Water Recycling Feasibility Study

MISSION SPRINGS WATER DISTRICT

Resource Protection and Wastewater Infrastructure,

Desert Hot Springs, CA

PSOMAS

March 2007

RESOURCE PROTECTION AND WASTEWATER INFRASTRUCTURE, DESERT HOT SPRINGS, CALIFORNIA

WATER RECYCLING FEASIBILITY STUDY – PHASE I

With funding assistance from U.S. Bureau of Reclamation

March 2007

Prepared for:
MISSION SPRINGS WATER DISTRICT
66575 Second Street
DESERT HOT SPRINGS, CA

Prepared by:
PSOMAS
3187 Red Hill Avenue
Suite 250
Costa Mesa, CA 92626
Project No. 2MIS040200

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1 Introduction 5

1.1 Overview 5
1.2 Purpose 5
1.3 Study Area 5
1.3.1 MSWD Service Area 5
1.3.2 Sub-basin Description 6
1.3.3 Wastewater Treatment Plants 9

2 Problems and Needs 10

2.1 Water Management Problems 10
2.2 Near and Long-Term Water Supplies and Demands 11
2.3 Groundwater Supply 12
2.3.1 Mission Creek Sub-basin 13
2.4 Imported Water Supply 15
2.5 Recycled Water Supply 16
2.6 Wastewater Treatment 17
2.7 Water Demands 18
2.8 Water Supplies Cost Analysis 20

3 Water Reuse Opportunities 22

3.1 Opportunities for Reuse 22
3.2 Status of Recycled Water Technology 26
3.3 Potential Uses and Associated Costs for Recycled Water 27
3.3.1 Treatment Costs 28
3.3.2 Distribution Costs 29
3.3.3 Seasonal Storage Costs 29

4 Description of Alternatives 31

4.1 Alternatives Considered 31
4.1.1 Treatment Alternatives 31
4.1.2 Distribution Alternatives: 32
4.2 Alternative Analysis 37
4.3 Analysis of Affect on Water Supply Management 41

5 Economic Analysis of Alternatives 42

6 Environmental Analysis of Alternatives 43

7 Legal and Institutional Requirements 44

7.1 Consultation Activities 44
7.2 Public Health and Environmental Health Issues 44
7.3 Federal, State, and Local Environmental Regulatory Requirements 45

7.3.1 Federal Clean Water Act 45
7.3.2 Federal Endangered Species Act 45
7.3.3 Federal Migratory Bird Treaty Act 45
7.3.4 California Fish and Game Code 46
7.3.5 California Endangered Species Act 46
7.3.6 Native Plant Protection 46
7.4 Current Versus Proposed Use of Reclaimed Water 46
7.5 Other Legal and Institutional Requirements 47
7.6 Unresolved Issues 47

8 Financial Capability of the Sponsor 49

8.1 Funding for Capital Costs 50
8.2 Funding for Operation and Maintenance Costs 51
8.3 Alternate Potential Funding Opportunities 51

9 Research Needs 53

10 References 54

TABLES

Table ES-1 3
Table 1-1 Capacity and Average Flow for 2006 (MGD) - Existing WWTP 9
Table 2-1 Water Springs Water District Water Balance (AF – all numbers rounded to nearest 100 AF) 12
Table 2-2 Active Wells 13
Table 2-3 Wastewater Flow Projections 17
Table 2-4 Projected Wastewater Treatment Capacity (by plant) 17
Table 2-5 Mission Springs Water District Projected Water Supply and Demand – Normal Water Year 19
Table 2-6 Delivery Systems Capital Costs for Irrigation Water Supply 21
Table 3-1 Projected Recycled Water Demands 23
Table 3-2 Recycled Water Phasing Projections 24
Table 3-3 Horton WWTP Seasonal Storage Calculations (AFY) 25
Table 4-1 Alternative Treatment Costs 37
Table 4-2 Alternative Distribution Costs 38
Table 4-3 O&M Costs for Booster Pump Stations and Wells 39
Table 4-4 O&M Costs for Pipelines 40
Table 5-1 Scenarios for Recycled Water Production and Supply 42
Table 8-1 Recycled Water Production and Supply Costs 49

FIGURES

Figure 1-1 MSWD Service Area..... 7
Figure 1-2 MSWD Groundwater Sub-basins..... 8
Figure 2-1 MSWD Well Locations..... 14
Figure 4-1 Treatment Alternative 1 Distribution Alternative 1..... 34
Figure 4-2 Treatment Alternative 1 Distribution Alternative 2..... 35
Figure 4-3 Treatment Alternative 2 Distribution Alternative 3..... 36

APPENDICES

Appendix A: Financial Proforma

LIST OF ABBREVIATIONS

AD	Assessment District
ADD	Average Daily Demand
AF	Acre Feet
AFY	Acre Feet per Year
CRA	Colorado River Aqueduct
CVWD	Coachella Valley Water District
DHS	Department of Health Services
DRIPP	Desalination Research and Innovation Partnership Program
DWA	Desert Water Agency
DWR	Department of Water Resources
EDU	Equivalent Dwelling Unit
GPM	Gallons Per Minute
MAF	Million Acre Feet
Max	Maximum
MCL	Maximum Contaminant Level
MDD	Maximum Daily Demand
MFR	Multi-Family Residential
MG	Million Gallons
MGD	Million Gallons per Day
Min	Minimum
MPN	Most Probable Number
MSWD	Mission Springs Water District
MWD (SC)	Metropolitan Water District of Southern California
SB	Senate Bill
SFR	Single Family Residential
SGPWA	San Gorgonio Pass Water Agency
SWP	State Water Project
TDS	Total Dissolved Solids
URS	URS Corporation
UWMP	Urban Water Management Plan
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

Mission Springs Water District (MSWD) has contracted Psomas to assist in the development of the *Water Recycling Feasibility Study – Phase I* to assess the feasibility of implementing a water recycling system in MSWD's service area. In November 2004, Psomas completed the Phase I Water Recycling Appraisal study, which detailed MSWD's existing groundwater conditions, threats to existing water quality, availability of recycled water, as well as a proposed plan to implement future recycled water use in the Mission Creek Sub-basin. This report aims to further analyze the feasibility of implementing a recycled water system throughout MSWD's service area.

The entire MSWD service area was reviewed to assess the feasibility of implementing a water recycling system. The District's service area consists of 135 square miles including the City of Desert Hot Springs, 10 smaller communities in Riverside County, and communities in the City of Palm Springs. The District's water source is 100 percent groundwater, drawn from nine active production wells, providing water service to approximately 23,000 people as well as sewer service to approximately 8,000 people in Desert Hot Springs, Desert Crest Country Club and Dillon Mobile Home Park. ***Figure 1-1*** shows the extents of the MSWD service area.

MSWD currently operates two wastewater treatment plants (WWTPs) currently serving a total of approximately 6,000 developed parcels. The plants are the Horton Treatment Plant and the Desert Crest Treatment Plant, with capacities of 2,300,000 gal/day (2,576 AFY) and 180,000 gal/day (202 AFY), respectively. It should be noted that the Horton WWTP has only been permitted to 2,000,000 gal/day. The District's wastewater treatment plants currently treat wastewater using a secondary treatment process.

Regional groundwater levels have been declining in recent years. Due to the large reliance on groundwater drawn from the Mission Creek Sub-basin, implementation of a recycled water system is needed to assist in enhancing the reliability of groundwater within the MSWD service area. With the development of the recycled water system, a number of landscape and irrigation users that are currently dependent on potable water will receive recycled water supply, thus reducing the demand on groundwater pumping. Several existing and proposed projects throughout the MSWD service area include golf courses and landscaping, which make up a significant portion of the District's current water demand.

If recycled water is not utilized to irrigate the golf course and other proposed landscape uses proposed in this report, the alternative water source would be the continued and future use of groundwater. Currently, groundwater is supplemented by CVWD and DWA through their exchange agreement with MWD which provides Colorado River Aqueduct (CRA) water in exchange for State Water Project (SWP) water for recharge into the Whitewater and Mission Creek groundwater sub-basins. CVWD and DWA have considered the feasibility of providing additional water supplies to the Coachella Valley through an extension of the SWP from the high desert in the Apple Valley area to the vicinity of the recharge basins. This would require an approximate 99-mile pipeline

delivering up to 300 cfs peak capacity. The total cost for developing this source is estimated at approximately $1,036 per acre-foot.

The availability of recycled water in MSWD's service area is limited to water generated as part of the wastewater treatment associated with sewage collected from sewered residential developments, commercial and industrial properties. Since the majority of the wastewater that is recycled in the early phases of the proposed plan will be used for recharging the groundwater basin and irrigation on unrestricted golf courses, the type of treatment is assumed to be equivalent to DHS requirements for Disinfected Tertiary Recycled Water.

Alternative recycled water production and supply methods were considered and analyzed for meeting landscape irrigation demands in the Desert Hot Springs area. The alternatives analysis discussion is divided into treatment and distribution alternatives:

Treatment Alternatives:

Alternative 1: In this alternative, tertiary treated effluent from the Horton Plant would supply irrigation demands to Tuscan Hills, Mission Lakes, Highland Falls and Palmwood. Around the year 2020, a Regional WWTP would be constructed to assist in treating wastewater flows in the District. The Regional WWTP would supplement irrigation demands at Highland Falls, Palmwood, and Mission Lakes, and provide recycled water to any other developments that are constructed south of Pierson Blvd. ***Figure 4-1*** shows existing and proposed treatment plants associated with Alternative 1.

Alternative 2: In this alternative, shown in ***Figure 4-3***, the Horton Plant would again supply tertiary treated recycled water to Tuscan Hills, Mission Lakes, Highland Falls and Palmwood beginning in 2015. Around 2020, a satellite plant would be required near Indian Avenue and Pierson Avenue. This satellite plant would treat wastewater from Highland Falls, Palmwood, and surrounding developments, and also provide tertiary treated recycled water to the golf courses in Palmwood and Highland Falls. Excess untreated wastewater would be routed through existing sewer lines to Horton Plant during the winter months. During high demand summer months, stored recycled water at the Horton Plant percolation ponds would supplement treated wastewater from the satellite plant. By 2035, a Regional WWTP may be necessary to supplement irrigation demands throughout the District, especially if there are new development projects south of Pierson Blvd.

Distribution Alternatives:

Alternative 1: Figure 4-1 shows the preliminary routing and sizing of pipelines and pump stations for Alternative 1. Booster Station Pump 1, located at Horton WWTP, is sized based on ultimate conditions that include supply from the proposed Regional WWTP. Once the Regional WWTP is online and incorporated into the recycled water distribution system, peak irrigation demands can be met.

The pipeline alignment shown in ***Figure 4-1*** would require two booster pump stations to supply recycled water to the Highland Falls and Palmwood developments. Both stations, shown as Booster Pumps 3A and 3B, have been sized to meet projected peak demands.

Alternative 2: Alternative 2, shown on ***Figure 4-2***, includes an alternative pipeline alignment which would allow the use of only one booster pump station to supply the Highland Falls and Palmwood developments. This alternative pipeline alignment, however, does not follow existing roadways up to the Palmwood development. All other aspects of Alternatives 1 and 2 are the same. A final routing would have to be developed in consultation with MSWD including engineering and environmental review.

Alternative 3: Alternative 3 corresponds to the treatment alternative which includes the Satellite Plant at Indian and Pierson, and is shown in ***Figure 4-3***. This alternative involves a total of 5 booster pump stations as follows: Booster Pump 1 at Horton WWTP will supply recycled water to Tuscan Hills and Mission Lakes, and supplement recycled water for use in Highland Falls and Palmwood developments. Booster Pump 2 at the Regional WWTP will supply additional flow as development continues within Desert Hot Springs. Booster Pump 4 will be located at the Indian/Pierson Satellite WWTP and will pump to Booster Pumps 3A and 3B, which will supply Highland Falls, Palmwood, and Mission Lakes.

Three scenarios for treatment and distribution alternatives were explored during the economic analysis of alternatives. The first scenario includes Treatment Alternative 1 and Distribution Alternative 1, as described above. The second scenario involves Treatment Alternative 1 and Distribution Alternative 2, as shown on ***Figure 4-2***. The third scenario entails Treatment Alternative 2 and Distribution Alternative 3. ***Table ES-1*** summarizes these scenarios and includes capital and O&M costs for each.

Table ES-1
Scenarios for Recycled Water Production and Supply

	Scenario 1	**Scenario 2**	**Scenario 3**
Treatment	$25,500,000	$25,500,000	$28,000,000
Distribution	$26,310,000	$24,530,000	$26,020,000
Storage	$3,000,000	$3,000,000	$3,000,000
Total Capital	$54,810,000	$53,030,000	$57,020,000
Annual Capital (1)	$2,830,000	$2,740,000	$2,940,000
Annual O&M - treatment (2)	$803,000	$803,000	$1,178,000
Annual O&M - distribution (3)	$3,159,000	$3,166,000	$2,872,000
Total Annual	$6,792,000	$6,709,000	$6,990,000

Notes:
(1) Interest rate is 4.608%, over 50 years.
(2) Tertiary treatment O&M costs estimated at $0.11 per gpd per year. Satellite plant O&M costs estimated at $0.26 per gpd per year
(3) From Tables 4-3 and 4-4.

The most costly scenario, as presented in ***Table ES-1***, totals $6.99 million per year. Dividing the annual cost by the average irrigation demand of 7,998 AFY results in a cost of $874 per acre-foot for recycled water produced and delivered using the scenario described above. As described above, the cost of providing additional water supplies to the Coachella Valley through development of the Desert Aqueduct totals $1,040 per acre-foot.

Several funding sources are readily available to meet recycled water capital funding needs. These include sewer connection fees, reclamation connection fees, domestic water connection fees, sewer user rates, and reclaimed water sales. In addition, there are several programs which can assist municipalities to attenuate the large up-front capital investment of a recycled water program.

Tertiary treatment capital costs can be funded by increasing the current sewer connection fee of new sewer users. Capital costs for the recycled water distribution and storage system may be funded by a reclamation connection fee charged to new developments when connecting to the recycled water system, as well as through an increase in domestic water connection fees. Operation and maintenance (O&M) yearly costs for tertiary treatment and recycled water distribution can be funded by sewer user rates and recycled water sales. Bond sales and matching grants may be considered during the first years of the program, when income from user rates and fees will not yet be available. The revenue from rates and fees will ensure that a repayment stream is adequate to cover the cost of the bonds, making this recycled water program financially feasible.

1 Introduction

1.1 Overview

Mission Springs Water District (MSWD) was established in 1953 and was formerly called the Desert Hot Springs County Water District. The MSWD service area consists of 135 square miles including the City of Desert Hot Springs, 10 smaller communities in Riverside County, and communities in the City of Palm Springs. MSWD's water source is 100 percent groundwater, drawn from nine active production wells, providing water service to over 23,000 people as well as sewer service to approximately 8,000 people in Desert Hot Springs, Desert Crest Country Club, and Dillon Mobile Home Park.

1.2 Purpose

Mission Springs Water District (MSWD) has contracted Psomas to assist in the development of the Water Recycling Feasibility Study – Phase I to assess the feasibility of implementing a water recycling system in MSWD's service area. In November 2004, Psomas completed the Phase I Water Recycling Appraisal study, which detailed MSWD's existing groundwater conditions, threats to existing water quality, availability of recycled water, as well as a proposed plan to implement future recycled water use in the Mission Creek Sub-basin. This report aims to further analyze the feasibility of implementing a recycled water system throughout MSWD's service area.

1.3 Study Area

1.3.1 MSWD Service Area

The entire MSWD service area will be reviewed to assess the feasibility of implementing a water recycling system. As previously noted, the District's service area consists of 135 square miles including the City of Desert Hot Springs, 10 smaller communities in Riverside County, and communities in the City of Palm Springs. The District's water source is 100 percent groundwater, drawn from nine active production wells, providing water service to approximately 23,000 people as well as sewer service to approximately 8,000 people in Desert Hot Springs, Desert Crest Country Club and Dillon Mobile Home Park.

The existing MSWD distribution system consists of three independent water distribution systems: 1) Desert Hot Springs and surrounding area system – encompasses the City of Desert Hot Springs and surrounding unincorporated areas of Riverside County, 2) Palm Springs Crest System, and 3) West Palm Springs Village System.

MSWD offices are located in Desert Hot Springs, California. MSWD's largest water supply and distribution system serves the community of Desert Hot Springs and surrounding communities of West Garnet, located south of Interstate 10 (I-10) and West of Indian Avenue, and North Palm Springs. The two smaller systems, Palm Springs Crest

System and West Palm Springs Village System, are located approximately five miles west of Desert Hot Springs. These two communities are located on the north side of I-10 abutting the Morongo Indian Reservation. ***Figure 1-1*** shows the MSWD Service Area location.

1.3.2 Sub-basin Description

Major surface water features in the area are the Whitewater River, Mission Creek, San Gorgonio River, Little and Big Morongo Washes, and Long Canyon. The MSWD service area and groundwater Sub-basins are presented on ***Figure 1-2***.

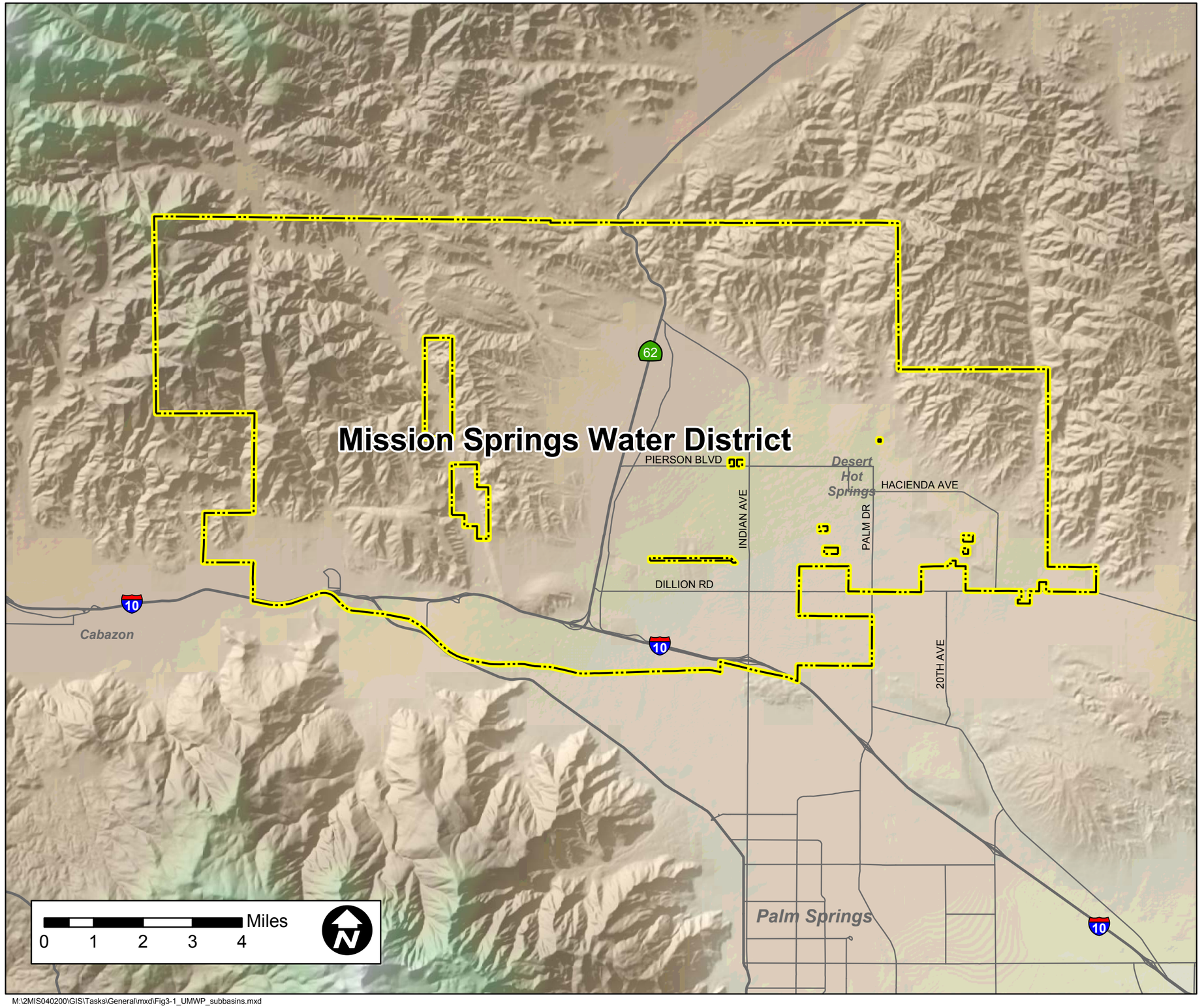
MSWD is located in the northwestern portion of the Upper Coachella Valley, in eastern Riverside County. Its service area contains a portion of the Upper Coachella Groundwater Basin and includes Mission Creek Sub-basin, Garnet Hill Sub-basin, Whitewater Sub-basin, San Gorgonio Pass Sub-basin, and the Desert Hot Springs Sub-basin. These sub-basins were formed by the large and active faults that make up the San Andreas Fault system. The Mission Creek Sub-basin is the largest source of groundwater for the MSWD service area. The Mission Creek Fault and the Banning Fault bound the northern and southern edges of the Sub-basin, respectively, and are the major groundwater controls. Both act to limit groundwater movement as these faults have folded sedimentary deposits, displaced water-bearing deposits, and caused once permeable sediments to become impermeable (California Department of Water Resources [DWR], 1964). All of the sub-basins, except for Desert Hot Springs are “cold-water” basins that can provide potable water. The Desert Hot Springs Sub-basin is a “hot-water” basin that is highly mineralized with water temperatures exceeding 100 degrees Fahrenheit and is not used to supply potable water. However, this hot, highly mineralized water is important to the economy as it supports numerous spa resorts and hotels within the city of Desert Hot Springs.

Although the MSWD service area boundary overlies several sub-basins, currently all of the producing water supply wells for the main MSWD System are located within the Mission Creek Sub-basin, with the exception of MW-33 which is located in the Garnet Hill Sub-basin. The Palm Springs Crest System and the West Palm Springs Village System are both supplied by wells that draw from the Cabazon Storage Unit of the San Gorgonio Pass Sub-basin. Currently, proposed development within the MSWD service area will rely predominantly on groundwater until recycled water is made available by MSWD.

Water Recycling Feasibility Study
Desert Hot Springs

Legend

MSWD Service Area Boundary



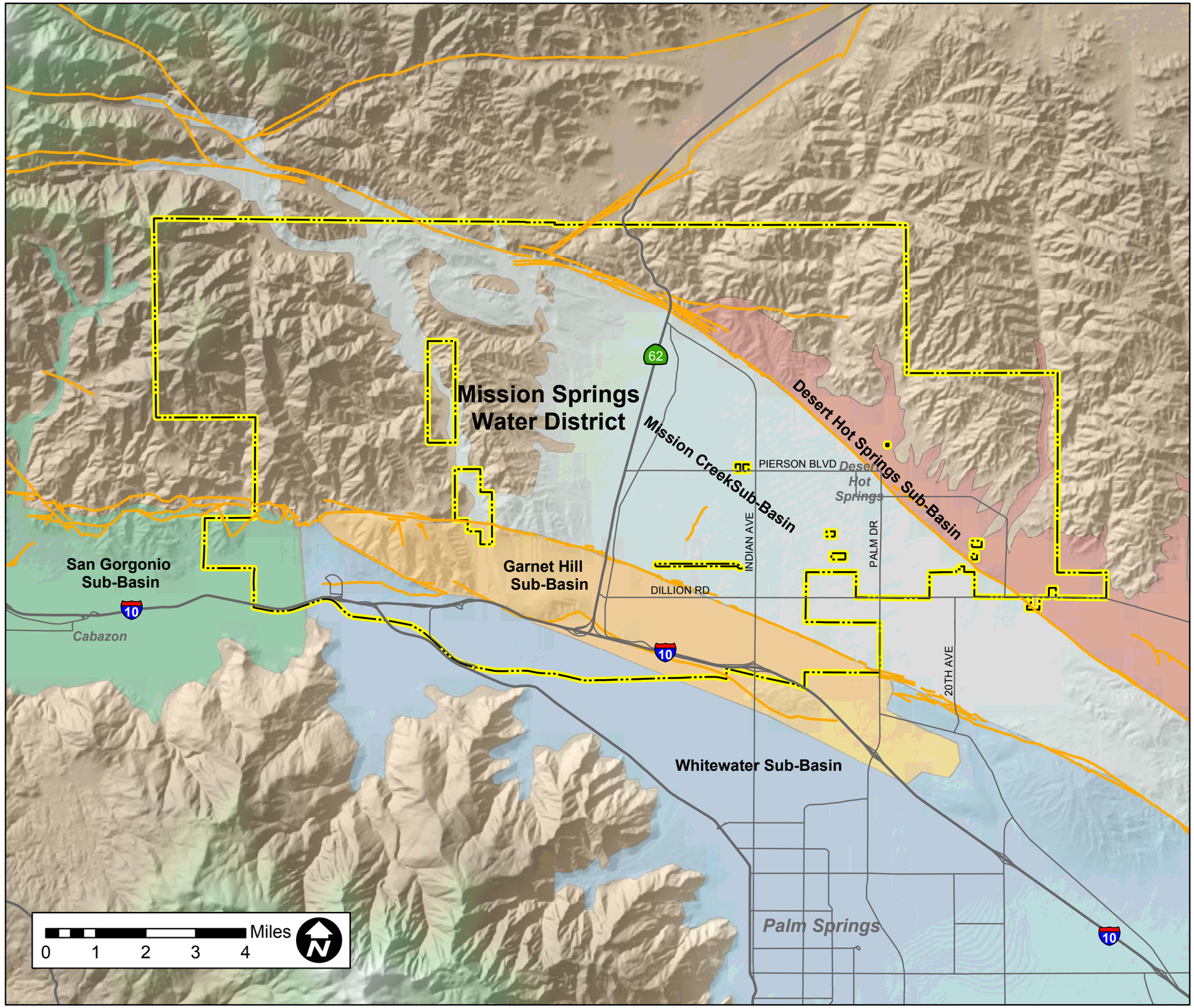
M:\2MIS040200\GIS\Tasks\General\mxd\Fig3-1_UMWP_subbasins.mxd

MSWD Service Area

MSWD PSOMAS

Figure 1-1

Water Recycling Feasibility Study
Desert Hot Springs



Legend

- MSWD Service Area Boundary
- Known Fault Lines

UWMP Sub-Basins

- Desert Hot Springs Sub-Basin
- Mission Creek Sub-Basin
- Garnet Hill Sub-Basin
- Whitewater Sub-Basin
- San Gorgonio Sub-Basin

M:\2MIS040200\GIS\Tasks\General\mxd\Fig1-1_MSWDServiceArea.mxd

MSWD Groundwater Sub-Basins

MSWD PSOMAS

Figure 1-2

1.3.3 Wastewater Treatment Plants

MSWD currently operates two wastewater treatment plants (WWTP) serving a total of approximately 6,000 developed parcels. The plants are the Horton Treatment Plant, located on Verbena Drive about ½ mile south of Two Bunch Palms Trail, and the Desert Crest Treatment Plant, located about ½ mile southeast of the intersection of Dillon Road and Long Canyon Road, with capacities of 2,300,000 gal/day (2,576 AFY) and 180,000 gal/day (202 AFY), respectively. The Horton WWTP, however, has only been permitted to 2,000,000 gal/day. The disposal of effluent from both the Horton and Desert Crest treatment plants is accomplished by utilizing percolation ponds located within the plants on the southwest (cold water) side of the Mission Creek Fault. In addition, effluent is used for irrigation and wash-down at the plants. The District's wastewater treatment plants currently treat wastewater using a secondary treatment process. See ***Table 1-1*** for capacity and current average flow of existing WWTPs.

MSWD's existing wastewater conveyance system consists of a network of nearly 77 miles of sewer pipeline concentrated in the central portion of the study area where the majority of the populace and businesses reside. The Desert Crest Country Club community first received sewer service in the early 1960s with the outlying tracts established later in the early 1970s. Most of the MSWD sewer pipelines were constructed in the early 1970s and include lines along Ocotillo Road, Palm Drive, and Mission Lakes Boulevard. In the early 1980s, improvements to the pipeline system were added to tracts west of West Drive.

There is an ongoing program to incorporate existing residences currently on septic systems to sewer collectors that have been constructed or are in the process of being constructed.

Table 1-1
Capacity and Average Flow for 2006 (MGD) - Existing WWTP

WWTP	Capacity	Average
Horton	2.3	1.3
Desert Crest	0.18	0.05
Total	2.48	1.35

2 Problems and Needs

2.1 Water Management Problems

Water reclamation and reuse will provide a solution to MSWD's 100% reliance on groundwater supply by providing an additional source to meet existing and future golf course and landscape irrigation demands. The groundwater supply from the Sub-basins within MSWD's service area is of excellent quality, with the exception of Desert Hot Springs Sub-basin. Therefore, the use of high quality potable water supply for non-potable uses, including irrigation, reduces the reliability of potable supplies for the region.

MSWD's water source includes groundwater, emergency inter-connections, and imported water for groundwater recharge. Groundwater is drawn from nine wells that supply the Desert Hot Springs System, with one additional well installed in 2006 (Well 34), three more planned for installation in the near future, and two wells each for the Palm Springs Crest System and the West Palm Springs Village System. Additional production from the Mission Creek Sub-basin comes from the Coachella Valley Water District (CVWD), which has four production wells located in an area overlying the south central portion of the sub-basin, and from approximately 200 private wells for domestic use. Several existing and proposed projects within the MSWD service area will utilize the groundwater (if approved) as its primary source of water supply until recycled water is made available in the future. MSWD currently has two inter-connections with the CVWD that can be used to provide emergency water to the Main System on a temporary and very limited basis.

The third source of water is obtained through an agreement between the Desert Water Agency (DWA) and the Metropolitan Water District (MWD) to exchange Colorado River water for SWP water. DWA obtains this water through a turnout from the Colorado River Aqueduct (CRA) and manages a recharge facility near the turnout that enables the water (when it is available) to replenish the aquifer used by MSWD and CVWD. ***Table 2-1*** provides a comparison of the existing water supply capacity with projected average daily demand (ADD) and maximum daily demand (MDD) in the MSWD service zone.

Due to the large reliance on groundwater drawn from the Mission Creek Sub-basin, implementation of a recycled water system is needed to assist in enhancing the reliability of groundwater within the MSWD service area. With the development of the recycled water system, a number of landscape and irrigation users that are currently dependent on potable water will receive recycled water supply, thus reducing the demand on groundwater pumping. Several existing and proposed projects throughout the MSWD service area include golf courses and landscaping, which make up a significant portion of the District's current water demand.

2.2 Near and Long-Term Water Supplies and Demands

Within the MSWD service area, a significant portion of the water demand comes from landscape and golf course irrigation. Due to the delicate balance of groundwater supply needed to manage the region's groundwater basins, recycled water will offset non-potable demands. Regional groundwater levels have been declining significantly in recent years, as described below in the groundwater basin descriptions for the region. Since development continues throughout the MSWD service area and throughout the desert region, recycled water is needed to provide a non-potable source of supply, which will allow groundwater to serve solely as a potable supply. The lack of recycled water supply within the service area results in the use of high quality groundwater to irrigate golf courses and landscape.

Table 2-1 shows a projected water balance for the Mission Creek Sub-basin, which is the primary source of water supply to MSWD with the exception of future recycled water. The projections in five-year increments for years 2010 through 2030 assume Normal Year conditions whereas the 2005 year is recognized as a wet-year condition as reflected by the 24,700 AF of imported water recharge in the first column. If the Net Balance values for years 2010 through 2030 are averaged and multiplied by the total 25 years of the UWMP projection period, the result would be a cumulative withdrawal of 46,000 AF from the Mission Creek Sub-basin. When the single-year surplus of 14,000 AF for 2005 (starting condition) is taken into account, the net cumulative withdrawal would be reduced to 32,000 AF. It should be noted that this conservative assumption assumes no wet-year condition such as 2005 will occur over the next 25-year period and that all years are normal water years.

The estimate of total available storage within the Mission Creek Sub-basin is approximately 1.4 MAF[1]. This cumulative withdrawal, based on the projections and assumptions described above and included in ***Table 2-1***, would therefore equate to a loss of available storage of 2.3 percent over the next 25 years. Although relatively small compared to the basin capacity, it is nevertheless MSWD's intent to continue to work with Desert Water Agency and Coachella Valley Water District to develop a strategic groundwater management program that will protect the Mission Creek Sub-basin for generations to come.

[1] 1.4 MAF as noted in Section 2.1 of the MSWD 2005 UWMP.

Table 2-1
Water Springs Water District
Water Balance
(AF – all numbers rounded to nearest 100 AF)

Year	Mission Creek Sub-basin Recharge[a]	CVWD Sub-basin Production[b]	Surplus GW Recharge[c]	Total MSWD Demand[d]	Recharge from 35% Return Flow[e]	Net Recharge Available[f]	Total MSWD GW Demand[g]	Net Balance[h]
2005	24,700	4,700	20,000	9,200	3,200	23,200	9,200	14,000
2010	11,200	4,000	7,200	15,400	5,000	12,200	14,400	(2,200)
2015	14,100	5,500	8,600	20,800	6,900	15,500	17,800	(2,300)
2020	16,100	7,100	9,000	23,500	7,900	16,900	17,200	(300)
2025	17,800	8,900	8,900	26,200	8,800	17,700	19,100	(1,400)
2030	19,100	10,700	8,400	28,900	9,800	18,200	21,200	(3,000)

[a] From Table 2-13 in CVWD 2005 UWMP for Mission Creek Spreading Facility; 2005 value from April 6, 2006 CVWD Engineer's Report on Water Supply and Replenishment Assessment, Mission Creek Sub-basin Area of Benefit 2006-2007 (Table 6).

[b] From Table 3-3 in CVWD 2005 UWMP for Mission Creek Sub-basin; 2005 value from April 6, 2006 CVWD Engineer's Report.

[c] Difference between Mission Creek Sub-basin Recharge and CVWD Production

[d] Total Projected MSWD demand including recycled water demand (refer to subsequent tables in this section)

[e] Naturally occurring recharge from return flow (35% of Total MSWD Demand)

[f] Net Recharge Available = Surplus GW Recharge + Recharge from Return Flow

[g] Total MSWD GW Demand (excludes recycled water demand)

[h] Net Balance = Net Recharge Available – Total MSWD GW Demand

Regional groundwater levels have been declining significantly in recent years. Since development continues throughout the MSWD service area and throughout the desert region, recycled water is needed to provide a non-potable source of supply for existing development, including Mission Lakes, and proposed future development, including Palmwood, Two Bunch Palms, Hot Springs Mobile Home Park, Highland Falls (formerly Rancho Royale), and Tuscan Hills. These developments include golf courses and landscape irrigation that make up significant portions of their projected overall water demand. As previously noted, the current lack of recycled water supply within the service area results in the use of high-quality groundwater for irrigation purposes.

2.3 Groundwater Supply

MSWD draws almost all of its water supply from groundwater. ***Table 2-2*** lists the active wells including age, depth and capacity.

Table 2-2
Active Wells

Well No.	Age (years)	Depth (feet)	Capacity (gpm)
Mission Creek Sub-basin			
MW-22	35	800	1,750
MW-24	32	800	1,200
MW-27	25	400	1,100
MW-28	16	900	1,900
MW-29	13	1,070	1,700
MW-30	13	1,100	825
MW-31	12	1,000	1,900
MW-32	1	1,000	2,000
Garnet Hill Sub-basin			
MW-33	0	1,000	800
San Gorgonio Pass Sub-basin, Cabazon Unit			
MW-25	48	465	400
MW-25A	3	600	175
MW-26	74	575	350
MW-26A	4	285	170

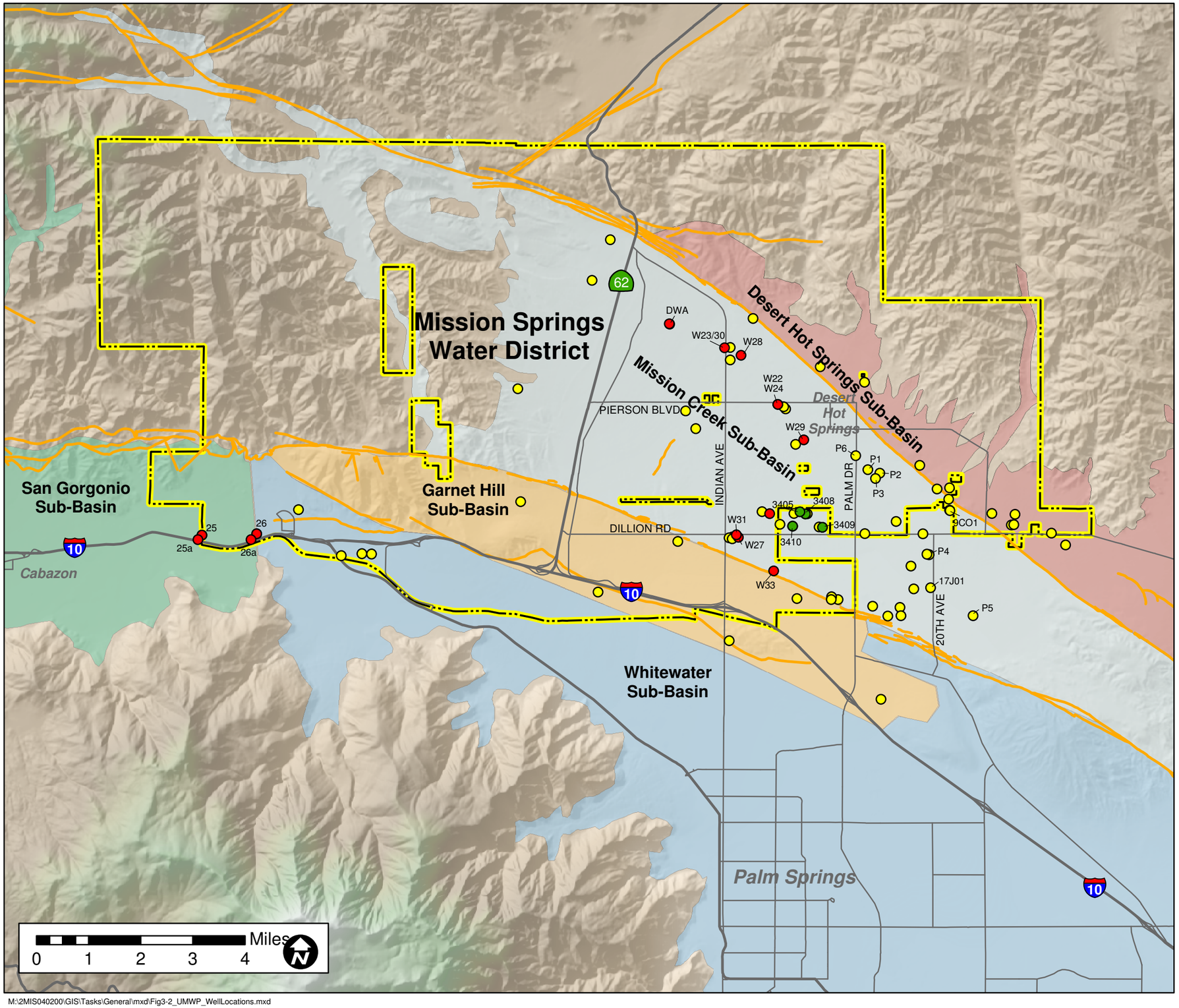
The following discussion includes descriptions of each of the Sub-basins from which MSWD pumps groundwater. See ***Figure 2-1*** for a detailed map of the location of Sub-basins and active wells throughout MSWD's service area.

2.3.1 Mission Creek Sub-basin

The Mission Creek Sub-basin is located in the Upper Coachella Valley in the north central portion of Riverside County, California. The Mission Creek Fault and the Banning Fault bound the northern and southern edges of the sub-basin, respectively, and are the major groundwater controls. Both act to limit groundwater movement as these faults have folded sedimentary deposits, displaced water-bearing deposits, and caused once permeable sediments to become impermeable (California Department of Water Resources [DWR], 1964).

Major surface water features in the area are the Whitewater River, Mission Creek, San Gorgonio River, Little and Big Morongo Washes, and Long Canyon. The MSWD service area and groundwater sub-basins were presented on ***Figure 1-2***.

Water Recycling Feasibility Study
Desert Hot Springs



Legend

- MSWD Service Area Boundary
- Known Fault Lines
- Private Wells
- Public Wells - MSWD
- Public Wells - CVWD

UWMP Sub-Basins

- Desert Hot Springs Sub-Basin
- Mission Creek Sub-Basin
- Garnet Hill Sub-Basin
- Whitewater Sub-Basin
- San Gorgonio Sub-Basin

M:\2MIS040200\GIS\Tasks\General\mxd\Fig3-2_UMWP_WellLocations.mxd

MSWD Well Locations

MSWD PSOMAS

Figure 2-1

2.4 Imported Water Supply

An emergency source of water for MSWD is the CVWD. MSWD currently has two inter-connections with the CVWD that can be used to provide emergency water to the Main System on a temporary and very limited basis.

DWA is the MSWD's wholesale supplier for the SWP. As a State Water Contractor, DWA is entitled to SWP water. A conveyance system to provide SWP water directly to the Coachella Valley currently does not exist. However, the CRA does go through the valley. DWA has entered into an agreement with MWD to exchange SWP water for CRA water.

In 1997, MWD tapped into the CRA for DWA and installed a 48-inch turnout just south of Indian Avenue and west of Worsley Road. DWA acquired approximately 190 acres of land in the vicinity of the turnout to construct spreading ponds to hold the Colorado River water as it percolates downward into the Mission Creek Sub-basin. A test well was also installed by DWA to monitor the flow of water underground. DWA completed construction of 60 acres of recharge basins as the Mission Creek Recharge Facilities in June 2002. Recharge commenced in November 2002 with 4,733 AF of water introduced into the basins in the remainder of 2002. A lack of available water resulted in no recharge in 2003. An additional 5,564 AF of water was recharged in October, November, and December of 2004. Because of the very wet conditions in 2005, recharge in calendar year 2005 totaled 24,700 AF (April 2006 CVWD Engineer's Report on the Mission Creek Sub-basin).

URS (2005) reported that the number of recharge basins in operation depends upon the availability of water. In 2005, only about two-thirds (40 acres) of the 60 acres of basins were being used at one time. Based on the current excellent rate of about 4 feet per day, and accounting for some downtime for maintenance, the 60 acres of basins could recharge as much as 60,000 acre-feet per year (AFY), which far exceeds the currently available supply. Even if recharge rates decreased over time to as little as 1 foot per day, the capacity would still be at least 15,000 AFY.

The possibility of continued recharge depends largely on the availability of future water from the MWD's Colorado River Aqueduct and on MWD's exchange agreements with DWA. This source of water does provide a significant amount of inflow to the northwesterly portion of the Mission Creek Sub-basin and reduces the amount of over drafting of the aquifer. In addition, assuming that sufficient water is available, this recharge facility provides for conjunctive use possibilities, such as water banking of Colorado River water. Because of the excess capacity and the lack of available water, DWA does not have any plans for expanding the facility any time soon. Even if water was available, most of the remaining 130 acres not currently used for recharge are located in Mission Creek, and any facilities constructed in the creek would be subject to damage from flood events. Any expansion of the recharge facilities would most likely require the purchase of additional land.

2.5 Recycled Water Supply

Recycled water is defined by the California Water Code as "water, which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource." The availability of recycled water is limited to water generated as part of the wastewater treatment associated with sewage collected from sewered residential, commercial, and industrial properties.

As mentioned in Section 1, MSWD currently operates two wastewater treatment plants serving a total of approximately 6,000 developed parcels with a wastewater conveyance system of nearly 77 miles of sewer pipeline. See ***Figures 4-1*** through ***4-3*** for the locations of existing wastewater treatment plants throughout the MSWD service area. A future regional wastewater plant is currently planned near Indian Avenue and Interstate 10, as shown on these figures. There is also a potential to develop a satellite treatment plant near Indian Avenue and Pierson to capture and reclaim effluent from the area tributary to it and pump it to the proposed Palmwood and Highland Falls golf courses. The alternative of utilizing this satellite wastewater treatment plant will be evaluated later in the report, in Section 4.

The Alan L. Horton Wastewater Treatment Plant has a capacity of 2.3 mgd, and is currently operating with an average daily flow of 1.3 mgd. The Horton facility uses an extended aeration process for treatment and disposes of the undisinfected secondary wastewater in adjacent percolation/evaporation ponds. The sludge generated from the treatment process is dried in on-site beds and then trucked offsite to proper disposal areas.

The Desert Crest Wastewater Treatment Plant has a capacity of 0.18 mgd and serves a country club development and mobile home park. This treatment facility is operating with an average daily flow of 0.05 mgd. The facility operates similar to the Horton facility using an aeration basin for treatment and disposes of the undisinfected secondary wastewater by way of percolation/evaporation ponds. The sludge generated from the treatment process is dried in on-site beds and then trucked offsite to proper disposal areas. In conjunction with the second phase construction of the proposed Hot Springs Mobile Home Park, which is projected to be completed by 2009, this treatment plant is planned to be abandoned and a gravity main, a small sewer lift station and a force main constructed to deliver the effluent from this region to the Horton Plant.

Since the availability and distribution of recycled water is directly dependent on the projected requirements for wastewater disposal in the MSWD service area, an evaluation was conducted to determine the projected flows tributary to the various wastewater treatment plants.

2.6 Wastewater Treatment

The anticipated wastewater flows were projected from Year 2005 though Year 2035. Expected annual wastewater generation for that period was based on existing use, population growth projections, consistent with the Water System Master Plan for MSWD – Draft, October 17, 2005, and a daily wastewater generation factor of 80 gallons per capita. The wastewater projections also take into account existing residences currently on septic systems to be connected to the sewer system. Non-residential wastewater generation was estimated based on a percentage of projected water demand. Forty percent of commercial water use and 10 percent of all other non-residential water use was assumed for wastewater generation. ***Table 2-3*** shows the projected wastewater generation in 5-year increments through Year 2035.

Table 2-3
Wastewater Flow Projections

Year	Total Wastewater Generation	
	AFY	MGD
2005	1,456	1.3
2010	3,246	2.9
2015	5,083	4.5
2020	5,940	5.3
2025	6,747	6.0
2030	7,465	6.7
2035	8,173	7.3

Based on conversation with MSWD it is assumed that the Horton WWTP will be expanded to 5 MGD total capacity. The existing and projected future capacity for each existing and proposed WWTP is presented in ***Table 2-4***.

Table 2-4
Projected Wastewater Treatment Capacity (by plant)

NAME OF WWTP	EXISTING CAPACITY (MGD)	FUTURE CAPACITY (MGD)
Horton WWTP	2.3	5.0
Desert Crest WWTP	0.18	To be Abandoned
Regional WWTP	Future	Alternative Dependent
Indian/Pierson Satellite Plant	Future	Alternative Dependent

2.7 Water Demands

Table 2-5 presents the normal year supply and demand projections for MSWD through 2030. The supply and demand projections assume:

- No imported water is available to MSWD. Although some State Project Water can be exchanged for CRA water through the auspices of DWA and CVWD, that water is ultimately used for groundwater recharge and is thus pumped from the aquifer by MSWD. Because this water is not directly supplied to the MSWD distribution system, it is not accounted for as imported water.
- Recycled water use will begin in approximately 2015 and will begin to reduce the demand on pumped groundwater at that time.
- Given the large capacity of the Mission Creek Sub-Basin, it is not reasonable to assume the entire 1.4 MAF will be available to MSWD in any given year (primarily because of limitations on the District's well depths and pumping capacity). A reasonably conservative assumption of 40,000 AFY, which is less than 3 percent of the estimate of total storage within the sub-basin, has therefore been assumed as the supply capability.
- Groundwater recharge will continue to occur as noted above.
- All projections are based on an assumed high growth water demand pattern.

Table 2-5
Mission Springs Water District
Projected Water Supply and Demand – Normal Water Year

(AFY – All projections rounded to nearest 10 AF)

Water Sources	2010	2015	2020	2025	2030
Supply	**Normal Water Years**				
Imported[(a)]	0	0	0	0	0
Recycled[(b)]	0	2,000	5,350	6,070	6,720
Local (Groundwater)[(c)]	40,000	40,000	40,000	40,000	4,000
Total Supply	**40,000**	**42,000**	**45,350**	**46,070**	**46,720**
% of Normal Year	100	100	100	100	100
Demand					
Imported[(a)]	0	0	0	0	0
Recycled[(b)]	0	2,000	5,350	6,070	6,720
Local (Groundwater)[(d)]	14,400	17,800	17,150	19,130	21,180
Other Project Demands[(f)]	970	1,010	1,010	1,010	1,010
Total Demand	**15,370**	**20,810**	**23,510**	**26,210**	**28,910**
% of Year 2005 Demand (9,194 AF)[(e)]	167.2%	226.3%	255.7%	285.1%	314.4%
Supply/ Demand Difference	24,630	21,190	21,840	19,860	17,810
Difference as % of Supply	61.6%	50.5%	48.2%	43.1%	38.1%
Difference as % of Demand	160.2%	101.8%	92.9%	75.8%	61.6%

(a) MSWD does not have direct access to imported water. Although State Project Water can be exchanged for Colorado River water, which can then be used for recharging the groundwater aquifer (via water transfers arranged through DWA and CVWD), that import water is not supplied directly to the MSWD distribution system and is therefore not counted as "imported" supply or demand.

(b) There are currently no recycled water supplies available; however, plans call for implementation of a recycled water system beginning in approximately 2015 with a minimal production capacity of 2,000 AFY ramping up to 6,720 AF in 2030. Recycled water supply and demand are assumed to be equal. Recycled water supply numbers were calculated assuming that 90% of the wastewater generated can be converted to recycled water (with the 10% balance lost in the treatment process).

(c) The current available supply in the local groundwater aquifer is estimated at 1.4 MAF. This analysis conservatively assumes that less than 3% of this supply (or 40,000 AF) will be available in any given year as groundwater supply. The analysis also assumes the water extracted by pumping will be replaced by (1) DWA's proposed groundwater recharge of imported water at its Mission Creek Spreading Facility) and by (2) a 35% return flow for all water used in MSWD.

(d) Groundwater demands obtained from Projected High Growth Water Demand data included in draft 2005 MSWD Comprehensive Water System Master Plan prepared by URS.

(e) 9,194 AF was the actual water usage in MSWD during the FY 05.

(f) Demands for the Two Bunch Palms and Hot Springs Mobile Home Park developments, which were not included in the 2005 Urban Water Management Plan, were obtained from the Two Bunch Palms Water Supply Assessment, dated June 30, 2006, and the Hot Springs Mobile Home Park Water Supply Assessment, dated July 20, 2006, respectively.

2.8 Water Supplies Cost Analysis

If recycled water is not utilized to irrigate the golf courses and other proposed landscape uses proposed in this report, the alternative water source would be the continued and future use of groundwater. Current water supplied by CVWD and DWA for recharge into either the Whitewater or Mission Creek Sub-basins costs approximately $300 per AF, based on discussions with CVWD staff using the total cost of providing State Water Project (SWP) water through their exchange agreement with MWD. This cost includes the capital component plus operation and maintenance (O&M) costs plus energy costs for pumping.

CVWD and DWA have considered the feasibility of providing additional water supplies to the Coachella Valley through an extension of the SWP from the high desert in the Apple Valley area to the vicinity of the two recharge/spreading basins. This would require an approximate 99-mile pipeline delivering up to 300 cfs peak capacity, which is derived from using the total of CVWD's and DWA's SWP Table A amount of 171,100 AFY and an appropriate peaking factor. The project cost for this proposed SWP pipeline extension referred to as the Desert Aqueduct is projected by CVWD at approximately $1.3 billion.

Assuming an interest rate of 4.608%, which CVWD staff indicates is the interest rate that the SWP uses, and a financing period of 50 years, this $1.3 billion equates to an annual cost of $66.94 million. Based on DWR's State Water Project Delivery Reliability Report, 2002, which determines that the SWP can be assumed to reliably deliver 77% of an agency's Table A amount in an average year, the 171,100 AF of total Table A allotment would equate to an average reliable delivery of 131,750 AFY. Dividing the annual cost of $66.94 million by this average supply of 131,750 AFY results in a cost of $508 per acre-foot for water delivered through the proposed Desert Aqueduct, excluding O&M costs.

This cost would have to be added to the cost of water delivered to the Apple Valley area, which can be considered approximately equal to the $300 per acre-foot currently used by CVWD for SWP delivered to them via their exchange agreement with MWD. Operation and maintenance costs for the Desert Aqueduct would add approximately one million dollars per year, based on a cost of $10,000 per mile per year for this type of facility. This would add another $8 per acre-foot to the cost of water delivered through the Desert Aqueduct. Therefore, the total cost of new SWP water delivered to either of the two spreading basins in the vicinity of Mission Springs Water District that could be considered to be an alternative supply to developing recycled water would be $816 per AF ($300 + $8 + $508).

Since the cost of developing the recycled water system provides water directly to the proposed irrigation users, the cost of a delivery system must also be added to the supply cost developed above. This delivery system can be considered to be additional wells to serve the proposed irrigation customers along with some varying amount of distribution

depending on the location of the wells in proximity to the users. For the purpose of this study, a well for every 1,000 gpm of peak month supply or 667 gpm of average supply will be used. The 667 gpm per well equates to 0.96 mgd per well or 8 wells to reliably serve the 7.3 mgd of proposed recycled water system demands. A 10-inch distribution pipeline of 1,000 feet is also assumed for each well. The project capital costs to develop these delivery systems total $9 million, as summarized in ***Table 2-6*** below. Using the assumed interest rate of 4.608%, this amounts to $464,440 per year for 50 years. In addition, each well will require 160 horsepower (HP) to operate, or 120 kilowatts (kW). At a rate of $0.15/kW-hr, energy costs equal to $157,770 per year per well, or $1,261,000 per year for all 8 wells. Therefore, a total capital plus energy cost of $220 per AF is required to extract and distribute an average of 7,810 AFY of groundwater for irrigation demands. O & M costs are assumed to be negligible compared to capital and energy costs. This brings the total to $1,036 per AF to develop this alternative supply.

Table 2-6
Delivery Systems Capital Costs for Irrigation Water Supply

Item	Quantity	Unit	Cost/unit	Cost
Wells	8	Wells	$1,000,000	$8,000,000
10" Diameter Pipeline	8,000	LF	$110	$880,000
Total Capital Cost				$8,880,000

3 Water Reuse Opportunities

The availability of recycled water in MSWD's service area is limited to water generated as part of the wastewater treatment associated with sewage collected from sewered residential developments, commercial and industrial properties.

MSWD's recycled water system will be used primarily for golf course and landscape irrigation purposes. These uses will require the upgrade of existing and/or proposed wastewater treatment plants to tertiary treatment with a new recycled water distribution system.

3.1 Opportunities for Reuse

The existing developments of Mission Lakes, Hidden Springs, Desert Dunes, Desert Crest Country Club, Two Bunch Palms, and Sands Resort, along with the proposed future developments of Tuscan Hills, Palmwood, Highland Falls (formerly Rancho Royale), and the Hot Springs Mobile Home Park provide opportunities for reuse within the MSWD service area. The Desert Dunes development is within the CVWD service area; therefore, an agreement between the two agencies would be required for MSWD to supply recycled water to this development.

Table 3-1 shows the calculated recycled water demands for each development. Using the projected recycled water demands along with projected wastewater treatment requirements, ***Table 3-2*** below shows potential recycled water supply phasing.

Table 3-1
Projected Recycled Water Demands

Development	Irrigated Area (acres)	Irrigation Demand (AFY)	Avg Month		Max Month		Peak Day	
			(MGD)	(GPM)	(MGD)	(GPM)	(MGD)	(GPM)
Tuscan Hills [5]	120	750	0.7	465	1.1	781	1.3	884
Mission Lakes [3]	133	1,171	1.0	726	1.8	1,220	2.0	1,380
Highland Falls [1]	250	1,600	1.4	992	2.4	1,667	2.7	1,885
Palmwood [2]	312	1,792	1.6	1,111	2.7	1,867	3.0	2,111
Desert Crest Country Clubs [4]	20	108	0.1	67	0.2	113	0.2	127
Desert Dunes GC[6][7]	175	1,500	1.3	930	2.3	1,563	2.5	1,767
Hidden Springs [3]	56	255	0.2	158	0.4	266	0.4	300
Sands Resort [3]	37	410	0.4	254	0.6	427	0.7	483
Two Bunch Palms[8]	60	188	0.2	117	0.3	196	0.3	222
Other[9]		224	0.2	139	0.3	233	0.4	264
Total	**1,163**	**7,998**	**7.1**	**4,959**	**12.0**	**8,331**	**13.6**	**9,422**

(1) Acreage information from Dave Davis telecom. Assume 4 acres lake. Irrigation based on ETo.
(2) Information from Palmwood Project WSA.
(3) Irrigation demand based on 2004 groundwater extraction. Acreage from CityGIS
(4) Draft WSA plus existing Desert Crest (estimate).
(5) 100 acres turf based on 3/28/06 telecom with Tim Blond. Assume 2 acres lake.
(6) Approximate well extraction from data table (M. Donovan). Acres from CityGIS.
(7) Desert Dunes GC is in CVWD service area.
(8) Information from Two Bunch Palms WSA, July 2006
(9) Other irrigation demands include schools, City offices, and commercial establishments with irrigation meters.

Table 3-2
Recycled Water Phasing Projections

	2008	2010	2015	2020	2025	2030	2035
Irrigation Demand (mgd)							
Tuscan Hills	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Mission Lakes	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Highland Falls		1.4	1.4	1.4	1.4	1.4	1.4
Palmwood			1.6	1.6	1.6	1.6	1.6
Desert Crest Country Club (1)					0.1	0.1	0.1
Desert Dunes GC (2)					1.3	1.3	1.3
Hidden Springs				0.2	0.2	0.2	0.2
Sands Resort				0.4	0.4	0.4	0.4
Two Bunch Palms	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Other Irrigation	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	**2.0**	**3.5**	**5.1**	**5.7**	**7.1**	**7.1**	**7.1**
Wastewater Generation (mgd)	**2.3**	**2.9**	**4.5**	**5.3**	**6.0**	**6.7**	**7.3**

(1) Includes proposed adjacent mobile home park.

(2) Desert Dunes is within the CVWD service area.

*Assume Horton WWTP will expand to 5 mgd.

**Horton pipeline and pump station sized for a maximum of 5.5 mgd to projects north of plant.

In order to assess the requirements for various distribution systems for the recycled water, it was assumed that only two types of planned uses would be considered:

- Percolation ponds for groundwater recharge in areas where no current or historical septic systems were in use; and
- Irrigation of large, mostly turf areas associated with golf courses, parks, and/or schools.

It has been assumed that the Horton WWTP will be expanded to 5 MGD treatment capacity. Based on projected sewer generation estimates, shown in ***Table 3-2***, a new WWTP will be needed between the years 2015 and 2020. Once the new WWTP comes online, additional pipeline and a pump station may be added to the recycled water distribution system in order to supply additional users and meet peak demands.

It is anticipated that recycled water distribution to each of the existing and proposed developments would be "phased in" depending on availability and proposed need, as shown in ***Table 3-2***. Since Mission Lakes Golf Course is an existing facility, recycled water would be directed to this area first commencing in 2009.

As recycled water becomes available, additional golf courses at Highland Falls, Palmwood, and Tuscan Hills developments would be cycled into the proposed distribution system to receive recycled water.

Seasonal storage of recycled water is needed in order to maximize reuse. Wastewater generation is relatively constant throughout the year. However, recycled water demand peaks in the summer months. On-site percolation ponds located at the Horton WWTP could be utilized for seasonal groundwater storage. A maximum percolation rate of 300 acre-feet per month can be achieved based on current estimates and planned expansion of ponds located at the Horton WWTP. A seasonal storage water balance was calculated for the Horton WWTP based on 5 MGD capacity. ***Table 3-3*** shows the monthly water balance calculations based on regional evapotranspiration data to estimate monthly irrigation. The calculations estimate a maximum seasonal storage of 1,177 acre-feet. A peak month pumping rate of approximately 2,230 gpm would be needed to extract 300 acre-feet per month from groundwater storage during the peak summer months.

Table 3-3
Horton WWTP Seasonal Storage Calculations (AFY)

Month	ETo (in)	%	Irrigation	Wastewater	Change in Storage (1)	Cumulative Storage (2)
Jan	2.8	3%	168	467	298	914
Feb	4.7	5%	279	467	188	1,102
Mar	6.6	7%	392	467	75	1,177
Apr	9.4	10%	560	467	-93	1,083
May	11.3	12%	672	467	-205	878
Jun	13.2	14%	784	467	-318	560
Jul	13.2	14%	784	467	-318	243
Aug	10.3	11%	616	467	-149	93
Sep	9.4	10%	560	467	-93	0
Oct	6.6	7%	392	467	75	75
Nov	3.8	4%	224	467	242	317
Dec	2.8	3%	168	467	298	616
Total	93.9	100%	5,600	5,600	0	

(1) Maximum percolation of 300 af/month can be achieved based on current estimates and planned expansion of ponds. Peak month pumping rate of 300 af/month (3.2 mgd).

(2) Maximum cumulative storage equals 1,177 acre-feet (March).

3.2 Status of Recycled Water Technology

For the most part, the availability of recycled water in the Mission Creek Sub-basin is limited to water generated as part of the wastewater treatment associated with sewage. In order for this water to be used as recycled water, it must meet Title 22 Standards. According to California State Regulations, Title 22, Chapter 3 Water Recycling Criteria, the available recycled water can fall into one of four categories as follows:

Undisinfected Secondary Recycled Water – "oxidized" wastewater.

Disinfected Secondary-23 Recycled Water – wastewater that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 23 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed a MPN of 240 per 100 milliliters in more than 1 sample in any 30-day period.

Disinfected Secondary-2.2 Recycled Water –wastewater that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than 1 sample in any 30-day period.

Disinfected Tertiary Recycled Water – filtered and subsequently disinfected wastewater that has been disinfected by one of the following methods: 1) a chlorine disinfection process following filtration that provides a CT value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak weather design flow; or 2) a disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS-2, or polio virus in the wastewater.

MSWD's recycled water treatment system will require the upgrade of existing and/or proposed wastewater treatment plants to tertiary treatment along with a distribution system. The California Department of Health Services (DHS) sets treatment/water quality requirements for recycled water depending on its end use.

As established by DHS, the California Water Recycling Criteria (adopted December 2000), defines Disinfected Tertiary Recycled Water as a wastewater, which has been oxidized and meets the following:

A. Has been coagulated* and passed through natural undisturbed soils or a bed of filter media pursuant to the following:

1. At a rate that does not exceed 5 GPM/ft^2 in mono, dual or mixed media gravity or pressure filtration systems, or does not exceed 2 GPM/ft^2 in traveling bridge automatic backwash filters; and

2. The turbidity does not exceed any of the following; a daily average of 2 NTU, 5 NTU more than 5% of the time within a 24-hour period, and 10 NTU at any time.

*Note: *Coagulation may be waived if the filter effluent does not exceed 2 NTU, the filter influent is continuously measured, the filter influent turbidity does not exceed 5 NTU, and automatically activated chemical addition or diversion facilities are provided in the event filter effluent turbidity exceeds 5 NTU.*

OR

B. Has been passed through a micro., nano., or R.O. membrane following which the turbidity does not exceed any of the following: 0.2 NTU more than 5% of the time within a 24-hour period and 0.5 NTU at any time.

AND

C. Has been disinfected by either:

1. A chlorine disinfection process that provides a CT of 450 mg-min/l with a modal contact time of not less than 90 minutes based on peak dry weather flow, or

2. A disinfection process that, when combined with filtration, has been demonstrated to achieve 5-log inactivation of virus.

MSWD will apply the above conditions to provide Disinfected Tertiary Recycled Water. Tertiary recycled water may be used for surface irrigation, impoundments, cooling, and other uses, including toilets, urinals, priming drain traps, industrial processes that may contact workers, structural firefighting, decorative fountains, commercial laundries, consolidation of backfill material around potable water pipelines, non-structural fire fighting, among others. However, MSWD will primarily use recycled water for golf course and landscape irrigation purposes.

3.3 Potential Uses and Associated Costs for Recycled Water

The potential uses for recycled water are heavily dependent on the degree of treatment provided as well as a distribution system that directs the recycled water to its intended use point. For the most part, the types of uses can be divided into five major categories that include:

- Groundwater Recharge
- Surface Irrigation

- Impoundments
- Cooling
- Other Uses

The cost discussion is separated into three areas: 1) probable costs associated with the intended treatment; 2) probable costs associated with distribution; and 3) probable costs associated with seasonal storage. In providing opinions of probable cost, the user of this document understands that Psomas has no control over costs or the price of labor, equipment or materials or over the contractor's method of pricing, and the opinions of probable construction cost provided in this report are based on Psomas' qualifications and experience. Psomas makes no warranties, expressed or implied as to the accuracy of such opinions as compared to bid or actual costs.

3.3.1 Treatment Costs

Since the majority of the wastewater that is recycled in the early phases of the proposed plan will be used for recharging the groundwater basin and irrigation on unrestricted golf courses, the type of treatment is assumed to be equivalent to DHS requirements for Disinfected Tertiary Recycled Water.

Treatment costs for the Horton WWTP assume that the plant will be upgraded to treat wastewater to Disinfected Tertiary Recycled Water standards following DHS requirements. Costs for expanding the plant to 5 mgd were not included, since this expansion will be necessary to handle population growth regardless of recycled water use. Costs for tertiary treatment were estimated by Carollo Engineers and are based on past construction projects with similar components, which include construction of tertiary filters, tertiary chemical feed, a chlorine contact basin, and a reclaimed water storage reservoir. The total estimated cost for the Horton WWTP tertiary treatment upgrades is $3.00 per gallon.

This cost includes design and construction and does not include: effluent pump station costs, since they are included in the distribution costs; dewatering and biofilter costs, since these are part of the expansion to 5 mgd; and the escalation to mid-point of construction.

O&M costs for tertiary treatment were estimated from the Lancaster Water Reclamation Plant 2020 Facilities Plan as well as conversations with plant operators from the Inland Empire Utilities Agency – Chino, CA Plant. These costs include chemicals, basin repair and replacement, filter maintenance, and labor, and total $0.11 per gal/day per year.

Costs for the Indian/Pierson Satellite Plant consist of design and construction of a 2.5 mgd membrane bioreactor wastewater treatment system with no solids handling, and are estimated at $4.00 per gallon, based on manufacturer cost estimates. O&M costs for the Indian/Pierson Satellite Plant include chemicals, membrane repair and replacement, energy costs for aeration blowers and sludge pumps, and labor. The Satellite O&M costs

were obtained from conversations with the manufacturer (Zenon), and total approximately $0.26 per gal/day per year.

The size and need of the Regional WWTP largely depend on whether the Satellite plant is installed into the system and the rate of development in the area south of Pierson Blvd. Only costs for tertiary treatment are considered for this analysis, since the Regional WWTP will be required to treat the increase in wastewater generation due to new development and new connections to the sewer system, regardless of recycled water production. Costs for the Regional Plant are again estimated with a factor of $3.00 per gallon, based on past projects with similar components, as explained above. O&M costs are equal to the Horton plant's O&M cost estimates.

3.3.2 Distribution Costs

It is anticipated that the distribution lines would be sized to accommodate the "phasing in" of water distribution to major developments as well as anticipate recharging of the Sub-basin groundwater when future production of recycled water exceeds demand for the recycled water. Distribution costs consist of pipelines and pump stations sized to meet these recycled water needs.

Section 4 presents distribution costs for various distribution alternatives. Costs for pipelines and pump stations are based on the 2000 Irvine Ranch Water District Water Resources Master Plan, and have been converted to present worth using the ENR index.

O&M costs for pump stations were calculated by converting the required horsepower to kilowatts, and converting kilowatts to dollars per hour using a rate of $0.15/kW-hr. O&M costs for pipelines were calculated using a factor of $0.10 per LF per year per diameter inch of pipe.

3.3.3 Seasonal Storage Costs

Seasonal storage costs consist of wells required to extract recycled water from the Horton plant percolation ponds during peak summer months. Costs for expanding the percolation ponds are not included since these will need to be expanded regardless of recycled water production, due to increased wastewater generation from development in Desert Hot Springs.

It is assumed that the depth of wells required for extraction of groundwater from the Horton percolation ponds will be approximately 1,000 ft. An estimated cost of $1,000 per foot of well depth was used to calculate a cost of $1 million per well. Three wells will be required to pump approximately 2,230 gpm during peak summer months, bringing total storage costs to $3 million.

O&M costs for wells at the Horton percolation ponds were obtained by converting the required horsepower to kilowatts, and converting kilowatts to dollars per hour using a

rate of $0.15/kW-hr. Therefore, 160 HP was converted to 120 kW, which resulted in $157,700 per year per well and totaled $473,000 per year for all three wells.

4 Description of Alternatives

4.1 Alternatives Considered

Alternative methods were considered and analyzed for meeting irrigation and groundwater recharge demands in the Desert Hot Springs area, including a no-action alternative, as well as alternatives including production and supply of recycled water.

The no-action alternative involves continuing to supply irrigation demands with potable water from the groundwater basin. The Mission Creek groundwater basin is currently recharged with water purchased by the DWA, which in turn exchanges SWP water for CRA water based on an agreement with MWD. As discussed in the previous section, a lack of available CRA water has resulted in low recharge in previous years, except for the unusually wet year of 2005. Due to lowering levels of groundwater and inconsistent availability of CRA water, this no action alternative would inevitably result in the need for construction of a conveyance system to provide SWP water directly to the Coachella Valley (described in Section 2.3).

The remaining alternatives involve production and supply of recycled water, and can be separated into treatment and distribution alternatives as follows:

4.1.1 Treatment Alternatives

Two alternative wastewater treatment scenarios were analyzed. Both include tertiary treatment at Horton Wastewater Treatment Plant, which involves converting Horton WWTP to tertiary standards, as well as increasing the treatment capacity from 2.3 mgd to 5 mgd in 2015. In addition, for both alternatives, the Desert Crest WWTP is planned to be abandoned during the second phase of construction of the Hot Springs Mobile Home Park (approximately 2009), and sewer flows routed to the Horton Plant . As described in previous sections, the projected wastewater generation by the year 2035 is 7.3 mgd. To treat this wastewater to tertiary standards so that it can be used for irrigation purposes, Alternatives 1 and 2 were analyzed as follows:

Alternative 1: In this alternative, tertiary treated effluent from the Horton Plant would supply irrigation demands to Tuscan Hills, Mission Lakes, Highland Falls and Palmwood. Around the year 2020, a Regional WWTP expandable to 3 mgd would be constructed to assist in treating wastewater flows in the District. The Regional WWTP would supplement irrigation demands at Highland Falls, Palmwood, and Mission Lakes, and provide recycled water to any other developments that are constructed south of Pierson Blvd. Therefore, the rate and location of development in the District will largely determine the capacity of the Regional Plant. Irrigation demands of the Desert Crest Country Club and Desert Dunes developments would be supplied by effluent from the Horton Plant. It should be noted that the Desert Dunes development is in the CVWD service area, and an agreement between MSWD and CVWD would be required for this

development to be serviced by MSWD. ***Figure 4-1*** shows existing and proposed treatment plants associated with Alternative 1.

Alternative 2: In this alternative, shown in ***Figure 4-3***, the Horton Plant would again supply tertiary treated recycled water to Tuscan Hills, Mission Lakes, Highland Falls and Palmwood beginning in 2015. Around 2020, a 2.5 mgd satellite plant would be required near Indian Avenue and Pierson Avenue. This satellite plant would treat wastewater from Highland Falls, Palmwood, and surrounding developments, and also provide tertiary treated recycled water to the golf courses in Palmwood and Highland Falls. Excess untreated water would be routed through existing sewer lines to Horton Plant during the winter months. The Satellite Plant would not provide solids treatment as the solids would be separated and discharged back to the sewers for treatment at either the Horton or Regional Plants. During high demand summer months, stored recycled water at the Horton Plant percolation ponds would supplement treated wastewater from the satellite plant. By 2035, a Regional WWTP may be necessary to supplement irrigation demands throughout the District, especially if there are new development projects south of Pierson Blvd.

4.1.2 Distribution Alternatives:

Three alternative pipeline and pump station layouts were analyzed. All distribution alternatives include the initial wastewater distribution system supplied from Horton WWTP and ultimate condition recycled water pipelines to serve Desert Crest and Desert Dunes. Each alternative assumes two pressure zones to serve potential recycled water users. The 1450 Zone will serve customers from elevation 1,100 feet to 1,300 feet, including Tuscan Hills and Mission Lakes. The 1800 Zone will serve customers at higher elevations including Palmwood and Highland Falls.

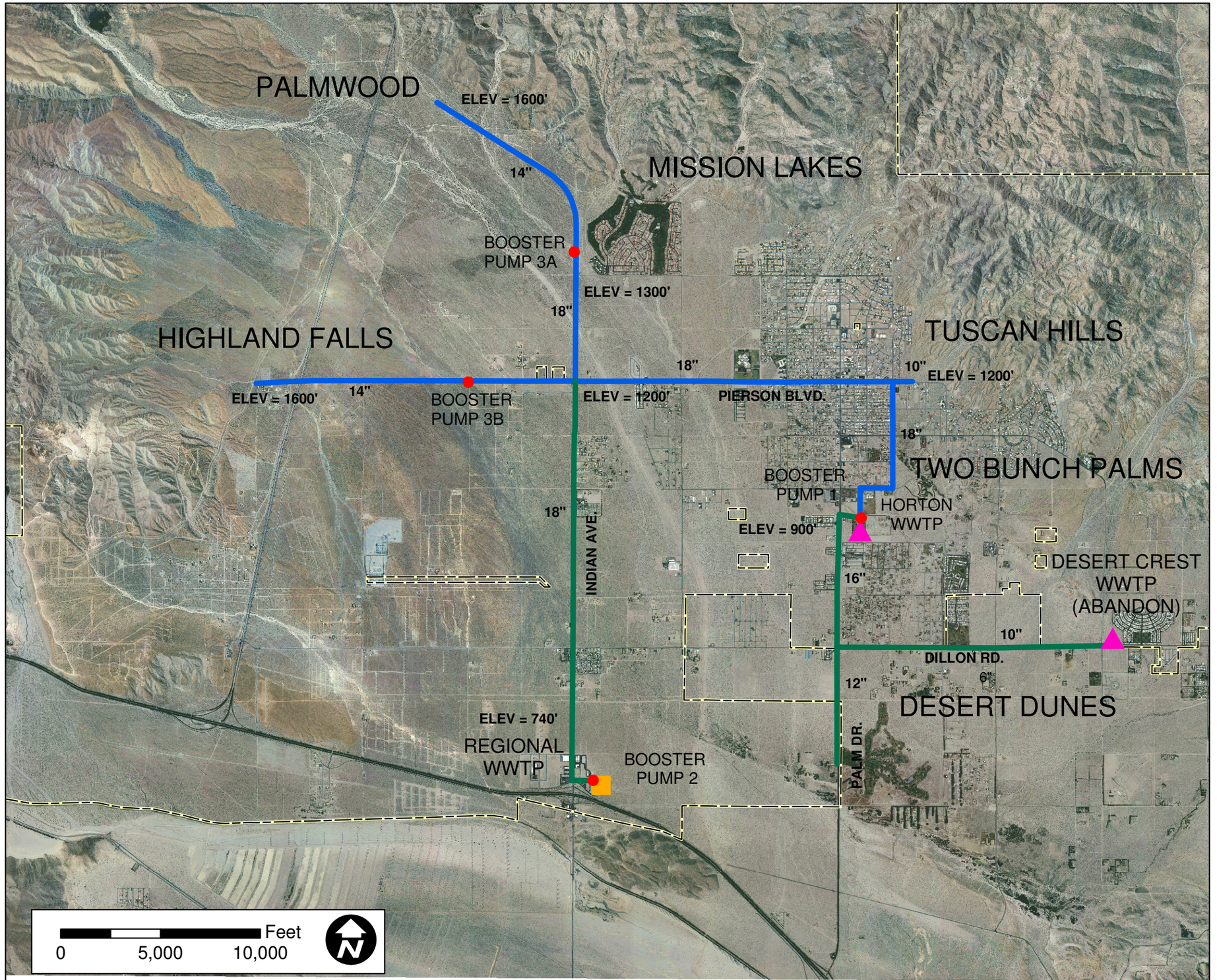
Alternative 1: Figure 4-1 shows the preliminary routing and sizing of pipelines and pump stations for Alternative 1. Booster Station Pump 1, located at Horton WWTP, is sized at 4,000 gpm based on ultimate conditions that include supply from the proposed Regional WWTP (see Treatment Alternatives). Average recycled water demand for the Tuscan Hills, Mission Lakes, Palmwood, and Highland Falls Developments equals approximately 3,300 gpm, or 4.8 MGD. Peak flows, however, are estimated to be equal to approximately 6,250 gpm, or 9 MGD. Once the Regional WWTP is online and incorporated into the recycled water distribution system, these peak demands can be met.

The pipeline alignment shown in ***Figure 4-1*** would require two booster pump stations to supply recycled water to the 1800 Zone (Highland Falls and Palmwood developments). Both stations, shown as Booster Pumps 3A and 3B, have been sized to supply approximately 2,000 gpm to meet projected peak demands.

Alternative 2: Alternative 2, shown on ***Figure 4-2***, includes an alternative pipeline alignment which would allow the use of only one booster pump station to supply the 1800 Zone. The pump station, shown as Booster Pump 3 in ***Figure 3-2***, would supply 4,000 gpm to the upper pressure zone. This alternative pipeline alignment, however, does

not follow existing roadways up to the Palmwood development. All other aspects of Alternatives 1 and 2 are the same. A final routing would have to be developed in consultation with MSWD including engineering and environmental review.

Alternative 3: Alternative 3 corresponds to the treatment alternative which includes the Satellite Plant at Indian and Pierson, and is shown in ***Figure 4-3***. This alternative involves a total of 5 booster pump stations as follows: Booster Pump 1 at Horton WWTP will be sized at 4,000 gpm and supply recycled water to Tuscan Hills and Mission Lakes, and supplement recycled water for use in Highland Falls and Palmwood Developments. Booster Pump 2 at the Regional WWTP will supply additional flow as development continues within Desert Hot Springs. Booster Pump 4 will be located at the Indian/Pierson Satellite WWTP and will boost 5000 gpm to Booster Pumps 3A and 3B, which will supply Highland Falls, Palmwood, and Mission Lakes.



M:\2MIS040500\watres\Water Supply Assessment\exhibit\mxd\Fig1-1_MSWDServiceArea.mxd

Water Recycling Feasibility Study
Desert Hot Springs

LEGEND

- PROPOSED_WWTP
- BOOSTER_PS
- EX_WWTP

PROPOSED RW PIPELINE

- INITIAL
- ADDITIONAL (YEAR 2020+)
- MSWD Service Area Boundary

1450 PRESSURE ZONE

BOOSTER PUMP 1

ELEVATION = 900'
TDH = 550'
PEAK FLOW = 4,000 GPM

BOOSTER PUMP 2

ELEVATION = 740'
TDH = 710'
PEAK FLOW = 2,700 GPM

1800 PRESSURE ZONE

BOOSTER PUMP 3A

ELEVATION = 1350'
TDH = 450'
PEAK FLOW = 2,100 GPM

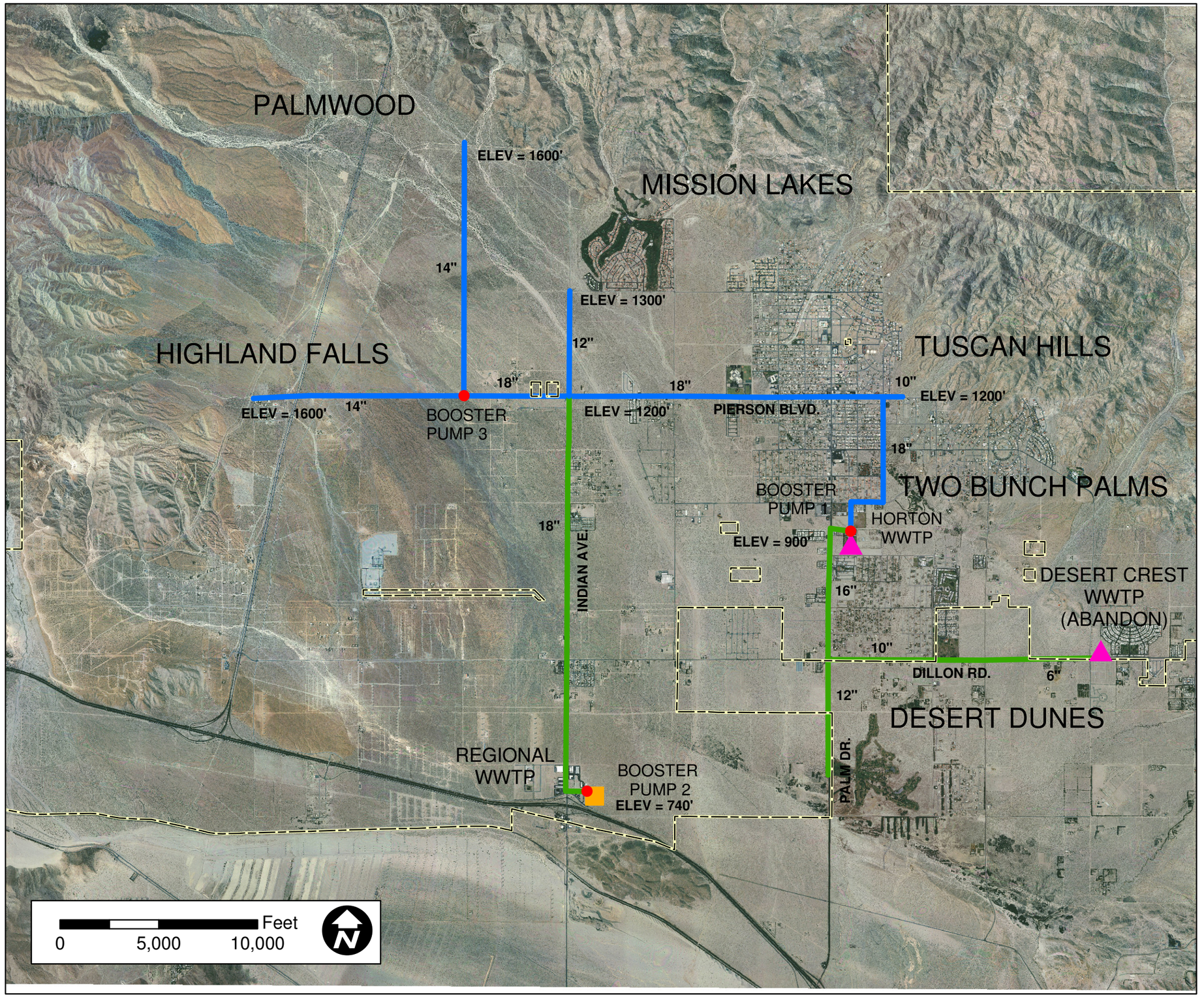
BOOSTER PUMP 3B

ELEVATION = 1350'
TDH = 450'
PEAK FLOW = 1,885 GPM

Treatment Alternative 1
Distribution Alternative 1

MSWD PSOMAS

Figure 4-1



M:\2MIS040200\Feasibility Study - Phase I\Exhibits\Fig 4-2 Alt2.mxd

Water Recycling Feasibility Study
Desert Hot Springs

LEGEND

- PROPOSED WWTP
- BOOSTER_PS
- EXISTING WWTP

PROPOSED RW PIPELINE

- INITIAL
- ADDITIONAL (YEAR 2020+)
- MSWD Service Area Boundary

1450 PRESSURE ZONE

BOOSTER PUMP 1

ELEVATION = 900'
TDH = 550'
PEAK FLOW = 4,000 GPM

BOOSTER PUMP 2

ELEVATION = 740'
TDH = 710'
PEAK FLOW = 2,700 GPM

1800 PRESSURE ZONE

BOOSTER PUMP 3

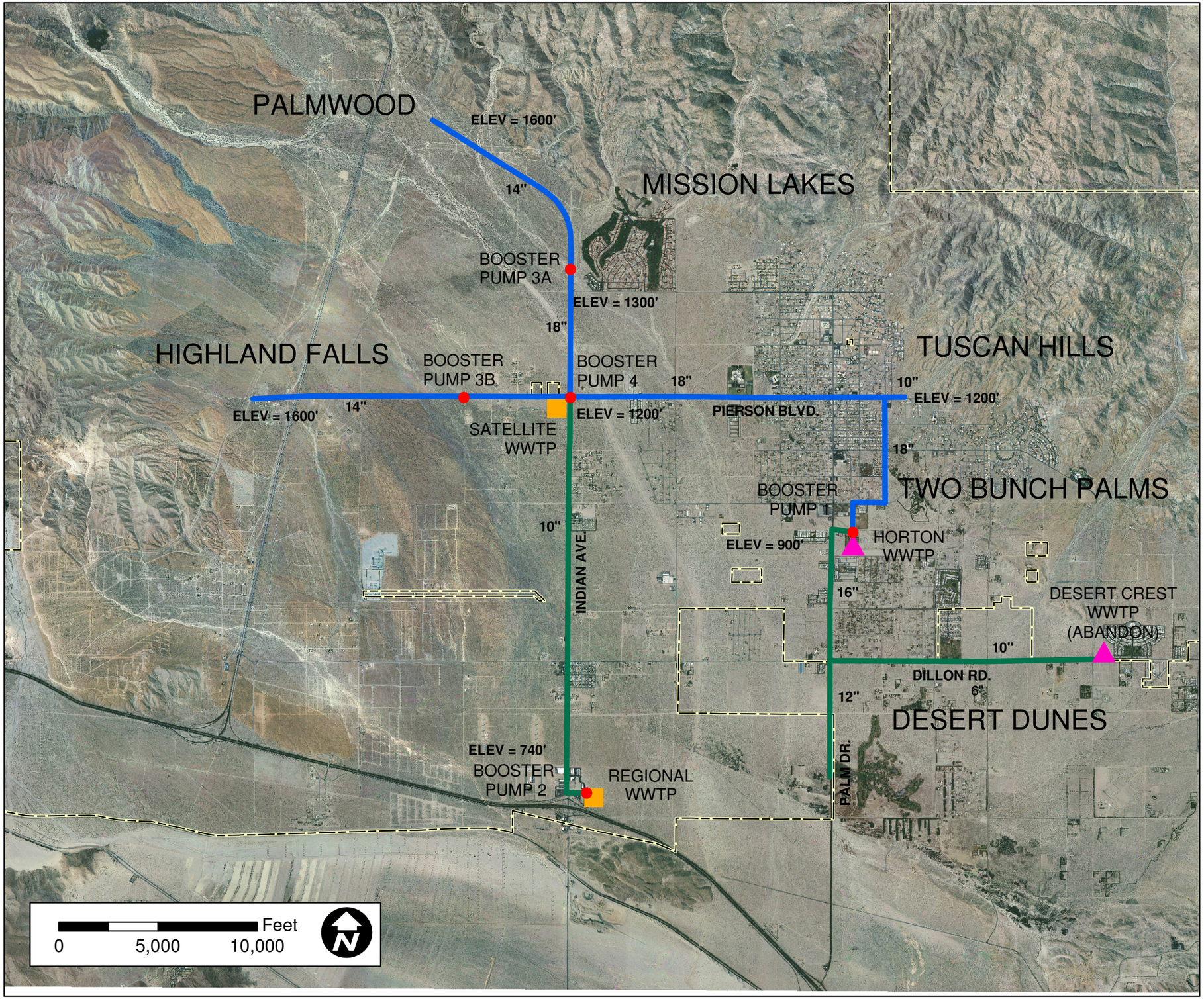
ELEVATION = 1350'
TDH = 450'
PEAK FLOW = 4,000 GPM

Treatment Alternative 1
Distribution Alternative 2

MSWD PSOMAS

Figure 4-2

Water Recycling Feasibility Study
Desert Hot Springs



M:\2MIS040200\Feasibility Study - Phase I\Exhibits\Fig 4-3 Alt3.mxd

LEGEND

- PROP_WWTP_3
- BOOSTER_PS_3
- EX_WWTP

PROPOSED RW PIPELINE

- INITIAL
- ADDITIONAL (YEAR 2020+)
- MSWD Service Area Boundary

1450 PRESSURE ZONE

BOOSTER PUMP 1

ELEVATION = 900'
TDH = 450'
PEAK FLOW = 4,000 GPM

BOOSTER PUMP 2

ELEVATION = 740'
TDH = 610'
PEAK FLOW = 700 GPM

1800 PRESSURE ZONE

BOOSTER PUMP 3A

ELEVATION = 1350'
TDH = 450'
PEAK FLOW = 2,100 GPM

BOOSTER PUMP 3B

ELEVATION = 1350'
TDH = 450'
PEAK FLOW = 1,885 GPM

BOOSTER PUMP 4

ELEVATION = 1200'
TDH = 232'
PEAK FLOW = 5,000 GPM

Treatment Alternative 2
Distribution Alternative 3

MSWD PSOMAS

Figure 4-3

4.2 Alternative Analysis

The following section describes benefits and disadvantages of each alternative. This section also provides construction cost opinions for the analyzed alternatives.

Treatment Alternative 1 requires two wastewater treatment plants to supply recycled water to all major developments through year 2035. Treatment Alternative 2, which entails the implementation of a Satellite Plant, may result in a total of three wastewater treatment plants. An advantage of using a Satellite Plant near Indian and Pierson would be the closer proximity to the golf courses at Palmwood and Highland Falls, minimizing pumping requirements. However, disadvantages would include higher capital and operations and maintenance (O&M) costs due to running an additional plant, as well as additional land requirements.

Distribution Alternative 2 does not follow existing roadways up to the Palmwood development. Although the capital cost of this alternative would be lower than following existing roadways, the implications may include the need for an easement as well as additional environmental permitting.

Distribution Alternative 3 corresponds to Treatment Alternative 2 and is the most costly of the evaluated options due to the need to operate a total of five booster stations to supply recycled water to developments with golf courses. ***Tables 4-1*** and ***4-2*** below summarize costs for treatment and distribution alternatives, respectively. ***Table 4-3*** lists O&M costs for booster pump stations associated with each alternative.

Table 4-1
Alternative Treatment Costs

Wastewater Treatment Plant	Current Capacity (gallons/day)	Projected Capacity (gallons/day)	Recycled Water Generation Cost $/gallon (a)	Total Cost
Alternative 1				
Horton WWTP (b)	2,300,000	5,000,000	3.00	$15,000,000
Desert Crest WWTP	180,000	Abandon	None	$0
Regional WWTP (b)	Future	3,000,000	3.00	$9,000,000
TOTAL	2,480,000	8,000,000		$24,000,000
Alternative 2				
Horton WWTP (b)	2,300,000	5,000,000	3.00	$15,000,000
Desert Crest WWTP	180,000	Abandon	None	$0
Satellite WWTP	Future	2,500,000	4.00	$10,000,000
Regional WWTP (b)	Future	1,000,000	3.00	$3,000,000
TOTAL	2,480,000	8,500,000		$28,000,000
Notes:				
a) Includes design and construction. Does not include operation and maintenance.				
b) Cost includes tertiary treatment only, as secondary treatment will be necessary due to District growth.				

Table 4-2
Alternative Distribution Costs

SCENARIO	Pipelines				Pump Stations			Total Cost (a)
	Length (feet)	Diameter (inches)	Cost/LF	Cost (a)	Name	Size (HP) (b)	Cost (a)	
Alternative 1								
Horton WWTP to Interconnect	1,160	10	$113	$131,000	BP-1	959	$2,226,000	$7,017,000
	24,400	18	$191	$4,660,000				
Horton WWTP to Desert Crest and Desert Dunes	6,000	12	$125	$750,000	None	None	$0	$3,644,000
	13,800	10	$113	$1,559,000				
	7,900	16	$169	$1,335,000				
Interconnect to Palmwood	11,200	14	$148	$1,658,000	BP-3A	412	$1,965,000	$4,861,000
	6,480	18	$191	$1,238,000				
Interconnect to Highland Falls	10,700	14	$148	$1,584,000	BP-3B	370	$1,764,000	$4,399,000
	5,500	18	$191	$1,051,000				
Regional WWTP to Interconnect	20,900	18	$191	$3,992,000	BP-2	835	$2,401,000	$6,393,000
Total - Alternative 1	108,040			$17,958,000			$8,356,000	$26,310,000
Alternative 2								
Horton WWTP to Interconnect	1,160	10	$113	$131,000	BP-1	959	$2,226,000	$7,037,000
	24,500	18	$191	$4,680,000				
Interconnect to Mission Lakes	5,400	12	$125	$675,000	None	None	$0	$675,000
Interconnect to Booster Pump 3	5,400	18	$191	$1,031,000	BP-3	784	$2,254,000	$3,285,000
Booster Pump 3 to Palmwood	12,900	14	$148	$1,909,000	None	None	$0	$1,909,000
Booster Pump 3 to Highland Falls	10,700	14	$148	$1,584,000	None	None	$0	$1,584,000
Horton WWTP to Desert Crest and Desert Dunes	6,000	12	$125	$750,000	None	None	$0	$3,644,000
	13,800	10	$113	$1,559,000				
	7,900	16	$169	$1,335,000				
Regional WWTP to Interconnect	20,900	18	$191	$3,992,000	BP-2	835	$2,401,000	$6,393,000
Total - Alternative 2	108,660			$17,646,000			$6,881,000	$24,530,000

Table 4-2
Alternative Distribution Costs, *(Continued)*

SCENARIO	Pipelines				Pump Stations			Total Cost (a)
	Length (feet)	Diameter (inches)	Cost/LF	Cost (a)	Name	Size (HP) (b)	Cost (a)	
Alternative 3								
Horton WWTP to Interconnect	1,160	10	$113	$131,000	BP-1	784	$2,255,000	$7,046,000
	24,400	18	$191	$4,660,000				
Horton WWTP to Desert Crest and Desert Dunes	6,000	12	$125	$750,000	None	None	$0	$3,644,000
	13,800	10	$113	$1,559,000				
	7,900	16	$169	$1,335,000				
Satellite WWTP to Palmwood and Highland Falls	21,900	14	$148	$3,241,000	BP-3A	412	$1,965,000	$11,412,000
	11,980	18	$191	$2,288,000	BP-3B	370	$1,764,000	
					BP-4	539	$2,154,000	
Regional WWTP to Interconnect	20,900	10	$113	$2,362,000	BP-2	186	$1,560,000	$3,922,000
Total - Alternative 3	108,040			$2,362,000			$9,698,000	$26,020,000

Notes:

a) Capital costs ($/LF of pipe and $/HP of pump station) obtained from the IRWD Water Resources Master Plan, dated 1/5/2000, and converted to current Year 2006 costs using ENR index.

b) Value represents total for all pumps that may be required as part of the overall distribution system. Total HP calculated from required flow and head.

Table 4-3
O&M Costs for Booster Pump Stations and Wells

Name	Size (HP) (b)	kW	Cost/year
Alternative 1			
BP-1	959	715	$939,700
BP-2	835	623	$818,200
BP-3A	412	307	$403,700
BP-3B	370	276	$362,500
Wells	480	358	$470,300
Total			$2,994,400
Alternative 2			
BP-1	959	715	$939,700
BP-2	835	623	$818,200
BP-3	784	585	$768,200
Wells	480	358	$470,300
Total			$2,996,400

Table 4-3
O&M Costs for Booster Pump Stations and Wells, *(Continued)*

Name	Size (HP) (b)	kW	Cost/year
Alternative 3			
BP-1	784	585	$768,200
BP-2	186	139	$182,300
BP-3A	412	307	$403,700
BP-3B	370	276	$362,500
BP-4	539	402	$528,100
Wells	480	358	$470,300
Total			$2,715,100

Table 4-4
O&M Costs for Pipelines

Pipelines			
Length (feet)	**Diameter (inches)**	**Cost/LF-year***	**Cost/year**
Alternative 1			
14,960	10	$1	$14,960
6,000	12	$1	$7,200
21,900	14	$1	$30,660
7,900	16	$2	$12,640
57,280	18	$2	$103,104
Total			$169,000
Alternative 2			
14,960	10	$1	$14,960
11,400	12	$1	$13,680
23,600	14	$1	$33,040
7,900	16	$2	$12,640
50,700	18	$2	$91,260
Total			$166,000
Alternative 3			
35,860	10	$1	$35,860
6,000	12	$1	$7,200
21,800	14	$1	$30,520
7,900	16	$2	$12,640
36,300	18	$2	$65,340
Total			$152,000

* Cost per LF per year per diameter inch = $0.10

4.3 Analysis of Affect on Water Supply Management

Water reuse can potentially defer or eliminate the development of new or expanded water supplies and thus reduce the associated added costs of these supplies to the District. Proposed development described in this report, including Palmwood, Highland Falls, and Tuscan Hills, in addition to existing developments within the District, will bring the total irrigation demand to almost 8,000 AFY. Because of decreasing groundwater levels and inconsistent availability of CRA water through the agreement with MWD, there may be a need to provide additional water supplies through the Desert Aqueduct to meet these demands, as described in Section 2.3. Water from the Desert Aqueduct would cost approximately $1,036 per AF. The cost of developing a recycled water system is economically competitive. By implementing a recycled water project, the need for the Desert Aqueduct could potentially be deferred or eliminated.

5 Economic Analysis of Alternatives

Three scenarios for treatment and distribution alternatives were explored during the economic analysis of alternatives. The first scenario includes Treatment Alternative 1 and Distribution Alternative 1, as described in Section 4.1. The second scenario involves Treatment Alternative 1 and Distribution Alternative 2, as shown on ***Figure 4-2***. The third scenario entails Treatment Alternative 2 and Distribution Alternative 3. ***Table 5-1*** summarizes these scenarios and includes capital and O&M costs for each.

The most costly scenario for production and supply of recycled water for irrigation demands is Scenario 3, as shown in ***Table 5-1***, and will be used for comparison to the alternate supply source, which is groundwater recharge through the Desert Aqueduct as described in Section 2.3. This recycled water scenario involves upgrading the Horton Plant to tertiary standards, constructing a Satellite WWTP near Indian Avenue and Pierson Blvd, and constructing a Regional WWTP to treat wastewater to tertiary standards. The distribution alternative corresponding to this treatment alternative requires a total of five booster pump stations to supply irrigation demands at the various developments within Desert Hot Springs. This scenario also requires pumping from three wells at the Horton WWTP percolation ponds, which would be used for seasonal storage.

Dividing the annual cost of the worst-case scenario of $6.99 million by the average irrigation demand of 7,998 AFY results in a cost of $874 per acre-foot for recycled water produced and delivered using the scenario described above. As described in Section 2.3, the cost of providing additional water supplies to the Coachella Valley through the Desert Aqueduct totals $1,040 per acre-foot.

Table 5-1
Scenarios for Recycled Water Production and Supply

	Scenario 1	**Scenario 2**	**Scenario 3**
Treatment	$25,500,000	$25,500,000	$28,000,000
Distribution	$26,310,000	$24,530,000	$26,020,000
Storage	$3,000,000	$3,000,000	$3,000,000
Total Capital	$54,810,000	$53,030,000	$57,020,000
Annual Capital (1)	$2,830,000	$2,740,000	$2,940,000
Annual O&M - treatment (2)	$803,000	$803,000	$1,178,000
Annual O&M - distribution (3)	$3,159,000	$3,166,000	$2,872,000
Total Annual	$6,792,000	$6,709,000	$6,990,000

Notes:
(1) Interest rate is 4.608%, over 50 years.
(2) Tertiary treatment O&M costs estimated at $0.11 per gpd per year. Satellite plant O&M costs estimated at $0.26 per gpd per year
(3) From Tables 4-3 and 4-4.

6 Environmental Analysis of Alternatives

Environmental analysis associated with this study is included in the *MSWD Recycled Water Project Initial Study with Mitigated Negative Declaration/Environmental Assessment with Finding of No Significant Impact* (Psomas, July 2006).

7 Legal and Institutional Requirements

7.1 Consultation Activities

Other than consultation with the Bureau of Reclamation, no other consultation has occurred between MSWD and Federal, State, regional, and local authorities during this feasibility study. Prior to implementation of any of the projects listed in this study, consultation with the appropriate agency or agencies will be made, if deemed necessary. Most, if not all, of the pipelines envisioned in this study are proposed to be constructed within public roads or right-of-ways. Addition of tertiary treatment facilities and a recycled water pump station at the Horton Wastewater Treatment Plant are proposed to be constructed within the current treatment plant area. Additional pump stations and reservoirs would be proposed to be sited so as not to disturb any habitat or other area that could adversely impact any endangered species, wetland, waters of the U.S., etc. as described in Federal, State, regional or local authorities' requirements. The tertiary treatment facilities proposed at the Regional Wastewater Treatment Plant would be constructed along with the construction of primary and secondary treatment facilities at this location and covered in any environmental analysis for that plant. If implementation of the alternative that includes a Satellite Wastewater Treatment Plant is ultimately selected, the impacts associated with locating, constructing and operating a separate wastewater reclamation plant would also have to be covered in a separate environmental analysis.

7.2 Public Health and Environmental Health Issues

Each recycled water alternative would have basically the same public health and environmental regulatory requirements with the exception of the alternative that includes a separate Satellite Treatment Plant. As tertiary treatment facilities are added to each plant, waste discharge requirements will be issued by the State Regional Water Quality Control Board and the California Department of Health Services governing the treatment and disposal or reuse of the treated wastewater. For the Horton and Regional Wastewater Treatment Plants, the reuse requirements issued when tertiary facilities are added will be issued in conjunction with the existing and proposed treatment facilities. For the separate Satellite Treatment Plant, separate waste discharge requirements would be issued.

Typical requirements relate to such things as maintaining proper treatment and disinfection levels that will be assured by requiring proper reliability of facilities and monitoring and reporting on water quality, avoiding human contact during irrigation periods, utilizing proper construction techniques with adequate separation between potable and recycled water pipelines, monitoring recycled water irrigation facilities to assure that excessive runoff is not occurring, and requiring proper markings on recycled water facilities for identification purposes.

7.3 Federal, State, and Local Environmental Regulatory Requirements

All recycled water alternatives should be able to meet the applicable Federal, State, and local environmental regulatory requirements equally, with the exception of the one that includes implementation of the Satellite Treatment Plant near Indian Avenue and Pierson due to the fact that it would be a significant, separate construction site that would not be included in any of the other alternatives. During preparation of any required future environmental documentation the following applicable Federal, State, Regional and local laws would be addressed including but not limited to:

7.3.1 Federal Clean Water Act

Section 404 of the Federal Clean Water Act regulates the discharge of dredged or fill material into areas delineated as "Waters of the United States" (33 CFR 328.3). The U.S. Army Corps of Engineers (Corps) has jurisdiction over waters of the United States and permitting authority under Section 404. Section 401 of the Federal Clean Water Act, which regulates (in general) the water quality component of wetland and non-wetland Waters of the U.S., is administered by the State and Regional Water Quality Control Boards. In California, the responsibility for certifying compliance with the federal Clean Water Act has been delegated to the State Water Resources Control Board.

7.3.2 Federal Endangered Species Act

The Endangered Species Act of 1973, as amended (ESA), protects species listed as endangered or threatened from "taking", which is defined as any action that would "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect" any threatened or endangered species. The ESA also regulates actions that would modify or degrade habitat to an extent that significantly impairs essential activities of listed species (breeding, feeding, or sheltering). The U.S. Fish and Wildlife Service (USFWS) administers the federal ESA.

Federal agencies that undertake projects or issue permits or licenses for projects are required to ensure that such projects or issuance of permits or licenses will not jeopardize the continued existence of any federally listed species.

7.3.3 Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) protects most native bird species from destruction or harm. This protection extends to individuals as well as any part, nest, or eggs of any bird listed as "migratory". Nearly all native North American bird species are on the MBTA list.

In practice, permits issued by resource agencies typically have conditions that require pre-disturbance surveys for nesting birds and, in the event that nesting is observed, a buffer area with a specified radius would be established, within which no disturbance or

intrusion would be allowed until the young had fledged and left the nest. If not otherwise specified in the permit, the size of the buffer area would vary with species and local circumstances (e.g. presence of busy roads), and would be based on the professional judgment of a monitoring biologist.

7.3.4 California Fish and Game Code

Analogous to the MBTA, Sections 335 through 337 of the California Fish and Game Code regulate the taking of migratory birds and their nests.

Sections 1600, et seq., of the California Fish and Game Code regulate actions affecting streambeds. Section 1600 regulates private projects that have potential to affect streambeds. The California Department of Fish and Game (CDFG) administers this code.

7.3.5 California Endangered Species Act

Sections 2050, et seq., of the California Fish and Game Code comprise the California Endangered Species Act (CESA). In general, the provisions of CESA parallel the main provisions of the federal ESA, but unlike the ESA, CESA protection extends to species proposed for listing (i.e. candidate species) in some circumstances.

7.3.6 Native Plant Protection

Sections 1900, et seq., of the California Fish and Game Code protect California native plants. Criteria for whether or not a plant species qualifies for protection are determined by CDFG, based on presence/absence of immediate threat to the species and/or population size. CDFG considers the rarity status of plants in their environmental analysis of a project, regardless of whether or not the species in question is officially listed as threatened or endangered. The Natural Heritage Program of CDFG administers a state database, the California Natural Diversity Database (CNDDB), which lists all plant and wildlife species of various ranks, including many that are not candidates and are not listed as threatened or endangered.

7.4 Current Versus Proposed Use of Reclaimed Water

The current use of reclaimed water is disposal to evaporation/percolation ponds adjacent to the Horton Wastewater Treatment Plant. The impacts of continuing with this method of disposal would be increased loss of the volume of water that is currently evaporated to the atmosphere that is significant, especially in the summer months.

Additionally, continued discharge of secondarily treated wastewater that will increase nitrate levels in the groundwater basin. As wastewater flows increase in the District, more land will need to be made available to these ponds and the above impacts will increase proportionately.

With the proposed recycled water projects, higher levels of treatment will be employed and the water will be beneficially used to eliminate the need for pumping groundwater from the basin to irrigate golf courses, parks, schools and open spaces. Even though these higher levels of treatment are not proposed to remove nitrates, the level of nitrates discharged to the groundwater basin should be significantly lowered due to their uptake by turf and landscaping in the evapotranspiration process. While all recycled water alternatives propose to continue the use of the existing percolation ponds at the Horton Plant no additional ponds will be needed and they will only be utilized to store water in the groundwater basin in the immediate area of the Plant during winter months and then this water will be removed in summer months so that no net discharge occurs on an annual basis.

Water rights should not be impacted since any treated wastewater currently discharge is the property of the Mission Springs Water District and they have the right to beneficially reuse any and all of this effluent.

7.5 Other Legal and Institutional Requirements

All of the recycled water alternatives included in this study would provide benefits to the achievement of Regional Water Quality Control Board basin plan objectives in that higher levels of treatment would be employed at the District's existing and proposed wastewater treatment plants. Although not currently in violation of these objectives, the higher level of treatment and beneficial reuse as compared to the current practice of evaporation/percolation of secondarily treated effluent would be a regional benefit and a positive step towards meeting existing and future water quality standards.

7.6 Unresolved Issues

Unresolved issues associated with the project would be timing of the proposed golf course projects and economic/financing of the project.

The timing of the three proposed large golf course communities, Palmwood, Tuscan Hills and Highland Falls is currently relatively uncertain. When and which one of these communities starts construction first will go a long way in determining when and how the recycled water system develops for Mission Springs Water District. The District could however, start a smaller recycled water system to serve only the existing Mission Lake golf course and start talks with Coachella Valley Water District relative to providing recycled water to the Desert Dunes golf course within their water service area but relative close by and down gradient from the existing Horton Wastewater Treatment Plant.

Additionally, economic affordability would seem to be a major factor for the District since, as discussed in Section 8.0, following. Sewer connection fees and sewer user fees would have to be increased significantly and a new, substantial recycled water connection fee would have to be implemented along with some form of debt financing and/or grant assistance to assure the implementation of a recycled water program.

Research and application for any applicable grants or financial assistance such as low-interest loans should be pursued by the District while the timing of the proposed golf course communities within the District becomes more concrete.

8 Financial Capability of the Sponsor

This section explores funding options and proposed scheduling for the implementation of a recycled water project including construction, operation, and maintenance of the recycled water system. Rate-setting strategies are analyzed to attenuate the financial burden of implementing the recycled water system in the MSWD area. This section is complemented by ***Appendix A, Financial Proforma***, which provides a preliminary timeline and potential funding scenario for this project.

Table 8-1 summarizes the total costs to produce and supply recycled water in MSWD, using the lowest cost Scenario 2 as discussed in Section 5. Costs are separated into capital and O&M. Capital costs consist of construction costs associated with tertiary treatment of wastewater, as well as construction costs associated with recycled water distribution. O&M costs include costs associated with the operation and maintenance of tertiary treatment systems and operation and maintenance costs associated with the distribution system (i.e. energy, chemicals, labor, etc.).

Table 8-1
Recycled Water Production and Supply Costs

Item	Cost
Treatment	$25,500,000
Distribution	$24,530,000
Storage	$3,000,000
Total Capital Cost	$53,030,000
Annual O&M - treatment	$803,000
Annual O&M - distribution	$3,166,000

The schedule for implementing the recycled water project discussed in this report depends to a great extent on the timing and location of new development throughout the District. Irrigation demands were calculated from existing and proposed development projects within MSWD. Recycled water availability for irrigation depends on wastewater generation, which in this report was based on population projections. ***Table 3-2*** in Section 3.1 provides an estimate of recycled water phasing projections. Although this table provides an approximate timeline of wastewater treatment and irrigation demands, a project schedule cannot be finalized until it becomes clear when the proposed development projects will be constructed. Therefore, a flexible recycled water system is important.

For purposes of this study, a cost timeline was developed for phasing of the proposed developments, capital projects, and funding including bond repayments (the first thirty-two years). This timeline, which begins in 2008 and ends in 2040, is based on the recycled water production and supply costs presented above, as well as the irrigation demand and wastewater generation projections included in Section 3. It must be noted that all costs and schedules are purely estimates, due to the uncertain nature of the

schedule for this project, and shall only be interpreted as an example plan for the financing of the project. ***Appendix A*** presents a Financial Proforma table which lays out the timeline, as well as assumptions and notes on how costs and revenue were generated and financing scheduled. The following sections discuss funding sources, rate setting strategies, and other funding opportunities.

8.1 Funding for Capital Costs

Tertiary treatment costs are usually recovered from wastewater users, spreading the costs over the wastewater utility's entire customer base. For capital cost recovery, the current sewer connection fee can be increased for all new sewer system users to cover tertiary treatment capital costs.

The capital costs for tertiary treatment include the upgrade of the Horton Wastewater Treatment Plant to tertiary treatment standards, and construction of the tertiary treatment system of the Regional Plant. Currently, the total wastewater flow treated at the existing Horton and Desert Crest wastewater treatment plants is 1.35 mgd. These existing users will not contribute to the tertiary treatment capital costs, as they have already paid a sewer connection fee. The total wastewater generation estimated at year 2035 is 7.3 mgd. Therefore, new user wastewater flow amounts to 5.95 mgd. Using a wastewater generation factor of 250 gal/day/EDU (gallons per day per equivalent dwelling unit), the flow from new users is converted to 23,800 EDU's. Dividing the tertiary treatment capital costs of $25,500,000 by the total number of new EDU's, $1,071 is calculated as an additional sewer connection fee over and above the fee currently being charged by the District. To cover the large up-front capital costs incurred in the first years of the program, this additional connection fee was raised to $1,176 in the Financial Proforma table in ***Appendix A***.

The capital costs for the recycled water distribution system, which includes design and construction of reclaimed water pipelines, pump stations, and wells, totals approximately $27,530,000. This cost can be covered by a reclamation connection fee charged to new recycled water customers. To account for demand from existing users such as the Mission Lakes golf course, the domestic water connection fee can be increased as well. The rationale for this increase is that the Mission Lakes conversion to recycled water will free up groundwater supply for potable use.

Current developments account for a total irrigation water use of about 3,500 AFY. These users have already paid a cost for connecting to the potable water system; therefore, the reclamation connection fee should be waived for these customers. Future users are estimated to generate an irrigation demand of approximately 4,500 AFY. A reclamation connection fee for new users of $3,000/AFY was estimated based on the alternative cost of drilling wells and constructing distribution systems to irrigate with groundwater. This cost per AFY is approximately half of the current domestic connection fee rate per AFY being charged by the District.

Additional domestic water connection fees were estimated by considering the existing Mission Lakes golf course demand of 1,171 AFY. The cost of converting Mission Lakes to reclaimed water is $3,510,000 (1,171 AFY x $3,000/AFY). Dividing this cost by the total number of new domestic water users (23,800 EDUs), an additional domestic connection fee of $147 per EDU is obtained. This fee increase will help attenuate the large capital cost of the recycled water distribution system.

8.2 Funding for Operation and Maintenance Costs

Annual Operation and Maintenance (O&M) costs for tertiary treatment equal approximately $803,000, and recycled water distribution annual O&M costs total almost $3,166,000. O&M costs can be funded by sewer user rates and recycled water sales. It is appropriate that sewer users cover costs of tertiary treatment O&M, and recycled water users cover costs for distribution O&M.

The total wastewater generation estimated in 2035 is 7.3 mgd. Using a factor of 250 gal/day/EDU, this equates to 29,200 EDU's which will be charged a monthly sewer user rate. The monthly rate to meet O&M expenditures for tertiary treatment is approximately $67,000, or $2.30 per month per EDU. This rate is in addition to the $15.06 per month per EDU currently charged to sewer users. The additional sewer user charge can be justified in order to eliminate the need for continued evaporation or percolation of secondary treated effluent.

The total recycled water demand estimated in 2035 is 7,998 AFY. Dividing the yearly O&M costs of $3,166,000 by this total recycled water demand, the rate per ccf comes out to $0.91, which is the recommended rate for new recycled water users. In comparison, the MSWD currently charges $0.92 per ccf for potable water.

8.3 Alternate Potential Funding Opportunities

Because revenue from connection fees and user rates will not be available in the early years of the recycled water project, the District will need to finance initial capital and O&M costs through other sources. ***Appendix A*** provides one example of how these programs can support the District throughout the project. The following programs can assist municipalities in the funding of a recycled water program. For purposes of this review, it is assumed that the program would consist of treated wastewater that would be utilized for groundwater recharge and/or municipal uses including irrigation.

1. **Integrated Regional Water Management (IRWM) Grant Program – State Water Resources Control Board (Proposition 50).** The 2nd funding cycle is anticipated to begin in Fall 2006.
   - ***Planning Grant Program*:** Provides $10 million for planning grants that foster development or completion of IRWM Plans, to enhance regional planning efforts, and to assist more applicants to become eligible for Implementation Grant Funding.

- ***Implementation Grant Program*:** Provides $150 million for projects that protect communities from drought, protect or improve water quality, improve local water security by reducing dependence on imported water and include at least one of the specified projects detailed in the application guidelines. Projects must be an implementation measure of an adopted IRWM Plan, and proposals must be submitted by a regional agency or regional group, as long as at least one of the members is a public agency or non-profit entity.

This is to encourage integrated regional strategies for management of water resources and promote a new model for water management.

2. State Revolving Fund (SRF) Loan Program – State Water Resources Control Board (Clean Water Act)

- ***SRF Loan Program*** – Implements the Clean Water Act, among various State laws, and provides low-interest loan funding for construction of publicly-owned wastewater treatment facilities, local sewers, sewer interceptors, water reclamation facilities, as well as expanded use projects such as implementation of nonpoint source (NPS) projects or programs, development and implementation. There is no limit on the loan amount. Applications are currently being accepted (as of August 2004) to be placed on a priority list.

3. I-Bank - Infrastructure State Revolving Fund (ISRF) Loan Program – CA Technology, Trade and Commerce Agency

- ***I-Bank Loan Program* –** Provides loans from $250,000 to $10 million with terms up to 30 years for any of the following types of projects: City streets, County highways, State highways, Drainage, Water supply and flood control, Educational facilities, Environmental mitigation measures, Parks and recreational facilities, Port facilities, Public transit, Sewage collection and treatment, Solid waste collection and disposal, Water treatment and distribution, Defense conversion, Public safety facilities, and Power and communications facilities. Applications are currently being accepted (as of August 2004) to be placed on a priority list.

4. U.S. Department of the Interior Bureau of Reclamation – Title XVI of Public Law 102-575

- ***Title XVI* –** Provides a program for Federal participation of specific water reuse projects. Water reuse projects are defined as projects which reclaim and reuse municipal, industrial, domestic, or agricultural wastewater, or naturally impaired groundwater and/or surface waters. Reclamation is authorized to participate in water recycling projects at funding levels up to 25 percent of the total project cost. However, section 1631 limits the Federal contribution to a maximum of $20 million (1996 dollars) per project. The Act requires the sponsor to provide at least 75 percent of the total planning, design, and construction costs. In addition, the sponsor must pay all operation and maintenance costs for the project.

9 Research Needs

Since all technologies being considered to develop a recycled water system for MSWD have been utilized successfully many times in the past, there are no new research needs to be considered in this study. Treatment, pumping, and pipeline distribution system infrastructure are common facilities and difficult to improve upon.

10 References

The following documents were used in conjunction with discussion with Mission Springs Water District staff in preparing this water supply assessment:

Carollo Engineers, 2006, *Mission Springs Water District Alan L. Horton WWTP Expansion No. 5*

CVWD, 2005, *Mission Creek Spreading Facility Urban Water Management Plan 2005*

CVWD, 2006, *Engineer's Report on Water Supply and Replenishment Assessment, Mission Creek Sub-basin Area of Benefit 2006-2007.*

DWR, 1964. *Coachella Valley Investigation.* Bulletin No. 108, July 1964. 145 p.

DWR, 2002, *State Water Project Delivery Reliability Report* .

DWR, 2003. *California's Groundwater*, Bulletin No. 118 Update.

DWR, 2005. *California Water Plan Update 2005, Volume – Resource Management Strategies.*

IRWD, 2000. *Water Resources Master Plan*

Mission Springs Water District, 2005. *Mission Springs Water District Urban Water Management Plan 2005.*

Mission Springs Water District, 2004. *Water Conservation Master Plan*, September 2004.

Mission Springs Water District, *2006, Hot Springs Mobile Home Park Water Supply Assessment.*

Psomas, 2004. *Desert Hot Springs Water Recycling Appraisal Study: Integrated Resource Plan - Phase I.* Prepared for MSWD and USBR, November 2004.

Psomas, 2004. *Hydrogeologic Evaluation and Drawdown Analysis for Little Morongo / 900 Zone Well Project Mission Creek Subbasin,* January 23, 2004.

Psomas, 2006. *Mission Springs Water District Recycled Water Project Initial Study with Mitigated Negative Declaration/Environmental Assessment with Finding of No Significant Impact*, July 2006.

URS Corp. (under contract to U.S. Army Corps of Engineers), 2005. Comprehensive *Water System Master Plan for Mission Springs Water District - Draft,* Received by Board of Directors October 17, 2005.

Appendix A

Financial Proforma

Appendix A – Financial Proforma

This Appendix describes an example of how the District might finance a recycled water project, as described in this report. The capital and O&M costs for the project are based on Scenario 2 from Section 5, which includes the upgrade of the existing Horton WWTP, as well as a new Regional tertiary WWTP, and a distribution system per Distribution Alternative 2, as illustrated in ***Figure 4-2***.

Table A-1 presents a cash flow analysis beginning in 2008 and ending in 2040. This schedule assumes sewer connection fees, sewer user rates, and domestic connection fees can be raised starting in 2008, to generate income before the first capital costs are incurred in 2009. Annual capital and O&M costs are based on irrigation demand and wastewater generation projections included in Section 3 of the report. See ***Table A-1*** "Notes and Assumptions" for a more detailed description of these costs.

To cover the initial capital costs of upgrading the Horton treatment plant to tertiary and constructing the recycled water distribution system to serve the Mission Lakes, Tuscan Hills, and Highland Falls golf courses and the Two Bunch Palms project, this financial proforma includes a bond sale in 2009, re-paid over 15 years at 3% interest. This interest rate is approximately what is offered by the State Revolving Fund low interest loans, as described in Section 8 of the report. In addition, a matching grant is assumed in 2010 to allow some accumulation of funds to attenuate future capital and O&M costs.

During the period from 2015 to 2020, the design and construction of the Regional tertiary WWTP may be required, as well as the distribution system from the Regional plant up to the interconnection with the first distribution system, and the pipeline from the Horton plant to the Desert Crest and Desert Dunes golf courses. Therefore, according to this financing plan, another bond sale would occur during this time, including another 50% matching grant.

As shown in ***Table A-1***, income from connection fees, sewer user rates, and recycled water sales ensure that a repayment stream is adequate to cover the debt service on the bonds. This financial proforma demonstrates that both bond sales would be paid off by 2040 resulting in a positive net cash flow.

The Financial Proforma table included in this appendix is a simplified plan that contains various limitations. First, all costs are in 2007 dollars and connection fees and user rates were assumed to remain constant throughout the planning period (inflation in costs and revenues are assumed to cancel out). This may or may not be the case, but fees and charges can be lowered or increased with time as capital projects are completed and O&M costs are tracked against inflation. This plan also includes 50% matching grants to cover capital costs. Of course, if matching grants cannot be obtained, other sources of funding would be needed or rates and fees would need to be higher than assumed. Finally, all rate and fee increases depend entirely on approval from the Board of Directors of the District. However, solutions to these items are beyond the scope of this

feasibility-level report. As previously stated, this plan shall only be interpreted as a preliminary example for the financing of the recycled water project for the MSWD.

Mission Springs Water District
Recycled Water Feasibility Study
Table A-1
Financial Proforma

Yearly Costs

	2008	2009	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035	2040	Totals
Capital Costs - Treatment	$0	$3,420,000	$7,980,000	$0	$1,080,000	$2,520,000	$0	$0	$10,500,000	$0	$0	$0	$0	**$25,500,000**
Sewer Connection Fees	$2,352,000	$1,411,200	$1,411,200	$1,505,000	$1,505,000	$1,505,280	$1,505,000	$1,505,000	$3,763,200	$3,293,000	$3,293,000	$2,822,000	$2,822,400	**$25,870,880**
Total	$2,352,000	($2,008,800)	($6,568,800)	$1,505,000	$425,000	($1,014,720)	$1,505,000	$1,505,000	($6,736,800)	$3,293,000	$3,293,000	$2,822,000	$2,822,400	**$3,193,280**
Capital Costs - Distribution	$0	$3,774,300	$8,806,700	$0	$900,000	$2,100,000	$572,700	$1,336,300	$10,037,000	$0	$0	$0	$0	**$27,527,000**
Reclamation Connection Fees	$0	$0	$0	$8,689,000	$1,075,000	$1,075,000	$1,075,000	$1,075,000	$2,016,000	$4,705,000	$0	$0	$0	**$19,710,000**
Domestic Water Connection	$558,600	$176,400	$176,400	$188,160	$188,160	$188,160	$188,160	$188,160	$470,400	$411,600	$411,600	$352,800	$352,800	**$3,851,400**
Total	$558,600	($3,597,900)	($8,630,300)	$8,877,160	$363,160	($836,840)	$690,460	($73,140)	($7,550,600)	$5,116,600	$411,600	$352,800	$352,800	**($3,965,600)**
O&M Costs - Treatment	$0	$0	$0	$354,200	$389,400	$424,600	$459,800	$495,000	$2,737,000	$3,144,000	$3,531,000	$3,883,000	$4,213,000	**$15,418,000**
Sewer User Rates	$253,000	$285,800	$318,800	$354,200	$389,400	$424,600	$459,800	$495,000	$2,737,000	$3,144,000	$3,531,000	$3,883,000	$4,210,000	**$16,275,600**
Total	$253,000	$285,800	$318,800	$0	$0	$0	$0	$0	$0	$0	$0	$0	($3,000)	**$854,600**
O&M Costs - Distribution	$0	$0	$0	$1,784,960	$1,784,960	$1,784,960	$2,255,260	$2,268,160	$11,510,000	$15,830,000	$15,830,000	$15,830,000	$15,830,000	**$84,708,300**
Recycled Water Sales	$0	$0	$0	$1,696,000	$1,838,000	$1,980,000	$2,123,000	$2,265,000	$12,122,000	$14,520,000	$15,763,000	$15,763,000	$15,763,000	**$83,833,000**
Total	$0	$0	$0	($88,960)	$53,040	$195,040	($132,260)	($3,160)	$612,000	($1,310,000)	($67,000)	($67,000)	($67,000)	**($875,300)**
														($793,020)

Totals

	2008	2009	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035	2040
Cash Flow	$3,163,600	($5,320,900)	($14,880,300)	$10,293,200	$841,200	($1,656,520)	$2,063,200	$1,428,700	($13,675,400)	$7,099,600	$3,637,600	$3,107,800	$3,105,200
Cumulative Cash Flow	$3,163,600	($2,157,300)	($17,037,600)	($6,744,400)	($5,903,200)	($7,559,720)	($5,496,520)	($4,067,820)	($17,743,220)	($10,643,620)	($7,006,020)	($3,898,220)	($793,020)

	2008	2009	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035	2040
Bond Sale 1		$20,000,000											
Capital from Bond Sale		$16,000,000											
Matching Grant (50%)			$8,000,000										
Debt Service - BS 1			($1,676,000)	($1,676,000)	($1,676,000)	($1,676,000)	($1,676,000)	($1,676,000)	($8,380,000)	($5,028,000)			
Bond Sale 2									$15,000,000				
Capital from Bond Sale									$12,000,000				
Matching Grant (50%)									$6,000,000				
Debt Service - BS 2										($6,285,000)	($6,285,000)	($5,028,000)	
Cumulative Cash Flow		**$13,842,700**	**$5,286,400**	**$13,903,600**	**$13,068,800**	**$9,736,280**	**$10,123,480**	**$9,876,180**	**$5,820,780**	**$1,607,380**	**($1,040,020)**	**($2,960,220)**	**$144,980**

Notes and Assumptions:

1. Capital Costs – Treatment:
   - 2009/2010: Design and construction of the Horton WWTP upgrade to tertiary treatment standards - 3.8 mgd.
   - 2012/2013: Design and construction of the addition of 1.2 mgd of tertiary treatment.
   - 2015-2020: Design and construction of the Regional WWTP (tertiary share only).
2. Sewer Connection Fees: Additional fee of $1,176 per EDU, starting in 2008, for new users only.
3. Capital Costs – Distribution:
   - 2009/2010: Design and construction of BP-1 and BP-3, including pipeline to Two Bunch Palms, Tuscan Hills, Mission Lakes, and Highland Falls golf courses.
   - 2013/2014: Design and construction of wells at the Horton storage ponds.
   - 2014/2015: Design and construction of BP-2, pipeline from BP-2 to interconnection with recycled water distribution system constructed in 2009/2010, and pipeline from Horton WWTP to Desert Crest and Desert Dunes golf courses.
4. Reclamation Connection Fees: $3,000 per AFY, beginning in 2011 after the completion of tertiary treatment capacity and distribution pipelines.
5. O&M Costs – Treatment: $0.11 per gpd per year. Gpd is based on wastewater projections from Section 3.
6. Sewer User Rates: Additional fee of $2.29 per EDU per month, beginning in 2008. EDUs are calculated from wastewater projections and 250 gpd per EDU.
7. O&M Costs – Distribution: Energy costs for pumps and repair of pipes. See Section 4 for specific costs.
8. Recycled Water Sales: $0.91 per ccf.
9. Domestic Water Connection Fee: Additional fee of $147 per EDU to generate equivalent revenue to what existing Mission Lakes golf course would otherwise be required to pay for conversion to the recycled water system.
10. Capital from Bond Sales is assumed to be 80% of bond sale to account for bond reserve fund and financing costs.
11. Debt Service assumes a 15 year bond at 3% with the final year's debt service paid from bond reserve fund.