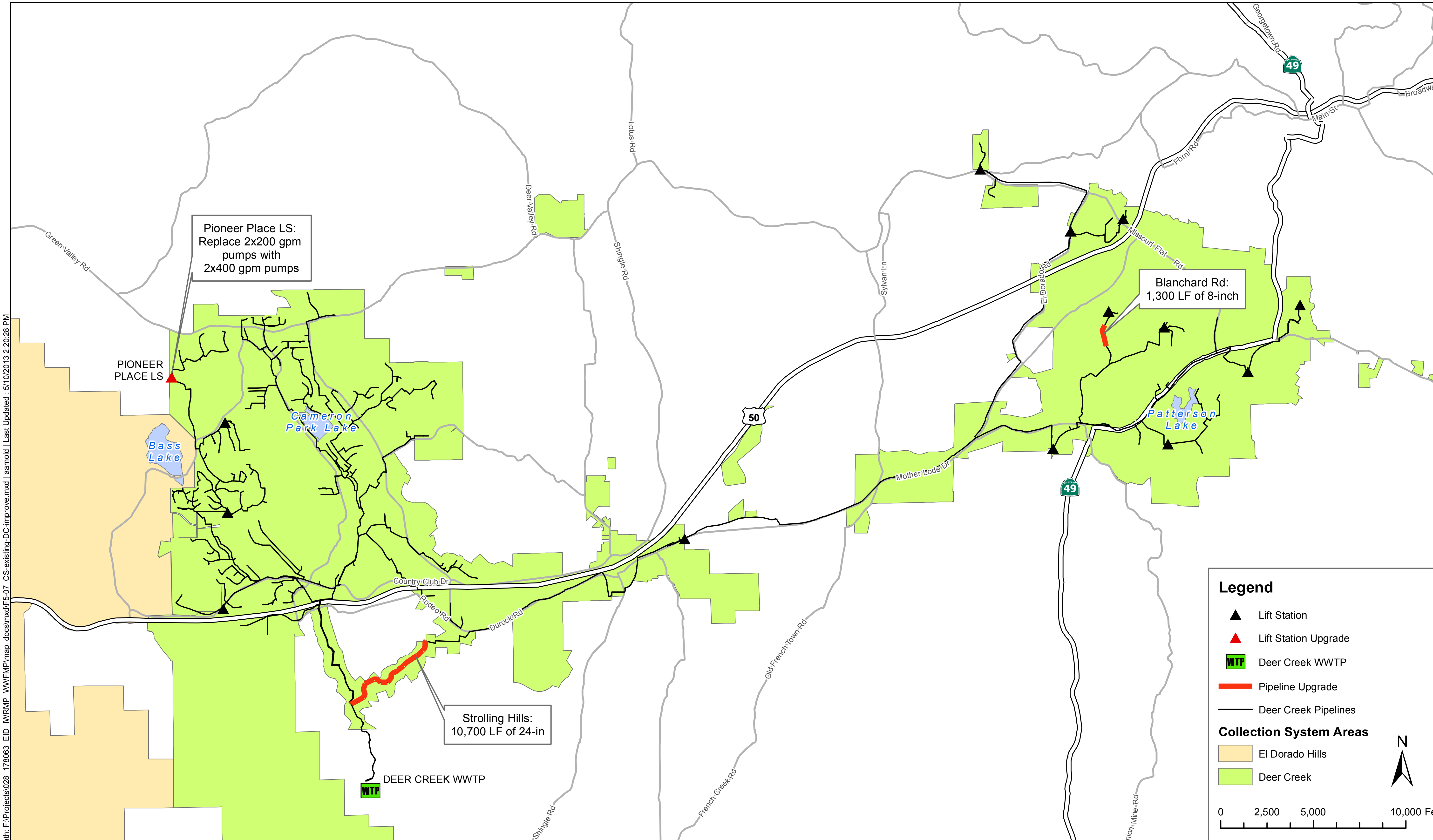

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Recommended Capacity Improvements, Deer Creek - Existing System

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FIGURE 5-7

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5.7 Existing System Condition Based Upgrades

There are several necessary upgrades to the existing system that are based on condition assessment rather than capacity needs. Among the items requiring condition based upgrades are the Mother Lode Force Main, various sections of collection system AC pipe, and several lift stations.

5.7.1 Mother Lode Force Main Replacement

As described in Section 2.1.2, the 12-inch Mother Lode Force Main is a critical District asset and is the only means for routing wastewater from the Mother Lode Sewershed to the DCWWTP for subsequent treatment and disposal. The Mother Lode Force Main runs from the El Dorado Lift Station to the gravity pipeline in Strolling Hills Road. The original 12-inch pipeline was constructed in the 1970s and is made of asbestos cement. The Force Main has sections that experience full pipe and open channel conditions making it highly susceptible to hydrogen sulfide corrosion. Recent line breaks and previous investigations suggest that many sections of the Force Main are deteriorated. To minimize future pipeline breaks, flows in the Force Main have been reduced (when possible) by operating the upstream El Dorado Lift Station at a lower capacity. However, higher flow pumps are required during peak rain events and a larger diameter pipeline will be needed to accommodate future growth, so the entire portion of the Force Main requires replacement and upgrade from the current 12-inch to a 20-inch or 24-inch diameter pipeline.

Figure 5-8 shows the phases and location of previous, current, and future upgrades to the Mother Lode Force Main. The District has completed Phases 1, 2A, 2B, 3, and 4 (50 percent of the total Mother Lode Force Main). Phase 2C (six percent of the Mother Lode Force Main) is currently in progress. Future upgrades to the Force Main include Phases 6 and 7 (the remaining 44 percent of the Mother Lode Force Main), as summarized in Table 5-8. Phase 5, as shown in Figure 5-8, is the upgrade of the Strolling Hills pipeline, which was discussed in the previous subsection.

Table 5-8. Mother Lode Force Main Future Upgrades

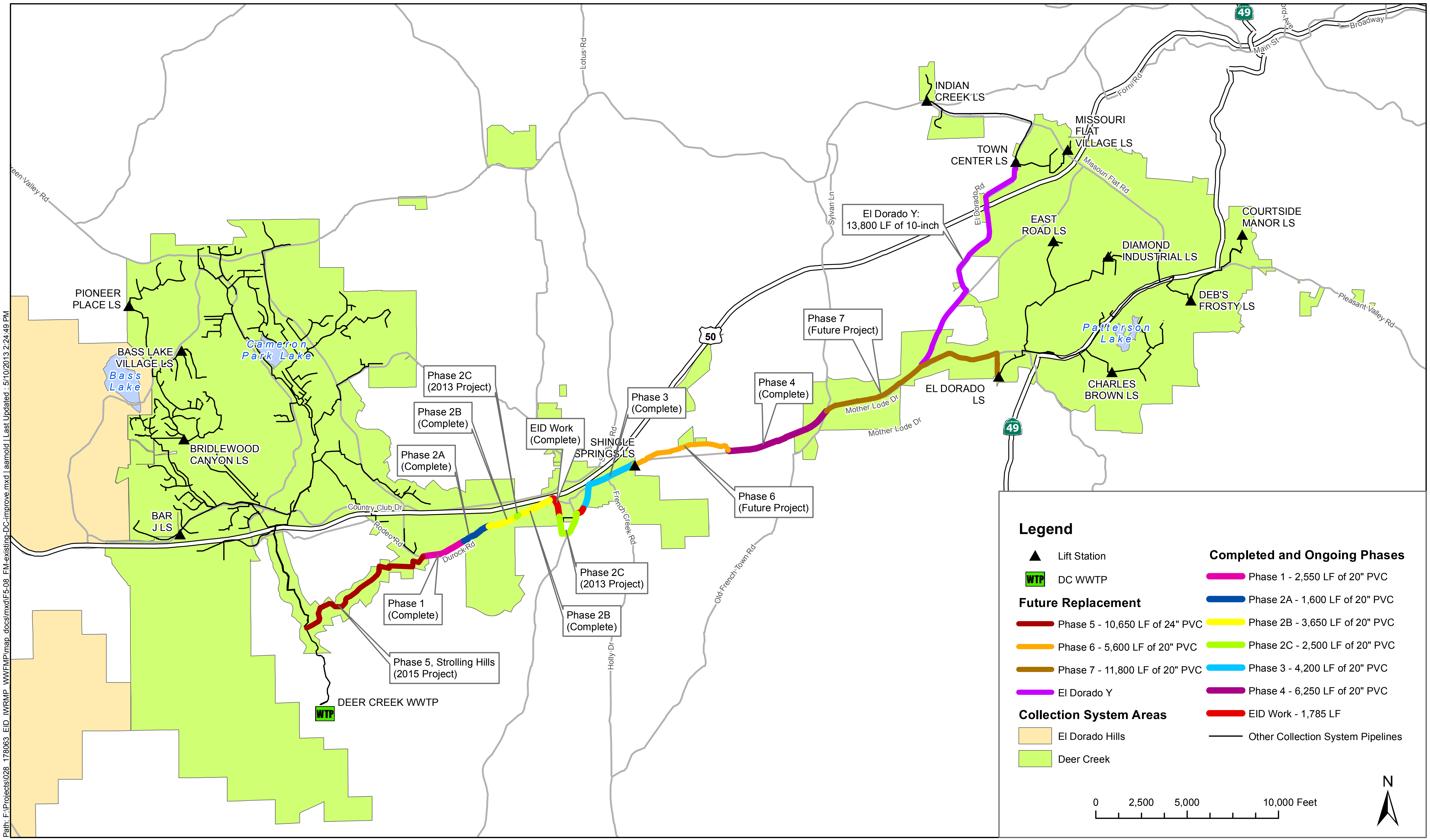
Phase	Total Length (LF)	Existing Diameter (inch)	Recommended Diameter (inch)
Phase 6	5,600	12	20
Phase 7	10,650	12	20

5.7.1 Asbestos Cement Pipe

Asbestos cement pipe is a common pipeline material found in the District's collection systems, comprising approximately 28 percent of pipes in the District's collection system, including 7,000 LF of pipe along the Mother Lode Force Main. AC pipe is no longer manufactured in the United States due to regulatory control and public health concerns arising from exposure from the milling, manufacture, common use, spraying, renovation, demolition, or disposal of asbestos products. Unfortunately, much of the AC pipe in the District was installed decades ago and is now nearing the end of its useful life. Deteriorated AC pipe will need to be abandoned in place or replaced in accordance with regulatory requirements to minimize exposure to asbestos fibers.

In California, public agencies are not required to remove and replace AC pipe. Studies have indicated that, in normal use, AC pipe does not pose a threat to public health. However, certain activities, including tapping, cutting, crushing/ removing, and disposing of AC pipe, are regulated.

To determine the appropriate approach for addressing deteriorated AC pipe, an AC pipe condition assessment is recommended in the near future for the El Dorado "Y" Force Main downstream of the Town Center Lift Station. The District plans to use a new technique to identify the extent of AC pipe deterioration and make recommendations for sections of pipe requiring replacement. Based on the findings of the study, the District should determine the need, schedule, and priority for replacement of the existing 8-inch diameter AC pipe with a new 10-inch diameter pipeline.



Recommended Condition Based Upgrades

FIGURE 5-8

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El Dorado Irrigation District and Wastewater Facilities Master Plan

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Another future condition assessment study of the Mother Lode Force Main is also recommended to confirm the priority for replacement of the remaining segments (Phases 6 and 7).

5.8 Future Collection System Expansion

This subsection describes the analysis of capacity deficiencies and recommended improvements to accommodate future growth in the District's collection systems as envisioned in the EDC General Plan.

The hydraulic model was used to identify and evaluate deficiencies in the backbone of the District's existing collection systems, as illustrated in Figure 5-9. Although developers will be responsible for providing new systems servicing their respective new developments, the District is responsible for providing sufficient capacity in its trunk sewers and force mains (the backbone) to convey future flows under buildout conditions.

The results and recommendations for the El Dorado Hills and Deer Creek Collection Systems are presented below. Note that the recommended improvements described in Subsections 5.7 and 5.8 for the existing system were sized for the buildout capacity requirement. These recommended improvements are not repeated in this subsection.

5.8.1 El Dorado Hills Collection System Expansion

Over the planning horizon of this Master Plan, development of approximately 1,800 acres is projected throughout the El Dorado Hills Collection System including residential, commercial, and industrial properties. As discussed in Section 4, new wastewater customers will generally consist of infill and new developments located along the eastern and southern perimeter of the existing El Dorado Hills Collection System.

The hydraulic model was used to evaluate the existing collection system under the future buildout scenario. Sewer parcel data were used to identify the number of future connections in the system. Projected wastewater flows were assigned based on the following design criteria:

- Single family residential connections: 240 gpd

- Multiple family residential connections: 180 gpd
- Commercial and industrial connections: 500 gpd/acre

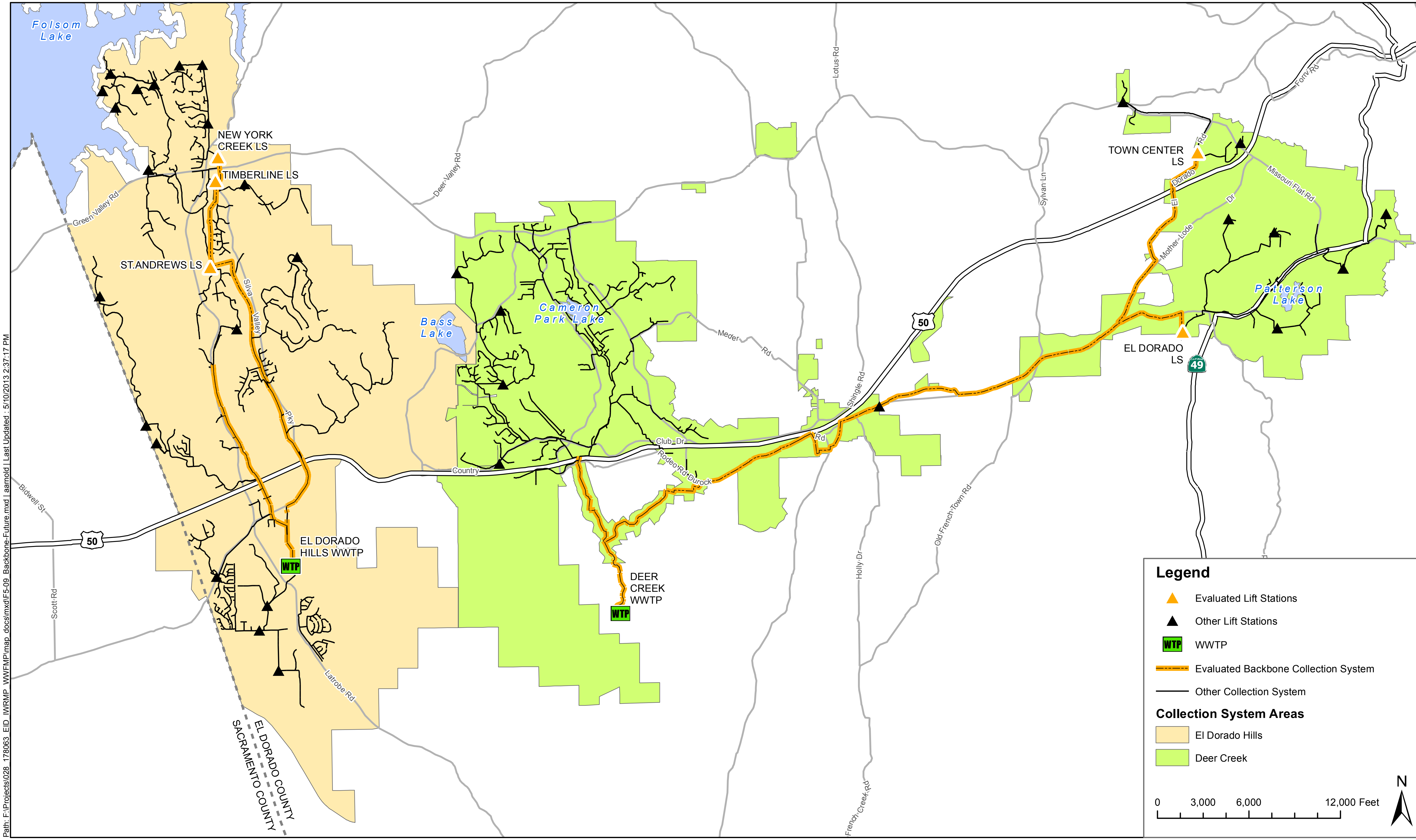
The backbone collection system illustrated in Figure 5-9 was evaluated for peak flows based on the District's design criteria of four times the ADWF. Major capacity-related deficiencies for the buildout backbone pipelines are shown in Table 5-9.

Table 5-9. El Dorado Hills Collection System Capacity Deficiencies – Future Expansion

Collection System Deficiency	Total Length (LF)	Existing Diameter (inch)	Recommended Diameter (inch)	Recommended Improvement
Silva Valley Parkway	2,100	18 & 21	24	Parallel with 24-inch
Timberline Force Main	6,200	12	16	Replace with 16-inch

In the El Dorado Hills Collection System, one trunk sewer was found to be deficient at buildout conditions. A portion of the Silva Valley Parkway pipeline between Serrano Parkway and US Hwy 50 was found to be surcharging above ground surface elevation under modeled conditions. To accommodate the additional future flows, a new parallel 18-inch pipeline is recommended to parallel the existing 18-inch and 21-inch pipelines along Silva Valley Parkway, as shown in Figure 5-10. In addition, it is recommended that the District conduct a survey of the Silva Valley pipeline because the available data was not complete. Better survey data could change the improvement recommendations.

The Timberline Force Main and two lift stations, the New York Creek and Timberline Lift Stations, were also found to be deficient under EDC General Plan buildout conditions. The Timberline and New York Creek Lift Stations are hydraulically connected and therefore operations at one lift station impact operations at the other. Note that modeling results for the Timberline and New York Creek Lift Stations are based on an assumed set of future operational controls. Because of the hydraulic connection between the two lift stations, modeling can only provide a limited result based on a single convergence of this assumed set of operational controls. A more thorough investigation of the lift station hydraulics and operations is recommended prior to the design of lift station expansion at either of the two lift stations.



Future Expansion: Collection System Backbone

FIGURE 5-9

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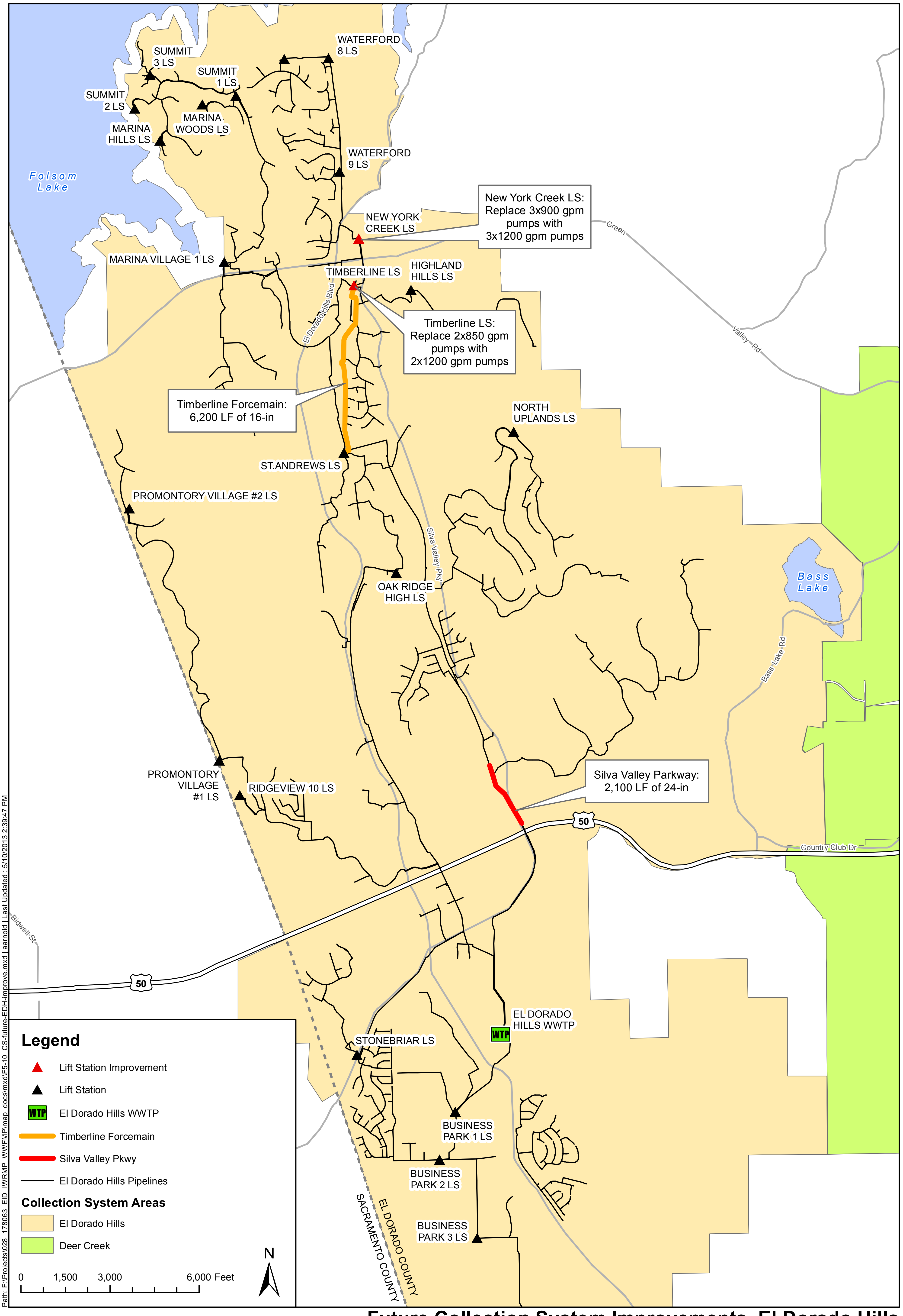

Future Collection System Improvements, El Dorado Hills
Based on EDC General Plan
FIGURE 5-10

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The hydraulic model analysis suggests that capacities need to be increased at both lift stations and in the force main downstream of the Timberline Lift Station in order to accommodate buildout growth. The existing 12-inch Timberline Force Main should be replaced with a 16-inch pipeline. The capacity of the New York Creek Lift Station should be increased by replacing the existing three, 900 gpm pumps with higher capacity 1200 gpm pumps. Similarly, the capacity of the Timberline Lift Station should be increased by replacement of the existing two, 850 gpm pumps with higher capacity, 1200 gpm pumps.

5.8.2 Deer Creek Collection System Expansion

Development of approximately 5,580 acres is projected throughout the DCWWTP collection system over the planning horizon based on the EDC General Plan. As discussed in Section 4, new wastewater customers will generally consist of infill throughout the Western and Mother Lode Sewersheds and new developments located along the southern, eastern, and northern perimeter of the Western Sewershed and small to medium sized developments located throughout the Mother Lode Sewershed.

The Deer Creek Collection System at buildout was modeled using the same criteria used to model and evaluate the El Dorado Hills Collection System. The analysis of buildout conditions indicated only one capacity-related deficiency for the buildout system, the El Dorado Lift Station. In order to provide sufficient capacity and reliable backup capacity at buildout conditions, one additional 2000 gpm standby pump is recommended.

A summary of recommended future collection system improvements for the Deer Creek Collection System is illustrated in Figure 5-11. As previously noted, the recommended improvements in Subsections 5.6 and 5.7 (improvements to correct existing system deficiencies) were also sized for buildout conditions.

5.9 Lift Station Condition Assessment

Lift station condition assessments provide a cost-effective roadmap for the maintenance, repair, and rehabilitation of existing lift station facilities. The following subsections summarize the representative condition assessment conducted as part of the Master Plan project and the District's current Lift Station Condition Assessment Program.

5.9.1 Representative Condition Assessment

As part of the WWFMP project, a condition assessment of 10 District lift stations was conducted in May 2009. Lift stations were selected to reflect a representative sample of all the District's 64 lift stations, including lift stations in both good and poor condition. The intent was to project the general condition of the District's lift station facilities to understand the extent of rehabilitation needs. The following lift stations were selected based on input from District staff:

1. Business Park No. 1
2. East Road
3. El Dorado
4. Mother Lode
5. Promontory No. 1
6. Ridgeview No. 7
7. St. Andrews
8. Summit No. 1
9. Summit No. 3
10. Shingle Springs

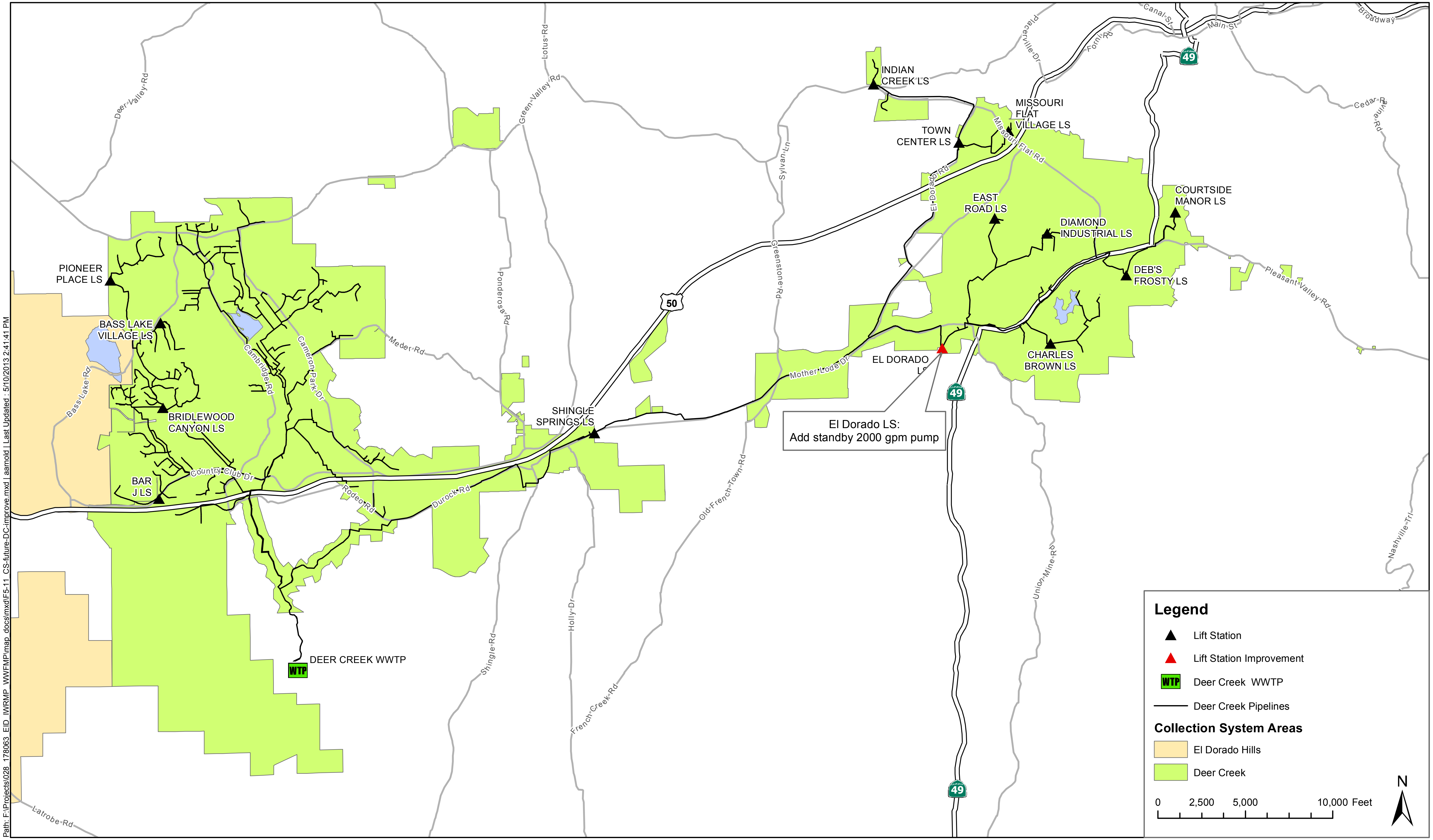
Lift station condition assessment included field investigations and observations of structural, civil and mechanical, electrical, instrumentation, back up power supply, and instrumentation and control (I & C) equipment review.

Based on techniques used in the condition assessments of the lift stations listed above in 2009, the District has initiated an in-house Lift Station Condition Assessment Program, as described in the following subsection.

5.9.2 Condition Assessment Program

As previously described, since the completion of the 2009 Lift Station Assessment, the District developed an in-house condition assessment program for the assessment and rehabilitation of its lift stations. The goal of the program was to assess the District's 64 lift stations by the end of 2012. Based on the results of that assessment, the District is planning for $9.4 million in lift station upgrade investments as part of the 2013-2017 CIP.

A summary of the recommended lift station upgrades for the current CIP is provided in Table 5-10. The District will continue to update and refine the condition assessment and new lift stations improvements will be added in the future, beyond 2018, as appropriate.



Future Collection System Improvements, Deer Creek

Based on EDC General Plan

FIGURE 5-11

El Dorado Irrigation District and Wastewater Facilities Master Plan

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Table 5-10. Recommended Lift Station Upgrades

Lift Station	Project Description
Summit 1	Summit 1 LS receives flows from three lift stations in addition to gravity flows. Summit 1 has had a number of near miss overflows and will be abandoned, if feasible. Flows from Summit 1 will be redirected to the Summit 3 LS.
Business Park 2	Business Park 2 LS was constructed in 1985 and has reached the end of its useful life. Complete replacement of the site is required.
Business Park 3	Business Park 3 LS was constructed in 1983 and has reached the end of its useful life. Complete replacement of the site is required.
Yates	Yates LS requires replacement of wetwell, controls, building, valves, and piping.
Bridlewood	Bridlewood LS was constructed in 1989 and has reached the end of its useful life. The following items will be repaired, replaced, or newly installed: Pumps, guide rails, station piping, valves, wetwell lid system, generator, switch gear, PLC control system, control panel, odor control system, and flow meter.
Rancho Ponderosa	Rancho Ponderosa LS was constructed in 1965 and has reached the end of its useful life. The entire LS will be replaced with a package pump station, including the following new items: piping, valves, wetwell lid system, portable generator connector, switch gear, PLC control system, control panel, odor control system, and flow meter.
South Point	South Point LS was constructed in 1990 and has reached the end of its useful life. The following items will be repaired, replaced, or newly installed: Pumps, guide rails, station piping, valves, wetwell lid system, generator, switch gear, PLC control system, control panel, odor control system, and flow meter.
Waterford 7	Waterford 7 LS was constructed in 1988 and has reached the end of its useful life. The following items will be repaired, replaced, or newly installed: Pumps, guide rails, station piping, valves, wetwell lid system, generator, switch gear, PLC control system, control panel, odor control system, and flow meter.
El Dorado	El Dorado LS is the critical, main pumping facility that pumps wastewater from the Mother Lode Sewershed to the DCWWTP. El Dorado LS was constructed in 1975 and is need of key repairs, including the electrical components (switch gear) and headworks (replacement of bar rack and washer/compactor).

Source: District 2013-2017 Capital Improvement Program. Recommendations are based on District's in-house Condition Assessment Program.

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6.0 WASTEWATER TREATMENT PLANT EVALUATION

The following subsections provide a discussion of future regulatory considerations and present capacity expansion requirements to meet forecasted growth in wastewater flows due to future development.

6.1 Regulatory Considerations

Numerous regulatory activities are being developed by state and federal agencies that may affect future permit conditions for both the DCWWTP and EDHWWTP. Development of new regulatory requirements can be a slow (i.e., decades), iterative process with varied changes occurring up until the final approach is approved, adopted, and implemented. As such, this discussion is based on regulatory developments that are in progress and/or under consideration as of April 2013. Changes to the District's NPDES permit conditions that may result from these regulatory initiatives are summarized in Table 6-1 and described in more detail below.

Table 6-1. Possible Effects of Proposed Regulations on District NPDES Permit Conditions

Proposed Regulatory Change	Possible Effect on the District's NPDES Permits
Modified definition of secondary treatment to include nutrient removal.	All state and federal permits would be required to include nitrogen and phosphorus limits. The USEPA denied the modification in early 2013, but an appeal process is likely to follow.
Revised USEPA Freshwater Ammonia Criteria (should be released by mid-year 2013).	If freshwater mussels are present in the receiving water body, the ammonia limits will be lower than the existing approach for calculating ammonia discharge limits. The calculated limits could be lower than the limit of treatment technology for wastewater treatment plants.
In Florida, establishment of numeric nutrient endpoints statewide for rivers, streams, estuaries and coastal waters. Florida is the only state developing limits for both coastal and freshwaters.	The criteria developed for in-stream values on nutrients could have a profound impact on the USEPA's approach on working with local state agencies. Several different strategies could be considered for developing nutrient limits: i) Water quality variances ii) Site specific alternative criteria (SSAC) iii) Compliance schedules iv) Restoration water quality standards
Ongoing San Francisco Bay Numeric Nutrient Endpoints (NNE) could lead to ammonia, total nitrogen and/or total phosphorus criteria.	NNE could lead to nutrient limits (ammonia, total nitrogen and/or total phosphorus) over the next 1-2 permit cycles. Although the efforts focus on San Francisco Bay, utilities that discharge to tributaries to the Delta could be impacted by the results.
Implementation of chronic toxicity limits in NPDES permits	Compliance with chronic toxicity limits would be required (no longer just a monitoring/investigative trigger). For example, NDMA limits proposed for SRCSD's recently adopted permit could govern the disinfection technology selection.
State derived limits on pharmaceuticals and personal care products	Longer aerobic solids residence time (SRT) and/or combination of advanced oxidation processes could be required.
Industrial General Permit	Discharge requirements on storm water discharge at the EDHWWTP

6.1.1 Nutrients

There is an increasing emphasis on nutrient control of surface water discharge from both state and national regulatory agencies with the focus being on nitrogen species and phosphorus. Approaches for determining permitted nutrient discharge limits and water quality objectives are the subject of much debate between regulators and stakeholders (Table 6-1). Table 6-2 provides the permitted concentration based discharge limits at both the EDHWWTP and DCWWTP. The District already removes ammonia and nitrate.

Table 6-2. Current NPDES Permit Limits for Nutrients

Constituent	Average Monthly (mg/L)	Maximum Daily Limit (mg/L)
EDHWWTP		
NH3-N	1.2	3.1
Nitrite + Nitrate	10	--
DCWWTP		
NH3-N	1.1	2.1
Nitrite + Nitrate	10	--

Currently there are no effluent phosphorus limitations for EDHWWTP or DCWWTP; this is consistent with many other California NPDES permits. Phosphorus limits are beginning to be incorporated in renewed NPDES permits in an effort to control algal growth in large impacted water-bodies such as the Gulf of Mexico and the Chesapeake Bay. Although phosphorus discharge limits are not currently included in the District's, or other nearby NPDES permits, the Central Valley Regional Water Quality Control Board (RWQCB) is starting to consider phosphorus discharge limits as reflected by the Sacramento Regional County Sanitation District (SRCSD) permit negotiations.

The San Francisco RWQCB is concerned about the role of phosphorus discharge loads on impairing the Suisun Marsh Wetlands and phosphorus levels exceed the USEPA's recommended Aggregate Ecoregion 1 levels.[9,10] The ongoing San Francisco Bay numeric

[9] State Water Resources Control Board's (SWRCB) (May 14, 2012) Own Motion Review of Waste Discharge Requirements Order No. R5-2010-0114 for Sacramento Regional Wastewater Treatment Plant.
[10] Ambient Water Quality Criteria Recommendations, Rivers and Streams in Ecoregion I (USEPA, 2001) (EPA 822-B-01-012). Ecoregion I includes the Central Valley and recommends a median concentration of 0.055 mg P/L total

nutrient endpoint (NNE) efforts provide a narrative science-based approach to develop nutrient limits. The NNE establishes a suite of biologically based numeric endpoints to address nutrient over-enrichment and eutrophication. The draft NNE plan being considered by the San Francisco RWQCB incorporates the role of phosphorus levels on water quality impairments. If the phosphorus levels are thought to impair San Francisco Bay, this might lead to phosphorus discharge limits both in the Bay Area and upstream for wastewater plants discharging to tributaries of the Sacramento-San Joaquin Delta. It is anticipated that the NNE recommendations will impact NPDES permits over the next one to two permit cycles.

If phosphorus removal is required in the future, the District should have the ability to retrofit EDHWWTP and DCWWTP to meet phosphorus discharge limits. Potential locations to remove phosphorus at EDHWWTP and DCWWTP include:

- Primary treatment using metal salts (approach commonly referred to as chemically enhanced primary treatment (CEPT)),
- Activated sludge basins by adding anaerobic zones to the front of the basins and modifying the flow routing within the basins, or
- Tertiary filters adding a metal salt in the existing Title 22 required chemical feed facilities to precipitate soluble orthophosphate out of solution with subsequent separation in the filters.

Of the listed options, removal in the tertiary filters would likely be the easiest and most affordable to implement. Both EDHWWTP and DCWWTP have tertiary filtration with chemical feed, rapid mix, and flocculation to meet unrestricted Title 22 recycled water requirements. At both facilities, a metal salt could be supplied in the chemical feed to precipitate soluble orthophosphate out of solution for subsequent downstream removal by filtration. This approach would reduce the filtration capacity due to additional solids

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phosphorus. USEPA developed these nutrient criteria recommendations with the intent that they serve as a starting point for states to develop more refined criteria to reflect local conditions.

loading; thus expansion of the filters could be required. Additional studies would be necessary to determine the extent of any filter modifications.

6.1.2 Ammonia and Nitrate

The ammonia discharge limits at EDHWWTP and DCWWTP are some of the most stringent seen nationally. The governing limit is the average daily limit which essentially requires full nitrification during peak wet weather events. Both WWTPs are encroaching on the reliable removal performance limits for ammonia without introducing reverse osmosis (RO).[11] RO would be required to achieve lower ammonia discharge limits. Alternatively, the District could consider a modification to lower the effluent pH limit which was successfully done at the EDHWWTP. Such a modification would increase the effluent ammonia limit and provide flexibility to help the District avoid RO at the DCWWTP.

Despite the extremely low ammonia discharge limits at EDHWWTP and DCWWTP, the limits could potentially be reduced further if the in-stream criteria change. There have been discussions on the criteria metrics being changed to mussels, which are more sensitive to ammonia. In 2009, the USEPA released a draft report titled "Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater." The draft received comments in 2010 and represented a shift to using freshwater mussel presence as an additional consideration in the determination of what ammonia criteria should apply to a specific water body. Preliminary comparisons indicate that the proposed chronic criteria for water bodies with "mussels present" will be significantly lower than the current criteria (approximately a ten fold decrease in the chronic ammonia criteria). The USEPA is expected to release the final version of the report by mid-2013.

The District conducted benthic macroinvertebrate (BMI) surveys in Deer Creek at locations upstream and downstream of the DCWWTP in the fall of 2000, fall of 2007, spring of 2008, and spring of 2009. Additionally, a BMI study was conducted by the California Department of Fish and Game in summer 1994 upstream and downstream of

[11] Bott, C. and Parker, D. (2011) WEF/WERF Study Quantifying Nutrient Removal Technology Performance. WERF Research Project under Nutrient Challenge, NUTR1R06h.

the DCWWTP. Two families of bivalve mussels were identified in these studies: Sphaeriidae and Corbiculidae. Whether or not these two families of bivalves are included in the final USEPA findings remains to be seen. The 2009 draft document focused primarily on mussels from the family Unionidae, which are not likely to exist in the Carson Creek as they are rare in this region. The District should revisit the results of past BMI studies and determine if additional surveys are needed once the USEPA releases the final version of the "Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater" later this year, as the findings could impact EDHWWTP and/or DCWWTP.

As previously described, if EDHWWTP or DCWWTP were required to further reduce ammonia discharge limits, RO could be required which is highly energy intensive and results in high O&M costs. Under this situation, different strategies (e.g., water quality variances) could be used to navigate the regulatory process. For example, the State of Montana used a water quality variance approach because the wastewater treatment technology required to meet in-stream criteria exceeded an affordability test (1% median household income) and the limit of treatment technology.[11]

The currently permitted nitrate limits are based on human health drinking water standards (10 mg NO_3-N/L). Unless the San Francisco Bay NNE efforts recommend a reduction in nitrate limits, it is not likely that nitrate discharge limits would be further reduced. Unlike ammonia, nitrate is not an ecosystem toxin. Because public health requirements are being met, it is not likely that EDHWWTP and DCWWTP will see a further reduction in nitrate discharge limits, unless they are reduced as a result of requiring a reduction in total nitrogen discharge limits.

6.1.3 Chronic Toxicity

The SWRCB is developing a policy for including numeric chronic toxicity effluent limitations in NPDES permits. The current practice in California is to include chronic toxicity monitoring requirements in permits to address a narrative standard, along with "trigger values" that initiate accelerated monitoring and special studies to determine the cause of trigger exceedances. In order to create an enforceable policy, the SWRCB recognizes that the statistical methods used to determine chronic toxicity must be adjusted to eliminate false positive results. The USEPA has developed a new methodology for the statistical calculations and the methodology was beta-tested by representative dischargers in California. Based on the beta-test results, the USEPA has agreed to make changes to the statistical protocols. When the protocols are finalized, the SWRCB plans to release an official chronic toxicity policy (draft comment deadline was December 2010). The impacts of the new effluent limitations for the District could include compliance problems and associated, increased monitoring efforts to determine the cause of an exceedance.

6.1.4 Constituents of Emerging Concern

Trace organic compounds often described as Constituents of Emerging Concern (CEC) include organic compounds such as endocrine disrupters, flame-retardants, and anti-microbial agents. There is increasing concern about the fate and transport of these compounds because there is little knowledge of the risk to human health and the environment. The California Department of Public Health (CDPH) and the SWRCB acknowledge these potential risks and are working towards the development of analytical methods to detect containments and regulate concentrations to protect the public and the environment.

As part of the SWRCB 2009 Recycled Water Policy, a research program was mandated to guide future actions on the monitoring and regulation of CECs. In 2010, the science advisory panel published the findings in the *Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water*. The purpose of the study was:

- To develop a conceptual framework for determining which CECs to monitor.
- Apply the framework to identify a list of chemicals that should be monitored.
- Develop a sampling design and approach for interpreting results from CEC monitoring programs.
- Prioritize future improvements in monitoring and interpretation of CEC data.

The panel used previously published scientific studies and survey data from stakeholders to select chemicals to be monitored. The report distinguished between water used for potable reuse (groundwater recharge and direct injection) and water used for irrigations purposes. In addition, it provided a program framework for monitoring performance-based and health-based indicator compounds for water used for potable reuse. Conclusions from the report encourage the State to continue to identify and quantify CECs that are of greatest concern and relevance to ecosystems and human health. However no regulatory requirements have been set to date.

Table 6-3 presents the list of CECs recommended for initial monitoring for wastewater effluent. As shown, of the 16 compounds listed, 12 are applicable for freshwater discharges.

Table 6-3. Recommended CECs to be Monitored in Wastewater Effluent

Compound	Discharge Type
Bis(2-ethylhexyl) phthalate	Ocean
Bisphenol A	Embayment and Freshwater
Bifenthrin	Embayment and Freshwater
Butylbenzyl phthalate	Ocean
Permethrin	Embayment and Freshwater
Chlorpyrifos	Embayment and Freshwater
Estrone	Embayment and Freshwater
Ibuprofen	Freshwater
17-beta estradiol	Embayment and Freshwater
Galaxolide (HHCB)	Embayment and Freshwater
Diclofenac	Freshwater
p-Nonylphenol	Ocean
PBDE -47 and -99	Embayment, Freshwater, and Ocean
PFOS	Embayment, Freshwater, and Ocean
Triclosan	Freshwater

Source: *Monitoring Strategies for Chemicals of Emerging Concern in California's Aquatic Ecosystems, Recommendations of a Science Advisory Panel*, SCCWRP, April 2012.

The District should anticipate future monitoring requirements for indicator compounds for treatment performance analysis. The panel's report on recommended CECs to be monitored was issued in April 2012. The SWRCB will initiate a public review process prior to the adoption of the report and its recommendations.

6.1.5 Biosolids

The District currently disposes of Class B biosolids through a successful land application program, a common method of disposal in western states. Biosolids production and disposal is regulated by the USEPA through Title 40 Code of Federal Regulations (CFR) Part 503, which specifically addresses land-applied biosolids. Part 503 regulates inorganic pollutants, pathogen concentrations, and vector attraction reduction (VAR). While regulations have not changed drastically since the 1990s, it is anticipated that in the next five to ten years the USEPA will further reduce the allowable concentration limits for contaminates such as arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.

Recently there has been a shift in the public perception of land application of biosolids. In particular, bans on land application of Class B biosolids in favor of Class A biosolids have prevailed. Class B biosolids have less stringent requirements for treatment and contain trace amounts of bacteria. At present, the DCWWTP uses lime stabilization to raise the pH of the biosolids to reduce pathogens and EDHWWTP uses anaerobic digestion. As future regulations become more stringent, this practice may no longer be approved and an alternative Class B technology or Class A treatment could be required, such as:

- Class B Technologies
  - Conventional anaerobic or aerobic digestion
  - Temperature phased anaerobic digestion
  - Lime stabilization
- Class A Technologies
  - Compost
  - Heat drying (e.g., pellet production)
  - Autothermal thermophilic aerobic digestion (ATAD)
  - Pasteurization
  - Emerging technologies (e.g., CAMBI)

If DCWWTP is required to replace lime stabilization with another technology to meet Class A biosolids requirements, it would require significant facilities (e.g., composting facilities). On the other hand, anaerobic digester facilities already exist at EDHWWTP which could be followed by a technology to meet Class A biosolids requirements, such as pasteurization.

6.1.6 Metals

The EDHWWTP NPDES permit has a default water effects ratio (WER) of 1.0 for all inorganic constituents, except for copper. EDHWWTP has the option of performing studies to adjust the 1.0 WER value for other metals. A WER value different from 1.0 is grounds for reopening the permit to modify the effluent limitations for the applicable inorganic constituents.

6.1.7 Industrial Pretreatment Program

The District's Environmental Division manages the Industrial Pretreatment and Pollution Prevention Program which is responsible for the permitting of food service establishments and commercial and industrial wastewater customers. The Program has identified one "Categorical User" and one "Significant Industrial User" (SIU) requiring permitting under the federal pretreatment regulations. The District has also permitted approximately 290 additional commercial and industrial businesses (e.g., photo processing, food service establishments, auto shops, vehicle washing facilities, dental offices, etc.) to aid in reducing the discharge of pollutants to the collection systems and wastewater treatment plants. Most of these facilities require only adherences to Best Management Practices (BMPs) and/or pretreatment systems in lieu of self-monitoring.

Federal regulation 40 CFR 403.8 (f)(4) requires all wastewater treatment plants that are developing pretreatment programs to also develop, implement, and enforce technically based local limits. Local limits are site-specific loading restrictions that a WWTP develops to enforce general and specific prohibitions on SIUs after considering the following: the current NPDES permit discharge limits; the WWTP's efficiency in treating wastes; its history of compliance with its NPDES permit limits; the condition of the water body that receives its treated effluent; any water quality standards that are applicable to the water body receiving its effluent; the WWTP's retention, use, and disposal of sludge; and worker health and safety.

The District's industrial pretreatment program may be affected by potential new pretreatment regulations under development by the USEPA Office of Water. Among other regulatory efforts, the USEPA is currently investigating the need for new or revised guidelines for regulating discharges from drinking water treatment facilities, from manufacturers of chlorine and chlorinated hydrocarbons, and from steam electric power generating facilities. The District should track these efforts and incorporate any new federal standards into its pretreatment program. The pretreatment program could also be affected if the District wishes to control salinity in its recycled water by enacting a salinity management program. The pretreatment program could be utilized to impose limits on industries with high salinity in their discharge or industries that dispose of brine waste.

6.2 Wastewater Treatment Plant Improvements

The District is well positioned to meet conventional surface water discharge and recycled water quality requirements such as BOD, TSS, ammonia, and total nitrogen, as previously described in Subsection 6.1. The following subsections describe the capacity expansions required to accommodate future growth.

6.2.1 El Dorado Hills Wastewater Treatment Plant Expansion

At full buildout the average dry weather flow capacity required at the EDHWWTP is estimated to be 5.45 mgd, as described in Subsection 4.1. This wastewater treatment plant was recently expanded (El Dorado Phase III Expansion) to increase the rated capacity from 3.0 to 4.0 mgd. A subsequent expansion phase will be implemented to provide the ultimate buildout capacity of 5.45 mgd.

As shown in Figure 6-1, the projected ADWF is expected to approach the existing EDHWWTP capacity in approximately 2026. Typically, a wastewater treatment plant expansion should be online and operational by the time the influent flow reaches approximately 80 to 90 percent of the plant capacity to provide flexibility to accommodate unforeseen conditions.

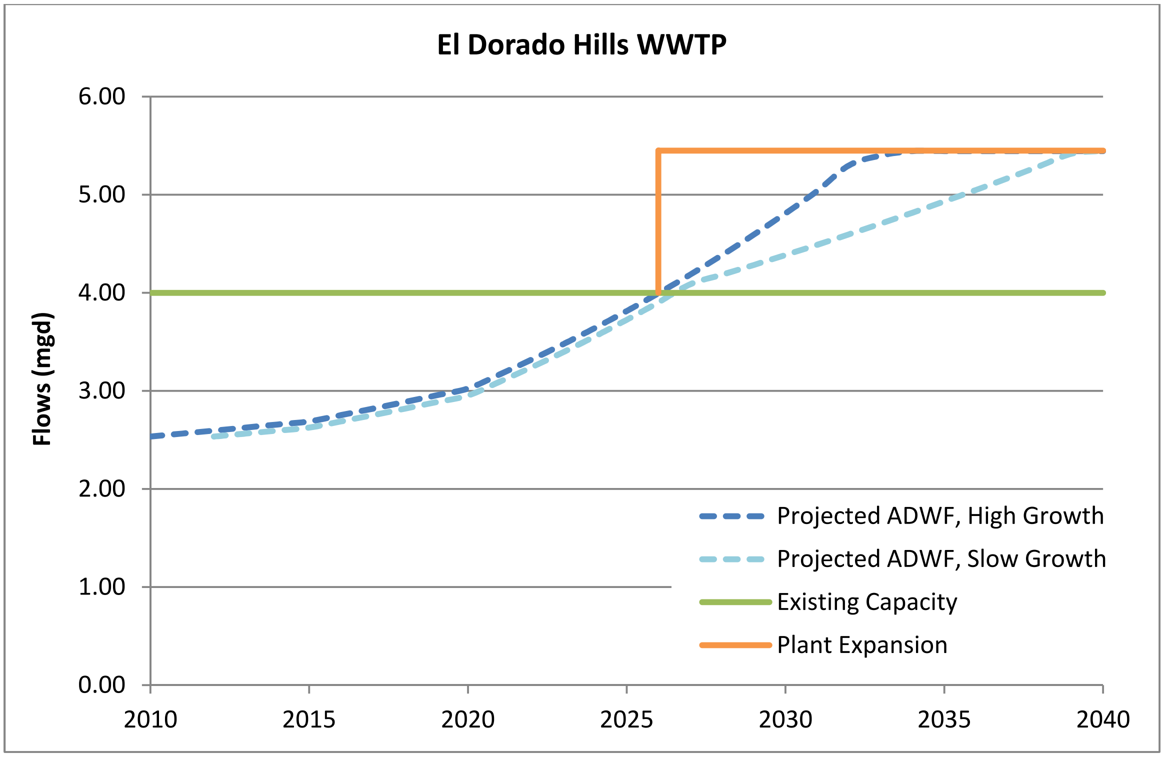


Figure 6-1. EDHWWTP Expansion

As shown in Figure 6-1, the District plans to have the new expansion operational by 2026. The timeframe for the EDHWWTP expansion from 4.0 to 5.45 mgd should be reviewed and refined based on actual growth rates.

6.2.2 Deer Creek Wastewater Treatment Plant Expansion

As described in Subsection 4.1, at full buildout the average dry weather flow capacity required at the DCWWTP is estimated to be 5.0 mgd, which exceeds the current rated capacity of 3.6 mgd. The Deer Creek sewershed is expected to reach the current DCWWTP capacity between 2022 under the high growth scenario and by 2032 under low growth scenario, as shown in Figure 6-2. For planning purposes, it is recommended that the District plan to expand the DCWWTP by 2029. The timeframe for the expansion should be reviewed and refined based on actual growth rates.

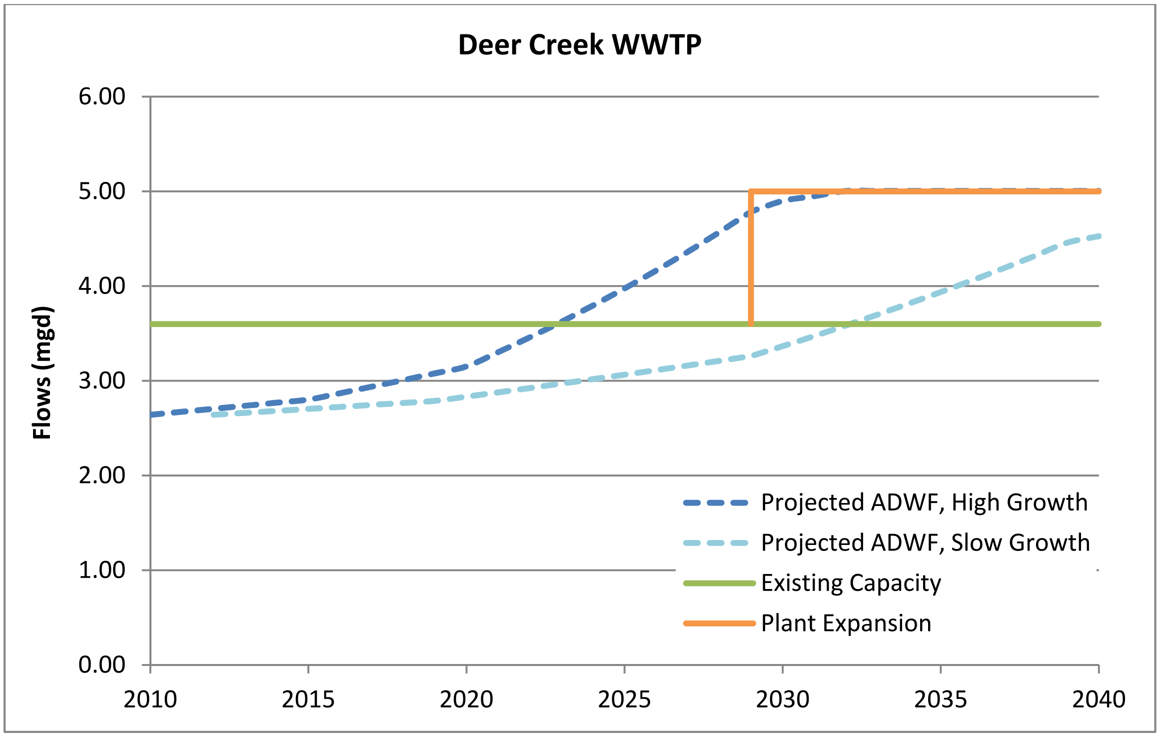


Figure 6-2. DCWWTP Expansion

7.0 WASTEWATER EFFLUENT DISPOSAL AND REUSE EVALUATION

Recycled water has been a key component of the District's water supply portfolio for over 30 years, particularly after the construction of the El Dorado Hills Executive Golf Course and the Serrano Development, and its use has reduced the District's dependence on new potable water sources.

The December 2002 Recycled Water Master Plan (RWMP) identified areas within the District's service area to be served with recycled water. The RWMP identified the need for seasonal storage of recycled water to meet current and future demands without raw or potable water supplementation. Following that, the 2009 Seasonal Storage Basis of Design Report (2009 Seasonal Storage BODR) was prepared to evaluate seasonal storage alternatives for recycled water. Since that report was finalized, changes have occurred that require an update of the economic evaluation of the seasonal storage project and alternatives to expand the recycled water system.

The following subsections present a summary of past studies and assumptions, provide a summary of effluent disposal and recycled water regulatory considerations, and include an update of the alternatives for future expansion of the recycled water system.

7.1 Review of Past Studies and Assumptions

At the time the RWMP was prepared, the RWQCB required the District to comply with an effluent monthly coliform limit of 2.2 most probable number (MPN) per 100 ml on a year-round basis, and anticipated potential temperature and pH limits in the future. In addition, it appeared that the RWQCB might also include salinity and metals limitations in the District's NPDES permits. Considering these potential future limitations, it was possible that pH control, effluent cooling, ultra filtration, and reverse osmosis could be required to assure effluent compliance.

An objective of the RWMP was to identify, evaluate, and compare the economics for continued effluent disposal while expanding the recycled water program versus constructing a seasonal storage reservoir and eliminating all effluent disposal. It was found that complete reuse at buildout flows in a wet season would require a 5,000 ac-ft seasonal storage reservoir and pasture land for excess disposal. The economic evaluation in the RWMP demonstrated that beneficial reuse was less expensive than continued surface water discharge due to the high cost of RO treatment required to ensure compliance with metals and salinity limits that could be imposed in future permits.

Since the completion of the RWMP, the District was successful in demonstrating to the RWQCB that treated effluent cooling and pH adjustment should not be required at either plant. According to the District's April 2009 Engineering and Operations Committee Staff Report, although salinity continues to represent a significant issue for the Central Valley, it does not appear to be as critical or problematic for the District, and while metals continue to be a concern, compliance may not require RO treatment.

As a result of the changes in potential discharge requirements, the District reexamined the economic evaluation of the seasonal storage project in 2009 and determined that future wastewater treatment improvements for surface water discharge and beneficial reuse were anticipated to be essentially equal, along with their implementation costs. Therefore, wastewater treatment plant improvement costs alone do not justify the selection of beneficial reuse. Instead, the choice between surface water discharge and beneficial reuse should be based on an economic comparison that considers the implications to the raw and potable water systems coupled with a comparison of tangible and intangible parameters, such as the current regulatory environment and the flexibility to accommodate future changes, Board Policies, water supply availability, reliability, and drought considerations.

The beneficial use of recycled water results in a potable water cost reduction (as it replaces a potable water demand), thereby reducing the magnitude of future potable water supply and facility capacity improvements. The economic analysis prepared in 2009 (Recycled Water Seasonal Storage Evaluation, March 2009, HDR) considered specific potable water improvements affected by beneficial reuse, including raw water pumping from Folsom Lake, potable water treatment, and potable water conveyance to the water storage tanks located east of the EDHWWTP.

Since the 2009 study was completed, there have been several changes that necessitated an update of the beneficial reuse and surface water discharge evaluation. The following subsections describe updated assumptions regarding surface water discharge requirements, recycled water monitoring and reporting requirements, and an update of the recycled water alternatives analysis.

7.2 Surface Water Discharge Regulatory Considerations

The DCWWTP and the EDHWWTP currently discharge a portion of treated effluent to Deer Creek and Carson Creek, respectively. This discharge is regulated under the NPDES permits issued by the RWQCB. A discussion of the water quality regulations and treatment requirements is presented in Subsection 6.1 of this Master Plan.

In addition to the NPDES permits, the SWRCB adopted Water Rights Order No. WR 95-09 requiring the District to maintain specific quantities of treated effluent discharge to Deer Creek to maintain downstream riparian habitat and provide water for beneficial use. Specifically, the Order requires that the DCWWTP must discharge a minimum of 1.0 mgd to Deer Creek when the plant flow exceeds 2.5 mgd.

The District is currently seeking a change of use petition to eliminate or reduce the discharge requirement to Deer Creek such that more recycled water could be available during peak demand periods. The change of use petition is expected to be submitted to the SWRCB in late 2014.

7.3 Recycled Water Regulatory Considerations

The District uses recycled water to offset the demand for potable water, particularly in the summer when there is no precipitation and there is a high demand for landscape irrigation. A description of the existing recycled water system, historical supply and demand is presented in Subsection 2.2. Projected recycled water supply and demand are described in Subsection 4.3.

The CDPH has established statewide recycled water criteria in Chapter 3, Division 4, Title 22, California Code of Regulations (CCR), Section 60301, et seq. (hereafter referred to as Title 22) for the use of recycled water for food crop, fodder, fiber, seed crop and landscape irrigation and impoundment supply. The District's recycled water program activities in the Central Valley Region are governed by Order No. 5-01-146, a Master

Reclamation Permit issued by the Central Valley RWQCB. The District's permit contains treatment requirements in order to assure protection of the public's health and compliance with Title 22 requirements.

On February 3, 2009, the State Water Board adopted the Policy for Water Quality Control for Recycled Water (Resolution No. 2009-0011). The policy states that use of recycled water from municipal sources must be increased and provides direction to the respective Regional Water Quality Control Boards when issuing permits for recycled water projects, allowing for streamlined permitting in some cases, and maximizing consistency when issuing recycled water permits. This policy requires the development of salt and nutrient management plans to protect groundwater quality and monitoring for CECs.

The beneficial uses of the groundwater underlying the District's recycled water service area include municipal, domestic, agricultural and industrial supply. Therefore, groundwater limitations have been included in the District's Master Reclamation Permit to assure that the use of recycled water does not degrade groundwater quality.

The SWRCB established a CEC Advisory Panel in 2009 to determine risks of CECs to public health and the environment, recommend actions that should be taken to improve understanding of CECs, and (as needed) propose actions to protect public health and the environment. A final report was issued on June 25, 2010 that addresses the appropriate constituents to be monitored in recycled water, along with applicable monitoring methods and detection limits. With respect to urban irrigation uses, none of the chemicals for which measurement methods and exposure data are available exceeded the threshold for monitoring priority. This finding is largely attributable to the potential for reduced water ingestion in a landscape irrigation setting as compared to drinking water. For irrigation practices, the Advisory Panel recommended monitoring of three surrogate chemicals, including chlorine residual, electrical conductivity, and turbidity. Surrogates are used to monitor the efficiency of trace organic compounds removal by a treatment process and indicate treatment failure. The District currently measures these three surrogates at the effluent disposal location prior to distribution in the recycled water system.

7.4 Recycled Water Expansion Alternatives

The 2009 Seasonal Storage BODR developed and evaluated five alternatives to meet future irrigation demand, including potable water, seasonal storage, raw water supplementation, supplementation with treated water, and an alternative with no supplementation. However, since the completion of the 2009 Seasonal Storage BODR, the recycled water supply projections have changed and the underlying assumptions of some alternatives have changed.

Based on the future wastewater flow analysis, as described in Subsection 4.1, the ADWF at EDHWWTP and DCWWTP is expected to total 10.45 mgd at buildout. This is higher than was projected at the time the 2009 Seasonal Storage BODR was prepared.

In addition, the District has discontinued its practice of raw water supplementation from Bass Lake and determined that raw water supplementation is no longer operationally feasible. Finally, the IWRMP presents new recommendations for future treated water infrastructure, including a new water treatment plant located near Placerville and new treated water transmission pipelines.

The changes described above require an update of the analysis of recycled water expansion alternatives.

As described in Subsection 4.3.3, the near-term projected demand in the recycled water system is expected to increase from approximately 2,530 AFY under existing conditions to 3,630 AFY with the buildout of the Valley View, Serrano, and Carson Creek developments. These developments are reasonably expected to build dual-plumbed services either due to previous commitments or due to their close proximity to existing recycled water infrastructure. There could also be other recycled water demands in the District’s service area. As described in the 2009 Seasonal Storage BODR, the buildout demand for recycled water could be as much as 8,630 AFY.

Although future wastewater influent flows to the EDHWWTP and DCWWTP are estimated to total approximately 12,380 AFY (including I/I), much of that water is available during the wet season, when the recycled water demand is very low.

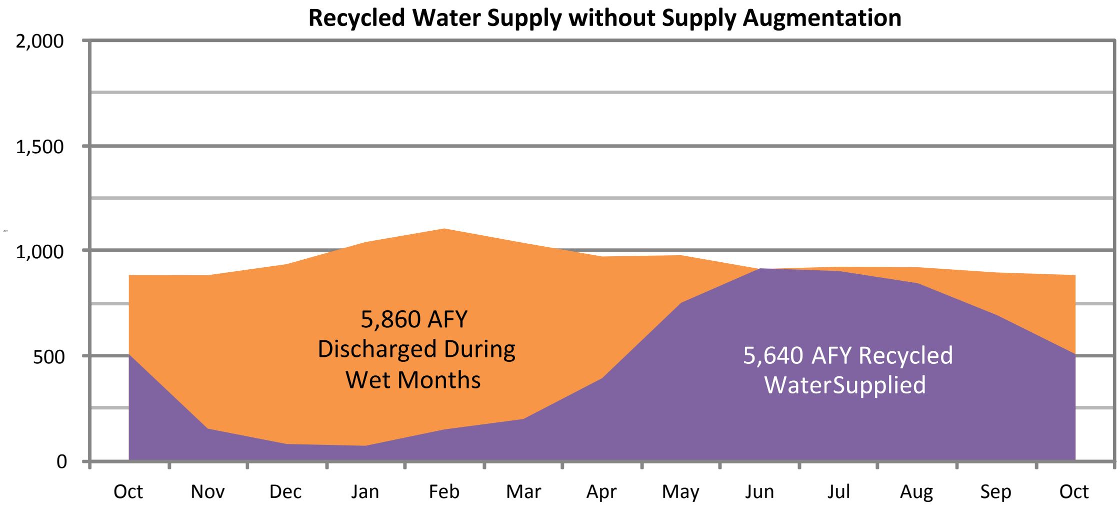
Considering the seasonality of recycled water production, it is estimated that the available recycled water supply will be limited to only 5,640 AFY without some form of augmentation.

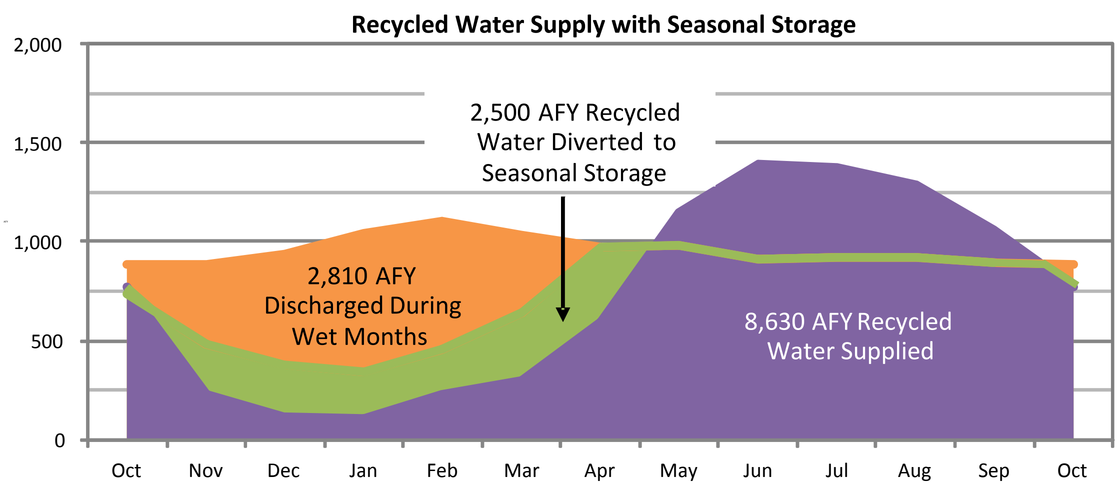
Two augmentation alternatives were considered to meet the future recycled water demand if the District elects to expand the recycled water system beyond the currently planned dual-plumbed developments previously described. The augmentation alternatives include:

- **Seasonal Storage.** Under the seasonal storage alternative, a 2,500 ac-ft recycled water reservoir would be constructed south of the EDHWWTP to store recycled water during the wet season for use later during the dry season.
- **Potable Water Supplementation**. Under the potable water supplementation scenario, the available recycled water supply would continue to be limited by the average dry weather flow to the respective wastewater treatment plants. However, the full demand would be realized through supplementation with potable water. Approximately 1,630 AFY of potable water would be needed, with a maximum day potable water supplement demand of 5.2 mgd.

Without supply augmentation, other new developments would not include dual-plumbed construction and as a result, the remaining demand would be served through the potable water system alone. The buildout recycled water supply and demand for each scenario, as well as the potable supplementation and supply from seasonal storage, are shown in Figure 7-1.

A summary of the recycled water supply and the demand served by each alternative is presented in Table 7-1. Projections are based on buildout flows to EDHWWTP and DCWWTP and the full potential demand identified in the RWMP. In addition, for the purposes of the comparison of these alternatives, it was assumed that the required discharge to Deer Creek was eliminated. Although the District may not be successful in completely eliminating the discharge requirement, the evaluation of the alternatives is comparative. Thus, this assumption is not expected to change the outcome of the analysis.





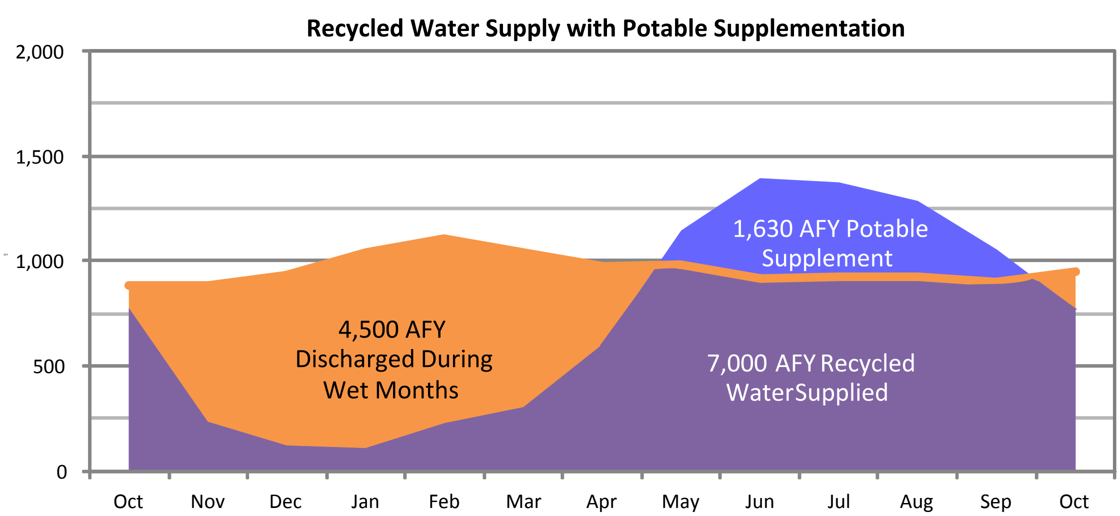


Figure 7-1. Buildout Recycled Water Supply and Demand

Table 7-1. Buildout Recycled Water Supply and Demand

	Potable Water Supplementation[a, b]	Seasonal Storage[a, c]
Recycled Water Demand[d]	8,630 AFY[b]	8,630 AFY
Wastewater Influent Flow[e]	12,380 AFY	12,380 AFY
Total Annual Recycled Water Supply Available[f]	12,070 AFY	12,070 AFY
Useable Recycled Water	7,000 AFY[g]	8,630 AFY
Potable Water Supplement	1,630 AFY	None
Seasonal Storage Capacity	None	2,500 ac-ft
Maximum Day Potable Water Supplement[h]	5.2 mgd	None

(a) Assumes the Order requiring a minimum discharge to Deer Creek is eliminated.
(b) Assumes future development will continue to be dual plumbed and supply will be augmented with potable water.
(c) Assumes future development will continue to be dual plumbed and supply will be provided in dry months through construction of a 2,500 ac-ft seasonal storage reservoir to store available supply in wet months.
(d) Assumes 5 percent losses in the recycled water distribution system.
(e) Based on ADWF of 5.45 at EDHWWTP and 5.0 at DCWWTP.
(f) Includes wastewater influent flow plus I/I during a typical dry year, less 10 percent losses in the plant.
(g) Based on a water balance analysis for a dry year.
(h) Based on water balance analysis for a dry year and estimated difference between recycled water production and demand in the peak month.

Both recycled water augmentation alternatives presented in Table 7-1 are able to meet the full projected recycled water demand of 8,630 AFY. Both of the alternatives are described further in the following subsections.

7.4.1 Potable Water Supplementation

In this alternative, approximately 7,000 AFY of recycled water would be delivered to customers, and potable water would be used to supplement the supply to meet the full 8,630 AFY irrigation demand in the summer months. All future development in the El Dorado Hills area would be dual-plumbed in accordance with Board Policy 7010.

This alternative would require a potable supply source and transmission facilities from the source to the recycled water system. As described in the District's IWRMP, a new water treatment plant will be constructed near Placerville. Under this alternative, that new water treatment plant and its associated raw water pump station would be sized to include capacity for the maximum day potable supplementation requirement, 5.2 mgd (the raw water conveyance pipeline is sufficiently sized to convey the additional flow). The IWRMP also includes upgrades to the District's transmission facilities between the new water treatment plant and the Cameron Park and Bass Lake area. As currently planned, those pipelines are sized to convey the additional maximum day potable water supplementation requirement. Due to the location of the new water treatment plant, water from the plant could be conveyed by gravity to the recycled water connection point.

7.4.2 Seasonal Storage

In this alternative a 2,500 ac-ft storage reservoir would be constructed. The seasonal storage reservoir would provide sufficient recycled water supply such that future development in the El Dorado Hills area could be dual-plumbed and served with full recycled water. The storage reservoir would allow the District to meet the 8,630 AFY irrigation demand through the summer months and excess treated effluent would be discharged to Deer Creek and Carson Creek.

The 2009 Seasonal Storage BODR report recommended the El Dorado Hills site south of the EDHWWTP for development of the seasonal storage reservoir, as shown in Figure 7-2, based on economic and non-economic factors.

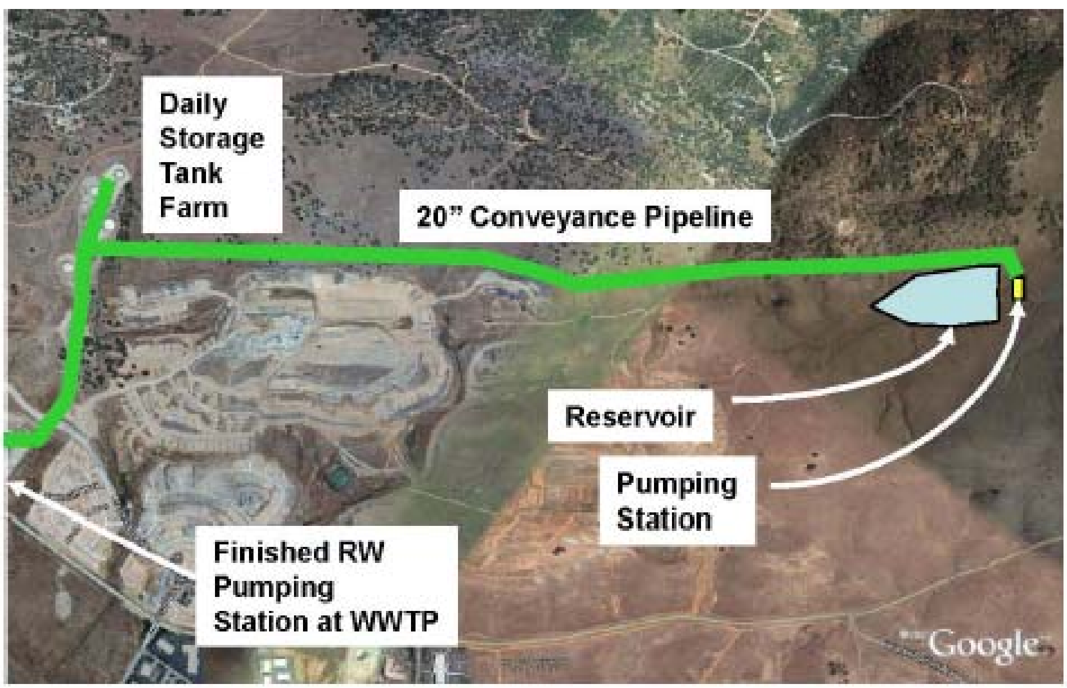


Figure 7-2. Selected Seasonal Storage Site[12]

[12] Source: 2009 Seasonal Storage BODR, HDR.

As described in the 2009 Seasonal Storage BODR, and as illustrated in Figure 7-2, implementation of the seasonal storage reservoir would also include the construction of a new pipeline to convey water from EDHWWTP to the storage reservoir and a pump station at the reservoir to convey water back toward the District's Tank Farm near the EDHWWTP.

7.4.3 Economic Evaluation

To determine which alternative is more economically feasible, the economic evaluation presented in the 2009 Seasonal Storage BODR was updated. An updated summary of infrastructure requirements is provided in Table 7-2.

Table 7-2. Summary of Infrastructure Requirements

Facility	Units	Potable Water Supplementation	Seasonal Storage
Raw Water Supply			
Additional Raw Water Supply[(a)]	AFY	1,630	n/a
Raw Water Pumping[(b)]	mgd	5.2	n/a
Water Treatment and Conveyance			
Water Treatment[(b)]	mgd	5.2	n/a
Treated Water Pumping[(c)]	mgd	n/a	n/a
Water Distribution	LF	Same for all Scenarios	
Wastewater Collection, Treatment and Disposal		Same for all Scenarios	
Recycled Water			
Additional Recycled Water	AFY	1,360	2,990
Pumping to Tank Farm[(d)]	mgd	n/a	9.8
Pumping to Seasonal Storage[(e)]	mgd	n/a	4.0
Seasonal Storage	ac-ft	n/a	2,500
Conveyance from Storage to Tank Farm	LF	n/a	2,200 (20")
Recycled Water Distribution	LF	Same for all Scenarios	

(a) Based on full projected recycled water demand of 8,630 AFY from the Seasonal Storage BODR.
(b) Sized for maximum day demand, above what the existing recycled water system can supply without augmentation.
(c) Per the IWRMP, water from the New WTP near Placerville will flow by gravity to the Cameron Park / Bass Lake area.
(d) Pumping based on maximum day demand.
(e) Pumping based on peak volume pumped to seasonal storage.

A summary of the updated present worth analysis is presented in Table 7-3. Costs that are common to both alternatives (e.g., distribution system pumping and piping) have not been included.

Table 7-3. Summary of Comparative Present Worth Analysis ($ Millions)

Facility[a]	Potable Water Supplementation	Seasonal Storage
Capital Costs		
Raw Water Supply[b]	$0.35	$0
Water Treatment and Conveyance[b]	$16.45	$0
Seasonal Storage[c]	$0	$46.17
Total Capital Costs	$16.80	$46.17
Present Value O&M Costs[d]		
Raw Water Supply	$1.05[e]	$0
Water Treatment and Conveyance	$0.31[f]	$0
Seasonal Storage	$0	$2.74
Present Value O&M Costs	$1.36	$2.74
Total Present Value Costs	$18.16	$48.91

(a) All costs are referenced to the February 2012, 20-City ENR CCI, 9198. Present value calculations are based on 5 percent interest rate and 3 percent inflation rate. Assumes capital expenditures occur in 2025.
(b) Assumes 5.2 mgd capacity raw water pump station to the new water treatment plant (includes prorated share of facilities included in the IWRMP). Raw and treated water pipelines are sufficiently sized to convey the additional supply; thus upsizing of the treated pipelines is not included.
(c) Includes a 2,500 ac-ft reservoir and associated pipelines and pump stations. Costs are from the Seasonal Storage BODR.
(d) O&M costs are based on an operating period of 2026-2072, consistent with the IWRMP.
(e) Based on 1,630 AFY potable water supplementation. Includes pumping at White Rock Diversion and cost of foregone hydropower.
(f) Based on 1,630 AFY potable supplementation, including treatment at the new water treatment plant, per the IWRMP.

A summary of the annual unit costs for recycled water is presented in Table 7-4.

Table 7-4. Recycled Water Unit Cost Analysis

Cost Component[a]	Potable Water Supplementation	Seasonal Storage
Annual Capital Cost	$472,000	$1,297,000
Annual O&M Cost	$449,000	$585,000
Total Annual Cost	$921,000	$1,882,000
Annual Demand	8,630 AFY	8,630 AFY
Annual Cost per AFY Recycled Water	$107	$218

(a) All costs are referenced to the February 2012, 20-City ENR CCI, 9198. Present value calculations are based on 5 percent interest rate and 3 percent inflation rate for a period of 60 years.

As shown in Table 7-4, the unit cost of recycled water under the seasonal storage alternative is more than double the unit cost of potable water supplementation. The recommended plan in the IWRMP includes a new diversion and water treatment plant, and associated conveyance and transmission facilities. This new recommendation for the potable water system provides better economy of scale for the facilities needed to provide potable water supplementation than facilities included in previous seasonal storage analyses. As a result, seasonal storage was not included as part of the recommended plan in the IWRMP. However, while the economic evaluation indicates that continued expansion of the system with potable water supplementation is preferred, the District should evaluate the operational constraints associated with potable supplementation, particularly during peak demand periods.

The additional recycled water demand introduced by the Valley View, Serrano, Carson and Creek developments can be met without any potable water supply augmentation once the El Dorado Hills and Deer Creek Collection Systems are built out, as shown in Figure 4-4. The exact timing for when the recycled water demand and supply will reach equilibrium is difficult to project. However, it is expected to occur sometime between 2023 and 2031, which is within the timeframe for construction of the new water treatment plant and transmission facilities described in the IWRMP. At buildout, there will be approximately 1,270 to 1,550 AFY of additional recycled water supply available, depending on the outcome of the Deer Creek change petition process, to serve additional developments if desired. Thus, the District should further evaluate the future of the recycled water program and determine the desired extent of future expansion considering the operational constraints associated with potable water supplementation. And, although the seasonal storage reservoir is not included in the recommended plan at this time, the District may want to reconsider it in the future due to the following benefits that it provides:

- Seasonal storage would maximize the use of recycled water which is consistent with Board Policy 7010.
- Recycled water is a drought resistant source of supply. Thus, it is highly reliable.
- Maximizing the use of recycled water is viewed favorably by the public, as its use is sustainable.

- Use of recycled water will offset the demand for potable supplies and their raw water sources, which could then be used for other purposes, such as groundwater banking or water transfers.

Therefore, as conditions change and evolve (e.g., financing becomes available), the District should reconsider the feasibility of the seasonal storage reservoir.

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8.0 RECYCLED WATER DISTRIBUTION SYSTEM EVALUATION

This section provides a summary of regulatory considerations for the District's recycled water system and an analysis of historical recycled water system overflows. In addition, the recycled water distribution system hydraulic model is described and recycled water system improvements needed to provide capacity for future planned growth are identified. The existing recycled water system is described in Subsection 2.2.

It is assumed that individual developers will be responsible for the planning, engineering and construction of proposed recycled water systems located within their respective developments.

8.1 Regulatory Considerations

The following subsections describe recycled water uses and past recycled water system overflows as they relate to current and pending regulations.

8.1.1 Recycled Water Uses

The District currently produces and distributes recycled water for the following uses: landscape median, school, park, golf course, commercial landscape, and residential irrigation; construction (dust control, soil compaction and general construction use); and industrial process water. Some recycled water uses, such as dust control, have lesser standards prescribed in Title 22 than uses such as playground irrigation. However, the District owns and operates one recycled water storage and distribution system. Therefore, the uses of recycled water with the most stringent treatment standards, nonrestricted recreational impoundments and irrigation of public access facilities, are satisfactory for all of the proposed recycled water uses.

Order No. 5-01-146 requires that the District establish and enforce rules and/or regulations governing the design and construction of recycled water use facilities and its use to be in accordance with the criteria established in Title 22. The District has developed administrative procedures and user agreements requiring compliance with Title 22 criteria and their Master Reclamation Permit. In addition, the District conducts periodic inspections of user facilities and operations to monitor and assure compliance with conditions of their permit and is required to maintain a right-of-entry for all properties where recycled water is used.

8.1.2 Past Recycled Water Overflows

The District's Master Reclamation Permit prohibits bypasses and overflows of partially treated and untreated wastewater, as well as the discharge of recycled water to surface waters. As required by the State, the District has reported bypasses and overflows from the recycled water distribution system. The number and volume of overflows from 2005 to 2010 is summarized in Table 8-1.

Table 8-1. Recycled Water System Overflows

	2005	2006	2007	2008	2009	2010
Number of Overflows	12	34	19	47	13	40
Total Volume of Overflows	184,000	587,000	41,000	20,000	345,000	36,000

In the February 2011, *System Deficiency Analysis*, it was suggested that the large number of overflows resulting from pipeline breaks could be due to large pressure oscillations in the distribution system resulting from peak hour demands, as described later in this Section.

The State is currently considering Assembly Bill 803 (AB-803) which would change unauthorized discharge reporting thresholds. The bill proposes to align the recycled water reporting requirements in the Health and Safety Code to be consistent with that in the Water Code. If the bill passes, recycled water overflows or spills less than 50,000 gallons would not be required by law to be reported.

8.2 Recycled Water Distribution System Improvements

Recycled water system improvements to accommodate future growth include recycled water pump station expansions, new recycled water storage, and new pipelines to serve customers. Improvements to the recycled water system should be designed in accordance with the design criteria previously described in Subsection 3.6.

Developers will be responsible for providing new recycled water distribution pipelines and booster pumps servicing new developments. Based on proposed development expansion at buildout, the District will not need to expand the capacity for any existing transmission pipelines. However, new storage and pumping facilities will be required to provide recycled water to the new developments.

The following subsections describe the recycled water system hydraulic model, system operations, future storage needs, and future pump station needs.

8.2.1 Recycled Water Model

The hydraulic model for the District's recycled water distribution system was updated to support the CSPA Settlement Agreement described in Subsection 5.1.3. As previously described, as part of the Settlement Agreement, the District agreed to limit the number of wastewater or recycled water overflows occurring in the system and evaluate the cause of historical overflows in the recycled water system. As s result, the 2011 *System Deficiency Analysis* was prepared which documented the development, calibration, and validation of the hydraulic model and, subsequently, the modeled recycled water system deficiencies.

The model was updated using information from the District's existing WaterCAD model which was imported into INFOWORKS WS for further development. The recycled water system was updated to include recent developments and historical billing data. The model includes information on piping, valves, tanks, and pump stations. Both physical information (e.g., elevation, size, and geometry) and operational constraints and logic (e.g., tank level, pump curve, and control valve settings) were defined in the model.

The recycled water model was calibrated and validated using three sets of pressure data occurring during a high-demand, summer period. The calibrated and validated hydraulic model was then used to investigate the condition of the existing recycled water system with respect to past recycled water main breaks.

Results from the analysis indicated that areas susceptible to main line breaks typically occur in areas of high maximum pressures (greater than 75 psi) and that the majority of historical line breaks occurred in areas with maximum pressures above 100 psi. In addition, the analysis indicated that significant pressure oscillations of up to 80 psi could occur during high demand periods.

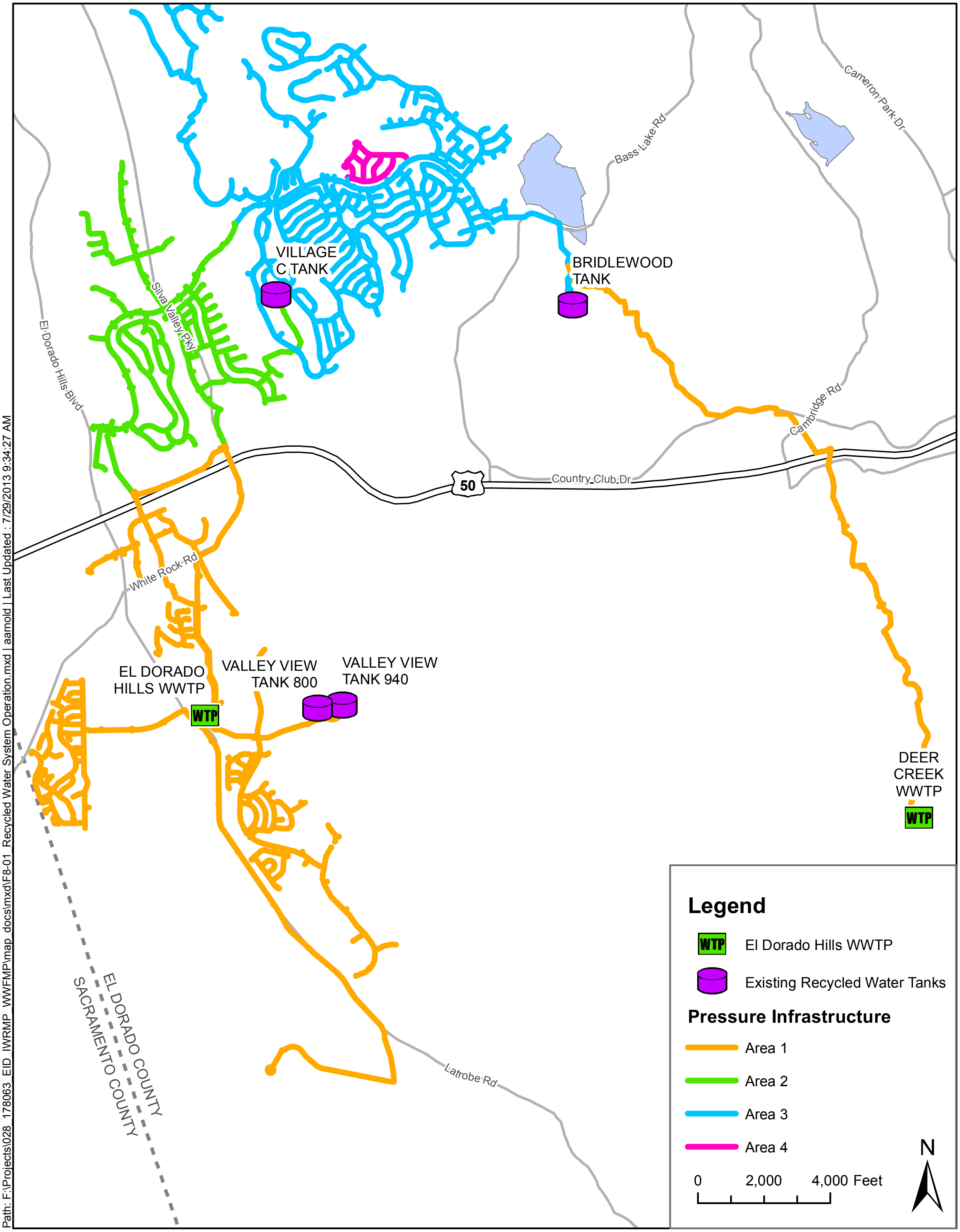
8.2.2 System Operations

As previously described, recycled water is produced at the EDHWWTP and DCWWTP with some supplemental potable water supply that can enter the system at the 800 and 940 Tanks, Village C Tank, Bridlewood Tank, and Bass Lake Booster Pump Station. Recycled water supply and system pressure are controlled by the pump stations at the WWTPs, Booster Pump Stations (Bass Lake, Village C, and Silva Valley), pressure reducing stations (PRSs), and by tank levels. The following are descriptions of the infrastructure that controls the operational pressure within the specific areas shown in Figure 8-1.

- Area 1: Pressures controlled by WWTP pump stations, associated tanks (800, 940, and Bridlewood Tanks) and downstream PRSs.
- Area 2: Pressures controlled by Silva Valley Booster Pump Station, Village C Tank and downstream PRSs.
- Area 3: Pressures controlled by Village C Pump Station, Bass Lake Booster Pump Station, Bridlewood Tank, and downstream PRSs.
- Area 4: Pressures controlled by Village K Booster Pump Station.

Abrupt demand fluctuations can lead to sudden changes in pipe velocity, subsequently producing large pressure waves that can damage or wear down distribution system equipment and piping.

As previously described, the *System Deficiency Analysis* indicated that high pressures and pressure oscillations were occurring in the existing distribution system. System operations can be modified to reduce these pressures to help reduce pipeline fatigue and, subsequently, the number of main line breaks.



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Recycled Water System Operation

FIGURE 8-1

Since 2011, the District has worked with the Serrano Home Owners Association (HOA) to spread peak recycled water demands, due to residential irrigation, more evenly over the delivery period in order to reduce high system pressure oscillations. The recycled water distribution system experiences high demands during the summer months, particularly in the hours between 9 pm and 6 am when residential irrigation demands are high. Because recycled water customers typically set irrigation timers at the top of every hour, short bursts of high system demands have occurred on an hourly basis.

To mitigate the pressure oscillations that increase pipe fatigue in the system, District staff has communicated to customers the need to offset irrigation timers so demands are spread more evenly over the delivery period. The District should continue to work with developers, homeowner associations, and other customers to distribute recycled water demand over the delivery period (9 pm to 6 am).

System operations with reduced peak hour demands will also reduce the capacity requirements for future facilities because the facilities must be sized to meet the peak hour demand.

8.2.3 Recycled Water Pump Stations

The recycled water pump stations at the District's wastewater treatment plants will require expansion to provide recycled water to serve future development. The respective pump stations at EDHWWTP and DCWWTP are described below.

EDHWWTP Pump Station Expansion

The EDHWWTP recycled water pump station currently consists of three 200 HP vertical turbine pumps (VTP), including:

- Two Floway 12LKH 7-stage VTPs (Serial Nos. 35895-1-1 and 24969-2-1)
- One Floway 12JKH 6-stage VTP (Serial No. 21165-1-2)

The current pump station firm capacity with the largest (12 LKH) pump out of service is 3.7 to 3.9 MGD assuming high (10 ft/ 1000 ft) to low (5 ft/ 1000 ft) headloss conditions. The total connected pump station capacity with all three pumps running is 5.5 to 5.9 MGD under high and low headloss conditions, respectively.

In order to serve future connections, increase system reliability, and improve supply flexibility, the District should double the (connected) capacity of the EDHWWTP recycled water pump station at buildout. Therefore, it is recommended that the pump station be expanded to approximately 11 MGD in the future.

The expansion to 11 MGD is recommended to occur in two phases. In the first phase, a new pump should be added to the remaining (4^{th}) pump bay at the existing recycled water pump station. The second phase will require a second, new pump station to accommodate buildout flows. Section 9 provides a cost estimate and schedule for the phasing of the pump station expansion.

Prior to the pump station upgrade, the District should also investigate the downstream transmission pipeline from the EDHWWTP to ensure the pipeline is appropriately designed to accommodate the additional pressure.

DCWWTP Pump Station Expansion

The DCWWTP recycled water pump station currently consists of three VTPs, including:

- Two Floway 12LKM 9-stage 200 HP VTPs (Serial Nos. 92-01462 and 92-01463)
- One Floway 10JKM 12 stage 100 HP VTP (Serial No. 92-01461)

The current total firm pump station capacity with the largest (12 LKM) pump out of service is 1.3 MGD with current headloss conditions. The total connected capacity with all three pumps running is 2.5 MGD at current headloss conditions.

As described in Section 6, the total buildout capacity of the DCWWTP is 5.0 MGD. If the District is successful in reducing the mandatory discharge to Deer Creek from 1.0 MGD to 0.5 MGD, the available recycled water production at buildout is 4.5 MGD. Thus, the recycled water pump station capacity should also be increased to 4.5 MGD.

Approaching buildout, the total frictional headloss in the existing 4.8 mile transmission pipeline from DCWWTP to the Bridlewood Tank will increase significantly. As a result, the total dynamic head required to pump water to the Bridlewood Tank will eventually increase above the shutoff point for the existing recycled water pumps. Therefore, the existing pumps will require replacement in addition to any new pumps required for expansion to meet the buildout pump station flow capacity of 4.5 MGD. Prior to the pump station upgrade, the District should also investigate the transmission pipeline between the DCWWTP and the Bridlewood tank to ensure the pipeline is appropriately designed to accommodate the additional pressure.

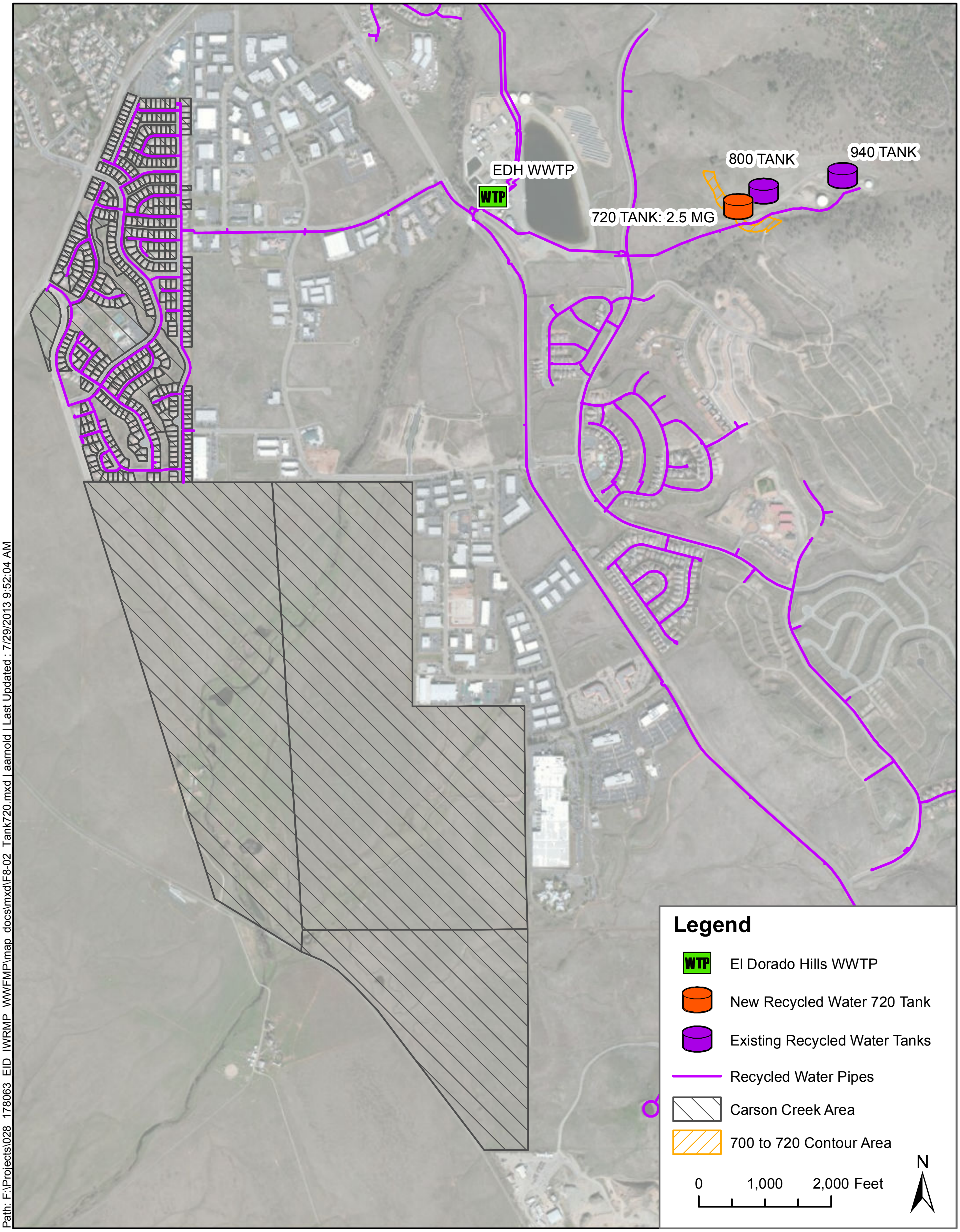
8.2.4 Recycled Water Storage

A new recycled water storage tank is needed to serve the future Carson Creek development. The new tank, the 720 Tank, will be located on the hill less than a mile east of EDHWWTP and at an approximate elevation of 720 ft, as shown in Figure 8-2.

The capacity of the 720 Tank recycled water storage requirements are based on projected recycled water demands for Carson Creek. Using design criteria provided by the District, the 720 Tank was sized to accommodate 100 percent of the maximum daily demand (MDD). The MDD was determined from residential and non-residential demands and peaking factors provided by the District, based on recent operational trends in the existing system. Based on these design criteria, the recommended capacity of the 720 Tank is 2.5 MG.

Residential demands were based on a residential water duty and the number of EDUs at buildout. The maximum day water duty factor was provided by the District based on review of historical recycled water system operations data.

The geometry, number, and operational levels of the 720 Tank will be determined in the future. Distribution system pipelines servicing the new developments from the 720 Tank will be provided by the developer.



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Recycled Water 720 Tank

FIGURE 8-2

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8.2.5 Recycled Water Transmission

The capacities of the existing transmission pipelines from both EDHWWTP and DCWWTP to the distribution system were evaluated based on buildout pump station capacity flows. Transmission pipelines from both treatment plants meet the District's design criteria of maintaining velocities below 10 fps. Therefore, no upgrades of the existing transmission pipelines are currently recommended. However, as previously described, the District should further evaluate the pipelines to determine if they are appropriately designed to accommodate the upgrades at the respective recycled water pump stations.

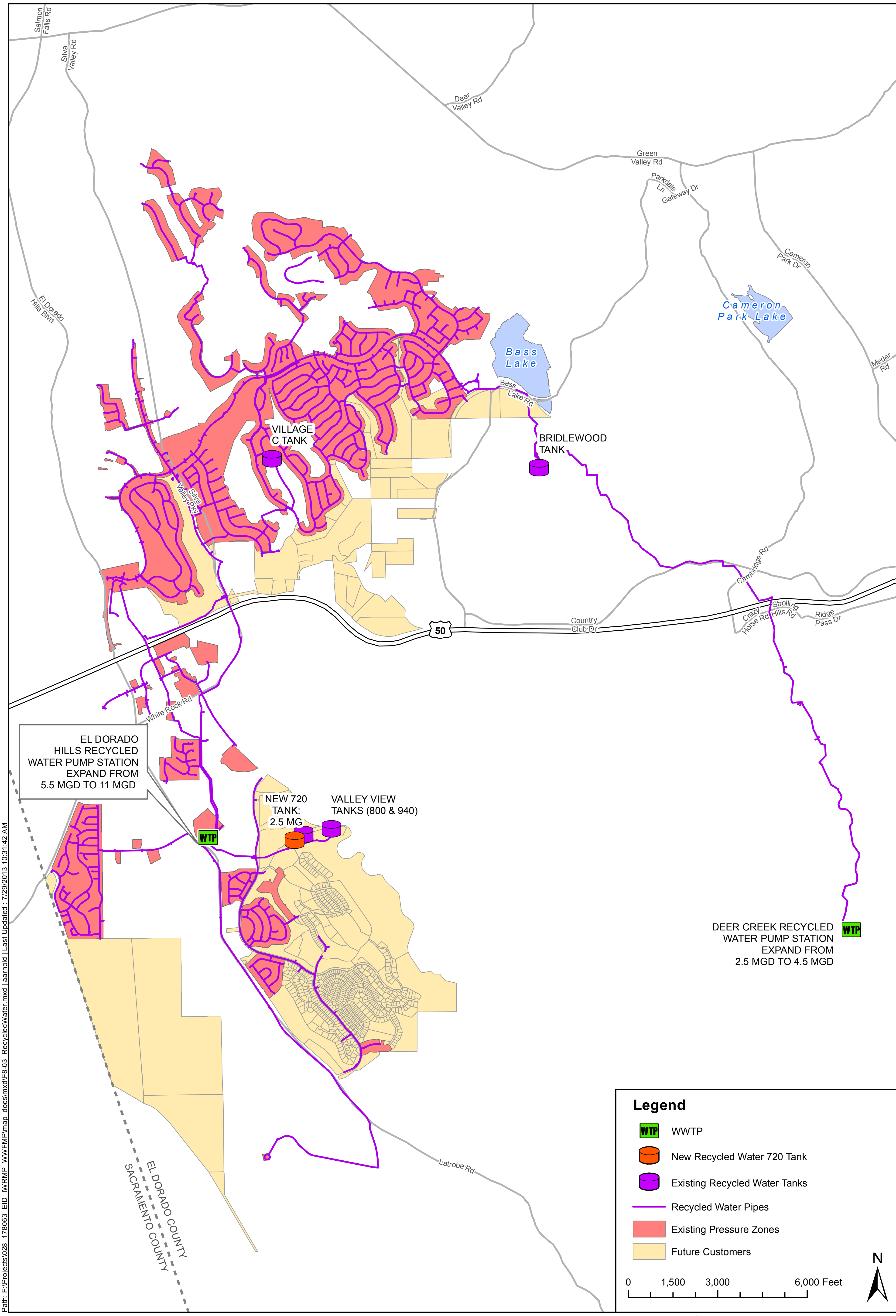
8.2.6 Summary of Recommended Recycled Water System Improvements

A summary of the recommended recycled water system improvements is provided in Table 8-2 and illustrated in Figure 8-3.

Table 8-2. Summary of Recommended Recycled Water System Improvements

Improvement	Recommended Expansion
Recycled Water Pump Stations	
EDHWWTP[(a)]	Phase 1: Add 4th Pump to Existing Pump Station Phase 2: Expand Pump Station from 5.5 to 11 MGD
DCWWTP[(a)]	Replace Existing Pumps with Higher Head Pumps and Expand Pump Station from 2.5 to 4.5 MGD
Recycled Water Diurnal Storage	720 Tank: New 2.5 MG Tank for Carson Creek Development[(b)]
Recycled Water Distribution Pipelines	Developer Provided

(a) Prior to pump station upgrades, the transmission pipelines from the pump stations should be further evaluated to ensure they are appropriately designed to accommodate the additional pressure.
(b) The 720 Tank will be developer-provided.



Recommended Recycled Water System Improvements

FIGURE 8-3

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9.0 WASTEWATER MASTER PLAN RECOMMENDATIONS

The previous sections of this WWFMP provided background information and presented the results of analyses and recommendations for the District's collection system, wastewater treatment plants, effluent disposal and reuse, and recycled water system. This section summarizes the recommendations of the WWFMP and presents the activities required for plan implementation, including phasing, feasibility studies and engineering, environmental compliance and permitting, coordination with ongoing programs, financing, stakeholder outreach, use of the WWFMP tools, and a recommended implementation schedule.

9.1 Wastewater Collection System

The recommended plan for the District's wastewater collection systems includes improvements to address existing capacity and condition related deficiencies, as well as upgrades to accommodate future growth. The recommended collection system upgrades, and the type of deficiency driving the respective upgrades, are summarized in Table 9-1. The recommended upgrades for the El Dorado Hills and Deer Creek Collection Systems are illustrated in Figure 9-1 and Figure 9-2, respectively.

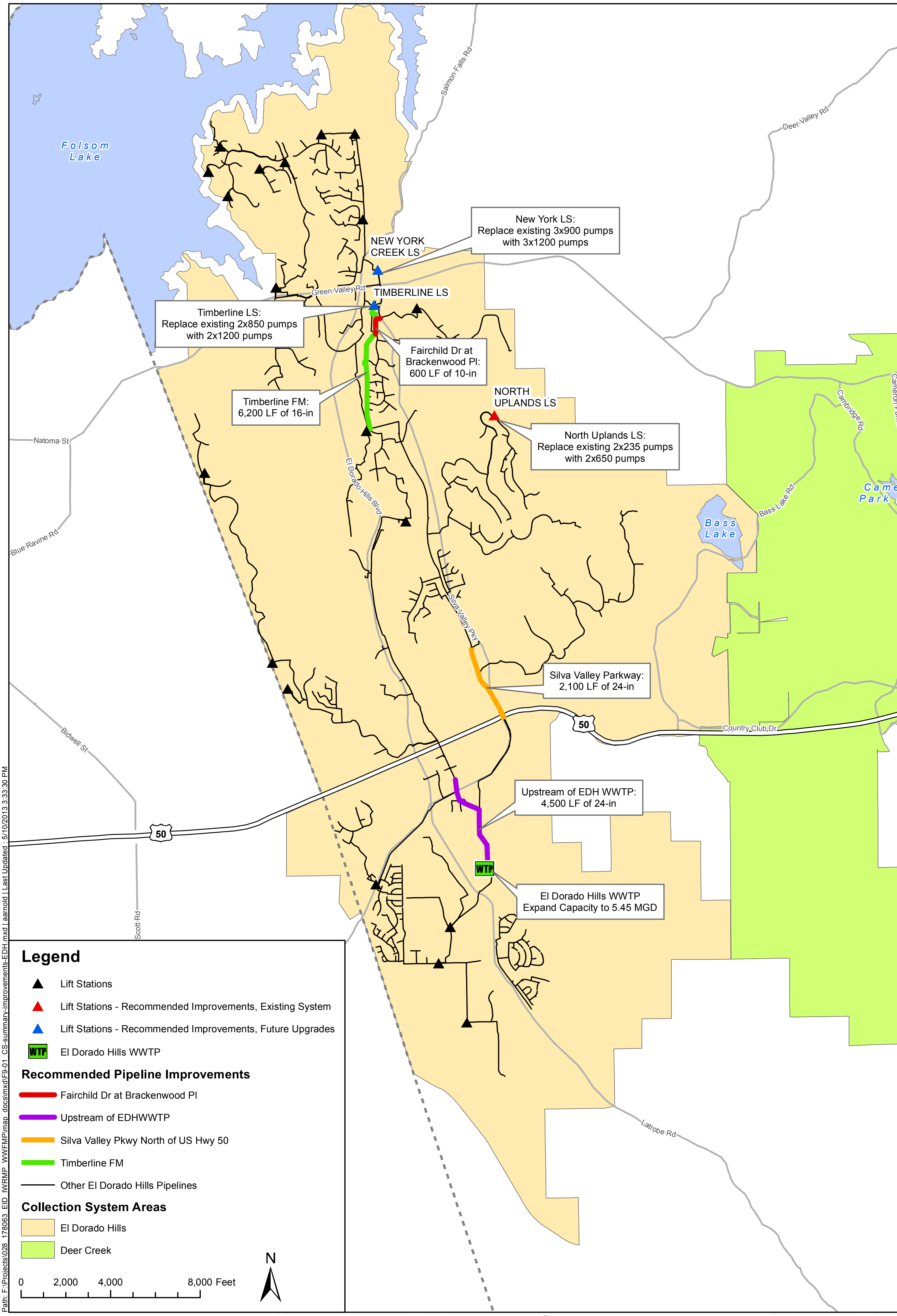
In addition to the recommendations summarized in Table 9-1, the District's ongoing Lift Station Condition Assessment Program has identified a number of lift station improvements that should be implemented in the near future (before 2018), including improvements at the following lift stations:

- Business Park 2 Lift Station
- Business Park 3 Lift Station
- Bridlewood Lift Station
- El Dorado Lift Station
- Rancho Ponderosa Lift Station
- South Point Lift Station
- Summit 1 Lift Station
- Waterford 7 Lift Station
- Yates Lift Station

Table 9-1. Summary of Collection System Recommendations

Facility Description	Estimated Quantity	Deficiency Type
El Dorado Hills Collection System		
Pipeline: Fairchild Dr at Brackenwood Place, Replace existing 8-inch with 10- inch	600 LF	Existing Capacity
Pipeline: Upstream of EDHWWTP, Replace existing 18- inch with 24- inch	4,500 LF	Existing Capacity
Silva Valley Parkway, Parallel existing 18-inch and 21-inch with 24-inch	2,100 LF	Future Capacity
Timberline Force Main, Replace existing 12-inch with 16- inch	6,200 LF	Future Capacity
North Uplands LS, Replace existing 2x325 gpm pumps with 2x650 pumps[(a)]	1	Existing Capacity
New York Creek LS, Replace existing 3x900 gpm pumps with 3x1200 gpm pumps[(b)]	1	Future Capacity
Timberline LS, Replace existing 2x850 gpm pumps with 2x1200 gpm pumps[(b)]	1	Future Capacity
Deer Creek Collection System		
Pipeline: Blanchard Rd downstream of East Rd LS, Parallel existing 6-inch with 8-inch	1,300 LF	Existing Capacity
Pipeline: Strolling Hills Rd downstream of Mother Lode Force Main, Upsize to 24-inch	10,700 LF	Existing Capacity and Condition
Mother Lode Force Main Phase 6, Replace existing 12-inch with 20-inch[(c)]	5,600 LF	Existing Condition and Future Capacity
Mother Lode Force Main Phase 7, Replace existing 12-inch with 20-inch[(c)]	11,800 LF	Existing Condition and Future Capacity
El Dorado "Y" Upgrades, Replace existing 8-inch with 10-inch[(c)]	13,770 LF	Existing Condition and Future Capacity
Pioneer Place LS, Replace existing 2x200 gpm pumps with 2x400 pumps[(d)]	1	Existing Capacity
El Dorado LS, Add standby 2000 gpm pump[(e)]	1	Future Capacity

(a) Condition improvements should be included with capacity upgrade, including full replacement of hatch assembly, discharge piping, junction box, MCC, and discharge main.
(b) New York Creek LS and Timberline LS are coupled. Capacity or operational improvements at one will affect the other. Future improvements should be planned together.
(c) Condition assessment will confirm the full extent of required improvements.
(d) Condition improvements should be included with capacity upgrade, including replacement of discharge piping, junction box, generator, check valve, isolation valves, and the discharge main.
(e) Recommended capacity improvement based on addition of the largest pump as a standby unit (for redundancy).



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Recommended Wastewater System Improvements, El Dorado Hills

FIGURE 9-1

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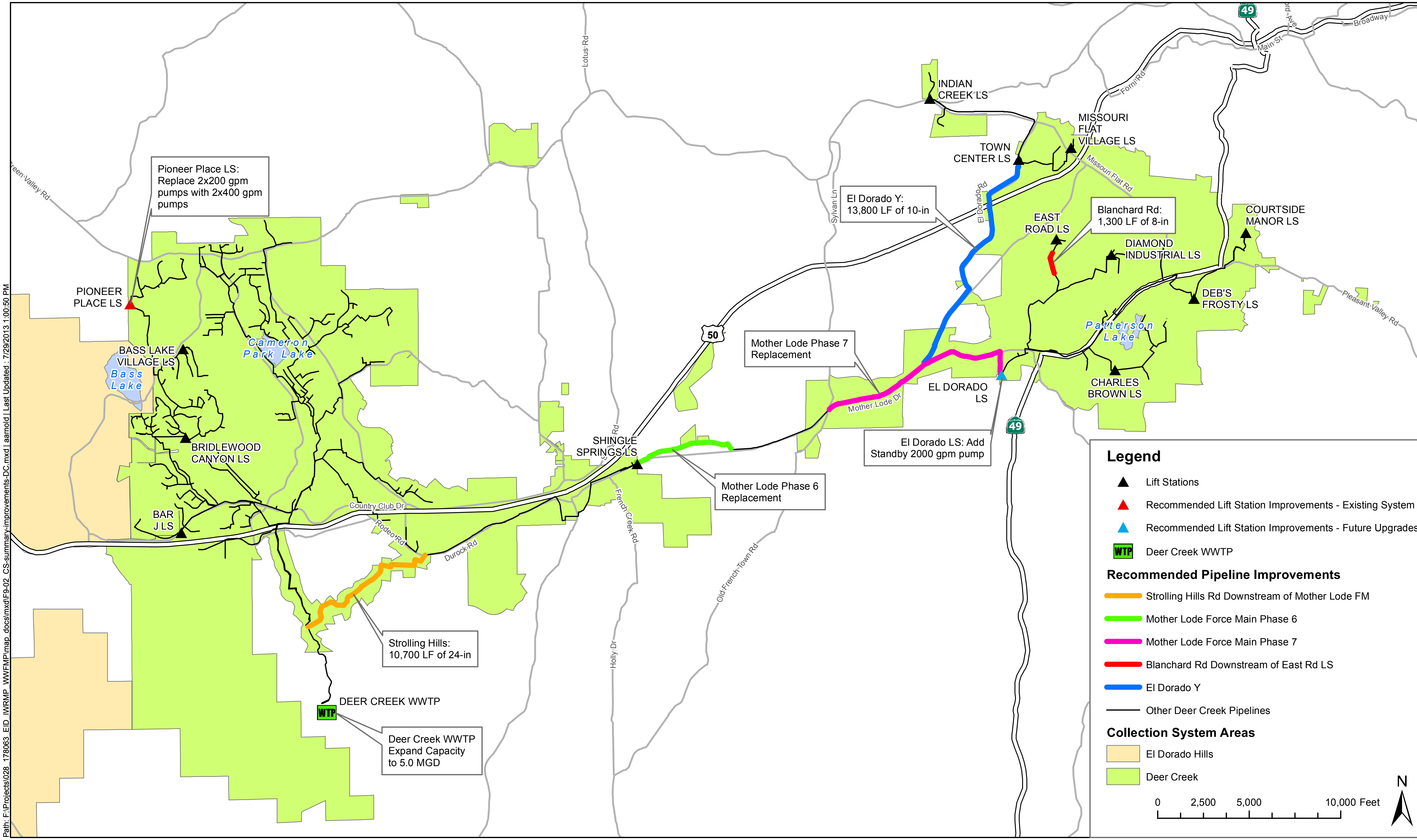

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Recommended Wastewater System Improvements, Deer Creek

FIGURE 9-2

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It is recommended that the District continue to update and refine the lift station condition assessment and identify new lift stations requiring condition related upgrades in the future.

9.2 Wastewater Treatment

The recommended plan includes the expansion of the District's EDHWWTP and DCWWTP.

The EDHWWTP is located approximately 1.25 miles south of Highway 50 on Latrobe Road, east of the El Dorado Hills business park area. Currently, the EDHWWTP has a rated ADWF capacity of 4.0 mgd. As shown in Figure 6-1, the projected ADWF is expected to approach the existing EDHWWTP rated capacity in approximately 2026. To accommodate future growth in the El Dorado Hills Collection System, the recommended plan includes the expansion of the EDHWWTP to 5.45 mgd. The District is currently planning to have the upgrades completed in 2025; however, the timeframe for expansion should be reviewed and refined based on actual growth in the system.

The DCWWTP receives flow from the towns of Diamond Springs, El Dorado, Shingle Springs, and Cameron Park. The plant is located approximately two miles south of Highway 50 in the Cameron Park area, a relatively remote area with little development in the surrounding hills. The DCWWTP currently has a rated ADWF capacity of 3.6 mgd.

To accommodate future growth in the Deer Creek Collection System, the recommended plan includes the expansion of the DCWWTP to 5.0 mgd. The Deer Creek Collection System is expected to reach the current rated capacity between 2022 and 2032, as shown in Figure 6-2. Thus, it is recommended that the District plan to expand the DCWWTP by 2029. The timeframe for the expansion should be reviewed and refined based on actual growth in the system.

Specific process improvements have not been identified as part of the expansions of the EDHWWTP and DCWWTP. However, the District should monitor the following regulatory issues, as they could impact future process upgrades and/or monitoring and reporting requirements:

- Nutrients
- Ammonia and Nitrate
- Chronic Toxicity
- Constituents of Emerging Concern
- Biosolids
- Metals
- Industrial Pretreatment

Depending on the outcome of these regulatory issues, the District may need to make significant capital investments at the wastewater treatment plants to comply with future regulatory requirements. Costs for process upgrades to address potential future requirements have not been included in this Master Plan.

9.3 Effluent Disposal and Reuse

Recycled water is used to offset potable water supply for irrigation of residential developments, schools, parks, golf courses, and commercial/industrial landscaping. As development occurs in the El Dorado Hills and Deer Creek Collection Systems, the availability of recycled water will increase. Previous analyses were conducted as part of the 2009 Seasonal Storage BODR to determine how much recycled water would be available and whether or not a seasonal storage reservoir was economically competitive with other supply options. As part of the WWFMP, that analysis has been updated to reflect current information.

As described in Subsection 7.4, the unit cost of recycled water under the seasonal storage scenario is approximately double the unit cost of potable water supplementation. As a result, seasonal storage is not included as part of the recommended plan at this time.

The additional recycled water demand introduced by the Valley View, Serrano, and Carson Creek developments can be met without any potable water supply augmentation once the El Dorado Hills and Deer Creek Collection Systems are built out, as shown in Figure 4-4. The exact timing for when the recycled water demand and supply will reach equilibrium is difficult to project; however, it is expected to occur sometime between 2023 and 2031, which is within the timeframe for construction of the new water treatment plant and transmission facilities described in the IWRMP. At buildout, there will be approximately 1,270 to 1,550 AFY of additional recycled water supply available, depending on the outcome of the Deer Creek change petition process, to serve additional developments if desired.

It is recommended that the District further evaluate the future of the recycled water program and determine the desired extent of future expansion considering the operational constraints associated with potable water supplementation. And, although the seasonal storage reservoir has not been included in the recommended plan, the District may want to reconsider it, and its benefits, in the future. As illustrated in Figure 7-1, the seasonal storage reservoir would allow the District to divert and store 2,500 AFY of recycled water that would otherwise be discharged during the wet months, thereby increasing the total annual supply from 5,640 AFY (without supplementation) up to 8,630 AFY, a difference of 2,900 AFY. This additional recycled water supply could offset other potable supplies, which could then be used for other purposes, such as groundwater banking or water transfers. Therefore, as conditions change and evolve (e.g., financing becomes available), the District should reconsider the feasibility of the seasonal storage reservoir.

9.4 Recycled Water Distribution System

The recommended plan for the District's recycled water system includes upgrades to accommodate future growth. The recommended upgrades are summarized in Table 9-2.

Table 9-2. Summary of Recycled Water System Recommendations

Facility Description	Estimated Quantity
Recycled Water Tank, Elevation 720 [(a)]	2.5 MG
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 1[(b)]	1
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 2[(c)]	1
Deer Creek Recycled Water Pump Station Expansion from 2.5 to 4.5 MGD[(d)]	1

(a) Tank is sized for 100 percent of max day demand for Carson Creek and Euer Ranch.
(b) Phase 1 includes an analysis of pump and pipeline capacity and addition of a pump at the existing pump station.
(c) Phase 2 is based on doubling the capacity of the existing pump station to accommodate max day demands and supply water from the 70 MG storage reservoir at the EDHWWTP.
(d) Existing pump station is unable to meet buildout requirements at the future head condition and all pumps at the existing pump station will require replacement.

In addition to the capital facilities summarized in Table 9-2, it is also recommended that the District continue to monitor peak demand conditions in the recycled water system and work with developers, homeowner associations, and other customers to distribute recycled water demand evenly over the delivery period (9 pm to 6 am). This will help to mitigate pressure oscillations that increase pipe fatigue in the system, reduce the peak hour demands and future capacity requirements for any new pipelines and pump stations.

9.5 Estimated Costs

The estimated capital costs for the recommended plan are summarized in Table 9-3. The basis of the estimated costs was presented in Subsection 3.7.

9.6 Implementation

The previous subsections presented the facilities and programs included in the recommended plan of this WWFMP. These recommendations provide a comprehensive program that includes improvements for the existing collection and recycled water systems, as well as future upgrades needed for the collection, wastewater treatment, effluent discharge, and recycled water systems. A separate report was prepared for the IWRMP. Together, these plans provide a roadmap for the development of future infrastructure and maintenance of existing water, wastewater, and recycled water facilities.

The following subsections describe facility phasing, feasibility studies and engineering, environmental compliance and permitting, coordination with ongoing programs, financing, stakeholder outreach, use of the WWFMP tools, and a recommended implementation schedule.

Table 9-3. Estimated Capital Costs for the Recommended Plan

Facility, Study, Program	Estimated Capital Cost[(a)]
El Dorado Hills Collection System	
Pipeline: Fairchild Dr at Brackenwood Place, Replace existing 8-inch with 10-inch[(b)]	$135,000
Pipeline: Upstream of EDHWWTP, Replace existing 18- inch with 24- inch[(b)]	$2,476,000
Silva Valley Parkway Study	$100,000
Silva Valley Parkway, Parallel existing 18-inch and 21-inch with 24- inch[(b)]	$819,000
Timberline Force Main, Replace existing 12- inch with 16- inch[(b)]	$2,713,000
North Uplands LS, Replace existing 2x325 gpm pumps with 2x650 pumps[(c)]	$141,000
New York Creek LS, Replace existing 3x900 gpm pumps with 3x1200 gpm pumps[(d)]	$126,000
Timberline LS, Replace existing 2x850 gpm pumps with 2x1200 gpm pumps[(d)]	$81,000
Subtotal	*$6,591,000*
Deer Creek Collection System	
Pipeline: Blanchard Rd downstream of East Rd LS, Parallel existing 6-inch with 8-inch[(b)]	$249,000
Pipeline: Strolling Hills Rd downstream of Mother Lode Force Main, Upsize to 24-inch[(b)]	$3,413,000
Mother Lode Force Main Phase 6, Replace existing 12-inch with 20-inch[(e, f)]	$2,316,000
Mother Lode Force Main Phase 7, Replace existing 12-inch with 20-inch[(e, f)]	$4,795,000
El Dorado "Y" Upgrades, Replace existing 8-inch with 10-inch[(f)]	$4,544,000
Pioneer Place LS, Replace existing 2x200 gpm pumps with 2x400 pumps[(g)]	$199,000
El Dorado LS, Add standby 2000 gpm pump[(h)]	$168,000
Subtotal	*$15,684,000*
Wastewater Treatment	
EDHWWTP Expansion from 4.0 to 5.45 mgd	$70,900,000
DCWWTP Expansion from 3.6 to 5.0 mgd	$68,800,000
Subtotal	*$139,700,000*
Recycled Water Improvements	
Recycled Water Tank 720, 2.5 MG[(i)]	$3,961,000
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 1[(j)]	$150,000
El Dorado Hills Recycled Water Pump Station, Upgrade Phase 2	$1,765,000
Deer Creek Recycled Water Pump Station Expansion from 2.5 to 4.5 MGD	$1,783,000
Subtotal	*$7,659,000*
Studies[(k)]	$200,000
Collection System Corrective Action Program[(l)]	$3,150,000
Collection System Upgrades Program[(m)]	$35,500,000
Future Wastewater Master Plan Updates	$500,000
Total Capital Cost	$208,984,000

Table 9-3 Notes:

(a) Estimated capital costs are based upon ENR 20 City Average Construction Cost Index of 9437 (January 2013). Capital costs include estimated construction costs and allowances for contingency, engineering, administration, and permitting.
(b) Pipeline costs based on estimated depth of bury along the existing pipeline alignment.
(c) Cost includes capacity and condition upgrades. Condition improvements include full replacement of hatch assembly, discharge piping, junction box, MCC, and discharge main.
(d) New York Creek LS and Timberline LS are coupled. Capacity or operational improvements at one will affect the other. Future improvements should be planned together.
(e) Costs are based on CIP costs for the Mother Lode Force Main Phase 2C construction. EAP is assumed to be $75,000 based on District staff input.
(f) Condition assessment will confirm the full extent of required improvements.
(g) Cost includes capacity and condition upgrades. Condition improvements include replacement of discharge piping, junction box, generator, check valve, isolation valves, and the discharge main.
(h) Recommended capacity improvement based on addition of the largest pump as a standby unit (for redundancy).
(i) Tank is sized for 100 percent of max day demand. Facility will be developer funded.
(j) Phase 1 expansion includes an analysis of pump and pipeline capacity and addition of a pump at the existing pump station.
(k) Includes condition assessments of the El Dorado Y and remaining phases of the Mother Lode Force Main.
(l) Includes the Wastewater Pipeline Replacement Program, and El Dorado Hills and Deer Creek Corrective Action Plans through 2017. Includes an estimate of $175,000 per year through 2030.
(m) Includes lift station replacements through 2017 as identified in Subsection 5.9.2. An estimate of $2 million per year is budgeted for 2018-2030 to continue the renewal and replacement of collection system facilities.

9.6.1 Phasing of Recommended Facilities

The facilities included in the recommended plan will be time-phased to correspond with projected development in the El Dorado Hills and Deer Creek Collection Systems and resulting increases in wastewater flows. Consistent with the IWRMP, the following phases have been established for addition of facilities and implementation planning:

- Phase 1: 2012 - 2020
- Phase 2: 2021 - 2025
- Phase 3: 2026 - Buildout

A summary of the required facilities by phase is presented in Subsection 9.6.8.

9.6.2 Feasibility Studies and Engineering

The technical work completed for the WWFMP provides a framework for the recommended facilities described in Subsections 9.1 through 9.4. Feasibility studies are required to finalize locations and alignments, refine design criteria and sizing, identify land requirements, determine the extent of additional condition related upgrades that could be needed and update cost estimates. Following completion of feasibility studies additional engineering will include predesign, design, construction management, testing and startup.

9.6.3 Environmental Compliance and Permitting

The recommended facilities will require compliance with the California Environmental Quality Act (CEQA) and possibly the National Environmental Policy Act (NEPA) to evaluate the environmental impacts of the projects. The required environmental compliance documents should be completed in conjunction with the engineering preliminary design studies.

Numerous federal, state and local permits will also be required for project implementation. The required permits will be identified during the preparation of the engineering preliminary design studies and environmental compliance documents.

9.6.4 Coordination with Ongoing Projects and Programs

Implementation of the WWFMP should be coordinated with other ongoing projects and programs. Specifically, the implementation of the WWFMP recommendations should be coordinated with District's existing Collection System Corrective Action Plan and the Lift Station Condition Assessment Program, as well as other renewal and replacement activities at the District's wastewater treatment plants and in the recycled water system.

9.6.5 Financing

The estimated capital costs by phase are summarized in Table 9-4. All costs are presented in 2012 dollars.

The recommended facilities should be incorporated into the Districts five-year capital improvement program in accordance with the proposed phasing plan. Specific project financing can then be addressed as part of the District's regular budgeting, rates, and facility capacity charges program updates.

9.6.6 Stakeholder Outreach

Three stakeholder workshops were conducted during preparation of this plan. Continued successful implementation of the WWFMP recommendations will require ongoing, proactive stakeholder outreach.

Table 9-4. Estimated Capital Costs by Phase for the Recommended Plan

Facility, Study, Program	Phase 1 2013-2020[a]	Phase 2 2021-2025[a]	Phase 3 2026-Buildout[a]	Estimated Capital Cost[a]
Collection System				
El Dorado Hills	$3,671,000	$2,920,000	$0	$6,591,000
Deer Creek	$15,516,000	$16,800	$151,200	$15,684,000
Ongoing Corrective Action Program[b]	$1,400,000	$875,000	$875,000	$3,150,000
Ongoing Upgrades Program[c]	$15,500,000	$10,000,000	$10,000,000	$35,500,000
Studies[d]	$200,000	$0	$0	$200,000
Collection System Subtotal	*$36,287,000*	*$13,811,800*	*$11,026,200*	*$61,125,000*
Wastewater Treatment				
EDHWWTP Expansion to 5.45 mgd	$5,317,500	$65,582,500	$0	$70,900,000
DCWWTP Expansion to 5.0 mgd	$0	$11,008,000	$57,792,000	$68,800,000
Wastewater Treatment Subtotal	*$5,317,500*	*$76,590,500*	*$57,792,000*	*$139,700,000*
Recycled Water Improvements[e]				
EDH RW Pump Station Upgrade, Phase 1	$150,000	$0	$0	$150,000
EDH RW Pump Station Upgrade, Phase 2	$0	$1,765,000	$0	$1,765,000
DC RW Pump Station Upgrade	$320,940	$1,462,060	$0	$1,783,000
Recycled Water Subtotal	*$470,940*	*$3,227,060*	*$0*	*$3,698,000*
Future WWMP Updates	$250,000	$0	$250,000	$500,000
Total Capital Cost	$42,325,440	$93,629,360	$69,068,200	$205,023,000

(a) Estimated capital costs based upon ENR 20 City Average CCI of 9437 (January 2013). Capital costs include estimated construction costs and allowances for contingency, engineering, administration, and permitting.
(b) Includes the Wastewater Pipeline Replacement Program, and El Dorado Hills and Deer Creek Corrective Action Plans through 2017. Includes an estimate of $175,000 per year through 2030.
(c) Includes lift station replacements through 2017 as identified in the District's 2013-2017 CIP. An estimate of $2 million per year is budgeted for 2018-2030 to continue the renewal and replacement of collection system facilities.
(d) Includes condition assessment studies for the El Dorado Y Force Main and remaining Phases of the Mother Lode Force Main.
(e) The 720 Tank will be developer provided. Thus, costs are not included and total is different than that shown in Table 9-3.

9.6.7 Use of WWFMP Processes and Tools

The District has invested substantial resources in the completion of this WWFMP. The process and tools developed as part of this work should be utilized in the future evaluation of proposed new developments, proposed land use changes, and refinements to the recommended facilities. Some of the process and tools to be utilized by the District include the following:

- Process and criteria established for projecting future wastewater flows and recycled water supply;
- Collection system hydraulic model;
- Recycled water system hydraulic model;
- Information used to assist with stakeholder outreach.

It is also recommended that this WWFMP be updated prior to 2020. Updating the WWFMP in this timeframe will provide the information necessary to refine the recommendations for future facilities sizing and implementation timing.

9.6.8 Implementation Schedule

A recommended implementation schedule is presented in Figure 9-3. This implementation schedule covers the period between 2013 and 2030. Future updates to this WWFMP will provide opportunities for refining the timing of facilities beyond 2020 based on growth trends and other factors.

As Figure 9-3 illustrates, Phase 1 facilities generally include improvements to existing facilities to correct existing deficiencies. The respective timing of these upgrades for the existing system has been adjusted, such that the highest priority upgrades are implemented first.

As shown in Figure 9-3, the El Dorado Hills WWTP upgrade is scheduled to be complete in 2025 and online in 2026. However, if growth in the El Dorado Hills Collection System increases more quickly, new wastewater treatment capacity would be required before 2025.

The Deer Creek WWTP upgrade is scheduled to be complete in 2028 and online in 2029. Similarly, if growth occurs more quickly, the facility upgrade could be required sooner.

Table 9-5 presents the cash flow needed through 2030 to implement the recommended plan within the schedule presented in Figure 9-3.

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Figure 9-3. Implementation Schedule

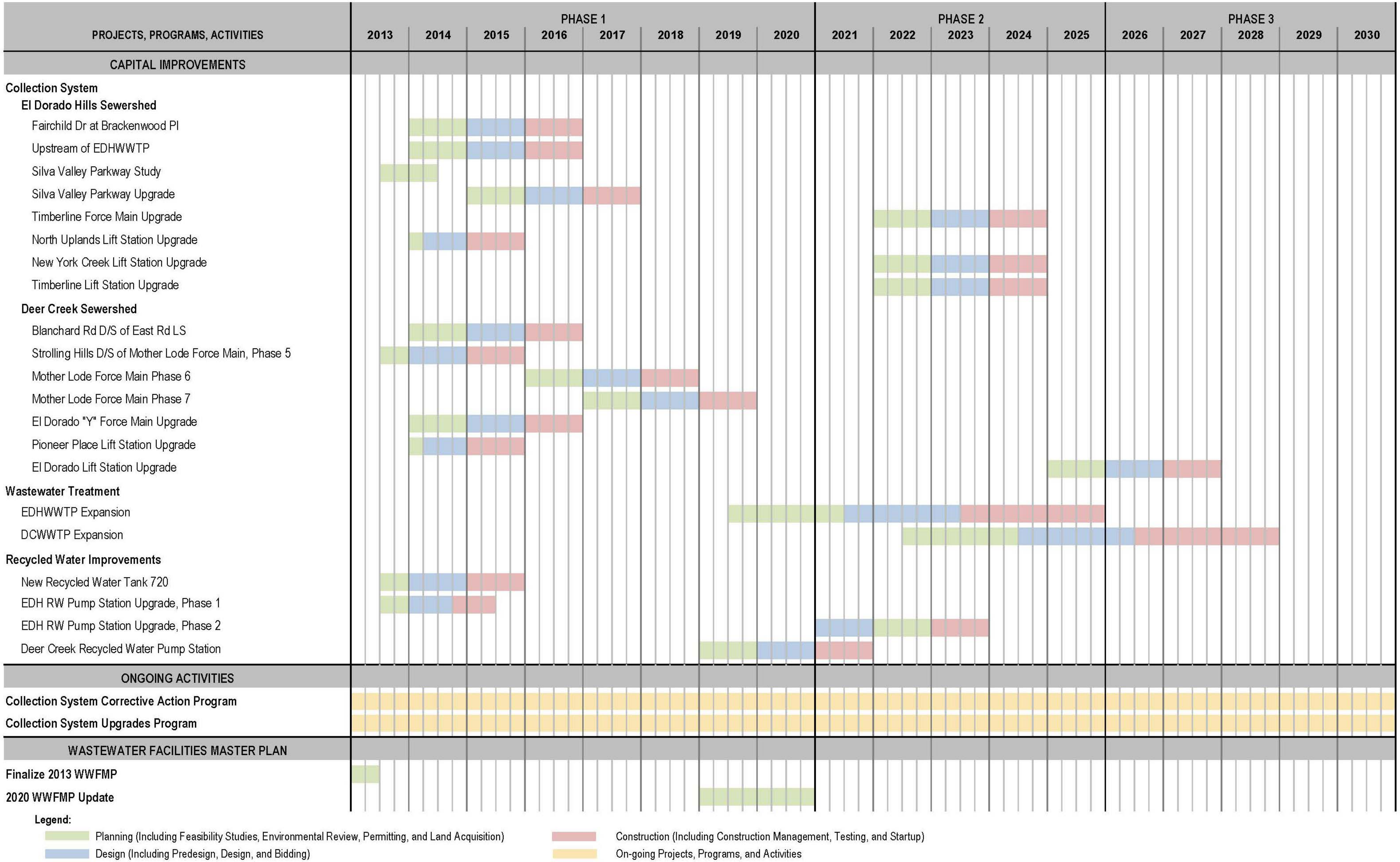

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Table 9-5. Cash Flow Through 2030 for the Recommended Plan

Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
El Dorado Hills Collection System																		
Fairchild Dr at Brackenwood Pl		$13,500	$10,800	$110,700														
Upstream of EDHWWTP		$247,600	$198,080	$2,030,320														
Silva Valley Parkway Study	$50,000	$50,000																
Silva Valley Parkway Upgrade			$81,900	$65,520	$671,580													
Timberline Force Main Upgrade										$271,300	$217,040	$2,224,660						
North Uplands LS Upgrade		$25,380	$115,620															
New York Creek LS Upgrade										$12,600	$10,080	$103,320						
Timberline Lift Station Upgrade										$8,100	$6,480	$66,420						
Subtotal	$50,000	$336,480	$406,400	$2,206,540	$671,580	$0	$0	$0	$0	$292,000	$233,600	$2,394,400	$0	$0	$0	$0	$0	$0
Deer Creek Collection System																		
Blanchard Rd D/S of East Rd LS		$24,900	$19,920	$204,180														
Strolling Hills	$341,300	$273,040	$2,798,660															
Mother Lode Force Main Phase 6				$231,600	$185,280	$1,899,120												
Mother Lode Force Main Phase 7					$479,500	$383,600	$3,931,900											
El Dorado "Y" Force Main		$454,400	$363,520	$3,726,080														
Pioneer Place LS Upgrade		$35,820	$163,180															
El Dorado Lift Station Upgrade													$16,800	$13,440	$137,760			
Subtotal	$341,300	$788,160	$3,345,280	$4,161,860	$664,780	$2,282,720	$3,931,900	$0	$0	$0	$0	$0	$16,800	$13,440	$137,760	$0	$0	$0
Wastewater Treatment																		
EDHWWTP Expansion							$1,772,500	$3,545,000	$3,190,500	$2,836,000	$13,045,600	$23,255,200	$23,255,200					
DCWWTP Expansion										$1,720,000	$3,440,000	$3,096,000	$2,752,000	$12,659,200	$22,566,400	$22,566,400		
Subtotal	$0	$0	$0	$0	$0	$0	$1,772,500	$3,545,000	$3,190,500	$4,556,000	$16,485,600	$26,351,200	$26,007,200	$12,659,200	$22,566,400	$22,566,400	$0	$0
Recycled Water																		
EDH RW PS, Upgrade Phase 1	$50,000	$100,000																
EDH RW PS, Upgrade Phase 2									$176,500	$141,200	$1,447,300							
Deer Creek RW PS Upgrade							$178,300	$142,640	$1,462,060									
Subtotal	$50,000	$100,000	$0	$0	$0	$0	$178,300	$142,640	$1,638,560	$141,200	$1,447,300	$0	$0	$0	$0	$0	$0	$0
Studies																		
El Dorado "Y" AC Pipe Assmt	$50,000	$50,000																
Mother Lode Force Main Assmt		$50,000	$50,000															
Subtotal	$50,000	$100,000	$50,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Collection System CAP	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000	$175,000
Collection System Upgrades	$1,462,000	$3,200,000	$2,430,000	$908,000	$1,500,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Total Capital Cost	$2,128,300	$4,699,640	$6,406,680	$7,451,400	$3,011,360	$4,457,720	$8,057,700	$5,862,640	$7,004,060	$7,164,200	$20,341,500	$30,920,600	$28,199,000	$14,847,640	$24,879,160	$24,741,400	$2,175,000	$2,175,000

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