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RUNNING SPRINGS WATER DISTRICT
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WATER AND WASTEWATER MASTER PLAN

2010

BY

ENGINEERING RESOURCES OF SOUTHERN CALIFORNIA, INC.

JOB NO. 59050.146

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Technical Memorandum 2	Development and Calibration of H2ONET Water Hydraulic Model
Technical Memorandum 3	Development and Calibration of H2OMAP Sewer Hydraulic Model
Technical Memorandum 4	Summary of Water Planning and Design Criteria
Technical Memorandum 5	Summary of Sewer Planning and Design Criteria
Technical Memorandum 6	Water Pumping, Storage and Distribution Facilities
Technical Memorandum 7	Wastewater Collection, Pumping and Conveyance Facilities

TERMINOLOGY, DEFINITIONS AND GLOSSARY

Average Dry Weather Flow (ADWF) – ADWF consists of average daily sewage flows and groundwater infiltration (GWI). ADWF is the average flow that occurs on a daily basis with no evident reaction to rainfall.

C-factor – A measure of the interior roughness of a pipe.

Effective Storage – Effective storage for each storage facility is determined by establishing the level in each tank above which all points in the water system can be served at 20 psi or higher (based on peak hour or maximum day plus fire flow).

Equalization Storage – The storage of peaking flows to prevent overflows from the sewer collection and conveyance systems.

Groundwater Infiltration (GWI) – Groundwater that infiltrates pipeline and manhole defects located below the ground surface. Groundwater infiltration is separate and distinguished from inflow resulting from storm events. Infiltration is a steady 24-hour flow that usually varies during the year in relation to the groundwater levels above the sewers. Infiltration rates are normally estimated from wastewater flows measured in the sewers during the early morning hours when water use is at a minimum and the flow is essentially infiltration.

H2ONET – H2ONET is a computer model used for modeling the Department of Utilities' water system under various demand conditions.

H2OMAP Sewer – H2OMAP Sewer is a computer model used for modeling the Department of Utilities' sewer system under various flow conditions.

Inflow – Drainage that enters the collection system through illegal or permitted connections, such as catch basins, downspouts, area drains and manhole covers. Inflow is separate and distinguished from infiltration. The inflow rate can be determined from the flow hydrographs recorded with flow meters by subtracting the normal dry weather flow and the infiltration from the measured flowrate.

Infiltration/Inflow (I/I) – The wastewater component caused by rainfall-dependent infiltration/inflow (RDI/I) and groundwater infiltration (GWI).

Maximum Day Demand – The one day in the year when the consumption is the highest.

Maximum Hour Demand – The one hour in the year when water consumption is the highest.

Node – A junction of two or more pipes, commonly representing a point where pipe characteristics change.

Peak Dry Weather Flow (PDWF) – PDWF consists of peak sewage flows plus GWI. PDWF is the highest measured flow that occurs on a dry weather day.

Peak Wet Weather Flow (PWWF) – PWWF consists of ADWF plus RDI/I. PWWF is the highest measured flow that occurs during wet weather.

Pressure Reducing Valve (PRV) – A valve that will maintain a specified downstream pressure.

Pressure Zone – A network of water pipes having a common static hydraulic grade line. Pressure zones are separated by closed valves, pressure regulating valves, pumping stations, and reservoirs.

Rainfall-Dependent Infiltration/Inflow (RDI/I) – RDI/I consists of rainfall that enters the collection system through direct connections (roof leaders, manholes, etc.) and causes an almost immediate increase in wastewater flow.

Service Area – The area served by the water distribution or wastewater collection system.

Steady State Simulation – A network model solution for a single point in time.

Tributary Area – The tributary area of a sewage system consists of all areas that contribute flow to the sewer by gravity and/or force main discharges.

ADWF	Average Dry Weather Flow
af	Acre-Foot
APCWD	Arrowbear Park County Water District
cf	Cubic Foot
CIP	Capital Improvement Program
CLAWA	Crestline-Lake Arrowhead Water Agency
CSA	San Bernardino County Service Area
RSWD	Running Springs Water District
EPA	US Environmental Protection Agency
EPS	Extended Period Simulation

ft	Feet
FY	Fiscal Year
gal	Gallon
gpcpd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
gpdidm	Gallons per Day per Inch Diameter – Mile
GWI	Groundwater Infiltration
I/I	Infiltration and Inflow
LF	Linear Foot
LRWQCB	Lohantan Regional Water Quality Control Board
LS	Lump Sum
mg	Million Gallons
mgd	Million Gallons Per Day
mg/L	Milligrams per Liter
MPN/100 mL	Most Probable Number per 100 Milliliters
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
PDWF	Peak Dry Weather Flow
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PWWF	Peak Wet Weather Flow
RDI/I	Rainfall-Dependent Infiltration/Inflow
SARWQCB	Santa Ana Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SSO	Sanitary Sewer Overflows
TCR	Total Coliform Rule
THMs	Trihalomethanes
ug/L	Micrograms per Liter
UWMP	Urban Water Management Plan
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WWTP	Wastewater Treatment Plant
yr	Year

CHAPTER 1 INTRODUCTION

This Running Spring Water District's (RSWD) Water and Wastewater Master Plan is the product of an effort to assess the District's many separate elements, and to combine these elements into a single "road map" for the future over the next 20 years. This Master Plan will serve as a guide to future system development and investment decisions, and will provide a succinct vision for the future of RSWD's public water and sewer systems, as well as present the necessary strategies to carry out this vision.

This is a "living document" and is intended to be updated as needed or every five (5) years in order to help predict the needs of the District for the upcoming twenty-year (20-year) cycle of improvements and services.

1.1. OVERVIEW

1.1.1. LOCATION AND GEOGRAPHY

RSWD is located in the San Bernardino Mountains in the County of San Bernardino, California, as shown in Figure 1.1. The District is adjacent to Pali Mountain Camp to the north, San Bernardino National Forest to the south, Arrowbear to the east and the San Bernardino National Forest to the west. Two watersheds (Deep Creek Mojave River and the Santa Ana River) adjoin the area boundaries. In general, the south side of Highway 18 is a part of the South Coast Hydrologic Region, Santa Ana Subregion with primary groundwater basin of Bunker Hill II, Santa Ana Regional Water Quality Control Board (SARWQCB), while to the north of Highway 18 is the South Lahontan Hydrologic Region, San Bernardino Mountain Area and Upper Mojave River Valley hydrologic unit, under the oversight of the Lohantan Regional Water Quality Control Board (LRWQCB). Figure 1.2 shows the 3D map of the service area of the Running Springs Water District.

The elevations of the District service area range from 5,536 feet to 6,450 feet above sea level. As shown in Figure 1.3, the major features of the District's temperature range from 30 F to 80 F, the wet weather season begins in November and runs until March, with the quantity and frequency of precipitation (rain and snow) varying from year to year. Based on a 2000 census, the service population of RSWD is approximately 5,125.

1.1.2. ORGANIZATION AND HISTORY

The District is an independent special district that was formed in March 1958. "Special District" can be defined as a legally constituted governmental entity which is neither city, nor county, and is established for the purpose of providing specific services within a specific boundary.

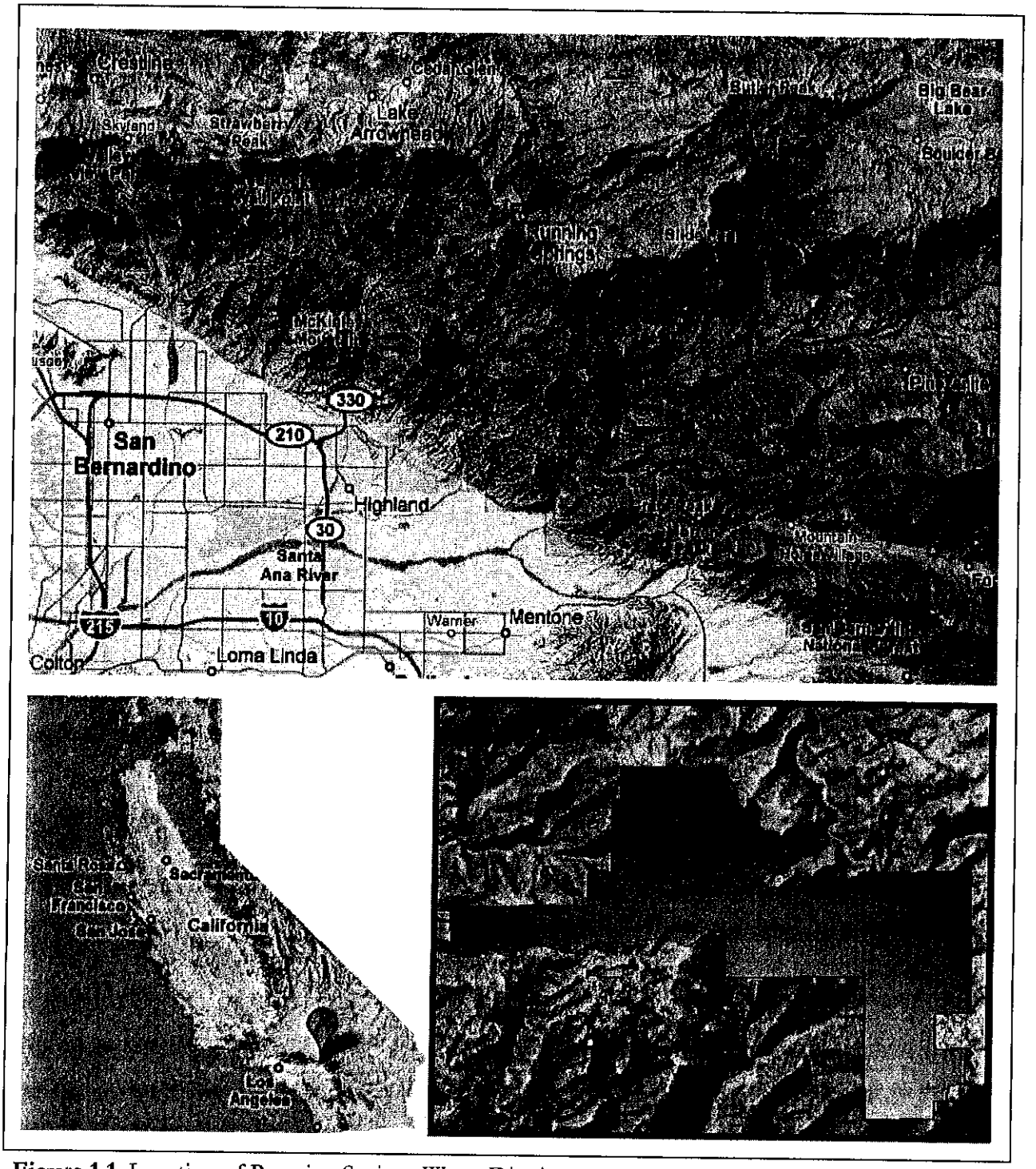

Figure 1.1. Location of Running Springs Water District.

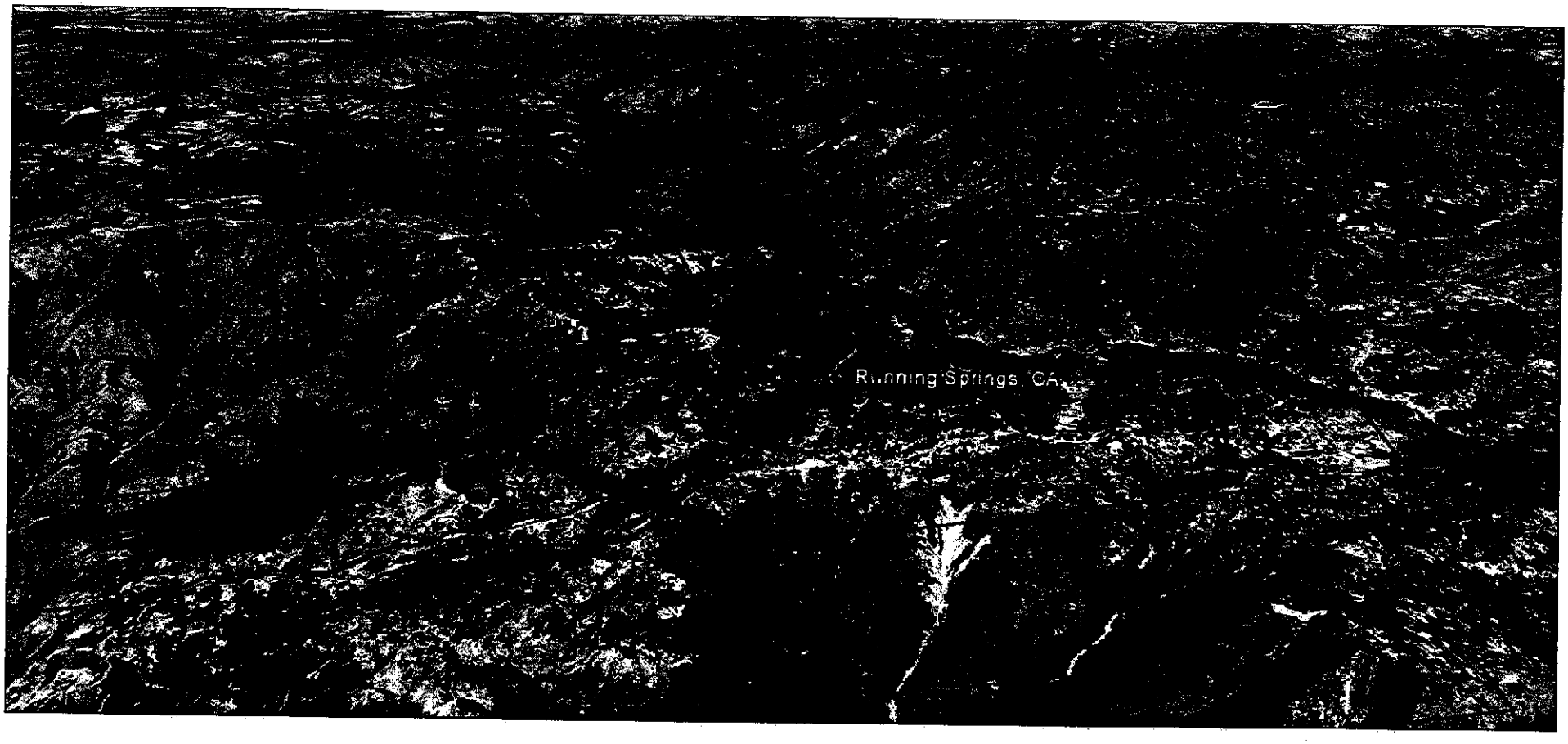

Figure 1.2. 3D Map of Running Springs Water District.

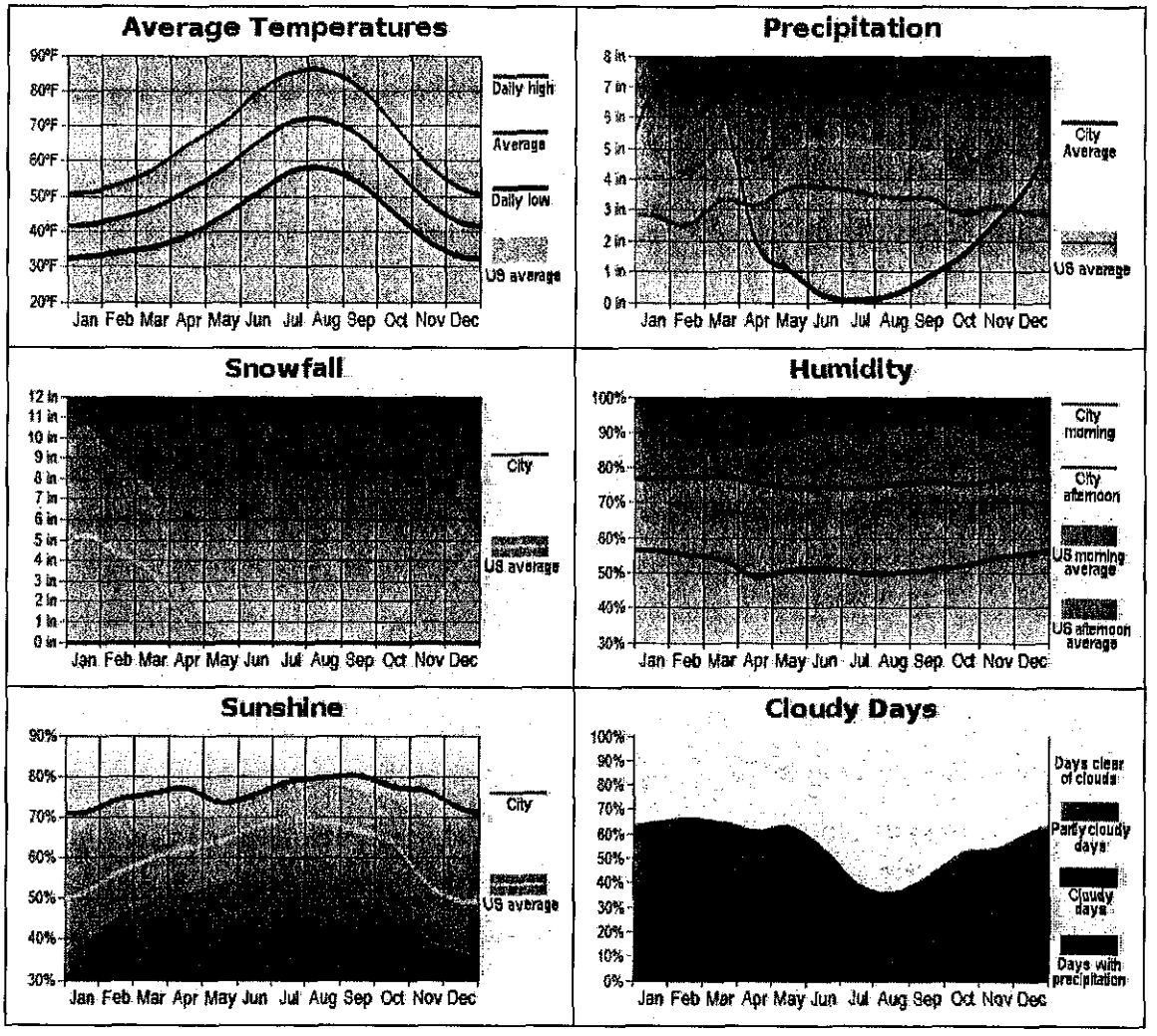

Figure 1.3. Climate of Running Springs Area.

The District's power and authority are primarily regulated and defined by Division 12, Sections 30000-33901 inclusive, of the California Water Code. Its five-member Board of Directors is elected from the community at large to govern the District's operations and policies. RSWD is a multi-service organization that operates three departments: a water department that provides retail water distribution, a fire department that provides fire protection and pre-hospital emergency medical aid service, and a wastewater department that collects, treats, and disposes of the area's wastewater. The District's entire service area encompasses approximately four square miles.

1.1.3. WATER SYSTEM OVERVIEW

The District's water distribution system consists of 9 pressure zones. The District has 13 storage reservoirs with following capacities: 650 gallon hydro-pneumatic tank, 100,000 gallon to 1.0 million

gallon (mg) reservoirs which provide 2.7 mg of storage. There are 14 booster pumping stations that lift water to upper zones or to replenish storage and to supply demand. The District has approximately 43 miles of water mains ranging in size from 2 to 16 inches in diameter. The 2-inch lines are back-lot lines and are systematically being replaced as part of an on-going process.

The District acquires water from local wells and two other water suppliers: Crestline-Lake Arrowhead Water Agency (CLAWA) since 1972 and Arrowbear Park County Water District (APCWD) since 1984. The District has supplied water to Smiley Park Country Club (Smiley Park) since 1970 on an as-needed basis.

1.1.4. SEWER SYSTEM OVERVIEW

The District's sewer system consists of 7 Assessment Districts, one interceptor system, and 3.22 miles (or 17,000 ft) of trunk or transmission lines. The collection system consists of pipelines ranging in sizes from 6-inch to 15-inch, spanning 58.3 miles (308,000 ft) in length. RSWD has one Wastewater Treatment Plant (WWTP) currently designed for a maximum treatment capacity of 0.6 million gallons per day (mgd) with the ability to increase the capacity to 1.0 mgd or more depending on the size of cassettes installed in the Membrane Bioreactor (MBR) System..

The District's sewer services also include treating wastewater from APCWD and Green Valley Lake (San Bernardino County Service Area 79, CSA79).

1.2. MASTER PLANNING PROCESS

RSWD's last update for Water and Sewer Master Plan was completed in the early 1980's. Problems that have been identified in the water system include undersized pipes and failures of pipes and fittings due to age.

Problems in the sewer system include an undersized collection system, failures from age or corrosion, WWTP capacity and equipment needs, inflow and influent flow metering, effluent flow metering, US Forest Service requirements for maintaining the ponds, and spry irrigation for effluent disposal and fire suppression.

In keeping with the District's goal to provide uninterrupted water and sewer services to its residents, it is important for the District to provide a Water and Sewer Master Plan update to address the priority of water transmission and distribution pipeline replacement, water supply reliability, future water supply, while improving system operation and maintenance.

In addition, sewer lift stations and collection pipeline replacement or upgrades, water re-use reliability, sewer system capacity, and improving sewer system operation and maintenance have been evaluated. .

This update will provide a "needs" forecast and associated costing structure, along with a Capital Improvement Project list.

In September 2008, ***Engineering Resources of Southern California, Inc.*** (***ERSC***) was engaged to update the previous Water and Wastewater Master Plan addressing the water demand and sewer load projections, the water distribution system, and the wastewater collection and treatment systems.

As part of this master planning effort, RSWD staff recognized the need to review all elements of the Master Plan in order to develop long-range provisions for water and wastewater service to its customers. The Master Plan effort has focused on the issues and challenges RSWD may face over the next 20 years.

The Master Plan highlights the implementation of specific utility system improvements and provides action plans and decision points for each of the utility system elements.

The Master Plan has been completed through the cooperation and sustained efforts of RSWD staff.

The Master Plan is one of RSWD's key policy instruments. The Master Plan will serve as a guide to annual investment decisions. In turn, implementation strategies in the Master Plan will be reviewed and updated periodically to reflect new information and changing community conditions.

Because the calculation of water demand is based on each water pressure zone, each different pressure zone will have a different built-out year. Pressure Zone #2 will reach build out condition at the Year 2024, while all other pressure zones will reach build out at the Year 2028).

1.3. ORGANIZATION OF THE MASTER PLAN

The Water and Wastewater Master Plan provides a comprehensive assessment of the water and wastewater components and issues confronting RSWD as it plans for the next 20 years.

The first chapter (Introduction) summarizes the foundation of the Master Plan. Chapter 2 (Water Demands and Sewer Flows) includes forecasts of future demands of water and sewer service as the RSWD service area develops through 2028.

Chapter 3 (Raw Water Supply) and Chapter 4 (Water Distribution) focus on the challenges of providing water service to meet future demands and adapting RSWD's facilities and infrastructure to anticipated regulatory programs affecting water supply and distribution.

Chapter 5 (Wastewater Collection) and Chapter 6 (Wastewater Treatment) will focus on the challenges in providing wastewater services through 2028.

The Technical Memoranda completed by ***ERSC*** during the Master Plan process are included in the Appendices in this report. These memoranda contain detailed technical information about the individual components of RSWD's utility system and are intended to be used by RSWD technical staff and consultants to support planning and design decisions.

CHAPTER 2 WATER DEMANDS AND SEWER FLOWS

The current and future water needs and sewer loads of RSWD's customers are of central focus as RSWD considers its long-range development options.

2.1. PLANNING HORIZON

In the past years, local housing in the Running Springs area consisted of 1-2 homes built per month; the area has experienced approximately three-percent (3%) population growth annually. However, the District is near build-out as of this date with 825 lots of vacant land (totaling 804.11 acres) and 36 lots of undeveloped land (totaling 104.40 acres)within District Boundaries; this report will retain and use the 3-percent figure to account for upstream development over which RSWD has no control. The area will continue to experience limited growth as a variety of factors continue to drive people to migrate from more urban areas to areas attractive for their rural nature. The population growth consequently raises water demand and sewer loads in this service area. Factors that will control growth and the demand for water in the area are: available land suitable for building and development purposes, re-establishment of structures destroyed by recent forest fires, and the rates at which foreclosures and resale of homes occur.

RSWD's Master Plan attempts to anticipate the utility needs for the next 20 years based on these physical and economic factors. This "planning horizon" allows RSWD's decision-making processes to maintain adequate water and wastewater facilities. Decisions must make sense as both short-term solutions and as long range investments in the community's future.

It should be noted that although a 20-year planning horizon is a valuable tool for planning, long-term growth rates and scenarios for eventual build out conditions are not well established and are subject to considerable uncertainty. While RSWD's water demand projections assume a constant increase throughout the planning period, actual growth may occur differently, and full build out may not occur before 2028.

2.2. KEY ASSUMPTIONS AND UNCERTAINTIES

The overall planning approach outlined in this Master Plan gives reasonable projections of future water demands and sewer flows and allows RSWD to build conservatism into the sizing of facilities

and piping in the latter stages of the planning process, thereby minimizing the amount of rework required to update plans and proposed improvement projects.

The disaggregated water demand/sewer load method was used to separate (disaggregate) the water demands and sewer loads into more uniform groups of users as the basis for future projections. This approach was used with land use information and water/sewer duties to develop water demands and sewer flows. We believe this system provides more accuracy and flexibility in analyzing alternatives.

Water and sewer utilities have traditionally adopted a conservative approach when planning and sizing facilities where high capital costs require long lead times for planning, permitting, design and construction. This approach typically includes diligent efforts to avoid underestimating the level of future demands the facilities will serve. Within this context, it is important to include allowances for the wide range of unknowns inherent in long-range forecasts.

A brief summary of our assumptions which we believe underlie the projected water demands and sewer flows follows. Changes in these conditions would require modification of the Master Plan.

- Service area boundaries – The Master Plan assumed the future service area boundaries to be based on the existing service area, projected land use, and topography. The existing service area for water encompasses the entire District area (including Enchanted Forest, Rowco, Nob Hill, Luring Pines, Nordic, Rimwood and Fredalba) whereas the sewer service area excludes Rimwood and Fredalba.

- Linear forecasts show moderate growth – Forecasts of water demand and sewer flows are essentially a linear extrapolation of current water demand and sewer flows through the buildout condition based on land use. The future water demand and sewer loads were assumed to be in direct proportion to the population growth.

- Land Use and water/sewer duties - Land use information and water/sewer duties (gallons per day per equivalent dwelling unit) were used to define how water demands and sewer flows were allocated to the various land use categories throughout the District. Changes to the characteristics of a land use category over time could impact the water demand and sewer loads. In addition, changing the land use for a specific geographic area could impact the water/sewer duties and alter the sizing of water or sewer facilities serving the area.

- Peaking factors – Peak water demands (maximum day or peak hour demands) and peak sewer flows (peak wet weather flows) are important because their magnitude drives the size and cost of future water and sewer facilities. Maximum day water

demands were based on a global peaking factor of 2.0 times the average day water demand. Maximum hour water demands were based on a global peaking factor of 4.0 times the average day water demand.

For sewer flows, different components of sewer loads were applied to each manhole separately. Groundwater infiltration and rainfall dependent infiltration/inflow (RDI/I) were assumed without peaking factors, while the peaking factor of sanitary based flow was determined by the hydraulic modeling with the Federov Peaking Equation.

2.3. FOUNDATION FOR WATER DEMANDS AND SEWER LOADS

In terms of the total quantity of water required or sewer flow generated, water demands and sewer loads are usually estimated on the basis of per capita usage. Variations in water use or sewer flow depend on size of community, geographic location, climate, season, day of week, time of day, and the extent of industrialization. Because of these variations, the only reliable way to estimate future water demands and sewer loads is land use.

2.4. PROJECTED WATER DEMANDS

2.4.1. COMPUTATION OF AVERAGE DAY DEMANDS

The objective of the demand analysis for this Master Plan was to determine how and where the water demands should be allocated throughout the District. Utilizing pressure zone information provided by RSWD and land use provided by the County of San Bernardino Planning Department, disaggregated water demand forecasts were developed. The following steps are the summary of the general methodology used to estimate the future water demands:

1. Compute the acreage for each existing and projected land use category in each water pressure zone.

2. Compute the number of current Equivalent Dwelling Units (EDUs) of the District's residential-use land based on the current land use data.

3. Calculate water rate of residential land use by dividing the District's current residential water consumption by the number of residential EDUs.

4. Compute the number of current EDUs of the District's Commercial/Industrial use based on the current commercial water consumption.

5. Calculate the total EDUs (residential + commercial/industrial) in the District.

6. Calculate the per EDU water demand.

7. Based on the current land use profile, apply the per EDU water demand to each water pressure zone to get the existing water demand of each pressure zone.

8. Based on the projected land use profile, apply the per EDU water demand to each water pressure zone to get the projected (buildout) water demand of each pressure zone.

9. Based on the projected population growth rate, linearly extrapolate the water demand of each water pressure zone for the next 20 years.

10. The total future water demand of the entire District area is the sum of water demands of all the pressure zones.

The District's projected annual water demand is presented in Figure 2.1. For detailed description of calculations, please refer to Technical Memorandum 1 (*Water Demands*).

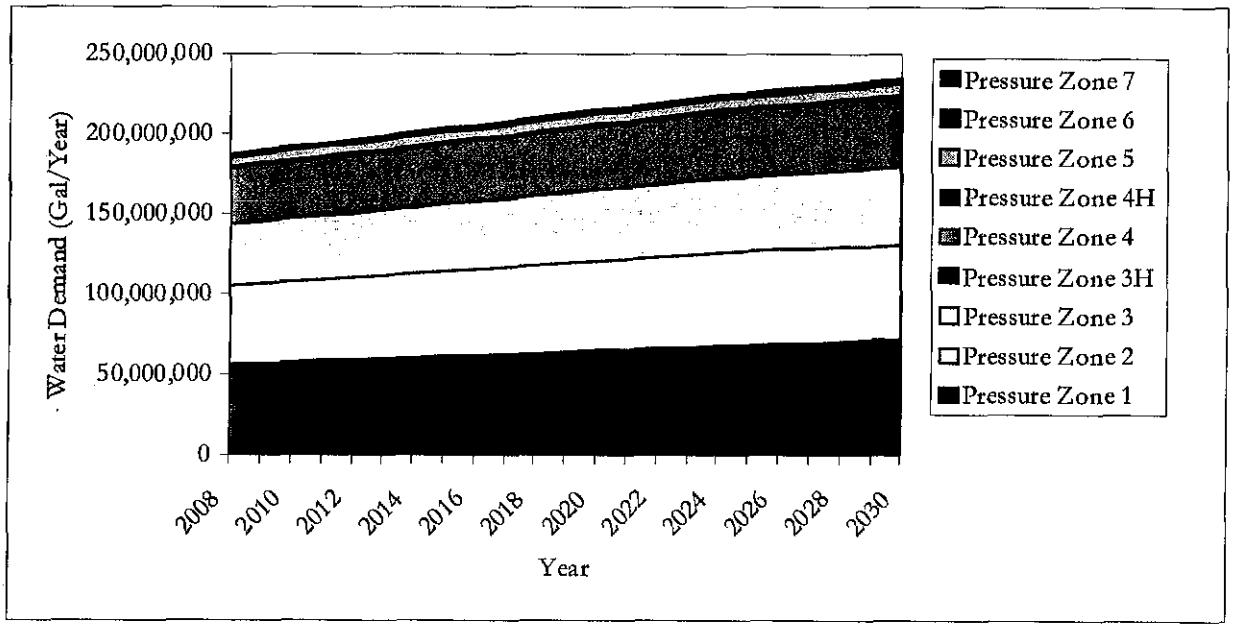

Figure 2.1. Projected Water Demands of Running Springs Water District.

2.4.2. PEAKING FACTORS

Water systems are required to supply flow at rates that fluctuate over a wide range from day-to-day and hour-to-hour. Rates most important to planning, design and operation of a water system are average day, maximum (peak) day, maximum (peak) hour, and maximum hour plus fire flow. A description of each term follows:

- Average Day Demand is the total volume of water delivered to the system in a given year divided by the number of days in the year.
- Maximum (Peak) Day Demand is the largest quantity of water supplied to the system on any given day of the year.
- Maximum (peak) hour Demand is the highest rate of flow for any hour in a year.
- Maximum Day plus Fire Flow considers the possibility of a fire event under maximum day demand conditions.

Peaking factors were defined as the ratio of the Maximum Day Demand or Maximum Hour Demand to the Average Day Demand. Peaking factors will drop as the system continues to expand through the planning period. In this Master Plan, peaking factors of 2.0 and 4.0 were used for the Maximum Day Demand/Average Day Demand and Maximum Hour Demand/Average Day Demand, respectively.

2.5. PROJECTED SEWER FLOWS

2.5.1. METHODOLOGY FOR PROJECTING SEWER FLOWS

Sewer flows are composed of three components:

- Sanitary Base Flow generated by homes, businesses, etc.,
- Infiltration due to normal groundwater levels (dry weather infiltration), and
- Infiltration/Inflow (I/I) due to rainfall and high groundwater levels (rainfall-dependent I/I, or RDI/I)

The formulas for calculating the sewer loads are as follows:

Peak Wet Weather Flow (PWWF) = Average Dry Weather Flow (ADWF) + Rainfall-Dependent I/I (RDI/I)

Average Dry Weather Flow (ADWF) = Sanitary Base Flow + Groundwater Infiltration (GWI)

Where:

Peak Wet Weather Flow (PWWF) equals the peak hour flow during wet weather conditions.

Average Dry Weather Flow (ADWF) is the average flow that occurs in sanitary sewers on a daily basis with no evident reaction to rainfall. The ADWF is composed of sanitary base flow and groundwater infiltration. Sanitary base flows are roughly equal to 65% of the water demand which approximates the customers' water demand that is returned to the sanitary sewer.

Groundwater infiltration (GWI) is an allowance that is added to the sanitary base flow to obtain the dry weather flow. GWI represents flow that is separate and distinguished from inflow resulting from storm events during wet weather conditions. The allowance used in this Master Plan for GWI was estimated to be 100 gallons per day per inch diameter – mile (gpdidm).

Rainfall-Dependent I/I (RDI/I) consists of rainfall that enters the collection system through direct connections (roof leaders, manholes, etc.) and causes an almost immediate increase in wastewater flows.

Figure 2.2 compares the District's monthly average water consumptions (in gal/day) sold to customer in RSWD's service area and the daily flow rates of RSWD's WWTP recorded wastewater flow from Year 2003-2008. Figure 2.2 indicates that from December to May the service area has relatively lower water demands but during the same period the WWTP has relatively higher wastewater flow, implying that from December to May the RDI/I has significant contributions to the WWTP wastewater flow. Conversely, from June to November, the service area has higher water demands, but the WWTP has relatively lower flow rates. This difference in components of sewer flows suggests analysis of the sewer loads under two different scenarios: "dry weather months" (from June to November) and "wet weather months" (from December to May).

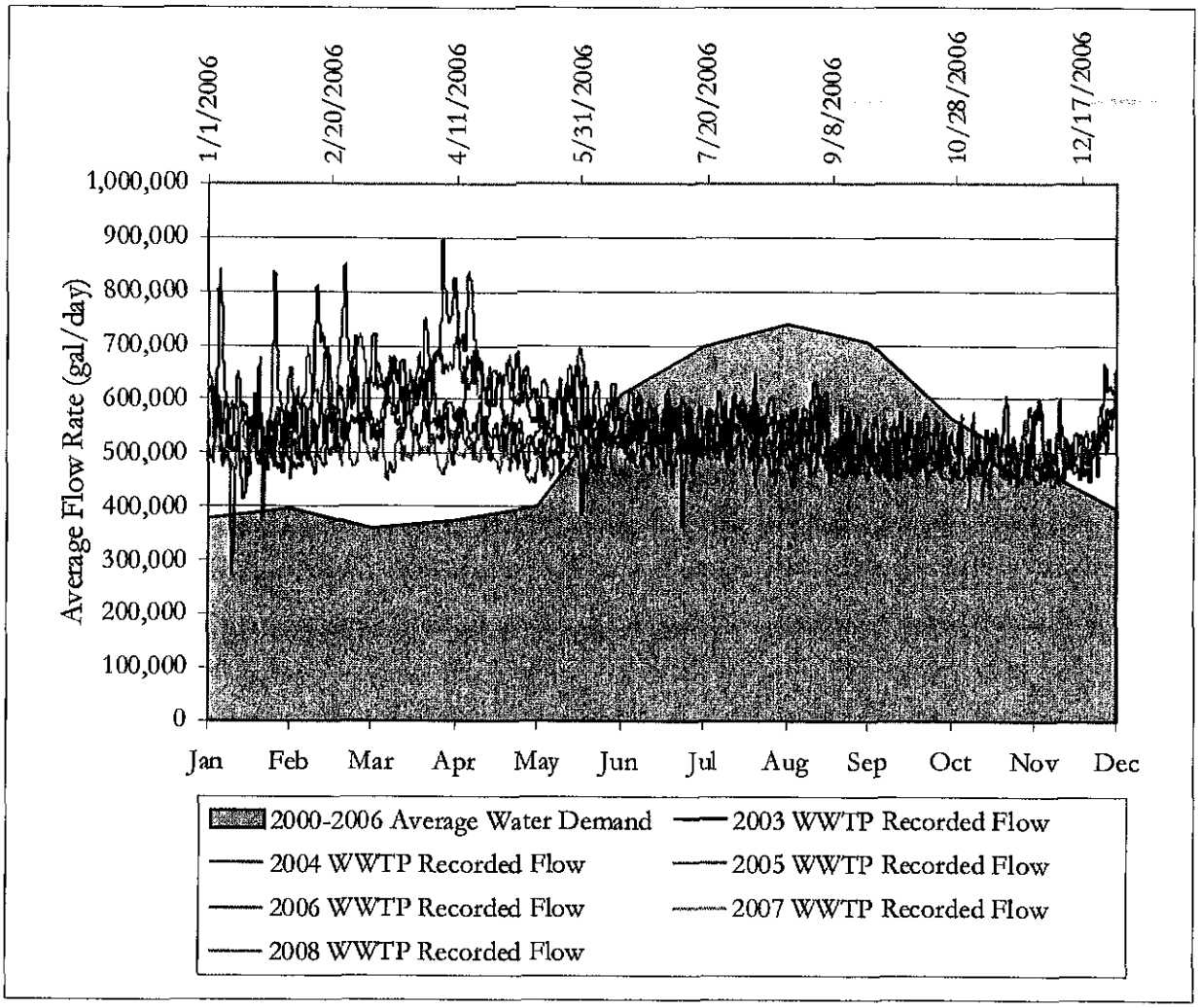

Figure 2.2. Running Springs Water District Water Demand and WWTP Recorded Sewer Flow Rate.

During dry weather months, the sewer flow consists primarily of sanitary base flow and GWI. Sanitary base flow equals the average water demand multiplied by a percentage reduction which is an estimate of the customer water demand that is returned to the sewer collection system. This percentage reduction usually varies from 60 to 85 percentages according to local conditions. GWI is the groundwater leakage into the pipe segments and could be quantified as gallons per day per inch diameter – mile of sewer (gpdidm). The inch-diameter miles of a collection system are derived from the length of sewer expressed in miles times the diameter in inches.

The typical allowances for proposed and new (< 10 years old) sewers is 100 gpdidm; the computation is typically performed incrementally by each sewer segment.

The percent reduction and GWI rate applicable to RSWD's sewer system were estimated by "trial and error" in order for the modeled ADWF to be consistent with the recorded WWTP wastewater flow in the dry weather months; this set the system base-line. A percentage reduction of 65% and

GWI rate of 100 gpdidm were finally obtained and were applied to this Master Plan. This low percentage reduction, although being an assumption, is consistent with irrigation demand on the potable water system in the District for two parks, while the low GWI rate is consistent with the low groundwater level in this area.

2.5.2. EXISTING AVERAGE SEWER LOADS – DRY WEATHER MONTHS

In the dry weather months from June to November, the average sewer load of the system is:

Average Dry Weather Flow (ADWF) = Sanitary Base Flow + GWI
= 411,068 gal/day + 46,522 gal/day
= 457,590 gal/day

Where:

46,522 gal/day is the GWI based on 100 gpdidm of GWI rate.
411,068 gal/day is the Sanitary Base Flow of the dry weather months.

This flow rate is the average sewer load in the dry weather months. The maximum sewer load in the dry weather months is higher because sanitary base flow is a peakable flow.

2.5.3. EXISTING PEAK SEWER LOADS – WET WEATHER MONTHS

During the wet weather months from December to May, the sewer system has to be able to deliver the maximum hour wet weather flow including RDI/I. According to the WWTP recorded flow rates from Year 2000 to 2008, the maximum day wet weather flow occurred on April 5, 2006 with a flow rate of 892,381 gal/day (daily average). On April 5, 2006, 2.6 inch of rainfall, the second high recorded number from 2000-2008, was received in Running Springs area. The Maximum Day RDI/I was calculated by subtracting the GWI and sanitary base flow from the recorded flow of this day:

Maximum Day RDI/I = 892,381 gal/day - 46,522 gal/day – 249,894 gal/day
= 595,965 gal/day

Where:

46,522 gal/day is the GWI based on 100 gpdidm of GWI rate.
249,894 gal/day is the Sanitary Base Flow of the wet weather months.

The Maximum Hour RDI/I was estimated by multiplying the Maximum Day RDI/I by a peaking factor assumed to be 2.0 for this Master Plan.

Maximum Hour RDI/I = Maximum Day RDI/I x Peaking Factor
= 595,965 gal/day x 2.0
=1,191,930 gal/day

Therefore during the wet weather months, if not considering sanitary base flow as peakable flow, the peak sewer loads for the existing RSWD's sewer system is:

Peak Wet Weather Flow (PWWF)[1] = Sanitary Base Flow + GWI + RDI/I
= 249,894 gal/day + 46,522 gal/day + 1,191,930 gal/day
= 1,488,346 gal/day

When peaking factor of sanitary base flow is included, a higher sewer load is expected.

[1] While this maximum anticipated flow has been based on an extremely wet rainy season, we believe that such an event may be repeated at any time and provisions need to be contemplated to prevent a Sanitary Sewer Overflow (SSO) occurring in either the collections system or at the Wastewater Treatment Plant (WWTP).

2.5.4. FUTURE SEWER LOADS

The same processes and same values of GWI and RDI/I were applied to obtain the future/buildout sewer loads, but future sanitary base flows were adjusted according to the future average daily water demands based on water duties of 157 gallon per EDU per day and future land use profile, multiplied by the percentage reduction of 65%.

2.5.5. APPLICATION OF SEWER LOADS IN THE MODEL

Sewer loads were applied to each manhole in the H2OMAP Sewer model in order to evaluate the capacity of the sewer collection system. During the modeling, each lot was checked and was associated to the nearest downstream manhole based on existing sewer lateral connection or topography. Because the existing and future water demand of each lot has been calculated, the percentage reduction of 65% was multiplied by the water demand to obtain the existing and future sanitary base flow of each lot contributing to the nearest downstream manhole. The existing or future sewer load of each manhole is simply the summary of sewer loads of each lot attributed to the manhole in question.

For groundwater infiltration, GWI was calculated for each gravity pipe segment with the rate of 100 gpdidm. GWI was then added to the pipe segment's nearest downstream manhole as an extra sewer load. It is important to note that the GWI is applied to produce a steady and unpeakable flow in the model.

For modeling of wet weather conditions, RDI/I of 1,191,930 gal/day was allocated proportionally to each manhole based on the "land coverage" percentage of this manhole. RDI/I was applied to produce a steady, unpeakable flow in the model.

2.6. KEY FINDINGS

- The average day water demand of the whole service area is expected to increase from 0.514 mgd (2008) to 0.692 mgd under buildout conditions. The projected average day water demands for the Year 2013, 2018, 2023, 2028 are 0.545 mgd, 0.577 mgd, 0.609 mgd and 0.634 mgd, respectively. Pressure Zone 2 will reach buildout condition at 2024, while all other pressure zones will not build out before 2028.

- The maximum day water demand is expected to increase to 1.384 mgd under buildout conditions. The projected average day water demands for the Year 2013, 2018, 2023, 2028 are 1.091 mgd, 1.154 mgd, 1.218 mgd and 1.269 mgd, respectively.

- The components of sewer flows in Running Springs area are significantly different during dry weather months (June to November) and wet weather months (December to May). During wet weather months, rainfall-dependent infiltration/inflow considerably contributes to the WWTP sewer flows.

- Average daily sewer flows during dry weather months are expected to increase from 0.458 mgd as measured in 2008, to 0.554 mgd under build out conditions. The projected average daily sewer flows during dry weather months for the Years 2013, 2018, 2023, 2028 are predicted to be 0.483 mgd, 0.507 mgd, 0.522 mgd and 0.530 mgd, respectively.

- Peak day sewer flows during wet weather months are expected to increase from 0.892 mgd as measured in 2006, to 0.951 mgd under build out conditions. The projected peak day sewer flows during wet weather months for the Years 2013, 2018, 2023, 2028 are predicted to be 0.908 mgd, 0.922 mgd, 0.932 mgd and 0.936 mgd, respectively.

- Peak hour sewer flows during wet weather months are expected to increase to 1.489 mgd under build out conditions. The projected peak hour sewer flows during wet weather months for the Years 2013, 2018, 2023, 2028 are predicted to be 1.504 mgd, 1.518 mgd, 1.528 mgd and 1.532 mgd, respectively.

2.7. PLAN OF ACTION

- RSWD will continue to monitor growth and update water demands and sewer flows as necessary.

- RSWD will continue to update water demand and sewer load forecasts; changes in the characteristics of land use categories (i.e., number of housing units per acre, persons per household, etc.) will be routinely reviewed by District Staff and the Engineer.

- Whenever water demand or sewer load forecasts are revised, RSWD will review the timing for capital projects identified in the Master Plan and will revise the sizing or timing of projects to meet current budget goals as required.

- RSWD will continue to monitor the sewer system's response to storm events with varying characteristics (i.e., intensity, duration, etc.) and, if necessary, modify operations at the WWTP to contain and treat the flow; information will be recorded and shared with the Engineer in order to refine the Master Plan as necessary.

CHAPTER 3 RAW WATER SUPPLY

3.1. URBAN WATER MANAGEMENT PLAN

In June 2007, Running Springs Water District developed an Urban Water Management Plan (UWMP), as required by California State Urban Water Management Planning Act (AB 797, California Water Code, Division 6, Part 2.6, Section 10610-10657), which required that urban water suppliers providing water for municipal purposes to more than 3,000 connections or supply more than 3,000 acre-feet (af) of water annually, to prepare and adopt an UWMP. This plan is scheduled to be updated in 2010 and every five (5) years thereafter.

The UWMP included:

- The summary and map describing the District's water system, including sources, facilities, and operations

- The summary of historical, current and projected water use in terms of annual consumption;

- The description of existing and planned sources of water available along with a description of the groundwater basins and the District's adjudicated pumping rights;

- The discussion of the reliability of the planned water sources and their vulnerability to seasonal, climatic shortage, and water quality;

- The assessment of the water supply reliability;

- The description of conservation measures currently in use by the District;

- The analysis of the potential for improved efficiency of water use;

- The history and description of the District's supply deficiencies;

- The identification of the projected amount of additional water supply and sources necessary to operate the water system without deficiencies.

Selected language and data from UWMP has been quoted and summarized in this Master Plan. For more detailed information, please refer to UWMP which is available in RSWD's main office during normal working hours.

3.2. WATER SOURCES

3.2.1. GENERAL

The District receives water from District owned and operated wells, as well as purchased water. Purchased water historically has been provided by Crestline-Lake Arrowhead Water Agency (CLAWA) and and has been supplemented with additional, as needed water purchases from Arrowbear Park County Water District (APCWD).

All of the horizontal wells owned and operated by the District are located at Sidewinder Canyon and produce only during the wet season. Vertical wells are the main source of water for the District and are utilized when water is available. Since the District's wells are located within fractured rocks, the water level for each well will depend on rainfall and snow melt.

The District does not have set water rights for its well production. As such, the District is allowed to operate each well to the maximum production limits. The District's existing well capacities are presented in Table 3.1.

Table 3.1. Running Springs Water Districts Well Capacities.

Location	Flow (gpm)	Pressure Zone
Sidewinder #1	5.5	1
Sidewinder #5	5	5
Sidewinder #3	20.5	1
Luring Canyon	16.5	2
Weiss Canyon	8.5	2
Brookings	Off Line	1
Rimwood #2	26	4
Owl Rock	26.5	3
Luring Pines	20	2
District Complex	9.5	3
Harris	26.5	3
Smiley Park	As Needed	2

RSWD has experienced multiple drought years from 1994 to 1996, but in subsequent years the District area has had above average rainfall that has recharged the wells (ie: Year 1996, 1999 and 2005). Throughout the drought years, the District had a significant loss of production capacity and the District had to purchase additional water from CLAWA and APCWD to meet water demands.

3.2.2. HISTORICAL AND PROJECTED WELL PRODUCTION

The District's use of imported / purchased water supply, as well as the District's own water production from each well, will vary from winter to summer. Figure 3.1 demonstrates the seasonal variation of the water production averages for the years 2000-2006 from each of the District's wells. In extreme wet weather years, the District has had the option to shut down pumping from vertical wells and rely solely on production from horizontal wells. During the dry season, the District has historically relied on the use of all vertical wells that are operable. If wells are not in service due to maintenance or repair, RSWD has the ability and right to pump 24 hours per day from its other wells that remain in-service.

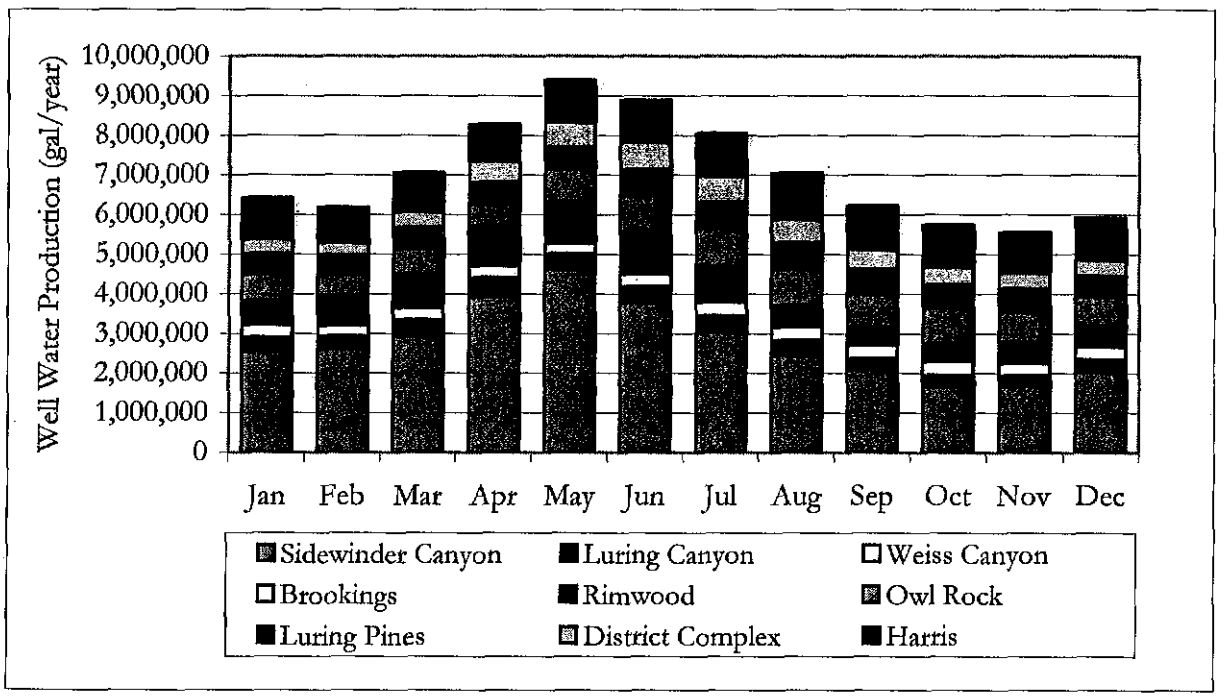

Figure 3.1. 2000-2006 Average Monthly Water Productions of RSWD Owned and Operated Wells.

Table 3.2 presents the yearly water production of District wells from 2000 to 2006. All District wells depend on rainfall and snowmelt. Above average rainfall during Year 2005 shows an increase in water production which increased the District's well capacity above that seen in previous years, which enabled them to provide sufficient supply to meet 74% of water demands at that time.

For the purposes of planning this document has assumed that the District water supply source will continue to be obtained from existing groundwater. Table 3.3 summarizes projected water demands and well water productions from Year 2013 to Year 2028. The projected well water production includes a number of new wells that have been planned to be drilled within the next five (5) years.

Table 3.2. Historical Water Production of the District Owned and Operated Wells (gal/yr).

Year / Water Sources	2000	2001	2002	2003	2004	2005	2006
Sidewinder Canyon	24,908,773	25,248,966	16,113,940	29,183,670	22,421,299	67,219,468	47,935,261
Luring Canyon	4,879,182	5,193,524	2,922,310	3,555,483	3,211,837	3,427,015	7,704,476
Weiss Canyon	4,014,270	3,965,273	3,460,688	1,726,445	3,795,673	3,707,872	5,241,431
Brookings	1,116,225	988,847	987,002	701,692	817,774	0	0
Rimwood	0	8,487,556	2,977,339	11,158,887	8,713,452	17,371,852	8,440,806
Owl Rock	10,206,579	8,869,894	7,662,459	5,646,510	4,586,505	12,775,682	13,960,396
Luring Pines	8,470,420	7,469,280	6,215,064	5,764,371	5,713,410	9,402,615	6,256,468
District Complex	6,177,208	6,000,862	3,931,924	5,479,894	4,710,628	7,910,340	6,704,810
Harris	14,874,871	13,488,122	12,373,310	11,577,671	11,698,069	10,492,661	13,386,479
Total Well Production	74,647,528	79,712,324	56,644,036	74,794,623	65,668,647	132,307,505	109,630,127
Total Water Supply	191,137,103	199,788,751	209,565,760	218,481,792	217,449,246	198,035,218	202,578,118
% of Total Water Supply	39%	40%	27%	34%	30%	67%	54%
Water Demand*	177,760,992	182,884,986	191,475,371	195,846,339	198,854,043	178,866,968	186,539,254
% of Water Demand	42%	44%	30%	38%	33%	74%	59%

*Water Demand does not include water sold to other agencies.

3.2.3. RELIABILITY OF SUPPLY

As with all water supplies in Southern California, the District's water supply is vulnerable to seasonal and climatic changes within the area based upon precipitation patterns; these may vary substantially from one year to the next. However, based on the location of the District, it is unlikely that there will be a simultaneous drought condition in both Southern and Northern California. When there is a drought condition in the Southern California, the District will be required to purchase more water from CLAWA, APCWD, and to institute water conservation measures.

Table 3.3. Projected Water Production of the District Owned and Operated Wells (gal/yr).

Water Sources \ Year	2013	2018	2023	2028
Sidewinder Canyon	27,697,371	27,697,371	27,697,371	27,697,371
Luring Canyon	4,561,920	4,561,920	4,561,920	4,561,920
Weiss Canyon	3,910,217	3,910,217	3,910,217	3,910,217
Brookings	977,554	977,554	977,554	977,554
Rimwood	10,427,246	10,427,246	10,427,246	10,427,246
Owl Rock	9,775,543	9,775,543	9,775,543	9,775,543
Luring Pines	6,517,029	6,517,029	6,517,029	6,517,029
District Complex	7,820,434	7,820,434	7,820,434	7,820,434
Harris	13,034,057	13,034,057	13,034,057	13,034,057
Additional Wells (New)	70,383,909	70,383,909	70,383,909	70,383,909
Water Demand	213,915,756	226,393,662	238,871,569	248,820,252

The water purchase agreement between the District and CLAWA was signed in 1972. The District can purchase water from CLAWA at a minimum of 161 af/year (or 52 mg/year) to a maximum of 1,137 af/year or 395 mg/year. The agreement between the District and APCWD expired in 2003 and was not renewed, but the District can purchase water with no limitation provided water is available. Formerly, there was a maximum purchase of 80 gpm or 129 af/year. A new agreement is being developed. Since CLAWA can provide the District with up to 1,137 af/year and APCWD has yet to establish a maximum limit on supply, the District should be able to meet the customer's demands for any multiple dry year condition.

To further protect the reliability of water supply, the District is currently planning to drill new wells within the next five (5) years; these wells are located in the area below Poplar Drive and Live Oak in the area currently referred to as "Ayers Acres." The exact construction time frame of the new wells is not known at this time. The District also plans for system upgrades and repair in order to be more efficient.

Currently, when operating at peak capacity, RSWD's wells can provide up to 53 percent of total annual water demand required by the District. The remaining 47 percent of the total annual water demand would be supplied by CLAWA and, if needed, APCWD.

3.3. WATER SHORTAGE EMERGENCY PLAN

In order to minimize the social and economic impact of water shortages, the District will manage water supplies prudently. A Water Shortage Emergency Plan has been developed to provide water during a severe or extended water shortage. The plan's phases have been established by the District to ensure a viable supply of water is available for public health and safety.

3.3.1. WATER CONSERVATION UNDER NORMAL CONDITIONS

During times of normal supply, it is recommended that water conservation be practiced within the home or business; restaurants are requested to serve water only to their customers who specifically request it.

The District has compiled a list of water uses considered non-essential to the public health, safety, and welfare, and would be considered wasting of water and are therefore prohibited. These include the following;

- There shall be no hose washing of sidewalks, walkways, driveways, parking areas, or other paved surfaces, except as required for sanitary purposes.

- Washing of motor vehicles, trailers, boats, and other mobile equipment shall be done only with a hand-held bucket or a hose equipped with a positive shutoff nozzle for quick rinses. Washing may be done at the immediate premises of a commercial car wash using recycled water with no other restrictions.

- No water shall be used to clean, fill, or maintain levels in decorative fountains, ponds, lakes, or other similar aesthetic structures unless such water is part of a recycling system.

- No restaurant, hotel, café, cafeteria, or other public place where food is sold, served, or offered for sale shall serve drinking water to any customer unless expressly requested.

- All customers of the District shall promptly repair all leaks from indoor and outdoor plumbing fixtures.

- No lawns or landscaped areas shall be watered more often than every third day, or between the hours of 8:00 a.m. to 5:00 p.m.

- No customer of the District shall cause or allow the water to run from landscaped areas into adjoining street, sidewalks or other paved areas due to incorrectly directed or maintained sprinklers or due to excessive watering.

3.3.2. PHASES OF ACTION

The District's Ordinance No. 17 establishes water conservation measures during periods of water supply shortages and emergencies. The Ordinance provides for prohibitions on wasteful water uses and permits irrigation of landscaped or vegetated areas during specified hours on specified days. As shortages become evident to the District Manager, he/she invokes the appropriate phases, unless the Board of Directors votes otherwise. Shortages may evoke a conservation phase at any time. The Ordinance provides six rationing plans to be undertaken by the District in response to water supply shortage.

Table 3.4 represents an outline of specific water supply conditions which are applicable to each phase. Water reduction utilizes a combination of voluntary and mandatory conservation measures; shortages are triggered when the average supply is reduced by a given percentage as noted below. The six-tiered set of reduction goals that addresses the various phases of water supply shortages are:

Phase No.	% Shortage
Phase I	0% to 10%
Phase II	10% to 20%
Phase III	20% to 30%
Phase IV	30% to 40%
Phase V	40% to 50%
Phase VI	50% to 60%

Priorities for the use of available water during a shortage contingency plan are:

- Health and Safety – Interior residential and fire fighting;
- Commercial, Industrial, and Municipal (in-office use) – Maintain jobs and economic base;
- Existing Landscaping – Especially trees and shrubs;
- New Demand – Projects under construction when shortage is declared.

3.3.3. CATASTROPHIC SUPPLY INTERVENTION PLAN

Catastrophic events include non-drought related events, and could be triggered by any of the following threats: earthquakes, floods, water borne disease, backflow conditions, chemical spills,

construction accidents, contamination of water storage tanks, fires, disabled mechanical equipment, power outages, sewer spills, terrorism, theft of materials, and vandalism, or any event (non-drought) where there is not enough water supply to meet the normal demands of the District. In these evens, the District may follow the requirements for any shortage events.

Assuming there is zero non-residential use during such times, the District's 13 storage reservoirs hold 2.73 million gallons, which is a sufficient supply of water to meet the health and safety requirements of 50 gallons per day per capita for 4,475 customers for 12 days.

Table 3.4. Specific Water Supply Conditions in Running Springs Water District.

Stage No.	Percentage of Water Reduction Required					
	Residential		Commercial, Park and Rec	Public School, Laundromats	Outside Service Agreements[1]	Building Restrictions
	Full Time	Part Time				
Phase I	LIMITED RESTRICTED USE - 10% REDUCTION					
Phase II	760 cf	300 cf	0%-20% Reduction	Limited to Last Year	0%-20% Reduction	
Phase III	650 cf	250 cf	20%-30% Reduction	Limited to Last Year	20%-30% Reduction	
Phase IV	550 cf	220 cf	30%-40% Reduction	Limited to Last Year	30%-40% Reduction	
Phase V	475 cf	190 cf	40%-50% Reduction	Limited to Last Year	40%-50% Reduction	
Phase VI	400 cf	160 cf	50%-60% Reduction	Limited to Last Year	50%-60% Reduction	Restricted Meter Installation

[1] At the discretion of the General Manager or at the Direction of the Board of Directors

3.4. RECYCLED WATER PLAN

Currently, wastewater from the Running Springs Water District service boundary is being treated at the District's Wastewater Treatment Plant. The wastewater is collected via the existing sewer collection system. The District has a program in place to re-use treated wastewater effluent. This effluent is used to provide water for landscape irrigation around the WWTP, and groundwater recharge through the 13 settling basins located downstream of the WWTP. Such use is also strongly supported by the State of California Recycled Water (meeting California Title 22 standards). Staff is currently exploring options and methods to capture the treated effluent for existing and future community and landscape irrigation needs within the District and surrounding areas and agencies.

CHAPTER 4 WATER DISTRIBUTION

Drinking water is provided to RSWD's customers through a network of approximately 43 miles of pipes one inch and larger in diameter. Thirteen storage tanks throughout the water distribution system provide equalization storage and reserve capacity for domestic consumption and fire suppression purposes. The Master Plan addresses water distribution system responses to increasing water demands, water pressure distribution, and the challenges of aging infrastructure.

4.1. DELIVERING DRINKING WATER TO THE CUSTOMERS

The RSWD water supply system includes 13 water storage tanks, 14 booster (pumping) stations and approximately 43 miles of pipes ranging in size from 2 to 16 inches in diameter. Pipe material in the distribution system consists of asbestos-cement (AC) pipe, polyvinyl chloride (PVC) pipe and steel (STL) pipe.

RSWD's current water distribution system is divided into 9 pressure zones:

- Pressure Zone #1, Rowco
- Pressure Zone #2, Luring Pines
- Pressure Zone #3, Nob Hill
- Pressure Zone #3H, Nob Hill Hydro-pneumatic
- Pressure Zone #4, Nordic
- Pressure Zone #4H, Nordic Hydro-pneumatic
- Pressure Zone #5, Enchanted Forest
- Pressure Zone #6, Fredalba
- Pressure Zone #7 , Rimwood

A map showing the water system has been included in the back pocket at the end of this Master Plan.

4.2. LEVEL OF SERVICE REQUIREMENTS FOR WATER DISTRIBUTION

The performance of a finished water distribution system is judged by its ability to deliver the required flows while maintaining desirable pressure and water quality; customer water demands and fire flow requirements must be met. Meeting these requirements depends

upon the proper design and performance of distribution and transmission piping, elevated and ground storage tanks and booster (pumping) stations. Planning and design guidelines vary from state to state and from utility to utility. The planning and design criteria proposed for use in RSWD's Water Master Plan were compared with criteria used by similar utilities in the region (e.g., location, estimated population served, growth rate, customer demographic, etc.). It is important to recognize that the planning and design criteria should be applied on a case-by-case basis and may change over time. RSWD's planning and design criteria for waterworks facilities are summarized below.

4.2.1. WATER TREATMENT FACILITIES

RSWD currently treats water for uranium only at selected locations as each situation warrants.

4.2.2. BOOSTER PUMPING STATIONS

Booster stations shall be designed with a minimum of one pump with one stand-by pump available for backup pumping. In systems where pumps shall meet instantaneous peak demands, without supplementary flows from storage, the pump capacity shall be based on peak hour demand with one pump out of service. In systems with adequate available flows from storage to supplement pumping, pump capacity shall be based on peak day demand with one pump out of service.

4.2.3. TRANSMISSION AND DISTRIBUTION MAINS

Transmission and distribution water mains are sized based on the following criteria:

- The minimum pipe diameter shall be eight inches.
- The mains should be capable of delivering the largest of either the maximum hour flow, the maximum day flow plus fire flow, or the replenishment flow.
- A maximum allowable velocity of 8 ft/sec under fire flow conditions.
- An allowable headloss of 2-5 ft/1,000 ft of pipeline.

4.2.4. MAXIMUM PRESSURE

The highest pressure level of water delivered within the District's system is 180 psi. However, the maximum pressure allowable is limited to the amount of pressure water heaters can withstand (120 – 130 psi). The maximum pressure is based on common household appliance limitations where the service connections are set at 120 psi. Current District Ordinance requires each service to contain a pressure reducing valve (PRV) on the customer side of the meter to prevent leaks caused by excessive water pressure; the customer is responsible for the installation of the PRV.

4.2.5. MINIMUM PRESSURE

The most common minimum pressure among utilities is 40 psi. If pressures are less than 40 psi, there could be a noticeable pressure decrease when more than one device (e.g., faucet, toilet, shower, etc.) is used. The water system must provide a minimum pressure of 20 psi at the service connection in order to satisfy fire flow demand conditions.

4.2.6. PRESSURE FLUCTUATION

Pressure fluctuations may occur at any one location in the system. An acceptable pressure fluctuation is 20-30 psi. In the interest of providing good service, large pressure fluctuations should be avoided in design. The maximum pressure fluctuation is set at 30 psi.

4.2.7. PRESSURE ZONE LAYOUT

Pressure zone layout refers to the design and layout of pressure zones across the system. Because pressure is related to ground elevation, a system covering hilly or mountainous terrain will have more pressure zones than one covering relatively flat terrain. The minimum pressure establishes the highest ground elevation while the maximum pressure establishes the lowest ground elevation. Pressure zone boundaries can be moved to increase or decrease pressures and resolve pressure complaints from customers in the vicinity of the boundaries.

4.2.8. PIPELINE LOOPING

Looping refers to providing supply to a single point or an area through two or more pipelines. This practice provides a higher level of reliability (i.e., if one source is out of service to the area, supply can be provided from a second source). Looped lines shall be provided where economically feasible.

4.2.9. PIPE MATERIALS

Pipe materials generally accepted include ductile iron, steel, concrete, and polyvinyl chloride (plastic or PVC). PVC is usually used for smaller diameter piping. AC pipe is no longer allowed to be installed for use in RSWD's system.

4.2.10. DRINKING WATER STORAGE

RSWD's water storage facilities are located throughout the distribution system – providing flexibility to meet highly variable customer demands throughout each day. Storage facilities have been sized to provide for:

- Equalization Storage – to meet fluctuating water demands.
- Fire Flow Storage – to meet the demands for fire fighting.
- Emergency Storage – to provide water reserves for contingencies such as system failures, power outages, main breaks, and other emergencies.

Storage capacity consists of operational storage plus fire flow storage as related to each pressure zone. Operational storage consists of 50% of the peak day flow for one day. The inclusion of emergency storage has been considered for pressure zones adjacent to forest service lands.

4.2.11. WATER QUALITY

The quality of the water in the distribution system can be affected by design and operation of the system, such as:

- Oversized pipelines and storage facilities.

- Operating practices for storage facilities that result in long detention times for the water stored.

- Corrosion of pipeline materials or increased growth potential of microorganisms.

- Backflow and cross-connection prevention.

There is a need to balance storage requirements with water quality. A utility cannot discount the need for adequate storage for fire flow and flow equalization. However, excess storage in storage tanks increases water residence times in the system, which can cause low disinfectant residuals, higher disinfection byproducts, and bacterial regrowth. Water quality in the distribution system can be improved by:

- Optimizing the operation of existing storage facilities by matching tank levels and turnover rate to water demands.

- Optimizing the operation of the distribution system and pressure zones.

- Designing emergency and reserve storage in new storage facilities.

- Providing an effective backflow prevention program.

Monitoring of some water quality issues in the distribution system is regulated (e.g., lead, copper, etc.) while others are identified by customer complaints (e.g., taste, odor, etc.).

4.2.12. REGULATORY REQUIREMENTS

Water distribution systems are regulated under Safe Drinking Water Act rules, as described below.

- Lead and Copper Rule – The Lead and Copper Rule sets action levels for lead and copper. RSWD monitors sites throughout its distribution system for lead and copper.

- Total Coliform Rule – The Total Coliform Rule sets the Maximum Contaminant Level goal of zero for total coliforms. Water systems must monitor for the presence of total coliforms and for chlorine to ensure that

adequate chlorine residuals are maintained throughout the distribution system.

- Backflow Prevention/Cross- Connection Control Program – The Safe Drinking Water Act Amendments of 1986 and the California Building Code require that RSWD protect its potable water supply from contamination by unapproved sources or any other substances by cross-connecting or back-siphoning. RSWD administers a crossconnection program to eliminate existing cross-connections. Approved backflow-prevention devices are installed and maintained at any water service connections with a potential hazard.

4.3. REVIEW OF PROJECTED WATER DEMANDS

Water demands represent the average flows that are applied to the water system network from the contributing area. These demands are defined as the amount of water that must be carried by the distribution system to satisfy the need. Nodes represent points in the water system where water demands are taken from the system. For the model of the existing system which was used for calibration, RSWD provided the water demands based on the average water consumption over the past 5 years. The demands were applied to each pressure zone allowing for an accurate allocation of water demands for model calibration.

Future water demands were projected using the estimated consumption method described in Technical Memorandum 1 (*Water Demands*). This method used land use, customer water consumption values, and peaking factors to determine the maximum day and peak hour demand conditions. The average daily demands through the planning period are shown in Figure 4.1.

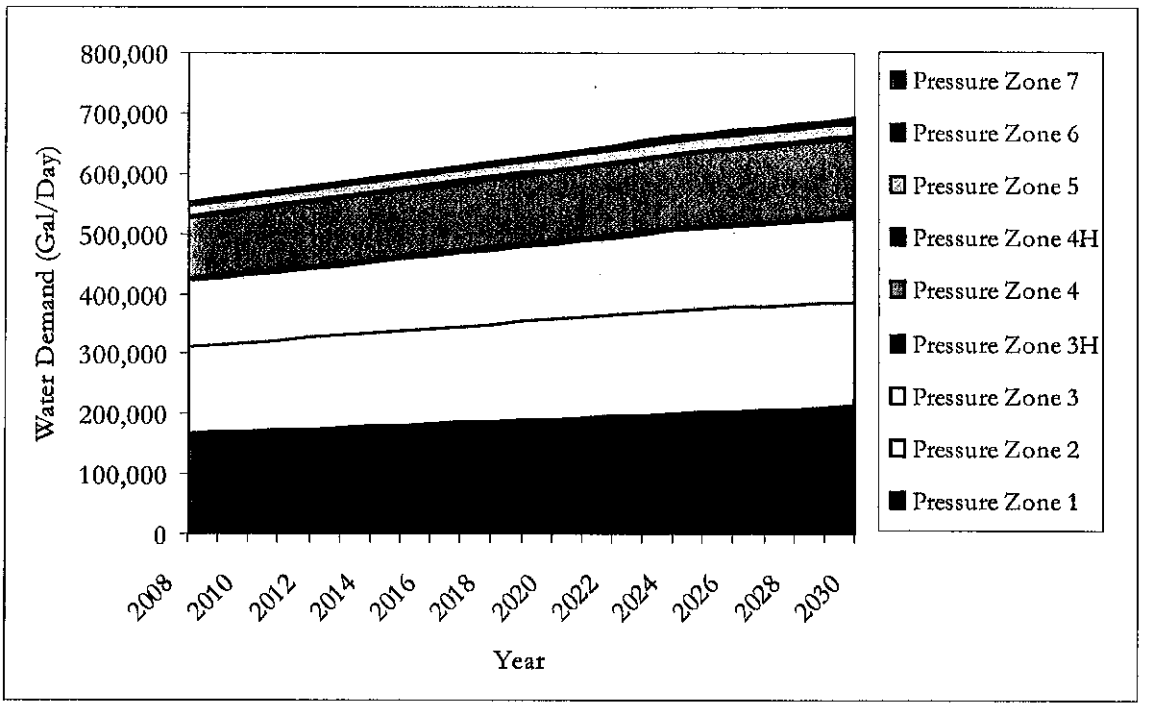

Figure 4.1. Running Springs Water District Projected Water Demand.

4.4. EXISTING WATER SYSTEM LIMITATIONS AND PROPOSED IMPROVEMENTS

The condition and performance of RSWD's water distribution system is influenced by hydraulic capacity, age, pipe material and service conditions (i.e., line pressures, soils, and installation). RSWD reviews the characteristics of the water system piping and facilities during day-to-day operations and maintenance activities.

The evaluation of the existing water distribution system included two aspects: (1) the storage capacity to provide adequate fire flow demand, and (2) the capacity of the water mains to provide adequate service pressure and flow rates for both domestic consumption and fire suppression activities.

4.4.1. STORAGE CAPACITIES

The system's overall storage capacity was compared to the storage requirements for the next 20 years. Analysis indicates that Pressure Zones #3, #3H and #5 have adequate storage capacity to meet the projected requirements. Pressure Zones #1, #2, #4, #4H, #6 and #7

do not have adequate storage capacity to meet the project requirements. Through pressure reducing valve connections, Pressure Zones #1, #2 and #6 can share storage with Pressure Zone #3 to meet the fire flow requirements. Without running booster pumps (the normal consideration for storage analysis), Pressure Zones #4 and #7 are not able to share storage from other pressure zones.

Pressure Zone #4 had deficient storage of 513,652 gallons in 2008, and will be short 539,334 gallons in 2028 and will be short 563,261 gallons under build out conditions. Pressure Zone #7 had deficient storage of 615,074 gallons in 2008, will be short 616,331 gallons in 2028 and will be short 619,706 gallons under build out conditions.

For detailed results of the storage analysis, please refer to Technical Memorandum 6 (*Water Pumping, Storage and Distribution Facilities*).

4.4.2. TRANSMISSION AND DISTRIBUTION MAINS

Hydraulic modeling was performed using H2ONET to assess the water main capabilities of the existing and future water system demand conditions. A functional H2ONET model was used to assess the performance of RSWD's water distribution and transmission system. The hydraulic model was used to assess the capabilities of RSWD's system by simulating and identifying hydraulic limitations – low pressures and fire flow limitations – within the system under specified demand conditions.

The hydraulic model, when used in conjunction with the other tools, such as Geographic Information System (GIS) and Supervisory Control and Data Acquisition (SCADA), will serve as an integral part for the successful management and operation of RSWD's water distribution and transmission system.

A detailed discussion of model development and calibration has been presented in Technical Memorandum 2 (*Development and Calibration of H2ONET Water Hydraulic Model*). The identified deficiencies of water distribution system and water storage as well as the proposed improvements are presented in Technical Memorandum 6 (*Water Pumping, Storage and Distribution Facilities*).

The maximum day demands used for hydraulic modeling of the Year of 2013, 2018, 2023 and 2028 are 0.62, 0.66, 0.69 and 0.72 mgd, respectively.

The model simulations indicate that based on the peak day demands or peak hour demands (without fire flow), some areas in the system will produce water pressure lower than required 40 psi. These areas are located in Pressure Zone #3 and along the east side of Pressure Zone #1, and are consistent with the locations of undersized water mains. The increases of the projected water demands during Year 2008 to Year 2028 and to build out are insignificant to have considerable effect on the locations of the under-pressure / undersized areas.

Running the model with fire flow demands while maintaining a minimum 20 psi in the water mains, the model depicted low flow (maximum available fire flow < 500 gpm) areas located in the east part of Pressure Zone #3 and the east part of Pressure Zone #1. The sizes of water mains in these areas range from 1" to 6"; this was consistent with what had been noted prior to fire flow loading.

The existing system has approximately 125,500 ft (or approximately 55% of total length) of transmission and distribution mains ranging in size from 2 inch to 6 inches. These sizes fail to meet the minimum 8-inch diameter requirements of RSWD's Standards for Domestic Water and Sewer Facilities.

The recommended improvements and the relatively priorities of the projects were suggested according to the model simulation results. The overall cost for the proposed water mains improvements presented in this Master Plan in the next 20 years is approximately $6,023,081. The overall cost for the proposed water system improvements (including water mains and water storage reservoirs) in the next 20 years is approximately $7,953,581.

For detailed results of the model simulation and the list of the recommended improvement, please refer to Technical Memorandum 6 (*Water Pumping, Storage and Distribution Facilities*). The timing for implementation of the improvements was presented in Chapter 7 (*Costs and Schedule for Recommended CIP Improvements*) in this Master Plan.

4.5. KEY FINDINGS

- Planning and design criteria used in this Master Plan are consistent with the criteria adopted by national organizations, local utilities, and state regulatory agencies. In addition, planning and design criteria have been initially applied on a case-by-case basis and may change over time.

- Pressure Zones #3, #3H and #5 have adequate storage capacity to meet the requirements by the District criteria over the next 20 years. Pressure Zones #1, #2, #4, #4H, #6 and #7 do not have adequate storage capacity to meet the requirements. However, Pressure Zones #1, #2 and #6 can share storage with Pressure Zone #3.

- Hydraulic modeling was performed using H2ONET to assess the capacities of the existing and future water system for the years 2008-2028. The maximum day demands used for hydraulic modeling of the Years of 2013, 2018, 2023 and 2028 were 0.62, 0.66, 0.69 and 0.72 mgd, respectively

- The cost estimates generated for this study are termed "budget" estimates and are appropriate for the level of detail associated with concept level planning. Budget level estimates are made without detailed engineering data or information on site-specific conditions (e.g., final pipeline alignments, aesthetics, etc.). The intended use of these estimates is for developing budgets for inclusion in the District's capital program.

- The overall cost for the proposed water system improvements presented in this Master Plan in the next 20 years is approximately $7,953,581.

4.6. PLAN OF ACTION

- RSWD will continue to assess the condition of the water distribution system by conducting field investigations and periodically reviewing physical attributes (pipe diameter and material), incidence of water quality complaints, and locations of water main breaks and other maintenance history (work orders).

- RSWD will continue to review water system planning and design criteria and make changes to the proposed improvement projects, as needed.

- RSWD will continue to collect data for various design demand conditions and coordinate the refinement of the hydraulic model of the water system with the Engineer.

- RSWD, along with the Engineer, will collect site-specific cost information on proposed projects, if available, and refine the budget-level costs presented in this Master Plan.

- RSWD will routinely review the timing of water projects proposed in this Master Plan and coordinate these water projects with sewer projects, roadway projects and other related activities.

CHAPTER 5 WASTEWATER COLLECTION

RSWD currently has over 58 miles of sewer pipe and nine (9) lift stations to carry wastewater to the WWTP for treatment and disposal. Focus by RSWD and regulatory agencies on wastewater collection systems has been increasing, and new regulations to protect public health and water quality have and will continue to include stricter standards that prevent sanitary sewer spills and overflows. RSWD will continue to upgrade, replace, and rehabilitate wastewater collection system components to improve performance, reduce WWTP impacts, and prepare for regulatory changes.

As an ancillary part of this report, the District's Sewer System Management Plan (SSMP) will be completed by May 2010 and is hereby included by reference as part of this Master Plan.

5.1. COLLECTION AND TRANSPORT OF WASTEWATER TO TREATMENT PLANTS

The wastewater collection system contains over 58 miles of sewer pipe, including 2.25 miles of sewer force mains, 1,994 manholes and cleanouts, and 9 lift stations. Pipe sizes in the collection system range from 6 to 15 inches in diameter. The most common pipe materials in the collection and conveyance system are asbestos cement (ACP), Acrylonitrile Butadiene Styrene (ABS) and polyvinyl chloride (PVC) Pipe.

A map entitled *Running Springs Water District Sewer Collection System Facilities* which showing the sewer system facility has been presented in the back pocket at the end of this Master Plan.

5.2. LEVEL OF SERVICE REQUIREMENTS FOR SANITARY SEWER SYSTEM

In general, the regulatory requirements for collection systems are becoming more stringent and there appears to be a trend toward a "zero tolerance" policy for sanitary sewer overflows. A sanitary sewer overflow (SSO) is the discharge of raw sewage from a municipal sanitary sewer system into basements, or out of manholes and pumping stations and onto city streets, playgrounds, and streams without any form of treatment.

5.2.1. SEWER SYSTEM MANAGEMENT PLAN

On May 2, 2006, the California State Water Resources Control Board (SWRCB) adopted statewide Order No. 2006-0003-DWQ, which includes General Waste Discharge Requirement (WDR) that provides a consistent statewide approach for reducing Sanitary Sewer Overflows (SSOs). The key provisions in the General Waste Discharge Requirement (WDR) include:

- In the event of an SSO, all feasible steps be taken to control the released volume and prevent untreated wastewater from entering storm drains, creeks, etc.
- If an SSO occurs, it must be reported to the SWRCB using an online reporting system developed by the SWRCB.
- All publicly owned collection system agencies with more than 1 mile of sewer pipe in the State must develop a Sewer System Management Plan (SSMP).

The 3 key milestones that must be included in the SSMP are:

- An Overflow Emergency Response Plan
- An Operation and Maintenance Program
- A System Evaluation and Capacity Assurance Plan (CAP).

RSWD's SSMP will be completed by May 2, 2010.

5.2.2. PLANNING AND DESIGN CRITERIA

A sanitary sewer collection system has basically two main functions: (1) to convey the design peak discharge, and (2) to transport solids so that deposits are kept to a minimum. It is imperative, therefore, that the sanitary sewer has adequate capacity at the peak flow and that it functions at minimum flows without excessive maintenance and generation of odors.

A comparative review of RSWD's planning and design criteria for sewer systems was performed to identify whether the sewer system criteria proposed for use in the Water and Sewer Master Plan project are reasonable. The planning and design criteria were used to evaluate the sewer system and to plan for future improvements, upgrades, and expansions of facilities. The planning and design criteria proposed for use in RSWD's Water and Sewer

Master Plan project are comparable to the criteria used by similar utilities in the region (e.g., location, estimated population served, growth rate, customer demographic, etc.).

Planning and design criteria were reviewed to identify any modifications needed to reflect recent or anticipated future changes and to document policy decisions regarding application of the criteria. Understanding the potential impacts that revising the planning and design criteria may have on the existing and proposed capital improvements is essential. Additional studies (e.g., flow monitoring, historic flow data, etc.) may be needed in the future to more clearly define modifications needed to the planning and design criteria.

The sewer planning and design criteria used in this Master Plan include the following:

- Roughness Coefficient: 0.013 for all pipe materials.

- Minimum Velocity: 2 ft/sec.

- Pipe Size: All gravity sewer pipes up to and including 12 inch diameter shall be sized to carry the peak flow when 50% full. All larger sewer pipe shall be sized to carry the peak flow when 75% full. No sewer main with an internal diameter less than 8 inches shall be installed without prior written approval of the District. Sewer laterals serving a single family dwellings or their equivalent shall be at least 4 inches inside diameter.

- Minimum Slopes:

Diameter (inches)	Slope (ft/ft)
6	0.0060
8	0.0040
10	0.0029
12	0.0022
15	0.0016
18	0.0012
21	0.0010
24	0.0008

  Where topography limits or prevents the use of minimum slopes as described herein, the District may required an engineer's report

- Minimum Cover of Pipes:

In public streets in pavement (service to properties permitting)	5 ft
Lateral sewer (at curb or edge of pavement)	4 ft
In recorded easement not subject to vehicular traffic	3 ft
Stream crossing	5 ft

5.3. REVIEW OF PROJECTED SEWER FLOWS

A flow study was performed in December 2008 at the manhole just upstream of the WWTP. Recorded flows were analyzed and compared to the readings taken by WWTP Staff during the same two-week period. Raw data was adjusted to account for low flow conditions; recorded flows were found to be within ten-percent (10%) of the adjusted, measured flows. This range is within industry accepted parameters. For consistency, we have elected to use the recorded flows provided by WWTP Staff to evaluate system requirements.

Average daily sewer flow during the dry weather months from June to November is expected to increase from 0.458 mgd (2008) to 0.554 mgd under buildout conditions. The projected average daily sewer flows in dry weather months for the Year 2013, 2018, 2023, 2028 are 0.483 mgd, 0.507 mgd, 0.523 mgd and 0.530 mgd, respectively.

During the wet weather months from December to May, the sewer flow for a selected rainfall event is the sum of the peak sanitary base flow, the infiltration and the inflow. Peak day sewer flow during the wet weather months is expected to increase 0.892 mgd (2008) to 0.951 mgd under buildout conditions. The projected peak day sewer flows in wet weather months for the Year 2013, 2018, 2023, 2028 are 0.908 mgd, 0.923 mgd, 0.932 mgd and 0.937 mgd, respectively. Peak hour sewer flow during the wet weather months is expected to increase to 1.547 mgd under buildout conditions. The projected peak hour sewer flows in wet weather months for the Year 2013, 2018, 2023, 2028 are 1.504 mgd, 1.519 mgd, 1.528 mgd and 1.533 mgd, respectively. This projection is based on recorded peak day weather flow from Year 2000-2008. This peak day had a storm event with rainfall of 2.6 inches in 24 hours.

The projected peak hour wet weather flows are shown in Figure 5.1.

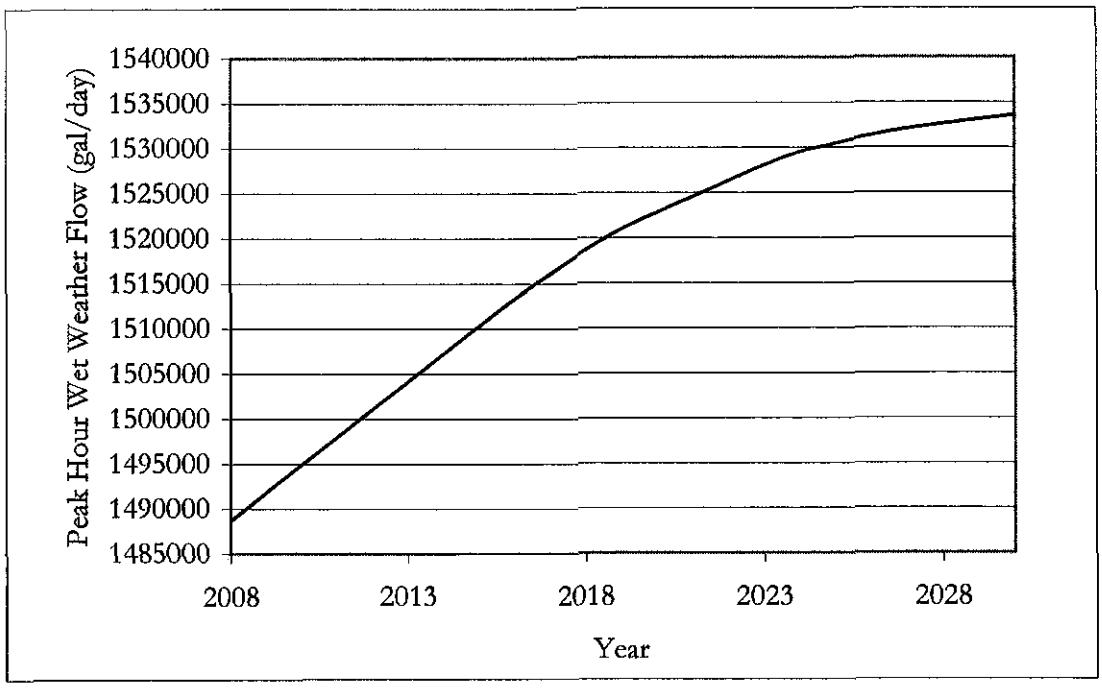

Figure 5.1. Projected Peak Hour Wet Weather Sewer Flow of Running Springs Water District.

5.4. EXISTING WASTEWATER COLLECTION SYSTEM LIMITATIONS AND PROPOSED IMPROVEMENTS

Hydraulic model simulations were conducted on H2OMAP Sewer to evaluate the sewer system capacity under various scenarios (dry weather average daily flow, wet weather peak day flow and wet weather peak hour flow) for the years 2008, 2013, 2018, 2023, 2028 and under build out conditions. A detailed discussion of model development is presented in Technical Memorandum 3 (*Development and Calibration of H2OMAP Sewer Hydraulic Model*). The identified wastewater collection system deficiencies and proposed improvements were presented in Technical Memorandum 7 (*Wastewater Collection, Pumping and Conveyance Facilities*). The timing for implementation of the improvements was presented in Chapter 7 (*Costs and Schedule for Recommended CIP Improvements*) in this Master Plan.

The model simulations indicated that under all scenarios, the existing pump capacities of the 9 lift stations have adequate capacity to accommodate peak hour flows. Since some pumps and lift stations are almost 40 years old, upgrade or replacement may be required within the

next 20 years. The estimated cost for lift station upgrade in the next 20 years is approximately $2,045,250.

Some gravity pipe failures were identified in the model simulations under designed peak hour flow conditions. This includes 120-feet of the 10-inch school trunk line and 138-feet of 12-inch trunk line which require the installation of parallel sewer mains. There are also 13,337-feet of 6-inch pipe that needs to be upgraded to minimum 8-inch pipe in order to satisfy the minimum sewer pipe diameter requirements by the District.

The District also has 2,119-feet of sewer mains that do not meet the minimum slope requirement established by District Standards and 3,410 ft of sewer mains that have a flow velocity greater than 10 ft/sec with peak hourly flow under build out conditions.

For cost estimation purposes, the recommended sewer main improvements in this report only include installation of parallel sewer mains and replacement of existing 6-inch sewer mains. The overall cost for the proposed sewer collection system improvements presented in this Master Plan through the next 20 years is approximately $1,999,913, including lift station upgrades, sewer pipe upgrades and pavement repair.

For detailed results of the model simulation and the list of the recommended improvement, please refer to Technical Memorandum 7 (*Wastewater Collection, Pumping and Conveyance Facilities*).

5.5. KEY FINDINGS

- Planning and design criteria used in this Master Plan are consistent with the criteria adopted by national organizations, local utilities, and state regulatory agencies. In addition, planning and design criteria has been applied on a case-by-case basis and may change over time.

- Proposed regulations will have more stringent requirements for planning, operating and maintaining the wastewater collection system to prevent SSOs.

- Hydraulic modeling was performed using H2OMAP Sewer to assess the capacities of the existing and future wastewater system conditions. The peak hour sewer flows used for hydraulic modeling for the years 2013, 2018, 2023 and 2028 are 1.504 mgd, 1.519 mgd, 1.528 mgd and 1.533 mgd, respectively.

- The overall cost for the proposed sewer system improvements presented in this Master Plan through the next 20 years is approximately $1,999,913.

5.6. PLAN OF ACTION

- RSWD will continue to maintain the database on the wastewater collection system with complete and up-to-date information.

- RSWD will continue to assess sewer system conditions by conducting field investigations and periodically reviewing physical attributes (pipe diameter and material), and locations of sewer main breaks and other maintenance history (work orders).

- RSWD will continue to review sewer system planning and design criteria and make changes to the proposed improvement projects, as needed.

- RSWD will coordinate with the Engineer to continue collecting data for various design storm events in order to refine the hydraulic model of the sewer system.

- RSWD will collect site-specific cost information on proposed projects, if available, and refine the budget-level costs presented in this Master Plan.

- RSWD will routinely review the timing of sewer projects proposed in this Master Plan and coordinate these sewer projects with water projects, roadway projects and other related activities.

CHAPTER 6 WASTEWATER TREATMENT

6.1. INTRODUCTION

Running Springs Water District owns and operates a regional Wastewater Treatment Plant (WWTP) located 0.75 miles south of the Community of Running Springs and 0.75 miles east of State Highway 330. The treatment plant is located at an elevation of 5,050 feet above sea level and has a current design capacity of 0.6 mgd, with the ability to expand to 1.0 mgd through the installation of additional and larger MBR cassettes. It is possible that continued advances in the development of the MBR cassette system will allow for even greater treatment capacity.

This facility was originally designed in 1969 and was constructed in 1970 with a capacity of 0.5 mgd. In 1975, an ammonia reduction requirement was established for the treatment plant by the Santa Ana Regional Water Quality Control Board Order No. 75-148. This reduced the effective capacity of the plant to 0.35 mgd. At about the same time, an agreement was also reached between the Running Springs District and their upstream neighbors, including County Service Area No. 79, Arrowbear Park County Water District, and Snow Valley, Inc. to allow these areas to connect into the Running Springs sewer system via interceptor lines.

To meet the above requirements, RSWD underwent an expansion of the treatment plant to expand the facility capacity to 1.0 mgd. This expansion was completed in 1980. The completed facility included an activated sludge process and final clarification. The treated secondary effluent from the wastewater facility was transported by means of an outfall pipe to the District's disposal site located on lands being leased from the United States Forest Service (USFS) in the south one-half of Section 7 and the north one-half of Section 18, Township 1 North, Range 2 West at an elevation of approximately 2300 feet. Disposal facilities included 13 percolation/evaporation ponds and a 13-acre spray irrigation area.

However, with the more and more stringent regulatory requirements for effluent discharge in the past decades, RSWD WWTP has been required to produce an effluent lower in nitrogen and lower in phosphorus. This must be done through biological nitrification and denitrification and biological phosphorus removal. During 1989 to 1999, three spills in the percolation ponds were documented in which the effluent overflowed directly into Fredalba Creek. These spills violated the District Special Use Permit and raised concerns from USFS regarding endangerment of wildlife including possible groundwater contamination of the Santa Ana Watershed. The concern for the level of nitrogen in the RSWD WWTP's effluent

was specifically addressed by USFS and Santa Ana Regional Water Quality Control Board (SARWQCB).

In response to the concerns of USFS and SARWQCB, RSWD made extensive improvements to the WWTP from 2001 to 2008. The work included replacing the Activated Sludge Treatment Process with an Enviroquip Membrane Bio-Reactor that utilizes a Kubota Flat Panel Membrane Treatment Process, converting one clarifier to an anoxic / flow equalization basin, and the other clarifier into an anaerobic tank. These improvements enabled RSWD to produce a tertiary treated permeate, including nitrogen and phosphorus removal; this permeate will be used to establish a wildlife habitat at the ponds and for spray irrigation of a green belt adjacent to the treatment plant.

6.2. TREATMENT LEVEL AND REGULATORY REQUIREMENTS

The effluent from the Running Springs's Wastewater Treatment Plant is required to meet regulatory requirements from several state agencies, including the State Water Resources Control Board (SWRCB) and the Santa Ana Regional Water Quality Control Board (SARWQCB).

6.2.1. REGIONAL BOARDS' WATER QUALITY OBJECTIVES

RSWD's wastewater and discharge facilities are located in the South Coast Hydrologic Region, Santa Ana Subregion within the primary groundwater basin of Bunker Hill II, under the administration of SARWQCB; the discharge of the effluent must meet SARWQCB's water quality objectives.

SARWQCB amended its respective Water Quality Control Plans in 1995. These plans established comprehensive lists of water quality objectives for any wastewater discharged to surface waters or to a groundwater basin. The emphasis is to provide the maximum beneficial use possible when a limited amount of water is available. In the *Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate an Updated Total Dissolved Solids (TDS) and Nitrogen Management Plan for the Santa Ana Region,* SARWQCB updated its TDS/Nitrogen Management Plan in 2004 to relax the TDS and/or nitrate-nitrogen water quality. The SARWQCB's criteria are based on the proposed beneficial uses of the reclaimed water and what hydrologic units or groundwater basins/subbasins to which the reclaimed water is discharged.

Among these objectives, TDS, hardness, Na, Cl, total nitrogen and sulfate would be the most important for the discharge of reclaimed wastewater in this area.

6.2.2. CALIFORNIA CODE OF REGULATIONS TITLE 22

Since RSWD' uses the effluent to maintain a wildlife habitat at the ponds and for spray irrigation of a green belt around the WWTP, it has to satisfy the requirements of California Code of Regulations Title 22. Title 22 has rules pertaining to the degree of wastewater treatment that is required depending on where and for what purpose the reclaimed water is to be used.

Reclaimed water used for the surface irrigation of parks, school yards and other areas where the public has similar exposure must be disinfected tertiary recycled water. "Disinfected tertiary recycled water" means a filtered wastewater that has been disinfected by either:

(1) A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) 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 dry 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 MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

Title 22 also requires the filter effluent turbidity not exceed 2 Nephelometric Turbidity Units (NTU). It further requires the turbidity of the influent to the filters is continuously measured, that the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes.

6.2.3. DEPARTMENT OF HEALTH SERVICE'S GUILDLINES FOR GROUNDWATER RECHARGE

If RSWD plans to use the effluent as the indirect groundwater recharge of domestic water supply aquifers by surface spreading in the green belt area, then the effluent shall be at all times of a quality that fully protects public health. Approval for such projects is usually

provided on a case by case basis by the California Department of Public Health (CDPH). However, CDPH has also developed a draft document entitled *Proposed Guidelines for Groundwater Recharge with Reclaimed Municipal Wastewater*; if the proposed guideline is finalized, it will replace the existing general regulations for ground water recharge in the CDPH wastewater reclamation criteria.

The guideline categorizes 4 types of projects based on the recharge method (surface spreading or injection) and treatment requirements. For surface spreading, the required water treatment is demonstrated in Table 6.1.

Table 6.1. Proposed Ground Water Recharge Criteria in California: Treatment Process and Site Requirements

	Surface Spreading		
	I	II	III
Maximum Allowable Reclaimed Water in Extracted Well Water (%)	50	20	20
Required Treatment			
Oxidation[1]	X[5]	X	X
Filtration[2]	X	X	
Disinfection[3]	X	X	X
Organic Removal[4]	X		

1. Oxidized wastewater is not to exceed 20 mg/L total organic carbon (TOC), 30 mg/L total suspended solids, and 30 mg/L biochemical oxygen demand (BOD);
2. Filtered wastewater is not to exceed an average turbidity of 2 units and shall not exceed 5 turbidity units more than 5 percent of the time;
3. For Category I, II, and IV projects, the median number of total coliform organisms in the disinfected wastewater is not to exceed 2.2 per 100 milliliters. The number of total coliform organisms is not to exceed 23 per 100 mL in more than one sample within any 30-day period;
4. Reclaimed water used for project categories I is subject to organics removal, to achieve the following product water TOC concentrations:

	Maximum TOC (mg/L)	
Reclaimed Water Contribution (%)	Category I	Category IV
0-20	20	5
21-25	16	4
26-30	12	3
31-35	10	3
36-45	8	2
46-50	6	2

5. X means that the treatment process is required;

6.2.4. SUMMARY OF EFFLUENT WATER QUALITY REQUIREMENTS

To meet regulation requirements and to use reclaimed water for the proposed beneficial uses, the water quality standards of effluent from RSWD WWTP are listed in Table 6.2.

Table 6.2. Effluent Water Quality Requirements for Running Springs Water District Wastewater Treatment Plant.

	Surface Water[1]	Groundwater[2]
Algae	Not contribute to excessive algal growth	-
Ammonia (Total)	Dependent on Temperature & pH	-
Ammonia (Un-ionized)	Dependent on Temperature & pH	-
Arsenic	-	0.05 mg/L
Bacterial, Coliform	for 30 days, log mean < 20/100 mL, less than 10% < 40/100mL	2.2/100 mL 7 days
Barium	-	1.0 mg/L
Boron	0.75 mg/L	0.75 mg/L
Cadmium	-	0.01 mg/L
Chemical Oxygen Demand	No adverse effects	-
Chloride	175 mg/L[5]	20 mg/L
Chlorine, Total Residual	0.1 mg/L	-
Chromium	-	0.05 mg/L
Cobalt	-	0.2 mg/L
Color	No adverse effects	-
Copper	-	1.0 mg/L
Cyanide	-	0.2 mg/L
Dissolved Oxygen	See Note 4	-
Floating Materials	No adverse effects	-
Fluorine	-	1.0 mg/L
Hardness	-	190 mg/L
Iron	-	0.3 mg/L
Lead	-	0.05 mg/L
Manganese	-	0.05 mg/L
Mercury	-	0.002 mg/L
Methylene Blue-Activated Substance	-	0.05 mg/L
Nitrate-N	-	7.3 mg/L
Oil and Grease	No adverse effects	No adverse effects
pH	Between 6.5 & 8.5	Between 6 & 9
Radioactivity	No adverse effects	
Selenium	-	0.01 mg/L

Settleable Materials	No adverse effects	-
Silver	-	0.05 mg/L
Sodium	-	30 mg/L
Sulfate	-	62 mg/L
Sulfide	No increase[7]	-
Suspended Materials	No adverse effects	-
Taste and Odor	No adverse effects	No adverse effects
Temperature	No adverse effects	-
Total Dissolved Solid	-	330 mg/L
Toxicity	No toxic[8]	No toxic
Turbidity	Max. increase < 20% or 10 NTU	-

1. No adverse effects = Shall not cause nuisance or adversely affect the water for beneficial uses;
2. < MCL & SMCL = lower than Maximum Contaminant Levels and Secondary Maximum Contaminant Levels based on drinking water standards;
3. Safe value for irrigation;
4. The dissolved oxygen content of surface waters shall not be depressed below 5 mg/L for waters designated WARM, or 6 mg/L for waters designated COLD. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95th percentile concentration to fall below 75% of saturation within a 30-day period;
5. No increase = No increase of concentration of receiving water;
6. No toxic = Not bioaccumulate in aquatic resources to levels which are harmful to human health.

6.3. TREATMENT PROCESSES

Wastewater Treatment at the Running Springs Water District's Wastewater Treatment Plant consists of the following processes: Primary Screening, Grit Removal, Secondary Screening, Flow Metering, Flow Equalization, Biological Treatment, Liquid / Solid separation and Bio-Solids handling. If/when the need arises the treatment plant also has the ability to do Biological Nutrient Removal, Ultra Violet Disinfection and Chlorination. The treatment process flow diagram is presented in Figure 6.1, the layout of the unit operations is presented in Figure 6.2. Figure 6.3 and 6.4 present photos of selected unit processes or equipment.

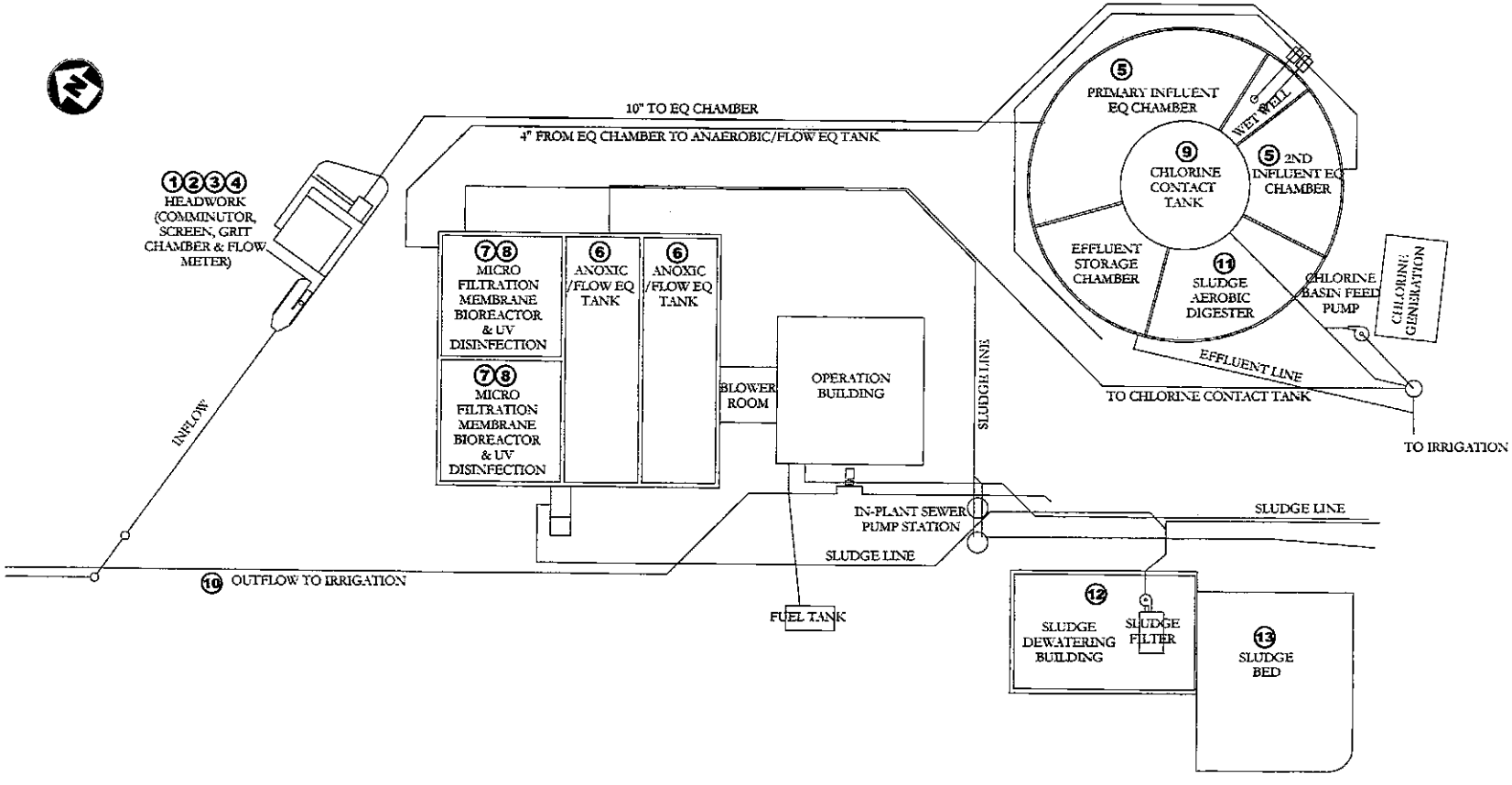

Figure 6.1. Site Layout of Running Springs Water District Wastewater Treatment Plant

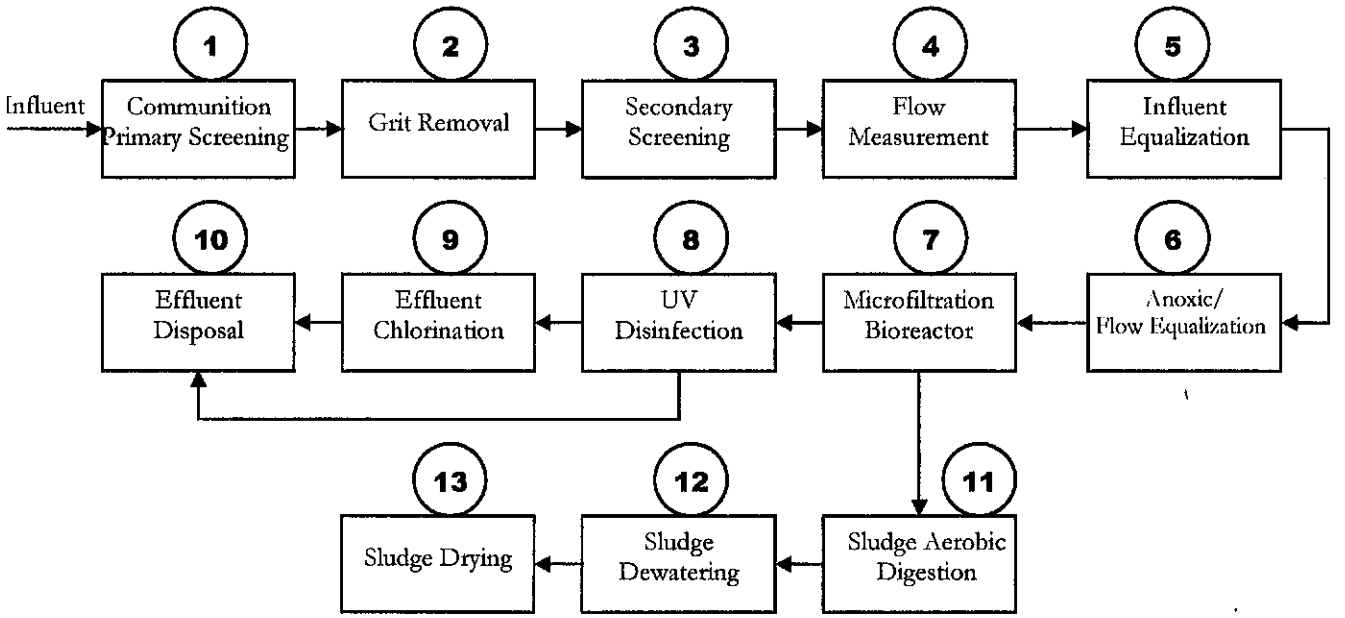

Figure 6.2. Treatment Process Flow Diagram of Running Springs Water District Wastewater Treatment Plant.

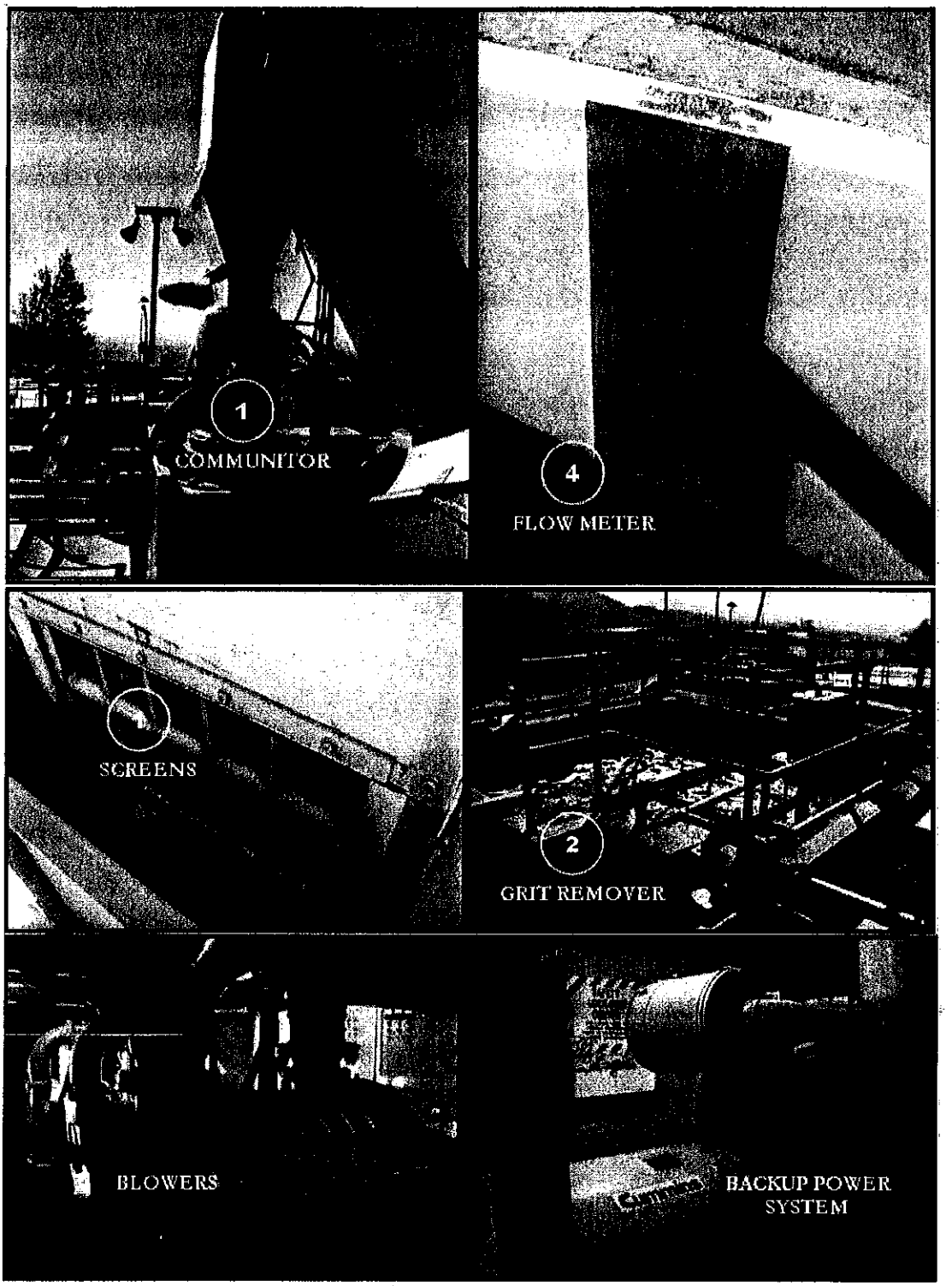

Figure 6.3. Headwork, Blowers and Backup Power System in Running Springs Water District Wastewater Treatment Plant.

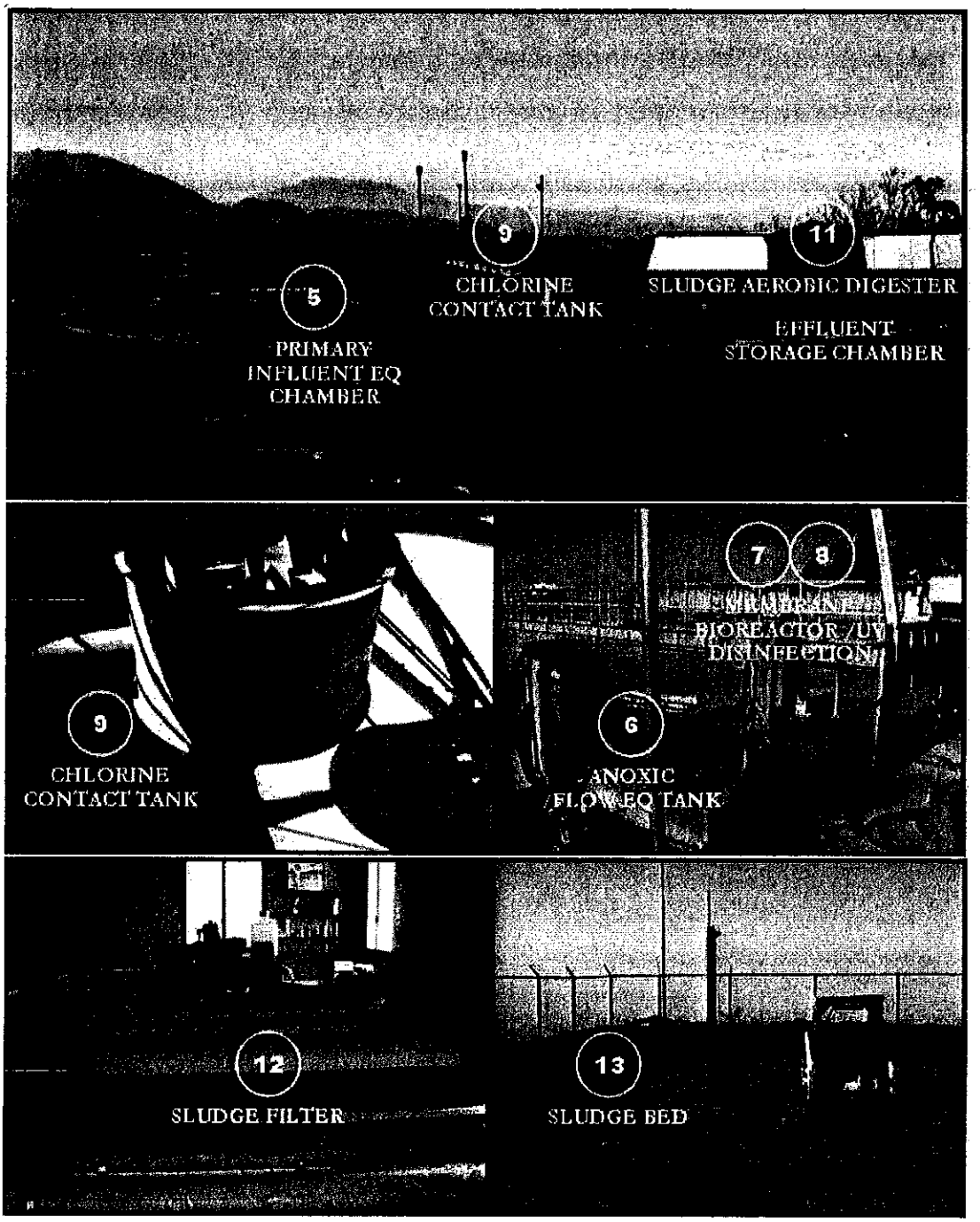

Figure 6.4. Selected Unit Processes and Equipment in Running Springs Water District Wastewater Treatment Plant.

6.3.1. PRIMARY SCREENING

Primary Screening is the first process at the Water Reclamation Plant the raw influent goes through. It consists of a Brackett/Green CF100 3mm perforated panel band screen of the

"Flow Through" type. The material that's removed from the influent by the band screen is referred to as "screenings". The screenings that are removed from the influent are conveyed to the Brackett/Green Screenings Conditioning Equipment. The screening conditioning process will be explained later under "Secondary Screening."

6.3.2. GRIT REMOVAL

The wastewater after comminution and screening is sent to the aerated grit chamber for grit removal. Grit is one of the solid constituents of wastewater which may include sand, gravel, cinders, coffee grounds, etc. The early removal of grit prevents abrasive action on mechanical equipment, reduces the potential to clog plant pipelines and tanks, and helps keep tanks from accumulating a layer of heavy bottom deposits.

The grit removal facility in RSWD WWTP consists of a square area measuring 13 feet by 10 feet, 10 inches with a depth of 8.5 feet, an air diffusion system, an air lift grit pump, grit washer and clarifier and wheelbarrows for grit. The equipment is manufactured by Walker Process Equipment. The air supply comes from Blower D1, D2 or D3 located in the Operation Room.

6.3.3. SECONDARY SCREENING

After the grit removal process is the Final Screening process. The equipment responsible for final screening is the Brackett/Green CF100 Center Flow Band Screen also with 3mm perforated panels. The screenings that are removed from the influent are conveyed to the Screenings Conditioning Equipment. This piece of equipment includes the Macipump which grinds all the screenings that are removed from the influent into a uniform size and pumps them to the LiSep. The Lisep separates the water from the screenings. After the water has been removed by the Lisep the screenings are then transferred to the Lipactor. Once in the Lipactor the screenings are compacted thus reducing the volume and removing even more water. The Brackett/Green Screenings Conditioning Equipment also handles the screenings removed by the Primary Screen. Once the screenings have been through the conditioning process they are able to be disposed of at a landfill.

6.3.4. INFLUENT FLOW METERING

The wastewater leaving the secondary screening process passes through a flow metering device for measurement of the total quantity of wastewater treated ~~in~~ at the facility.

The flow measurement device consists of a Plasti-Fab Parshall Flume with a 9-inch throat, a Milltronics Multiranger 100 ultrasonic level sensing and transmitting system and a Honeywell DR4500 totalizing, indicating, and recording circular chart recorder.

6.3.5. INFLUENT EQUALIZATION CHAMBER

The raw wastewater leaving the headworks is then transported through a 10-inch pipe to the influent equalization chambers. The equalization chambers were converted from the previous aerobic digestion tank. The modification of the previous digestion tank was completed in 2008, and the tank was partitioned into two influent equalization chambers, one wet well, one effluent chlorine contact basin, one chlorinated effluent storage chamber, and one aerobic digester chamber.

The Primary Influent Equalization Chamber has a capacity of 167,494 gal. The Secondary Influent Equalization Chamber has a capacity of 83,741 gal. The total capacity is 251,235 gal. Each equalization chamber is equipped with a Submersible Mixer (Landia POP-1 9.0 hp) and a Venturi Aerator (Landia DG-1 12.2 hp) to help mix the influent in the chamber.

6.3.6. ANAEROBIC AND ANOXIC/FLOW EQUALIZATION TANKS

The wastewater from the Influent Equalization Chambers is pumped to the Anaerobic and Anoxic/Flow Equalization Tanks with two submersible pumps (KJ Hydro Model 6: KSE 7.5T) from the pump well and through 8" PVC pipe. The Anaerobic and Anoxic /Flow Equalization Tanks are part of the Membrane Bioreactor (MBR) process. The tanks are located between the headworks and the Influent Equalization Chambers. Each tank has a volume of 80,000 gal with dimensions of 18 feet by 60 feet by 10 feet side water depth. These tanks were converted from previous clarifier tanks of the activated sludge process.

The purpose of the anaerobic tank is for phosphorus removal, while the anoxic/flow equalization basin is used for influent flow equalization and also ammonia/nitrogen removal.

The flow through the anaerobic and anoxic/flow equalization basins is as follows; from the equalization basin all of the influent and 50% of the return activated sludge from the MBR's goes to the anaerobic tank, the remaining 50% of the return activated sludge flows directly into the anoxic/flow equalization basin. This liquid then flows through a common channel between the two basins and into the anoxic/flow equalization basin where it is mixed with the other 50% of return activated sludge and pumped up to the MBR's.

The equipment in the anaerobic tank consists of one Landia POP-I 6.5 HP 180 rpm submersible mixer and its purpose is to keep the influent and return activated sludge thoroughly mixed. The equipment in the anoxic/equalization tank consists of two Landia POP-I 4.9 HP 900 rpm mixers as well as four Pumpex K 150 7.5 HP submersible pumps. The mixers in this basin are used to mix the influent+return activated sludge from the anaerobic tank with the remaining 50% of the return activated sludge. Only two of the submersible pumps at a time are used to pump the liquid from the anoxic tank up to the MBR's for treatment.

6.3.7. MICROFILTRATION MEMBRANE BIOREACTOR

The wastewater flow from the Anoxic/ Flow Equalization Tank is then introduced to the two Enviroquip Membrane Bioreactors.

The Membrane Bioreactors were modified from the previous aeration tanks used in the activated sludge process, with dimension of 29 feet by 29 feet by 20 feet side water depth each. The tanks maintain 10,000 to 15,000 mg/L mixed liquor biomass system. This is used in association with a control strategy to achieve simultaneous nitrification and denitrification to achieve an effluent with low levels of nitrogen.

Each of the two Membrane Bioreactors consists of 8 Kubota SMU's; an SMU is one Upper Cassette with 150 flat plates, one Lower Cassette with 150 flat plates and a diffuser case. With a surface area of roughly 8.6ft^2 per plate, the plates are responsible for the separation of the liquid from the solids in the Bioreactor. These plates will filter down to 0.4 microns which removes virtually all the suspended solids as well as most of the bacteria. The diffuser case provides the air in the Bioreactor that is necessary for the oxidation of the BOD and the nitrogen in the wastewater; it also provides the scouring air for the cassettes to keep them clean throughout the permeate cycle. The scouring air requirement for each Bioreactor is 640 scfm. Water is forced through the membranes via the pressure generated from the depth of water above the permeate headers. The flow of water out of the membranes is controlled by the Flow Control Valves, through a PID loop from the PLC.

As the water is being filtered to produce permeate, the membrane surface will become fouled with bacteria. To remove excessive bacteria, the membranes must be cleaned. The cleaning process is the Clean In Place type, meaning the tank does not have to be drained of the mixed liquor or the membranes do not have to be removed. The membranes in the Bioreactor are cleaned using a 0.8% NaOCl solution that the district is able to generate on site.

The current designed flow capacity of the Membrane Bioreactors is 0.6 mgd and peak flow of 0.8 mgd. The ultimate design flow capacity will be 1.0 mgd and peak flow of 1.5 mgd with more membrane cassettes installed.

6.3.8. UV DISINFECTION

After the microfiltration membranes, the permeate is disinfected with a Suntech High Intensity Low Pressure UV system consisting of stainless steel wires that are square in cross section formed around quartz tubes; the wires are moved along the quartz tubes where the knife-like edges clean the quartz without scratching it. The system was designed to meet a 23 MPN disinfection level, which means the water is oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a 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 an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

6.3.9. EFFLUENT CHLORINATION AND STORAGE

When the need arises, permeate from the MBR process can be pumped from the stand pipe, chlorinated and sent to the Chlorine Contact Basin. The Chlorine Contact Basin was converted from the decant tank of the previous aerobic digester and it has a volume of approximately 52,846 gal. For the average daily flow rate of 0.5 mgd, the retention time is approximately 152 minutes. From the Chlorine Contact Basin, the permeate flows into the Permeate Storage Compartment where the Green Acres irrigation pump suction is connected. The treatment plant high pressure wash-down water pump's suctions is also connected into the permeate storage compartment.

No chlorinated permeate is permitted at the ponds, all permeate that is to be chlorinated must first be pumped from the Stand Pipe which leads to the ponds before chlorination.

6.3.10. EFFLUENT DISPOSAL

The permeate that is not pumped from the stand pipe, chlorinated and used for green acres irrigation, irrigation of the vegetation around the treatment plant or plant wash-down water is sent to the permeate disposal site. The permeate disposal site is located on USFS lands and is under the guidance of a Special Use permit from the USFS. The permeate flows by gravity in a southeasterly direction through a 9000 foot outfall line consisting of 6-, 8-, 10-,

and 12- inch sections. The outfall line drops approximately 1700 feet in elevation over this span. There are 13 evaporation / percolation ponds located on the USFS lands with total surface area of about 3.2 acres. There is a 13 acre Spray Irrigation site located on the USFS lands adjacent to the evaporation / percolation ponds site, that is also used for permeate disposal.

6.3.11. AEROBIC DIGESTION / THICKENING OF WASTE ACTIVATED SLUDGE

Waste Activated Sludge from the MBR process is pumped from the Bioreactors to the Aerobic Digestion / Thickening Basin where they are digested then thickened using a Membrane Thickening Unit. The membrane thickening unit uses the same technology as the Membrane Bioreactors; a cassette with 200 flat plates and a diffuser case. The gpd output of the thickening unit is de-rated to take into account the higher MLSS concentration that is achievable, 20,000 to 30,000 mg/l. The Aerobic Digestion / Thickening Basin was created by partitioning off a section of the Aerobic Digester aeration zone. The basin has an approximate volume of 72,000 gal.

6.3.12. SLUDGE DEWATERING / DRYING

The digested / thickened sludge is pumped to the Belt Filter Press where it is dewatered. After the belt filter press the solids are spread out in the drying bed where they are allowed to dry. Once the moisture content of the bio solids in the drying bed is at an acceptable level for hauling, the solids are loaded into two roll-off bins and hauled off site for disposal to Mecca by Hazmat Trans Hauling.

6.3.13. STANDBY POWER SYSTEM

The plant is equipped with a 330 kW 60 Hz 277/480 Volts A.C. generator (Model 500FDF4656) manufactured by Marathon Electric MFG Corp.

6.4. PROJECTED SEWER LOAD

As the computation in Section 2, the projected average daily sewer flow of Running Springs area during the dry weather months from June to November is expected to increase from

0.458 mgd (2008) to 0.508 mgd under buildout conditions. The projected average daily sewer flows in dry weather months for the Year 2013, 2018, 2023, 2028 are 0.483 mgd, 0.507 mgd, 0.523 mgd and 0.530 mgd, respectively.

During the wet weather months from December to May, the sewer flow for a selected rainfall event is the sum of the peak sanitary base flow, infiltration and inflow. Peak day sewer flow during the wet weather months is expected to increase 0.892 mgd (2006) to 0.951 mgd under buildout conditions. The projected peak day sewer flows in wet weather months for the Year 2013, 2018, 2023, 2028 are 0.908 mgd, 0.923 mgd, 0.932 mgd and 0.937 mgd, respectively. Peak hour sewer flow during the wet weather months is expected to increase to 1.489 mgd under buildout conditions. The projected peak hour sewer flows in wet weather months for the Year 2013, 2018, 2023, 2028 are 1.504 mgd, 1.519 mgd, 1.528 mgd and 1.533 mgd, respectively.

Above projection doesn't include the flow from RSWD's upstream neighbors, whose wastewater is also treated in RSWD's treatment facility. Currently the average daily wastewater flow from RSWD's upstream neighbors is approximately 77,000 gal/day, or about 16.4% of the average daily sewer flow produced in the Running Springs area. Because detailed projections of the future flows of the neighboring water agencies is out of the scope of this Master Plan, this study simply assumes that the wastewater flow from the upstream neighbors will flow the same increase rate as that of the Running Springs studied in this Plan. Table 6.3 lists the projected maximum wastewater flow (wet weather) to the WWTP based on the above assumption. These flow rates should be the designed flow rates of the wastewater treatment facilities.

Table 6.3. Projected Wastewater Peak Flow in Running Springs Water District Wastewater Treatment Plant.

	Running Springs		Upstream Agencies		Total in WWTP	
Year	**Peak Day**	**Peak Hour**	**Peak Day**	**Peak Hour**	**Peak Day**	**Peak Hour**
2008	0.892	1.488	0.080	0.114	0.972	1.603
2009	0.895	1.491	0.080	0.115	0.976	1.606
2010	0.899	1.495	0.081	0.115	0.979	1.610
2011	0.902	1.498	0.081	0.115	0.983	1.613
2012	0.905	1.501	0.082	0.116	0.986	1.617
2013	0.908	1.504	0.082	0.116	0.990	1.620
2014	0.911	1.507	0.082	0.117	0.993	1.624
2015	0.914	1.510	0.083	0.117	0.997	1.627
2016	0.917	1.513	0.083	0.117	1.000	1.630
2017	0.920	1.516	0.083	0.118	1.003	1.633
2018	0.922	1.518	0.084	0.118	1.006	1.636
2019	0.925	1.521	0.084	0.118	1.009	1.639
2020	0.926	1.522	0.084	0.119	1.011	1.641
2021	0.928	1.524	0.085	0.119	1.013	1.643
2022	0.930	1.526	0.085	0.119	1.015	1.645
2023	0.932	1.528	0.085	0.119	1.017	1.647
2024	0.933	1.529	0.085	0.119	1.018	1.649
2025	0.934	1.530	0.085	0.120	1.019	1.650
2026	0.935	1.531	0.085	0.120	1.020	1.651
2027	0.936	1.532	0.086	0.120	1.021	1.652
2028	0.936	1.532	0.086	0.120	1.022	1.652
Buildout	0.951	1.547	0.088	0.122	1.038	1.669

6.5. EXISTING TREATMENT CAPACITY LIMITATIONS AND PROPOSED IMPROVEMENTS

For a wastewater treatment plant, its pumping facilities, conduits, bar-rack, grit chambers, chlorine-contact tank should be sized to be able to handle peak hour flow, while the biological process and the sludge pumping system should be sized to be able to handle peak day flow. However, with flow equalization facilities, peak flow could be scientifically shaved off and reduces the required capacity of the followed processes.

6.5.1. EXISTING TREATMENT CAPACITY

The headwork of the wastewater treatment facility should be sized for peak hour flow. For the case of RSWD WWTP, the headwork of the plant has peak capacity of up to 3.0 mgd, which is enough for the peak hour flow of 1.67 mgd under buildout conditions.

The existing MBR process has a design capacity of 0.6 mgd, and can be expanded to design flow of 1.0 mgd in the future. During peak flow, the plant can divert the upstream flow to the Equalization Chambers to balance out the peak flow in order to treat the designed flow of 0.6 mgd (or 1.00 mgd in the future) with MBR process. The maximum holding times of the Flow Equalization Chambers are shown in Table 6.4.

Table 6.4. Maximum Holding Time of Flow Equalization Chambers in Running Springs Water District Wastewater Treatment Plant.

		Maximum Holding Time (hour)	
Year	**Peak Flow**	**Existing MBR**	**Ultimate MBR**
2008	Peak Hour 1.60 mgd	6.0	Not Applicable
	Peak Day 0.97 mgd	16.2	Not Applicable
2013	Peak Hour 1.62 mgd	5.9	9.7
	Peak Day 0.99 mgd	15.5	Infinite
2018	Peak Hour 1.64 mgd	5.8	9.5
	Peak Day 1.01 mgd	14.9	1004.9
2023	Peak Hour 1.65 mgd	5.8	9.3
	Peak Day 1.02 mgd	14.5	354.7
2028	Peak Hour 1.65 mgd	5.7	9.2
	Peak Day 1.02 mgd	14.3	274.1
Buildout	Peak Hour 1.67 mgd	5.6	9.0
	Peak Day 1.04 mgd	13.8	158.7

Table 6.4 indicated with the current MBR capacity of 0.6 mgd, the plant can stand the peak hour flow for at least consecutive 5.6 hours. The plant can also stand the peak day flow for consecutive 13.8 hours to 16.2 hours. Since peak day flow is likely to sustain for over 24 hours, the current MBR capacity may fail to treat the peak day flow under this situation.

If the MBR capacity is expanded to 1.0 mgd, the plant can stand the peak hour flow for at least consecutive 9.0 hours and stand the peak day flow for at least consecutive 158 hours (or 6.6 days) in the future.

Under the worst situation, the plant can employ other options to reduce peak flow:

- Use the peak capacity of the MBR itself.

6.5.2. PROPOSED IMPROVEMENTS

Wastewater treatment facility improvements were proposed based on sewer load projection, capacity analysis and the evaluation of existing system. Proposed improvements include:

- Expansion of the current MBR system from a capacity of 0.6 mgd to 1.0 mgd. with the installation of more membrane cassettes.
- Replacement of existing belt press sludge de-watering system.

The more details of the timing and cost estimates of proposed improvements are shown in the pocket at the end of this Master Plan (Summary of Costs and Schedule for Recommended CIP Improvements). Project costs to be incorporated into the District's capital improvement program were generated by adding allowances to the estimated construction costs.

Construction cost estimates were converted to total project costs by adding an allowance of 25% for engineering, legal and administrative fees. Project cost estimates are intended for use in budget development, wherever site-specific costs are not utilized. They represent typical experience and should be adjusted, where appropriate, to meet special needs.

The overall cost for the proposed improvements presented in this Master Plan through the next 20 years is approximately $870,500.

6.6. KEY FINDINGS

- The effluent from RSWD's wastewater treatment facilities need satisfy the requirements from several state regulations. Basically, the effluent should be disinfected tertiary treated water.

- The treatment processes of RSWD's WWTP include pretreatment, MBR process and UV disinfection. Under normal operation conditions, the effluent from the treatment plant can meet all of the regulatory requirements.

- Peak day sewer flows to the WWTP are expected to increase from current 0.972 mgd to 1.038 mgd under buildout conditions. The projected peak day sewer flows for the years 2013, 2018, 2023, 2028 are 0.990 mgd, 1.006 mgd, 1.017 mgd and 1.022 mgd, respectively. Peak hour sewer flow is expected to increase from the current 1.603 mgd to 1.669 mgd under buildout conditions. The projected peak hour sewer flows for the

Year 2013, 2018, 2023, 2028 are 1.620 mgd, 1.636 mgd, 1.647 mgd, and 1.652 mgd, respectively.

- The RSWD should expand the MBR capacity from the current 0.6 mgd to 1.0 mgd to achieve more flexibility of handling the projected peak day flows.

CHAPTER 7 COSTS AND SCHEDULE FOR RECOMMENDED CIP IMPROVEMENTS

This chapter summarized the costs and schedules for recommended water and wastewater CIP improvements.

Project costs to be incorporated into the District's capital improvement program were generated by adding allowances to the estimated construction costs. Construction cost estimates were converted to total project costs by adding an allowance of 25% for engineering, legal and administrative fees. Project cost estimates are intended for use in budget development, wherever site-specific costs are not utilized. They represent typical experience and should be adjusted, where appropriate, to meet special needs.

The timing for implementation of the proposed improvements is based on projected demands and hydraulic modeling of the capabilities of the existing system facilities. A number of factors may dictate that projects be accelerated or deferred (e.g., timing of sewer flows or developments, physical condition of facilities or piping, upcoming maintenance expenditures, etc.).

Table 7.1 and Table 7.2. show the cost estimates for the water and wastewater system improvements identified in this Master Plan, respectively. Table 7.3 and Table 7.4 show the proposed expenditure schedule for the improvements identified in this Master Plan. The priority of the locations of the water main upgrade is listed in the Technical Memorandum 6 (*Water Pumping, Storage and Distribution Facilities*). It is recommended that RSWD conduct an annual review of the proposed projects and revise the project costs and implementation schedule as necessary.

Table 7.1. Cost Estimates for Running Springs Water District's Water Distribution System CIPs*.

	Description		Quantity	Unit	Unit Cost	Subtotal Cost	10% Contingency	25% Engineering & Administration	Estimated Cost
	Water Main Upgrade (location & size)								
1	CEDARWOOD DR	4" to 8"	1,748	LF	$70	$122,386	$12,239	$30,596	$165,221
2	CIRCLE VIEW DR	4" to 8"	3,630	LF	$70	$254,112	$25,411	$63,528	$343,052
3	FERNSIDE DR	4" to 8"	730	LF	$70	$51,094	$5,109	$12,773	$68,977
4	FIRWOOD DR	4" to 8"	1,487	LF	$70	$104,085	$10,409	$26,021	$140,515
5	OAKLEAF CT	4" to 8"	314	LF	$70	$21,984	$2,198	$5,496	$29,679
6	OAKLEAF DR/HWY 18	4" to 8"	2,426	LF	$70	$169,836	$16,984	$42,459	$229,279
7	OVERHILL DR	4" to 8"	1,491	LF	$70	$104,370	$10,437	$26,093	$140,900
8	PINEHURST DR	4" to 8"	1,521	LF	$70	$106,441	$10,644	$26,610	$143,695
9	VALLEY VIEW DR	New 8"	1,350	LF	$70	$94,500	$9,450	$23,625	$127,575
10	VALLY RIDGE DR	4" to 8"	1,127	LF	$70	$78,870	$7,887	$19,717	$106,474
11	WILDERNESS DR	4" to 8"	5,225	LF	$70	$365,724	$36,572	$91,431	$493,728
12	ALL VIEW DR	6"to12"	2,056	LF	$100	$205,600	$20,560	$51,400	$277,560
13	HOLLYMONT DR	6"to12"	289	LF	$100	$28,901	$2,890	$7,225	$39,016
14	ONACREST DR	4" to 12"	2,049	LF	$100	$204,900	$20,490	$51,225	$276,615
15	OUTER HIGHWAY 18	New 12"	3,000	LF	$100	$300,000	$30,000	$75,000	$405,000
16	VALLEY VIEW DR	4" to 12"	1,100	LF	$100	$110,000	$11,000	$27,500	$148,500
17	EASY ST/SPRING OAK	6" to 16"	2,791	LF	$120	$334,920	$33,492	$83,730	$452,142
18	LURING PINES DR	6" to 16"	1,774	LF	$120	$212,857	$21,286	$53,214	$287,358
19	NOB HILL CIR	12" to 20"	516	LF	$150	$77,400	$7,740	$19,350	$104,490
20	NOB HILL CIR	6" to 20"	972	LF	$150	$145,810	$14,581	$36,452	$196,843
21	NOB HILL DR	6" to 20"	2,951	LF	$150	$442,637	$44,264	$110,659	$597,560
22	Pavement Repair (AC Repair for 100% of the Pipeline Alignment with 12' Width)		38,546	LF					
			462,557	SF	$2.00	$925,114	$92,511	$231,278	$1,248,904
	Water Main Subtotal								**$6,023,081**
23	Pressure Zone #4 Storage Reservoir		550,000	Gal	New storage will be installed by Developer (Hawks Estates)				
24	Pressure Zone #7 Storage Reservoir		650,000	Gal	$2.20	$1,430,000	$143,000	$357,500	$1,930,500
	Total								**$7,953,581**

* Unit costs are based on 2008 ENR Index. The cost includes necessary fittings and valves.

Table 7.2. Cost Estimates for Running Springs Water District's Wastewater System CIPs*.

	Description	Quantity	Unit	Unit Cost	Subtotal Cost	10% Contingency	25% Engineering & Administration	Estimated Cost
	Sewer Collection System							
1	Lift Stations #1, #2 Rehabilitation	2	EA	$400,000	$800,000	$80,000	$200,000	$1,080,000
2	Lift Station #3 Replacement	1	EA	$500,000	$500,000	$50,000	$125,000	$675,000
3	Lift Station #1, #2 & #7, Generators Replacement	3	EA	$50,000	$150,000	$15,000	$37,500	$202,500
4	Undersized Sewer Pipelines Replacement							
	12-Inch Gravity Sewer Pipeline	138	LF	$80	$11,040	$1,104	$2,760	$14,904
	15-Inch Gravity Sewer Pipeline	120	LF	$105	$12,600	$1,260	$3,150	$17,010
	Pavement Repair (AC Repair for 100% of the Pipeline Alignment with 12' Width)	258 3,096	LF SF	$2.50	$7,740	$707	$1,935	$10,449
	Subtotal							**$1,999,913**
	Sewer Treatment System							
5	Membrane Filtration System Expanding from 0.6 mgd to 1.0 mgd	1	Lump Sum	$500,000	$500,000	$50,000	$20,000	$570,000
6	Generator Replacement	1	EA	$50,000	$100,000	$10,000		$110,000
7	Belt Press Replacement	1	EA	155,000	$155,000	$15,500	$20,000	$190,500
	Subtotal							**$870,500**
	Total							**$2,870,413**

* Unit costs are based on 2008 ENR Index.

Table 7.3. Proposed Schedule for Running Springs Water District's Water Distribution System CIPs.

Description			FY 2011-2015	FY 2016-2020	FY 2021-2025	FY 2026-2031	Total
Water Main Upgrade(location, size & length)							
EASY ST/SPRING OAK DR	6" to 16"	2,791'	$452,142				$452,142
OUTER HIGHWAY 18	New 12"	3,000'	$405,000				$405,000
VALLEY VIEW DR	4" to 12"	1,100'	$148,500				$148,500
VALLEY VIEW DR	New 8"	1,350'	$127,575				$127,575
ALL VIEW DR	6"to12"	2,056'		$277,560			$277,560
HOLLYMONT DR	6"to12"	289'		$39,016			$39,016
NOB HILL CIR	12" to 20"	516'		$104,490			$104,490
NOB HILL CIR	6" to 20"	972'		$196,843			$196,843
NOB HILL DR	6" to 20"	2,951'		$597,560			$597,560
FERNSIDE DR	4" to 8"	730'			$68,977		$68,977
FIRWOOD DR	4" to 8"	1,487'			$140,515		$140,515
OAKLEAF CT	4" to 8"	314'			$29,679		$29,679
OAKLEAF DR/HWY 18	4" to 8"	2,426'			$229,279		$229,279
PINEHURST DR	4" to 8"	1,521'			$143,695		$143,695
WILDERNESS DR	4" to 8"	5,225'			$493,728		$493,728
CEDARWOOD DR	4" to 8"	1,748'				$165,221	$165,221
CIRCLE VIEW DR	4" to 8"	3,630'				$343,052	$343,052
LURING PINES DR	6" to 16"	1,774'				$287,358	$287,358
ONACREST DR	4" to 12"	2,049'				$276,615	$276,615
OVERHILL DR	4" to 8"	1,491'				$140,900	$140,900
VALLY RIDGE DR	4" to 8"	1,127'				$106,474	$106,474
Pavement Repair (Assume AC Repair for 100% of the Pipeline Alignment with 12-Ft Width)			$267,008	$219,801	$379,156	$382,938	$1,248,904
Water Main Update Subtotal			$1,400,225	$1,435,271	$1,485,029	$1,702,556	**$6,023,081**
Pressure Zone #7 New Storage			$1,930,500				$1,930,500
Total			$3,330,725	$1,435,271	$1,485,029	$1,702,556	**$7,953,581**

Table 7.4. Proposed Schedule for Running Springs Water District's Wastewater System CIPs.

	Description	FY 2011-2015	FY 2016-2020	FY 2021-2025	FY 2026-2031	Total
1	Lift Stations #1, #2 Rehabilitation & Lift Station #3 Replacement	$1,080,000				$1,080,000
2	Lift Station #3 Replacement		$675,000			$675,000
3	Lift Station #1, #2 & #7, Generators Replacement	$202,500				$202,500
4	Undersized Sewer Pipelines Replacement					
	12-Inch Gravity Sewer Pipeline		$14,904			$14,904
	15-Inch Gravity Sewer Pipeline		$17,010			$17,010
	Pavement Repair (Assume AC Repair for 100% of the Pipeline Alignment with 12-Ft Width)		$10,449			$10,449
5	Membrane Filtration System Expanding from 0.6 mgd to 1.1 mgd	$570,000				$570,000
6	WWTP Generator Replacement	$110,000				$110,000
7	Belt Press Replacement	$190,500				$190,500
	Total	$2,153,000	$717,363			**$2,870,413**

CHAPTER 8 CONDITIONAL ASSESSMENT

This chapter summarizes the conditional assessment of those items (equipment, etc) directly related to the Water and Wastewater systems.

This section will be modified in conjunction with the Financial and Facility Master Plans.

Table 8.1. Running Springs Water District Wastewater Treatment Plant Conditional Assessment.

Project	Section Segment Rating	Age	Operation Concerns	Design Limits	Mat'ls	Public Health Risk	Reg. Element	Weighted Assmnt
K Turbo Blowers	2 each	1	1	1	1	1	2	**28**
Generator	325 kW	4	2	2	3	4	3	**72**
NaOCl Building	1 each	1	1	1	1	1	1	**24**
NaOCl Unit	100 lbs/day	1	1	1	1	1	1	**24**
Belt Press	1.5 meter	3	3	3	1	4	4	**72**
Bracket / Green Influent Screen	3 mm	1	1	1	1	1	1	**24**
Percolation Ponds Infrastructure	13 ponds	5	1	1	4	1	4	**64**
UV System	1 each	1	4	1	1	1	1	**36**
Grit Washer	1 each	2	2	2	4	1	3	**56**
MBR Cartridges	4,800 ea	1	3	3	1	3	3	**56**
Bobcat	543	2	3	3	2	3	3	**64**
Increase Plant Capacity		3	3	3	3	3	3	**72**

AGE ➔ Age of the system / date component was put into service or use

0 - 10 years = 1
11 - 20 years = 2
21 - 30 years = 3
31 - 40 years = 4
over 40 years = 5

OPERATION CONCERNS ➔ Issues encountered during maintenance and / or operation

Low (less than 2x per year) = 1
Medium (3x - 7x per year) = 2
High (more than 7x per year) = 3

DESIGN LIMITS ➔ Does the line meet Design Criteria

Yes = 1
Marginal = 2
No = 3

MATERIALS ➔ Materials in use

PVC Pipe / Stainless Steel = 1
Ductile Iron Pipe = 2
Cast Iron Pipe = 3
Steel Pipe = 4
AC Pipe = 5

PUBLIC HEALTH RISK ➔ Risk to Public Health

Benign = 1
Moderate Leak (3 gpm) = 2
No Backflow Preventer = 3
Leak (Greater than 4 gpm) = 4
Immediate / Toxic / Immediate Need for facility = 5

REGULATORY ELEMENT ➔ State Regulation or Requirement

Optional = 1
Recommended = 2
Required = 3
Mandatory Deadline = 4

WEIGHTED ASSESSMENT ➔ Weighted Assessment is based on 4 points per category multiplied by the weighting factor

90 -100 Points = 1st Year Priority
80 - 89 Points = 2nd Year Priority
70 - 79 Points = 3rd Year Priority
60 - 69 Points = 4th Year Priority
50 - 59 Points = 5th Year Priority
40 - 49 Points = Second Tier Priority (Year 6 - 10)
30 - 39 Points = Third Tier Priority (Year 11 - 15)
0 - 29 Points = Fourth Tier Priority (Year 16 - 20)
AS NEEDED – this item will be completed as deemed necessary during normal maintenance activities and review

Table 8.2. Running Springs Water District Collections System Conditional Assessment.

Project	Section Segment Rating	Age	Operation Concerns	Design Limits	Mat'ls	Public Health Risk	Reg. Element	Weighted Assmnt
Sewer Jetter	1 each	3	3	3		5	1	**100***
Lift Station No. 1 overflow tank	15,000 gallon	0	3	3	TBD	5	2	**100***
Lift Station No. 1 Generator	100 kW	4	3	2			4	**52**
Lift Station No. 2 Generator	100 kW	4	3	2			4	**52**
Lift Station No. 7 Generator	30 kW	4	3	2			4	**52**
Rebuild Lift Station No. 1	1 each	4	3	3		5	4	**76**
Replace Unit #67	½ Ton	2						
Rebuild Lift Station No. 2	1 each	4	3	3		5	4	**76**
Replace Unit #70	½ Ton	2						
Rebuild Lift Station No. 3	1 each	4	3	3		5	4	**76**
Replace Unit #77	½ Ton	2						
Portable Compressor	P125	3	2				1	**50**
Sag x 2 repair	12 each							**As needed**

* denotes a forced Weighted Value of 100 to meet needs / deadlines or to help facilitate maintenance operations

AGE → Age of the System / date component was put into service or use

0 - 10 years = 1
11 - 20 years = 2
21 - 30 years = 3
31 - 40 years = 4
over 40 years = 5

OPERATION CONCERNS → Issues encountered during maintenance and / or operation

Low (less than 2x per year) = 1

Medium (3x - 7x per year) = 2
High (more than 7x per year) = 3

DESIGN LIMITS ➔ Does the line meet Design Criteria
Yes = 1
Marginal = 2
No = 3

MATERIALS ➔ Materials in use
PVC Pipe / Stainless Steel = 1
Ductile Iron Pipe = 2
Cast Iron Pipe = 3
Steel Pipe = 4
AC Pipe = 5

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30 - 39 Points = Third Tier Priority (Year 11 - 15)
0 - 29 Points = Fourth Tier Priority (Year 16 - 20)
AS NEEDED – this item will be completed as deemed necessary during normal maintenance activities and review

Table 8.3. Running Springs Water District Water System Conditional Assessment.

Project	Section Segment Rating	Age	Operation Concerns	Design Limits	Mat'ls	Public Health Risk	Reg. Element	Weighted Assmnt
Water Development								100
Luring Pines Tank Refurbishment		5	1	2	4	2	2	**95**
Silver Spruce / Hilltop Boulevard	3,000 ft	5	2	3	4	5	2	**90**
Valley View – PZ#1	1,300 ft	5	2	3	4	5	2	**84**
Valley View – PZ#2	1,100 ft	5	1	3	4	5	2	**80**
Hilltop Blvd – Block 5 TR1847	500 ft	5	1	3	4	5	2	**78**
Sidewinder Canyon Booster Line	1,800 ft	5	1	3	4	4	1	**72**
Luring Canyon Booster Line	700 ft	5	1	3	4	4	1	**72**
PZ#3 12-inch Transmission Line	6,900 ft	5	1	3	5	1	1	**64**
Spring Oak / Easy Street 12-inch Main	2,100 ft	5	1	3	5	1	1	**64**
P.Z. # 3 / 4" A.C. Main Replacement	19,800 ft	5	1	3	5	1	1	**64**
P.Z. # 3 / 6" A.C. Main Replacement	800 ft	5	1	3	5	1	1	**64**
P.Z. # 2 / 4" A.C. Main Replacement	13,500 ft	5	1	3	5	1	1	**64**
P.Z. # 2 / 6" A.C. Main Replacement	8,300ft	5	1	3	5	1	1	**64**
P.Z. # 1 / 4" A.C. Main Replacement	1,400 ft	5	1	3	5	1	1	**64**
P.Z. # 1 / 6" A.C. Main Replacement	9,100 ft	5	1	3	5	1	1	**64**
P.Z. # 4 / 4" A.C. Main Replacement	900 ft	5	1	3	5	1	1	**64**
P.Z. # 4 / 6" A.C. Main Replacement	16,200 ft	5	1	3	5	1	1	**64**
P.Z. # 6 / 4" A.C. Main Replacement	1,500 ft	5	1	3	5	1	1	**64**
P.Z. # 5 / 4" A.C. Main Replacement	1,300 ft	5	1	3	5	1	1	**64**
P.Z. # 5 / 6" A.C. Main Replacement	3,200 ft	5	1	3	5	1	1	**64**

AGE ➔ Age of the System / date component was put into service or use

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over 40 years = 5

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