LEUCADIA WASTEWATER DISTRICT
ASSET MANAGEMENT PLAN

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VOLUME 1

EXECUTIVE SUMMARY

The Leucadia Wastewater District (District) covers a total service area of 10,200 acres (16 square miles) which includes southern portions of the City of Carlsbad (Carlsbad) and northern portions of the City of Encinitas (Encinitas). The District provides wastewater collection, treatment, disposal and service to a population of approximately 60,000. The Leucadia Wastewater District's existing wastewater system encompasses approximately 190 miles of gravity sewer pipeline, 5,000 manholes, ten pump stations and 12 miles of force mains, a wastewater treatment plant, and a water reclamation plant.

As of December 2011, the District serves 27,799 equivalent dwelling units (EDUs) at 92.5% of buildout. Utilizing current and historical District flow and EDU data, it is anticipated that the existing conveyance system has sufficient capacity to convey District buildout flows. An analysis of the data also indicates that current peak infiltration and inflow rate is near equal to the design infiltration and inflow.

Asset planning has morphed into organizing the District's wastewater assets into five distinct categories – gravity sewers, manholes, pump station, force mains, and jointly-owned facilities. The District is one of six owners of the Encina Water Pollution Control Facility (WPCF) which is operated and administered by the Encina Wastewater Authority (EWA). Additionally, the District pumps secondary treated wastewater from the Encina WPCF to its Gafner Water Reclamation Plant (WRP) for tertiary treatment and then distributes the recycled water to the South La Costa Golf Course.

The following paragraphs summarize the recommendations of this asset management plan by asset category highlighting operation and maintenance recommendations (where appropriate) and providing short-term expenditures of capital funds (i.e., 5-Year Capital Improvement Program projects). Long-term (20 year) estimates of expenditures are also provided. Note that no growth-related capital improvement projects are recommended for the District at this time based on (1) the District approaching the estimated number of buildout EDUs and (2) the quantity of wastewater per EDU on a District-wide basis has not increased.

GRAVITY SEWER PIPELINES

- In 2011 – 2012, the District has enhanced the quantity and quality of closed-circuit television (CCTV) inspections of its gravity sewer pipelines through the purchase of a new state-of-the-art CCTV truck and additional training of its field service staff. To make best use of the information acquired during these inspections, the District should:
  - Assign an estimated integrity/condition of the pipeline as District staff completes each pipeline inspection. The National Association of Sewer Service Companies (NASSCO) system, or similar condition-grading system, should be utilized.
  - Outline a clear path for the inspection results (i.e. condition of pipeline) to move from the inspector to supervisor, and then to the engineering and administrative sections of the District to plan for facilities replacement/repair if necessary.
  - Compile and organize the CCTV inspections such that prior inspections can quickly and easily be reviewed prior to conducting a new inspection. This could be accomplished via a GIS-centric software program. Programs would have to be evaluated and purchased by the District.
  - Confirm long-term plan for CCTV inspection utilizing District's two CCTV trucks.
- Work orders for routine maintenance are presently generated strictly based on geographic zone. This approach should be revised to also consider the associated requirements of the activity. For example, if it is decided that a large diameter sewer in Zone 1 which requires traffic control to hydroclean is only planned to be cleaned every few years, a new work order should not be generated each year Zone 1 comes up for hydrocleaning.
- The following replacement-based capital improvement projects are recommended for the District's 5-Year CIP.
  - Address structural repairs identified in Infrastructure Engineering Corporation's (IEC) 2009 Phase 1 AMMP Implementation.
  - Address structural repairs identified in the special maintenance area (SMA) evaluation conducted in 2012.
  - Complete trial lining project (with lateral connection lining or partial lateral lining as-needed to protect the publically-owned rehabilitated sewer line).

- Begin replacement or lining of all vitrified clay pipe (VCP) throughout the District.
- CCTV inspections show the District has a chronic issue of root intrusion in VCP pipe. Replacement should begin in the most affected area, Old Leucadia, Zone 1. The District should evaluate replacement versus lining as a cost-effective alternative.
- Following Zone 1, replacement should move to the scale-impacted Alga Hills area of the District. The District should evaluate replacement versus lining, mechanical cleaning, and/or chemical treatment as cost-effective alternatives.
- Following Alga Hills, replacement or lining should continue in the oldest areas of the District (Zones 2, 3, and 4) and then the remaining zones.
- Purchase a GIS-based work management system.
- The District has historically had a Miscellaneous Line Repair budget line item within the budget. We recommend continuing to include the Miscellaneous Line Repair at $150,000.
- The District has historically had a Lateral Replacement Backflow Program budget line item with the budget. The 5-Year CIP shows this program continuing at its current funding level of $100,000.

- For long-term financial planning, at a spending rate of $1,500,000 per year, the District would replace approximately 130,435 feet of gravity sewer over 20 years. This equates to approximately 13 percent of the District's gravity sewer pipelines. Alternatively, if lining was preferred over replacement, at the same spending rate the District would line approximately 260,870 feet over 20 years, which represents approximately 25 percent of the gravity sewer pipelines.

MANHOLES

- The District presently inspects all manholes on an annual basis. The District is planning to enhance its technological capabilities and increase the quality of the inspections by maximizing the use of existing camera equipment to photograph and videotape manholes. To make best use of the information acquired during these inspections, the District should:
  - Assign an estimated integrity of the manhole as District staff completes each inspection. The National Association of Sewer Service Companies (NASSCO) system, or similar condition-grading system, should be utilized.

- Outline a clear path for the inspection results (i.e. condition) to move from the inspector to supervisor, and then to the engineering and administrative sections of the District to plan for rehabilitation (or replacement) of the manholes if necessary.
- Compile and organize the photographs and video so that prior records can quickly and easily be reviewed prior to conducting a new inspection. This could be accomplished through a GIS-centric software program.

- For the District's 5-Year CIP, establish a manhole rehabilitation budget item of up to $150,000 and determine whether manholes will be rehabilitated with pipeline replacement/lining or independently.
- For long-term financial planning, at a spending rate of $150,000 per year, the District would replace approximately 500 manholes over 20 years. This equates to approximately 10 percent of the District's manholes.

PUMP STATIONS

- Conduct condition assessment of all District pump stations to identify capital improvement projects. All components of the pump station (controls, mechanical, electrical, structural, etc.) should be inspected. Force mains should be inspected separately.
- Maintain summary (in Appendix F) of pump station improvements and their associated cost to allow for more accurate financial planning.
- The following replacement-based capital improvement projects are recommended or are planned by the District and are included in the District's 5-Year CIP.
  - Rehabilitation of the Batiquitos Pump Station
  - Leucadia Pump Station Generator Replacement
  - Rehabilitation of the La Costa Pump Station
  - Condition assessment of all District pump stations
  - Replacement of Power Monitors at Saxony and Rancho Verde
  - Replacement of pumps at the Saxony Pump Station
  - Encinitas Estates Improvements
  - Village Park 5 Improvements
  - Village Park 7 Improvements
  - The 5-Year CIP also includes place holder expenses for improvements which are expected to result from the condition assessment ("General Pump Station Improvements")

- For long-term financial planning, District pump station expenditures (including force mains) are expected to total approximately $34 million over the next 20 years.

FORCE MAINS

- For asset planning purposes, plastic-based force mains (e.g., PVC, HDPE) are estimated to have a useful life of 50 years while metallic-based force mains' useful life is estimated to be 25 years.
- Five of the District's ten pump station force mains (Avocado, Diana, Encinitas Estates, Village Park 5, and Village Park 7) have been replaced since 2008, all with PVC. Rancho Verde Pump Station's force main is PVC and was installed in 1997. The condition of these facilities should be evaluated as they approach the end of their estimated remaining useful life of 50 years. Additionally, an interim inspection (e.g. CCTV from discharge, evaluation of pump efficiency, etc) at approximately 20 years would be warranted. The District should continue to evaluate the most appropriate manner in which to conduct this interim inspection.
- Saxony Pump Station's force main has ductile iron sections installed in 1999 and 2001. The force main should be evaluated as part of the overall pump station condition evaluation. The force main should be planned for replacement by 2024 unless the condition assessment recommends otherwise.
- La Costa Pump Station's force mains are a combination of CIP (cast iron), PVC, and HPDE and were installed between 1963 and 1998. The CIP section is the oldest section and should be evaluated as part of the overall pump station evaluation. The remaining force main sections should be evaluated as they approach the end of their estimated remaining useful life.
- Sections of the Batiquitos Pump Station force mains were replaced following a leak in 2010. Based on destructive testing completed in 2011, the remaining sections of B2 are recommended to be replaced in FY2023 and B3 is recommended to be replaced in FY2025.
- Leucadia Pump Station force main L1 is at the end of its theoretical remaining useful life and is planned for replacement in FY16/FY17. A corrosion evaluation is planned for FY13. This, and other evaluations, should be utilized to (1) determine whether this pipeline should be lined or replaced and (2) confirm planned replacement timeframe.

- The following replacement-based capital improvement projects are recommended or are planned by the District and are included in the District's 5-Year CIP.
  - Cathodic Protection Improvements for L2, B2, and B3 (and annual testing)
  - Integrity Inspection of L1
  - Integrity Inspection of L1, B2, and B3 (Ultrasonic Testing)
  - Leucadia Pump Station Force Main L1 Replacement
- Long-term capital estimates for force main replacement are included in the pump station long-term capital replacement estimates. These include IEC's recommendations to replace B2 in FY2023 and B3 in FY2025.

JOINTLY-OWNED GRAVITY SEWERS

- Recommendations regarding the Batiquitos Influent Sewer
  - Continue maintaining with remaining gravity sewers. Generate hydrocleaning and CCTV work orders based on the needs of the pipeline.
- Recommendations regarding the Lanikai Gravity Sewer
  - Update work management system to reflect that the diameter is 21-inch for its entire length.
  - Place pipeline on a 5-year schedule for hydrocleaning and CCTV.
  - Develop long-term inspection schedule and integrate with a chronological summary of inspection and maintenance activities.
- Recommendations regarding the Occidental Sewer
  - Monitor Carlsbad's proposed cleaning schedule of every five years.
  - Develop a chronological summary of inspection and maintenance activities.
- The following capital improvement projects are included in the District's 5-Year CIP (District's share of cost only).
  - Lanikai Line Repair – Lining from Franciscan Road to Occidental Line
  - Occidental Line Repair – Rehabilitation of eight (8) manholes and CIPP lining of two cracked line segments
- For long-term financial planning, the District's share of the Lanikai Gravity Sewer expenditures is expected to total $191,000 and for the Occidental Sewer, $675,700. The Batiquitos Influent Sewer is planned for in the remaining District gravity pipelines.

RECYCLED WATER

- The District should inspect the Secondary Effluent Pump Station at Encina WPCF as part of the overall pump station condition assessment planned in FY14.
- The District should inspect the Gafner WRP as part of the overall pump station condition assessment planned in FY14.
- The following capital improvement projects are included in the District's 5-Year CIP.
  - Recycled Water Effluent Line Valve Repair
  - Recycled Water Effluent Line Replacement (includes new San Marcos Creek Crossing)
  - The North San Diego County Regional Recycled Water Project
  - General Secondary Effluent Pump Station and Force Main Improvements
  - General Gafner WRP Improvements
- For long-term financial planning, District recycled water expenditures for pumpback facilities at Encina are estimated to total $7,328,000 over the next 20 years. The Gafner Water Reclamation Plant expenses are expected to total $4,764,000 over the next 20 years.

ENCINA WASTEWATER AUTHORITY

- The District's average annual share of EWA's capital projects is estimated to be $1,200,000 based on the capital replacement value of the District's ownership of EWA facilities.
- The actual use of funds shall be based on specific projects as defined by EWA.
- For long-term financial planning, the District's share of EWA projects is estimated to be $24,000,000 over the next 20 years.

5-YEAR CIP

The following table presents the District's recommended 5-Year CIP as a culmination of all CIP projects discussed throughout the report.

TABLE ES-1
District Capital Improvement Program (CIP) Detail in 1,000's

Wastewater Program	FY2013	FY2014	FY2015	FY2016	FY2017
Gravity Pipelines and Manholes					
Phase 1 AMMP Structural Repairs	-	100.0	-	-	-
SMA Structural Repairs	250.0	-	-	-	-
Trial Lining Project	250.0	-	-	-	-
Scott's Valley Pipeline Lining	-	500.0	-	-	-
VCP Programmatic Replacement	-	1,000.0	1,500.0	1,500.0	1,500.0
Annual Manhole Rehabilitation	-	150.0	150.0	150.0	150.0
New Work Management System Purchase	-	125.0	-	-	-
Miscellaneous Pipeline Rehabilitation	150.0	150.0	150.0	150.0	150.0
Lateral Replacement Backflow Program	100.0	100.0	100.0	100.0	100.0
Pump Stations					
Batiquitos Rehabilitation	2,850.0	-	-	-	-
Leucadia Generator Replacement	550.0	-	-	-	-
La Costa Rehabilitation	240.0	-	-	-	-
Condition Assessment	-	30.0	-	-	-
Saxony and Rancho Verde Power Monitors	-	50.0	-	-	-
Saxony Pump Replacement	-	100.0	-	-	-
Encinitas Estates Improvements	-	337.5	-	-	-
VP5 Improvements	-	-	337.5	-	-
VP7 Improvements	-	-	240.0	-	-
General Pump Station Improvements	-	-	379.0	955.8	955.8
Force Mains					
L2,B2, & B3 CP Improvements	212.0	-	-	-	-
Annual CP Testing - L1, L2, B2, and B3	-	0.5	0.5	0.5	0.5
L1 Corrosion Evaluation	47.0	-	-	-	-
L1, B2, and B3 Corrosion Evaluation	-	-	-	90.0	-
L1 FM Replacement	-	-	-	2,268.0	2,268.0
Jointly-Owned Gravity Sewers					
Lanikai Line Repair	256.0	-	-	-	-
Occidental Line Repair	301.8	-	-	-	-
Subtotal Wastewater Program	*5,206.8*	*2,643.0*	*2,857.0*	*5,214.3*	*5,214.3*
District Share of Encina CIP	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0
Total Wastewater Program	***6,406.8***	***3,843.0***	***4,057.0***	***6,414.3***	***6,324.3***
Recycled Water Program	**FY2013**	**FY2014**	**FY2015**	**FY2016**	**FY2017**
RW Effluent Line Valve Repair	110.8	-	-	-	-
RW Effluent Line Creek Crossing	-	250.0	-	-	-
North SD County Regional Project	81.5	2,000.0	1,325.0	-	-
General Secondary Eff PS & FM Imprvmnts	-	267.8	267.8	79.7	79.7
General Gafner WRP Improvements	-	724.5	724.5	315.9	315.9
Total Recycled Water Program	***192.3***	***3,242.3***	***1,920.4***	***395.6***	***395.6***
District Total CIP Expenses	**6,599.1**	**7,085.3**	**6,374.3**	**6,809.9**	**6,719.9**

20-YEAR CIP SUMMARY

The following tables present a summary of the estimated wastewater and recycled water program expenditures by asset class over the next 20 years (through FY2032). These values are calculated based on the long-term expenditures forecast for each asset category. Details about the forecast methodology for each asset class are provided in their respective chapter of the AMP.

TABLE ES-2
20-YEAR (FY13-FY32) SUMMARY
OF WASTEWATER CIP EXPENDITURES

Asset Category	Expenditures over 20 Years
Gravity Sewer Pipelines	$ 23,547,258
Manholes	$ 3,000,000
Pump Stations and Force Mains	$ 39,474,000
Jointly-Owned Gravity Sewers	$866,700
Encina Wastewater Authority Projects	$ 24,000,000
Total	**$90,887,958**

TABLE ES-3
20-YEAR (FY13-FY32) SUMMARY
OF RECYCLED WATER CIP EXPENDITURES

Asset Category	Expenditures over 20 Years
Recycled Water Pump Station and Force Main	$ 7,328,000
Gafner Water Reclamation Plant	$ 4,764,000
Total	**$12,092,000**

CHAPTER 1

INTRODUCTION

The District completed their most recent wastewater master plan in 2008. The 2008 Asset Management Master Plan (2008 AMMP) was completed by Dexter Wilson Engineering, Inc. At that time, the District was at approximately 92 percent of buildout, and the majority of its future capital expenditures were expected to be for repair, rehabilitation, and replacement of existing facilities (i.e., assets). The District's prior 1999 Master Plan prepared by Dudek and Associates had predicted required improvements necessitated by additional sewage flow generated from growth in the District.

With no substantial changes to the service area since the 2008 AMMP, and an estimation that the District is presently at 92.5 percent of buildout, the focus of this update to the District's asset management plan (2012 AMP) remains on the repair, rehabilitation, and replacement of existing assets as compared to funding of growth-related projects.

AMMP IMPLEMENTATION

The 2008 AMMP marked the District's transition in asset planning from a growth-based capital program to a replacement-based capital program, providing predictive failure models for gravity pipelines and manholes as well as expenditure and replacement reports for major pump station components and treatment facilities. The following paragraphs highlight the asset management plan implementation efforts. Discussion of these efforts is expanded upon in their respective asset category chapters later in this report.

Implementation of the 2008 AMMP (Phase 1) began with the District engaging Infrastructure Engineering Corporation (IEC) to evaluate and provide improvement recommendations at eight of the District's pump stations. Additional Phase 1 work included the review of numerous gravity sewer pipeline closed-circuit television (CCTV) inspections identified by the 2008 AMMP predictive failure model and additional IEC work. These evaluations resulted in repairs and replacements which are detailed later in this report.

In 2010, the District conducted a comprehensive CCTV inspection of pipelines in the Alga Hills area of the District to assess the limits of the chronic scale problem encountered in the area (primarily in VCP pipe).

In 2010 the District contracted Dexter Wilson Engineering, Inc. to develop a force main evaluation plan of the District's four most critical force mains: the parallel force mains leaving the Batiquitos and Leucadia Pump Stations. As a result, evaluations were completed by corrosion engineers RF Yeager Engineering to identify cathodic protection inadequacies in external corrosion protection in these force mains and recommend improvements and long-term monitoring.

The District recognized that they were frequently maintaining a group of gravity sewer lines known as Special Maintenance Areas (SMAs) which required attention above and beyond typical maintenance demands. District staff proceeded to CCTV all of these areas. As part of the 2012 AMP, the CCTV reports were reviewed and a list of gravity line repairs and replacements was developed.

Finally, the District has enhanced the quality and quantity of CCTV inspections of gravity sewers. This report provides recommendations to best utilize and manage this data.

PURPOSE

The major elements of the District sewerage facilities (i.e. asset categories) will be analyzed in this report. These elements are gravity sewers, manholes, pump stations, force mains, treatment plants, and jointly-owned facilities. Recycled water facilities and the District's financial commitments with respect to the Encina Wastewater Authority (EWA) will also be discussed.

The purpose of this report is to build upon the asset management activities that have been occurring since the development of the 2008 AMMP to provide a continued path forward for the District's future asset replacement activities. The list below summarizes the goals of this document.

1. Update inventory of sewerage facility assets.

2. Confirm prior asset management findings that capital projects should be replacement-based rather than growth-based.

3. Identify capital replacement-based projects in each asset category for the District's 5-Year Capital Improvement Program (CIP) based on Phase 1 Implementation of the 2008 AMMP and subsequent efforts.

4. Provide estimated expenditures in each District asset category for long-term financial planning.

5. Confirm or revise the inspection schedules of each asset category recommended in the 2008 AMMP.

6. Provide recommendation of future asset management implementation in each asset category.

APPROACH

This report will first provide an overall description of the District's existing wastewater system. This includes a description of the District sewer drainage basins and an inventory of system components.

Subsequently, Chapter 3 will reaffirm the finding that there are no-growth related projects required for the District when comparing historical flow data and the projected buildout of the District and thus the District's focus should remain on capital replacement..

Chapters 4 through 7 will describe the asset management implementation efforts since the 2008 AMMP, provide recommendations for ongoing implementation, and describe recommended capital improvement projects for gravity sewers, manholes, pump stations, and force mains, respectively.

After discussion of the jointly-owned facilities Lanikai and Occidental gravity sewers in Chapter 8, recycled water facilities in Chapter 9, and the EWA facilities in Chapter 10. The 5-Year CIP and 20-Year summary of CIP expenditures will be provided in Chapter 11.

CHAPTER 2

EXISTING SYSTEM DESCRIPTION

The District sewerage system contains over 200 miles of pipelines, 10 pumping stations, and two treatment plants. Previous planning has split the District into 11 drainage basins. Figure 2-1 provides a location map of the District. Figure 2-2 shows the drainage basins, pumping stations, force mains, gravity sewer pipelines, and manholes.

SETTING

The District is located in the coastal hills of northern San Diego County. The District stretches from the coastline to about 5 miles inland. The District abuts the south and east side of the Batiquitos Lagoon. As shown in Figure 1-1, the District's service area encompasses portions of the Cities of Carlsbad and Encinitas.

Topography

The lowest elevation in the District is sea level. Sea level elevations are found along the coast and along the shoreline of the Batiquitos Lagoon. The highest elevations in the District are on the east side and reach 600 feet. The District is dominated by valleys and mesa tops with steep bluffs.

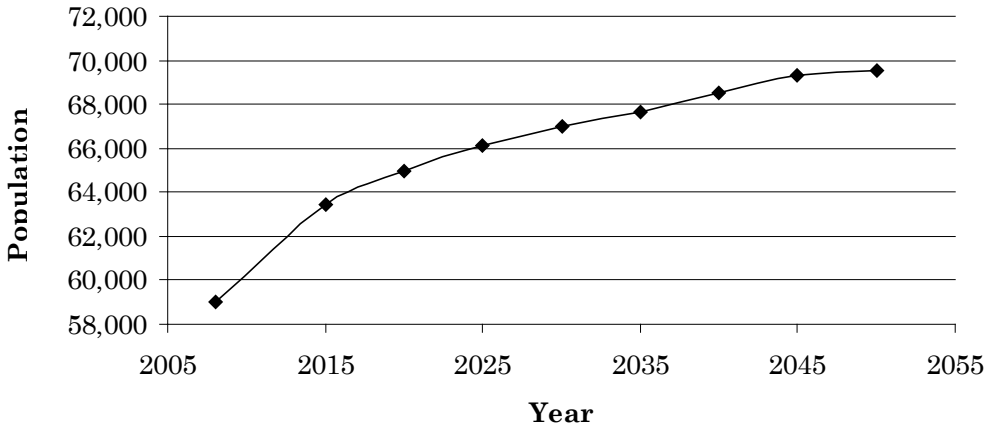
Weather and Rainfall

The major influence on weather in the District is the Pacific Ocean. The ocean moderates summer heat and winter cold. The mean temperatures in the District vary from a January low of 55°F to an August high of 70°F. Winds are predominantly from the ocean.

The rainfall normally occurs from November through March and varies with elevation. The lower elevations average 11 inches per year and the higher elevations average 14 inches per year. The San Diego region has been diligent in pursuing water conservation measures due to the low rainfall. This has led to reduced sewer flows per capita.

POPULATION

The estimate of current population within the District is 59,298 as provided by the San Diego Association of Governments (SANDAG) in September 2012. SANDAG also provided an estimate of population growth within the District from their Series 12 Forecast (2008 base year). SANDAG projects a 2050 population of 69,510. By comparison, in February 2008 Dudek estimated an ultimate 2027 buildout EDU (equivalent dwelling unit) count of 30,045. Assuming 90% of these EDUs are residential (based on the existing distribution of District EDUs) and that there is an average of 2.5 people per EDU, the buildout population of the District would be 67,602. This compares well with SANDAG's 2030 population projection of 66,962.



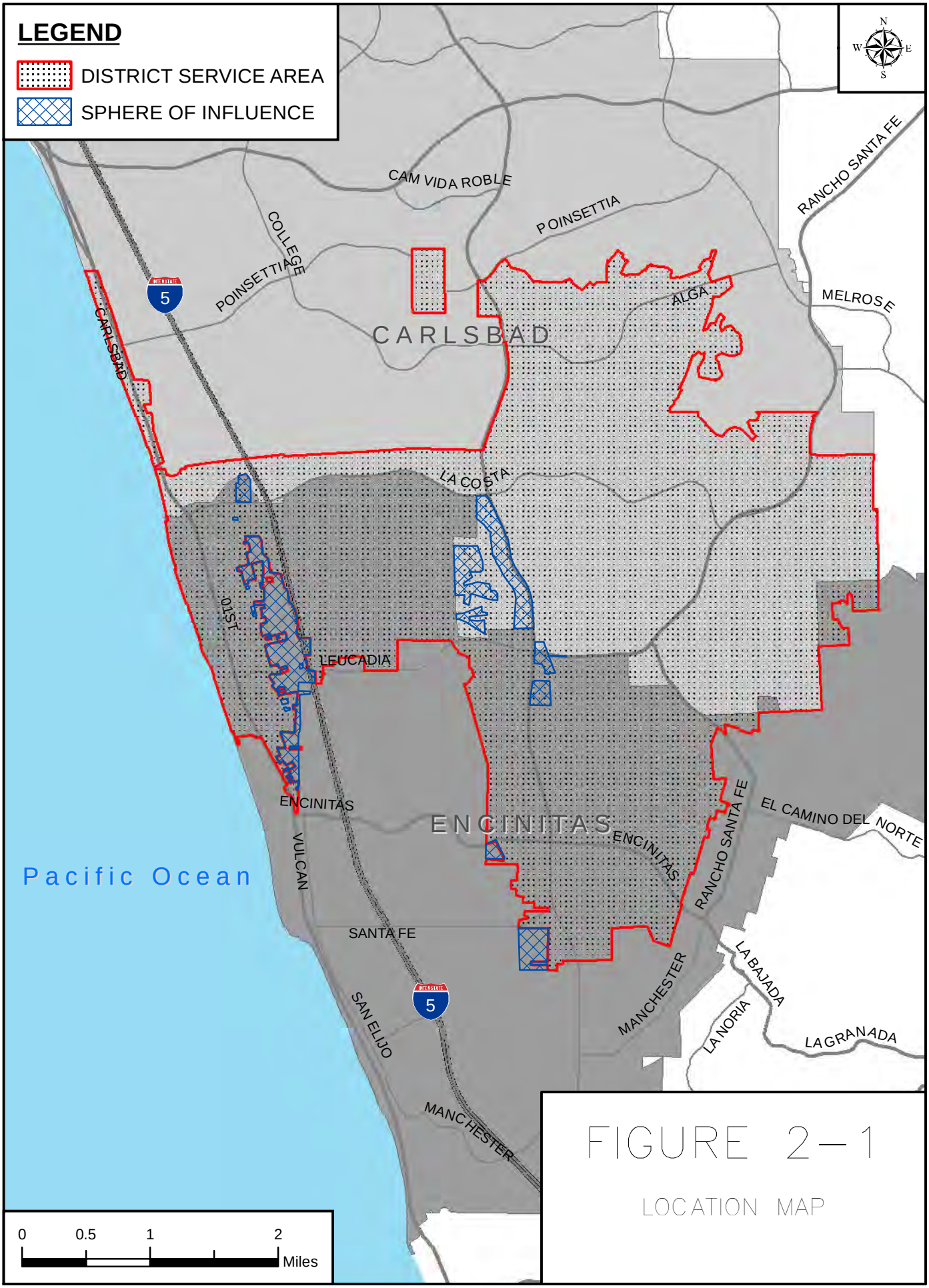


FIGURE 2-1

LOCATION MAP

FIGURE 2-2

LEUCADIA WASTEWATER DISTRICT
SEWER COLLECTION SYSTEM AND DRAINAGE BASINS

DRAINAGE BASINS

The District's 11 drainage basins are based on the District's piping system. Seven of these basins flow to the Leucadia Pump Station located on the District headquarters site. The flows from all 11 basins as well as flows from the City of Encinitas are pumped from the Batiquitos Pump Station to the Encina Water Pollution Control Facility (Encina WPCF). The Batiquitos Pump Station is located at the northwest corner of the District on the east side of Coast Highway 101 just north of La Costa Avenue.

The 11 drainage basins are described below. The original descriptions were taken from the Wastewater Master Plan, July 1999, prepared by Dudek & Associates, Inc and have been updated as necessary.

Drainage Basin #1

Drainage Basin #1 is located in the southwestern portion of the City of Encinitas, between the Pacific Ocean and Interstate 5. This basin consists of mixed residential and commercial customers, characteristic of the older downtown Encinitas area. Wastewater generated within this drainage basin is tributary to the Diana Pump Station, where it is pumped into the gravity line along North Vulcan Avenue, which is part of Drainage Basin #3. The North Vulcan Avenue gravity line flows north to the Batiquitos Pump Station.

Drainage Basin #2

Located in the northern portion of the City of Encinitas, Drainage Basin #2 provides wastewater collection to the Leucadia community. As with Drainage Basin #1, this basin consists of a mix of residential and commercial land uses. Collected wastewater is conveyed by gravity to the Avocado Pump Station, which lifts the wastewater into the gravity line along North Vulcan Avenue (Drainage Basin #3) and subsequently to the Batiquitos Pump Station.

Drainage Basin #3

Drainage Basin #3 is located in the northern part of the Leucadia community, within the City of Encinitas between Old Highway 101 and Interstate 5. This basin is primarily comprised of residential customers, although there are commercial land uses located generally along North Vulcan and La Costa Avenues. Wastewater pumped into this basin from Drainage Basins #1 and #2, and locally collected gravity flows, are conveyed by gravity directly to the Batiquitos Pump Station.

Drainage Basin #4

Located within the City of Encinitas, Drainage Basin #4 is bounded by Interstate 5 on the west, the Batiquitos Lagoon on the north end, and the Encinitas City Limits on the east. This basin is characterized by a mixture of residential, commercial, and agricultural land uses. Wastewater generated within this basin is conveyed by gravity to the Saxony Pump Station. Saxony Pump Station lifts the wastewater into the Leucadia Pump Station force mains (L1 or L2) which discharge to the Batiquitos Influent Sewer in Coast Highway 101 and subsequently to the Batiquitos Pump Station.

Drainage Basin #5

Drainage Basin #5 is located in the City of Encinitas. It is in the extreme southern portion of the District, south of Encinitas Boulevard and along the El Camino Real alignment. The basin consists almost exclusively of residential land uses. The majority of the wastewater generated in this basin is conveyed by gravity to the El Camino Real gravity trunk sewer system. A southern sub-portion of the basin is tributary to the Encinitas Estates Pump Station, which in turn lifts the wastewater into the gravity collection system of the basin. The El Camino Real gravity trunk sewer discharges to the Leucadia Pump Station, which lifts wastewater to the Batiquitos Influent Sewer and Batiquitos Pump Station.

Drainage Basin #6

Drainage Basin #6 is located immediately north and east of Drainage Basin #5 in the City of Encinitas. It is bounded approximately by El Camino Real to the west, Mountain Vista Drive on the north, and Encinitas Boulevard on the South. The majority of the basin drains southward towards Encinitas Boulevard and is conveyed west in the Encinitas Boulevard gravity trunk system. An eastern sub-basin drains to the east along Encinitas Boulevard to the Village Park 5 Pump Station, which pumps the wastewater west into the Encinitas Boulevard gravity trunk system. The vast majority of Drainage Basin #6 consists of residential land uses, although a small commercial area exists along the western boundary of the basin adjacent to El Camino Real. Drainage Basin #6 wastewater combines with Drainage Basin #5 flows in this area, flowing north to the Leucadia Pump Station.

Drainage Basin #7

Drainage Basin #7 is located in the City of Encinitas north of Drainage Basin #6, bounded generally by El Camino Real to the west, Mountain Vista Drive on the south, and Willowspring Drive on the north. The basin is comprised almost exclusively of residential land uses. Wastewater generally flows by gravity along the Mountain Vista Drive alignment to the El Camino Real gravity trunk system. The eastern portion of the basin is conveyed east to the Village Park 7 Pump Station, where it is lifted to the west into the gravity collection system of the basin. Drainage Basin #7 flows combine with the Drainage Basin #5 and #6 flows in the El Camino Real gravity trunk system for transfer to the Leucadia Pump Station.

Drainage Basin #8

This drainage basin is located in the central and eastern portions of the District, generally along the Olivenhain Road alignment. Most of this basin is located in the City of Carlsbad; however, the portion south of Olivenhain Road is within the City of Encinitas. The basin is characteristically a large residential basin, with collected wastewater flowing by gravity from east to west into the El Camino Real gravity trunk system. Wastewater tributary to the Rancho Verde Pump Station, located in the eastern portion of the basin, is lifted into the gravity collection system of the basin. Drainage Basin #8 flows combine with the Drainage Basin #5, #6, and #7 flows in the El Camino Real gravity trunk system for transfer to the Leucadia Pump Station.

Drainage Basin #9

Drainage Basin #9 is located along the El Camino Real corridor, extending from Encinitas Boulevard on the south to La Costa Avenue on the north. The northern portion of the basin is in the City of Carlsbad and the southern portion is in the City of Encinitas. This basin is comprised of a mixture of commercial and residential land uses. Wastewater from adjacent and upstream drainage basins is collected and conveyed to the Leucadia Pump Station by the El Camino Real gravity trunk system.

Drainage Basin #10

Drainage Basin #10 is located in the City of Carlsbad. It is in the northeastern portion of the District, bounded generally on the south by Calle Barcelona and on the north by San Marcos Creek. This basin primarily consists of residential land uses. Most wastewater generated within this basin is conveyed by gravity to the Leucadia Pump Station; a portion is conveyed by gravity to the La Costa Pump Station, which lifts Drainage Basin #10 and #11 wastewater to the Leucadia Pump Station.

Drainage Basin #11

Drainage Basin #11 is located in the City of Carlsbad, in the extreme northern portion of the District. It is bounded generally by San Marcos Creek on the south, El Camino Real to the west, and the District boundary on the north and east. This basin is characterized as a predominantly residential area with the La Costa Resort and Spa being the District's largest commercial customer. Wastewater from the basin is conveyed by gravity to the La Costa Pump Station. A smaller portion of the extreme northern basin was previously lifted into the gravity collection system by the Meadows #3 Pump Station. This station was abandoned and replaced by a gravity sewer flowing to the Carlsbad system. Additionally, the parcels within this area were detached from the District.

GRAVITY PIPELINES

The District owns an extensive gravity piping system. Construction of the pipelines began in the 1960s and continues to the present day. The gravity system ranges in size from 6-inch diameter to 30-inch diameter. Table 2-1 provides a summary of the length of pipeline by size in the District. Table 2-2 provides a summary of the length of pipeline by material in the District. The District has a pipeline numbering system and this system has been adopted for use in this report.

TABLE 2-1
SUMMARY OF GRAVITY SEWER PIPING BY DIAMETER

Pipe Diameter, inch	Pipe Length, Feet
6	8,011
8	904,804
10	30,662
12	29,070
14	1,088
15	25,435
16	1,552
18	13,551
20	378
21	4,628
24	1,738
30	826
TOTAL	**1,021,743**

Excludes Lanikai and Occidental Lines
Source: 07-25-12 District Access database

TABLE 2-2 SUMMARY OF GRAVITY SEWER PIPING BY MATERIAL	
Pipe Material	**Pipe Length, Feet**
ACP	2,024
CIP	353
DIP	344
HDPE	125
PVC	433,590
RCP	49
VCP	584,150
Unknown	1,108
TOTAL	**1,021,743**

Excludes Lanikai and Occidental Lines
Source: 07-25-12 District Access database

MANHOLES

There are approximately 5,000 manholes in the gravity sewer system. All the manholes are constructed of precast concrete sections (with one exception, a plastic manhole). According to the District's database provided to DWE in July 2012, 268 of the District's 5,006 manholes are lined with a protective coating to prevent concrete corrosion, 4,674 have not been lined, and the status has not been identified on 64 (primarily in Drainage Basins 8 and 9). Of the 268 lined manholes, 51 of them were installed 2006 and later; the District's 2006 revision to the Standard Spec added the requirement that all new manholes, existing manholes with new connections, and existing manholes with new manhole risers be lined.

The District's numbering sequence for manholes has been adopted for use in this report.

PUMP STATIONS

The District owns and operates 10 pump stations. Five of these are prefabricated package stations. All of the pump stations are described below. Table 2-3 contains a summary of the pump stations' operational characteristics.

TABLE 2-3
SUMMARY OF DISTRICT PUMP STATION CHARACTERISTICS

Pump Station	No. of Pumps	Capacity,[1] gpm	Motor Speed	Originally Built	Remarks
Avocado	2	300	Constant	1961	Station replaced in 2010 as submersible station
Batiquitos	4	8,440	Variable	1974	Electrical Upgrade 1998
Diana	2	750	Constant	1963	Station replaced in 2010 as submersible station
Encinitas Estates	2	450	Constant	1974	Pumps replaced in 1998
La Costa	2	2,200	Constant	1964	Pumps replaced in 1998
Leucadia	4	4,880	Variable	1974	Station Improved & Pumps replaced in 2006
Rancho Verde	2	250	Constant	1996	-
Saxony	2	900	Constant	1962	Rebuilt in 2000, except for force main
Village Park 5	2	250	Constant	1974	-
Village Park 7	2	200	Constant	1973	-

[1] Pump capacities represent nameplate information.

Avocado Pump Station

The Avocado Pump Station was built as a Smith and Loveless package pump station in 1961, and underwent a major upgrade in 1998. In 2010, the entire pump station was replaced as a submersible pump station with above ground controls and a PVC parallel force main was installed under Highway 101 and the railroad tracks. The pump station has two pumps, duty and standby, each of which is capable of pumping 300 gallons per minute. The motor on each of the pumps is a three horsepower motor. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force mains. The pump station is located on Avocado Street approximately 75 feet west of Old Highway 101.

Batiquitos Pump Station

The Batiquitos Pump Station was built in 1974 and is the largest and most complex pump station in the District. The station is located on the southwest shore of the Batiquitos Lagoon adjacent to Coast Highway 101. The pump station conveys flows from both the District and the City of Encinitas. The District owns 77.86 percent of the pump station and the City of Encinitas owns 22.14 percent.

The pump station contains four pumps (lead, lag, and two standby) each of which can pump 8,440 gallons per minute (12.6 million gallons per day). Each of the pumps is equipped with a 250 horsepower motor controlled with a variable speed drive. During dry weather flows, the lead and lag pumps pump into one of the two pump station force mains. During wet weather flows, the lead and lag pumps pump into both force mains. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force mains.

The pump station has a cast-in-place concrete wet well, dry well, and emergency overflow basin. Major upgrades were completed at the station in 1988, 1998, and 2005. The design for further rehabilitation of Batiquitos Pump Station was completed in FY 2012. The rehabilitation project will repair wet well and emergency overflow basin linings, replace three of four pumps (at the existing capacity), improve pump station bypass piping, and complete other miscellaneous improvements. The projected completion date for these improvements is March 2013.

Diana Pump Station

The Diana Pump Station was constructed in 1963 as a Smith and Loveless package station, and underwent a major upgrade in 1998. The pump station was replaced in 2010 as a submersible pump station with above ground controls. Also, the original AC force main was abandoned and replaced with PVC. Approximately 250 feet of the force main is paralleled (PVC) in a 30" steel casing under Highway 101 and the railroad tracks from the pump station to Vulcan Avenue. The pump station contains two pumps, duty and standby, each of which can pump 750 gallons per minute. The motor horsepower for each of the pumps is 15. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force mains. The station is located at 111 Diana Street west of Coast Highway 101.

Encinitas Estates Pump Station

The Encinitas Estates Pump Station was built in 1974 and underwent a major upgrade in 1999. The pump station is a Smith and Loveless package pump station. The station contains two pumps, duty and standby, each of which pumps 450 gallons per minute. Each of the pumps has a 40 horsepower motor. The original AC force main was replaced in 2010 with a 6-inch PVC force main. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force main. The station is located at 2501 Oak Branch Drive in the southern portion of the District's service area.

La Costa Pump Station

The La Costa Pump Station is a Smith and Loveless package pump station that was built in 1964. The pump station was extensively upgraded in 1999. The pump station contains two pumps, duty and standby, each of which can pump 2,200 gallons per minute. Each of the pumps has a 30 horsepower motor. The pump station is located in an easement in the La Costa Resort and Spa adjacent to the main tennis court.

The La Costa Pump Station has parallel force mains: a 10-inch PVC force main installed in 1976 and a 12-inch PVC force main installed in 1998. The force mains are interconnected such that either can be directed to the 12-inch HDPE force main which was directionally drilled under San Marcos Creek in 1998 and both discharge to the same downstream

manhole. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force mains.

A design contract for improvements to this pump station was approved in June 2012. The improvements include recoating the MCC mounting channel, replacing the electrical switchboard and electrical transfer switch, installing bypass piping and valving for emergency pumping, installing a new uninterruptable power supply for control, and replacing both pumps and motors.

Leucadia Pump Station

The Leucadia Pump Station has a cast-in-place concrete wet well, dry well, and an above grade building. The pump station is located at the District headquarters and was built in 1974. This station collects the majority of the flow from the eastern end of the Batiquitos Lagoon and pumps it west along La Costa Avenue. The pump station contains four pumps (lead, lag, and two standby) rated at 4,880 gallons per minute. All four pumps have 200 horsepower motors. In 2006, the pump station was improved and all four pumps were replaced. Additionally, an emergency overflow basin was added which also allows for bypass pumping. The District is currently evaluating the size, location, and fuel source of the emergency power generator at the Leucadia pump station in order to determine the best setup for this location.

Meadows Pump Station #3

Meadows Pump Station #3 was decommissioned in 2010. The area is now served by a gravity pipeline flowing to the Carlsbad sewer system.

Rancho Verde Pump Station

Rancho Verde Pump Station was built in 1996. The pump station has a concrete wet well with submersible pumps and above ground structure. The pump station has two pumps, duty and standby, each of which has a capacity of 250 gallons per minute. Each of the pumps has a 7.5 horsepower motor. The station is located at the corner of Camino Lindo and Calle Acervo.

Saxony Pump Station

The Saxony Pump Station was rebuilt in the year 1999 (including the onsite portion of ductile iron force main). This station has a concrete wet well with submersible pumps and an above ground structure. The pump station has two pumps, duty and standby, each of which has a capacity of 900 gallons per minute. The motor horsepower for each of the pumps is 40. In 2001, the offsite portion of the force main was replaced to connect to both Leucadia Pump Station force mains, L1 and L2. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force main. The Saxony Pump Station is located near the intersection of Saxony Avenue and La Costa Avenue adjacent to the Batiquitos Lagoon.

Village Park 5 Pump Station

The Village Park #5 Pump Station is a Smith and Loveless package station built in 1974. The pump station contains two pumps, duty and standby, each of which has a capacity of 250 gallons per minute. Each of the pumps is driven by a 15 horsepower motor. The original PVC force main was replaced in 2008 with 6-inch PVC. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force main. The station is located on Encinitas Boulevard south of the intersection of Willow Springs Drive.

Village Park 7 Pump Station

The Village Park #7 Pump Station is a Smith and Loveless package station built in 1973. The pump station contains two pumps, duty and standby, each of which has a capacity of 200 gallons per minute. Each of the pumps is driven by a 20 horsepower motor. The original AC force main was replaced in 2010 with 6-inch PVC. Bypass piping and valving is available at this pump station to bypass the pump station and utilize the pump station force main. Village Park #7 Pump Station is located near the District's eastern boundary along Mountain Vista Drive.

FORCE MAINS

Each of the District's 10 pump stations has a single or dual force main system. These force mains range in size from 4-inch diameter to 24-inch diameter. The force mains are constructed of cast iron (CIP), ductile iron (DIP), polyvinyl chloride (PVC), asbestos cement (AC), and high density polyethylene (HDPE). Table 2-4 contains a summary of the force main characteristics.

TABLE 2-4
SUMMARY OF DISTRICT FORCE MAIN CHARACTERISTICS

Force Main	Diameter, inches	Length, feet	Material	Discharge Manhole	Year Installed
Avocado	6	275	Original: AC Parallel: PVC	03-0130	1962; 2010 parallel FM
Batiquitos, B2 Batiquitos, B3	24 24	10,240 10,134	DIP DIP	LKT-1000 LKT-2000	1980 1988
Diana	10	2,300	Parallel: PVC (2)	03-0105	2010 parallel FM
Encinitas Estates	6	2,230	PVC	05-9080	2010
La Costa	10 12	1,127	Original*: CIP/PVC Parallel: PVC/HDPE	10-0128	1965/76 1998 parallel FM
Leucadia, L1 Leucadia, L2	24 24	13,989 14,000	DIP PVC/DIP/HDPE	03-0980 03-0992	1980 1996/01/03
Rancho Verde	4	460	PVC	08-12160	1997
Saxony**	8	80	DIP	LEUCFM	1999/2001
Village Park 5	6	1,945	PVC	06-0270	2008
Village Park 7	6	1,500	PVC	07-0330	2010

* The original 10-inch force main discharges to the 1998 HDPE section to cross San Marcos Creek.
**Pumps into L1 or L2, whichever is operational.
Note – All force mains can be bypassed except for Rancho Verde.

JOINT CONVEYANCE FACILITIES

Table 2-5 provides a summary of the ownership of the joint conveyance facilities from the Batiquitos Pump Station to the Encina WPCF. There are five major elements to the joint conveyance system. These are the Batiquitos Influent sewer, the Batiquitos Pump Station, the Batiquitos Pump Station force mains, the Lanikai Gravity sewer and the Occidental sewer.

TABLE 2-5
JOINT CONVEYANCE FACILITIES OWNERSHIP

Facility	District Ownership, percent
Batiquitos Influent Sewer	77.86
Batiquitos Pump Station - Pump Station - Generator - Force Mains (B2 and B3)	77.86
Lanikai Gravity Sewer (Railroad Crossing)	77.86
Occidental Line	40.3

Batiquitos Influent Sewer

Batiquitos Influent Sewer is owned 77.86 percent by the District and 22.14 percent by Encinitas. This sewer line conveys flows to the Batiquitos Pump Station.

Batiquitos Pump Station

Batiquitos Pump Station (including the generator) is owned 77.86 percent by the District and 22.14 percent by Encinitas. The District is responsible for the operation and maintenance of the pump station and the District bills Encinitas for their share of costs.

Batiquitos Pump Station Force Mains

Batiquitos Pump Station has two force mains which leave the site. Both are owned 77.86 percent by the District and 22.14 percent by Encinitas.

Lanikai Gravity Sewer

The 21-inch Lanikai Gravity Sewer was originally installed in 1972. It runs west to east, starting at the end of the Batiquitos Pump Station force mains and connecting to the Occidental Sewer in Avenida Encinas. The Lanikai Gravity Sewer is jointly owned by the Encinitas and the District. Leucadia owns 77.86 percent and Encinitas owns 22.14 percent.

Occidental Sewer

The 39-inch, 42-inch, and 48-inch Occidental Sewer is jointly owned by the District, Carlsbad, and Encinitas. The District owns 40.3 percent of the facility, Carlsbad owns 40 percent, and Encinitas owns 19.7 percent of this facility.

WASTEWATER TREATMENT AND DISPOSAL

The Leucadia Wastewater District relies on the Encina WPCF for the majority of its wastewater treatment and disposal needs. The District owns 17.55 percent of the Unit I liquid capacity at Encina WPCF and 16.42 percent of the Unit J outfall capacity and the Unit I solids capacity (based on Phase V upgrades). This equates to a treatment capacity of 7.11 million gallons per day.

The District also has a tertiary treatment plant north of the headquarters building called the Gafner Water Reclamation Plant (Gafner WRP). This treatment plant is all that remains of the original wastewater treatment facility for the District. Table 2-6 summarizes the District's treatment facilities.

TABLE 2-6
SUMMARY OF TREATMENT PLANT CAPACITY

Plant	Ownership, percent	Capacity
Gafner	100	1.0 mgd (tertiary only)
Encina	17.55 (Unit I liquid) 16.42 (Unit J outfall, Unit I solids)	7.11 mgd 7.11 mgd

Encina Water Pollution Control Facility (Encina WPCF)

The Encina WPCF is operated and administered by the Encina Wastewater Authority (EWA). The facility is operated under a joint powers agreement and is owned by six members including the District, Carlsbad, the City of Vista, the Vallecitos Water District, the Buena Sanitation District, and Encinitas. The current liquid capacity of the Encina WPCF is 40.51 mgd. The solids and outfall capacity are 43.31 mgd.

Effluent from the Encina WPCF is discharged to an ocean outfall directly west of the plant. Some effluent is recycled by Carlsbad through their reclamation plant located directly south of the Encina WPCF. Other effluent is pumped back to the District for treatment to a tertiary level at the Gafner WRP.

Gafner Water Reclamation Plant (Gafner WRP)

The Gafner WRP was originally constructed in 1962 as a secondary wastewater treatment plant. When the District became a member agency of the Encina WPCF in 1972, the Encina WPCF became the major treatment plant for the District. In 1994, the Gafner WRP was upgraded to tertiary standards to provide recycled water for the La Costa Golf Course. The current operation of the Gafner WRP consists of pumping back secondary effluent from the Encina WPCF and treating it to a tertiary level. This recycled water is then used for irrigation at the South La Costa Golf Course. The original primary and secondary treatment facilities were decommissioned in 1999 and demolished in 2003.

The District's headquarters and maintenance buildings are located adjacent to the Gafner WRP and were reconstructed in 2010.

CHAPTER 3

EXISTING/ULTIMATE FLOW AND EDU PROJECTIONS

To validate the District's planning basis for facilities (215 gpd/EDU) and to confirm the existing sizing of the District's overall sewer system, the 2008 AMMP provided a detailed comparison of District-wide existing measured flows and predicted flows. This chapter presents a reevaluation of the conclusions described in the 2008 AMMP based on flow data through June 2012. All instances of "year" in this chapter refer to calendar year unless otherwise specified.

HISTORIC FLOWS

The EWA keeps flow records for the six EWA members. This information will be used to review historic District flows only and does not consider non-District flows (i.e., flows in facilities jointly owned with the City of Encinitas and the City of Carlsbad).

Average Flows

The 2008 AMMP reported historic average flows for the District from January 1997 through June 2007. Table 3-1 and Figure 3-1 add to this data through June 2012. Data was not available from July 2007 through January 2008. The greatest yearly average flow occurs in Year 2005; it is 4.647 mgd. The highest monthly average flow over the period of historic data occurred in February 2005 and was 5.371 mgd. Based on District records, the number of EDUs connected to the District's collection system in February 2005 was 26,427.

It is also of interest to note that in 2009 the average daily flow within a month fell below 4 mgd for the first time since 2002.

TABLE 3-1
HISTORIC FLOW DATA

Month/Year	Rainfall, Inches Per Month	Average Daily Flow, mgd	15 Minute Peak Flow, mgd	Ratio, 15 Min. to Avg.	1 Hour Peak Flow, mgd	Ratio, 1 Hour to Avg.
Jan-97	4.24	3.985	8.779	2.13	7.921	1.92
Feb-97	0.40	4.114	7.789	1.89	6.913	1.68
Mar-97	0.00	4.036	7.351	1.78	6.919	1.68
Apr-97	0.91	3.974	7.466	1.81	6.775	1.64
May-97	0.00	4.484	9.079	2.20	8.077	1.96
Jun-97	0.00	4.799	9.286	2.25	7.748	1.88
Jul-97	0.00	4.412	8.388	2.03	7.979	1.93
Aug-97	0.00	4.075	7.466	1.81	7.195	1.74
Sep-97	1.00	3.994	8.203	1.99	7.426	1.80
Oct-97	0.00	3.800	7.259	1.76	6.896	1.67
Nov-97	1.82	3.993	7.720	1.87	7.627	1.85
Dec-97	1.26	3.839	8.918	2.16	8.226	1.99
Yearly Average Daily Flow		**4.125**				
Jan-98	2.02	3.923	7.720	1.90	7.599	1.87
Feb-98	8.53	4.563	10.093	2.48	9.770	2.40
Mar-98	1.40	4.174	8.203	2.02	7.823	1.93
Apr-98	2.85	4.374	8.549	2.10	7.927	1.95
May-98	1.18	4.233	10.507	2.59	7.610	1.87
Jun-98	0.00	4.118	7.466	1.84	6.948	1.71
Jul-98	0.00	3.399	7.996	1.97	7.610	1.87
Aug-98	0.00	4.133	7.673	1.89	7.195	1.77
Sep-98	0.70	3.942	7.789	1.92	7.403	1.82
Oct-98	0.00					
Nov-98	0.62	3.932	7.812	1.92	7.547	1.86
Dec-98	0.60	3.898	9.079	2.23	8.693	2.14
Yearly Average Daily Flow		**4.063**				
Jan-99	1.47	3.940	7.904	2.01	7.650	1.94
Feb-99	0.74	3.987	7.512	1.91	7.184	1.82
Mar-99	1.00	3.914	7.766	1.97	7.328	1.86
Apr-99	1.13	4.032	8.733	2.22	7.702	1.95
May-99	0.00	3.948	8.134	2.06	7.426	1.88
Jun-99	0.00	3.937	7.144	1.81	6.856	1.74
Jul-99	0.00	3.984	7.789	1.98	7.236	1.84
Aug-99	0.00	4.075	9.586	2.43	7.489	1.90
Sep-99	0.00	3.937	8.572	2.17	8.059	2.04
Oct-99	0.00	3.862	8.411	2.13	7.512	1.91
Nov-99	0.00	3.849	8.273	2.10	7.737	1.96
Dec-99	0.00	3.831	7.950	2.02	7.483	1.90
Yearly Average Daily Flow		**3.941**				
Jan-00	0.83	3.901	7.789	1.94	7.201	1.80
Feb-00	3.05	3.937	8.111	2.03	7.293	1.82
Mar-00	1.20	3.968	8.526	2.13	7.437	1.86
Apr-00	0.56	3.980	7.973	1.99	7.322	1.83
May-00	0.00	3.927	8.296	2.07	7.529	1.88
Jun-00	0.00	4.011	8.042	2.01	7.403	1.85

TABLE 3-1
HISTORIC FLOW DATA

Month/Year	Rainfall, Inches Per Month	Average Daily Flow, mgd	15 Minute Peak Flow, mgd	Ratio, 15 Min. to Avg.	1 Hour Peak Flow, mgd	Ratio, 1 Hour to Avg.
Jul-00	0.00	4.027	8.296	2.07	7.593	1.90
Aug-00	0.00	4.180	8.273	2.07	7.420	1.85
Sep-00	0.08	3.937	8.641	2.16	7.933	1.98
Oct-00	2.11	3.957	8.457	2.11	7.875	1.97
Nov-00	0.18	4.022	8.664	2.16	7.875	1.97
Dec-00	0.00	4.213	8.825	2.20	8.624	2.15
Yearly Average Daily Flow		**4.005**				
Jan-01	2.74	4.246	8.825	2.14	8.428	2.05
Feb-01	3.91	4.482	9.563	2.32	8.733	2.12
Mar-01	0.76	4.268	9.517	2.31	8.249	2.00
Apr-01	0.97	4.221	8.641	2.10	7.904	1.92
May-01	0.00	4.045	9.286	2.25	7.656	1.86
Jun-01	0.01	3.993	7.604	1.85	7.299	1.77
Jul-01	0.00	4.061	7.743	1.88	7.311	1.77
Aug-01	0.00	4.142	8.872	2.15	8.486	2.06
Sep-01	0.00	4.072	8.572	2.08	8.226	2.00
Oct-01	0.00	3.935	7.858	1.91	7.207	1.75
Nov-01	1.09	4.028	8.526	2.07	7.766	1.88
Dec-01	1.14	3.962	8.641	2.10	7.823	1.90
Yearly Average Daily Flow		**4.121**				
Jan-02	0.41	3.945	7.720	1.93	7.259	1.81
Feb-02	0.38	3.907	7.420	1.85	7.109	1.77
Mar-02	0.56	3.969	8.157	2.04	7.270	1.81
Apr-02	0.39	3.886	7.627	1.90	7.115	1.78
May-02	0.00	3.929	7.604	1.90	7.391	1.85
Jun-02	0.00	4.067	7.697	1.92	7.265	1.81
Jul-02	0.00	4.060	7.720	1.93	7.230	1.80
Aug-02	0.00	4.083	7.697	1.92	7.236	1.81
Sep-02	0.33	4.069	8.019	2.00	7.529	1.88
Oct-02	0.09	3.984	8.065	2.01	7.581	1.89
Nov-02	1.17	4.038	7.881	1.97	7.691	1.92
Dec-02	2.01	4.133	9.448	2.36	8.849	2.21
Yearly Average Daily Flow		**4.006**				
Jan-03	0.21	4.038	8.042	1.87	7.385	1.72
Feb-03	5.14	4.227	12.397	2.89	9.897	2.30
Mar-03	1.34	4.342	8.480	1.97	7.950	1.85
Apr-03	2.44	4.523	10.784	2.51	10.191	2.37
May-03	0.13	4.244	7.973	1.86	7.535	1.75
Jun-03	0.20	4.395	8.088	1.88	7.714	1.80
Jul-03	0.09	4.346	8.457	1.97	7.437	1.73
Aug-03	0.07	4.398	8.365	1.95	7.362	1.71
Sep-03	0.00	4.268	8.134	1.89	8.042	1.87
Oct-03	0.14	4.327	8.388	1.95	8.002	1.86
Nov-03	0.63	4.231	9.102	2.12	8.019	1.87
Dec-03	0.66	4.218	8.641	2.01	7.558	1.76

TABLE 3-1
HISTORIC FLOW DATA

Month/Year	Rainfall, Inches Per Month	Average Daily Flow, mgd	15 Minute Peak Flow, mgd	Ratio, 15 Min. to Avg.	1 Hour Peak Flow, mgd	Ratio, 1 Hour to Avg.
Yearly Average Daily Flow		**4.296**				
Jan-04	0.40	4.167	8.457	1.89	7.800	1.74
Feb-04	3.27	4.297	12.535	2.80	11.233	2.51
Mar-04	0.27	4.416	8.710	1.95	7.921	1.77
Apr-04	0.45	4.276	8.249	1.84	7.771	1.74
May-04	0.00	4.377	9.079	2.03	7.633	1.71
Jun-04	0.00	4.296	8.480	1.89	7.512	1.68
Jul-04	0.00	4.445	8.549	1.91	7.483	1.67
Aug-04	0.00	4.502	7.904	1.77	7.524	1.68
Sep-04	0.00	4.493	8.480	1.89	7.599	1.70
Oct-04	5.09	4.651	12.235	2.73	11.619	2.60
Nov-04	0.39	4.972	9.194	2.05	8.941	2.00
Dec-04	2.84	4.811	9.908	2.21	8.710	1.95
Yearly Average Daily Flow		**4.475**				
Jan-05	5.20	5.315	13.526	2.91	13.215	2.84
Feb-05	6.43	5.371	14.816	3.19	12.143	2.61
Mar-05	1.04	4.799	9.171	1.97	8.491	1.83
Apr-05	0.78	4.600	13.203	2.84	9.355	2.01
May-05	0.03	4.516	8.618	1.85	7.794	1.68
Jun-05	0.00	4.653	8.664	1.86	7.944	1.71
Jul-05	0.00	4.474	8.733	1.88	7.708	1.66
Aug-05	0.00	4.525	8.710	1.87	7.391	1.59
Sep-05	0.37	4.418	8.296	1.79	8.140	1.75
Oct-05	1.06	4.295	8.296	1.79	7.466	1.61
Nov-05	0.34	4.369	7.904	1.70	7.933	1.71
Dec-05	0.38	4.426	8.572	1.84	7.956	1.71
Yearly Average Daily Flow		**4.647**				
Jan-06	0.61	4.399	9.286	2.02	8.745	1.91
Feb-06	1.05	4.655	11.268	2.46	9.079	1.98
Mar-06	2.10	4.392	9.655	2.10	8.129	1.77
Apr-06	1.08	4.439	8.641	1.88	7.806	1.70
May-06	0.58	4.661	9.770	2.13	8.278	1.80
Jun-06	0.17	4.690	8.249	1.80	8.013	1.75
Jul-06	0.00	4.797	8.296	1.81	7.835	1.71
Aug-06	0.00	4.813	8.134	1.77	7.973	1.74
Sep-06	0.00	4.709	8.503	1.85	7.961	1.73
Oct-06	0.23	4.491	8.180	1.78	7.610	1.66
Nov-06	0.00	4.530	8.849	1.93	7.985	1.74
Dec-06	0.75	4.494	8.941	1.95	7.892	1.72
Yearly Average Daily Flow		**4.589**				
Jan-07	1.02	4.355	8.157	1.86	7.829	1.78
Feb-07	1.49	4.344	9.217	2.10	8.722	1.98
Mar-07	0.05	4.578	8.872	2.02	7.904	1.80
Apr-07	0.75	4.300	9.041	2.06	7.846	1.79
May-07	0.00	4.364	8.830	2.01	8.093	1.84

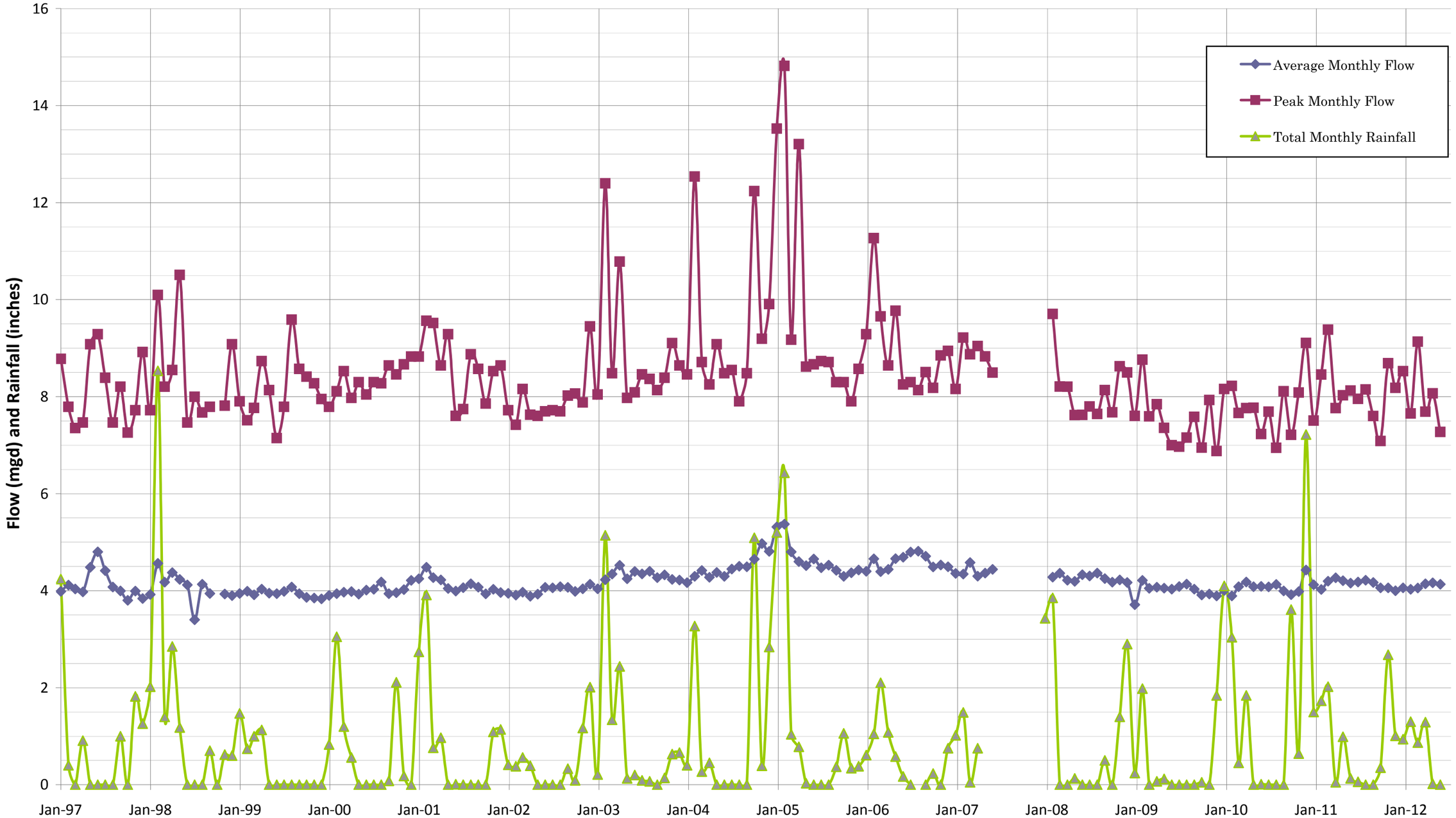
TABLE 3-1
HISTORIC FLOW DATA

Month/Year	Rainfall, Inches Per Month	Average Daily Flow, mgd	15 Minute Peak Flow, mgd	Ratio, 15 Min. to Avg.	1 Hour Peak Flow, mgd	Ratio, 1 Hour to Avg.
Jun-07	0.00	4.438	8.494	1.93	7.684	1.75
Jul-07	-	-	-	-	-	-
Aug-07	-	-	-	-	-	-
Sep-07	-	-	-	-	-	-
Oct-07	-	-	-	-	-	-
Nov-07	-	-	-	-	-	-
Dec-07	-	-	-	-	-	-
Yearly Average Daily Flow		**4.397**				
Jan-08	3.43	-	-	-	-	-
Feb-08	3.85	4.280	9.705	2.27	8.588	2.01
Mar-08	0.00	4.360	8.206	1.88	7.944	1.82
Apr-08	0.00	4.214	8.205	1.95	7.552	1.79
May-08	0.13	4.192	7.619	1.82	7.391	1.76
Jun-08	0.00	4.329	7.624	1.76	7.264	1.68
Jul-08	0.00	4.302	7.795	1.81	7.496	1.74
Aug-08	0.00	4.361	7.643	1.75	7.263	1.67
Sep-08	0.50	4.248	8.134	1.91	7.648	1.80
Oct-08	0.00	4.174	7.675	1.84	7.211	1.73
Nov-08	1.40	4.224	8.625	2.04	8.034	1.90
Dec-08	2.90	4.167	8.499	2.04	7.795	1.87
Yearly Average Daily Flow		**4.259**				
Jan-09	0.24	3.712	7.602	2.05	7.115	1.92
Feb-09	1.98	4.213	8.761	2.08	8.503	2.02
Mar-09	0.00	4.048	7.594	1.88	7.391	1.83
Apr-09	0.07	4.071	7.842	1.93	7.070	1.74
May-09	0.12	4.052	7.355	1.82	7.182	1.77
Jun-09	0.00	4.033	6.997	1.74	6.794	1.68
Jul-09	0.00	4.086	6.967	1.70	6.858	1.68
Aug-09	0.00	4.137	7.154	1.73	7.098	1.72
Sep-09	0.00	4.031	7.581	1.88	7.019	1.74
Oct-09	0.05	3.910	6.948	1.78	6.616	1.69
Nov-09	0.00	3.933	7.931	2.02	7.582	1.93
Dec-09	1.84	3.891	6.878	1.77	6.805	1.75
Yearly Average Daily Flow		**4.010**				
Jan-10	4.10	4.006	8.157	2.04	7.508	1.87
Feb-10	3.04	3.893	8.221	2.11	7.827	2.01
Mar-10	0.45	4.083	7.661	1.88	7.460	1.83
Apr-10	1.84	4.179	7.763	1.86	7.190	1.72
May-10	0.00	4.081	7.769	1.90	7.418	1.82
Jun-10	0.01	4.087	7.227	1.77	6.977	1.71
Jul-10	0.00	4.079	7.688	1.88	7.139	1.75
Aug-10	0.00	4.129	6.945	1.68	6.886	1.67
Sep-10	0.00	3.994	8.109	2.03	7.114	1.78
Oct-10	3.61	3.917	7.212	1.84	6.920	1.77
Nov-10	0.64	3.981	8.082	2.03	7.875	1.98

TABLE 3-1
HISTORIC FLOW DATA

Month/Year	Rainfall, Inches Per Month	Average Daily Flow, mgd	15 Minute Peak Flow, mgd	Ratio, 15 Min. to Avg.	1 Hour Peak Flow, mgd	Ratio, 1 Hour to Avg.
Dec-10	7.22	4.426	9.105	2.06	8.981	2.03
Yearly Average Daily Flow		**4.071**				
Jan-11	1.50	4.122	7.505	1.82	7.322	1.78
Feb-11	1.73	4.025	8.454	2.10	7.670	1.91
Mar-11	2.02	4.196	9.379	2.24	8.827	2.10
Apr-11	0.05	4.264	7.764	1.82	7.564	1.77
May-11	0.99	4.205	8.027	1.91	7.365	1.75
Jun-11	0.13	4.156	8.122	1.95	7.269	1.75
Jul-11	0.06	4.177	7.953	1.90	7.444	1.78
Aug-11	0.00	4.215	8.147	1.93	7.680	1.82
Sep-11	0.00	4.167	7.598	1.82	7.441	1.79
Oct-11	0.35	4.060	7.085	1.75	6.953	1.71
Nov-11	2.68	4.057	8.689	2.14	8.478	2.09
Dec-11	1.01	3.998	8.182	2.05	7.259	1.82
Yearly Average Daily Flow		**4.137**				
Jan-12	0.94	4.058	8.525	2.10	7.918	1.95
Feb-12	1.30	4.028	7.652	1.90	7.247	1.80
Mar-12	0.87	4.056	9.134	2.25	7.734	1.91
Apr-12	1.29	4.143	7.691	1.86	7.146	1.72
May-12	0.02	4.161	8.066	1.94	7.290	1.75
Jun-12	0.00	4.132	7.272	1.76	7.025	1.70
Yearly Average Daily Flow		**4.096**				

FIGURE 3-1
LEUCADIA WASTEWATER DISTRICT FLOWS FROM JANUARY 1997 TO JUNE 2012



Peak Monthly Flow is the 15 min peak during the highest one hour peak in the month.
Flow data was obtained from ADS flow monitoring system. Data not available from July 2007 - January 2008.
Rainfall data was obtained from NCDC for Oceanside Marina.

FIGURE 3-1

Peak Flows

Table 3-1 and Figure 3-1 also present the District-only peak flows measured in each month from January 1997 to June 2012. The 15 minute peak that occurred during the highest one hour peak for each month is tabulated in Table 3-1 and graphically shown in Figure 3-1. The one hour peak flow for each month is only tabulated in Table 3-1.

The 15 minute peak flow occurring during the one hour peak was used to separate peak 15 minute wet weather flow from artificial peaks caused by maintenance operations. The ratio of 15 minute and 1 hour peak flows to average flow for each month is provided in Table 3-1.

The monthly rainfall for each year is included in Table 3-1 and Figure 3-1. It is to be noted that the measured peaks are greater in wet years than in dry years.

The highest 15 minute peak from all the data presented was in February 2005 and was 14.816 mgd. The ratio of this peak flow to the average measured flow was 3.19. The highest 15 minute peak from the data added since the 2008 AMMP (July 2007 – June 2012) was in February 2008 and was 9.705 mgd. The ratio of this peak flow to the average measured flow was 2.27.

The highest hourly peak from all the data presented was 13.215 mgd and occurred in January 2005. The ratio of this peak to average measured flow was 2.84. The highest hourly peak from the data added since the 2008 AMMP was 8.918 mgd and occurred in December 2010. The ratio of this peak to average measured flow was 2.03. Therefore peak flows (15 minute and hourly) since 2008 are less than evaluated in the 2008 AMMP.

The dry weather peaks are much smaller than the wet weather peaks. The ratio of the hourly peak dry weather flow to the average daily flow is about 1.79.

EXISTING EDUs

Table 3-2 provides a summary of existing and ultimate EDUs. Existing EDU figures are current as of the end of Year 2011. The percent of buildout for each basin is shown in Table 3-2 as well as the estimated total system buildout of 92.5 percent as of the end of Year 2011. In some Drainage Basins, the Percent of Buildout exceeds 100. This is due to a 2009

District reconciliation of EDUs. Additionally, note that 78 EDUs discharge to pipelines with a Drainage Basin 8 labeling, but actually drain to Drainage Basin 9 and 306 EDUs discharge to pipelines with the Drainage Basin 9 labeling, but actually drain to Drainage Basin 8. Both of these adjustments are reflected in Table 3-2. The District may want to consider revisiting the Ultimate EDU estimate as well as the renaming of piping to reflect the correct drainage basin.

In addition to growth within the District's sphere and boundary, the District has had areas over the years which have been detached from the District or, in one instance, served by a bordering sewer agency. Appendix A – District EDU Agreements and Detachments provides an historical and current summary of these occurrences. Table 3-2 below reflects all of the items in Appendix A.

TABLE 3-2
SUMMARY OF EDU GROWTH PROJECTIONS BY DRAINAGE BASIN

Description	Existing EDUs 2011[1]	Ultimate EDUs[2]	Percent of Buildout
Drainage Basin #1	2,274	2,556	89
Drainage Basin #2	847	959	88
Drainage Basin #3	751	1,088	69
Drainage Basin #4	1,196	1,578	76
Drainage Basin #5	1,128	1,151	98
Drainage Basin #6	2,106	2,072	102
Drainage Basin #7	1,811	2,012	90
Drainage Basin #8	3,996	4,690	85.2
Drainage Basin #9	5,489	5,588	98.2
Drainage Basin #10	3,530	3,582	99
Drainage Basin #11	4,672	4,769	98
SYSTEM TOTAL	**27,799**	**30,045**	**92.5**

[1] As of December 2011 as provided by operations staff.
[2] Source: 2008 AMMP.

ANALYSIS OF DISTRICT FLOWS

Table 3-3 provides flow projections for the District based on the ultimate EDUs shown in Table 3-2. The flow projections have been done utilizing the average design flow generation factor of 215 gallons per day per EDU (gpd/EDU). (The design flow generation factor was established in the 1994 Planning Study Update, dated April 1995, Parsons Engineering

Science, Inc., Section 3, pg. 3-1.) The flow projections have also been done utilizing the flow per EDU calculated using the most recent available data. This data includes the average daily flow for the Year 2011 (the most recent full year of data) and the number of EDUs connected to the system at the end of 2011.

As shown in Table 3-3, a design factor of 215 gallons per EDU per day leads to an ultimate District average flow of 6.46 mgd. This is close to the ultimate average flow of 6.32 mgd estimated in the 1999 Wastewater Master Plan. Based on 149 gpd/EDU obtained from the 2011 flow and EDU data, the ultimate District average flow would be 4.48 mgd. This suggests that the 1999 Wastewater Master Plan's evaluation of the District's sewer system was sufficiently conservative to account for build-out average flows within the District.

Table 3-4 provides the same comparison from the 2008 AMMP, highlighting the average gpd/EDU has decreased from 169 to 149 gpd/EDU.

TABLE 3-3
2012 AMP COMPARISON OF FLOW PROJECTIONS, YEAR 2011

Parameter	Value
Average Flow, Year 2011	4.137 mgd
Total EDUs Connected, Year 2011	27,799 EDUs
Average Flow per EDU, Year 2011	149 gpd/EDU
Buildout EDUs	30,045 EDUs
Buildout Flow Based on 149 gpd/EDU	4.48 mgd average
Buildout Flow Based on 215 gpd/EDU	6.46 mgd average

TABLE 3-4
2008 AMMP COMPARISON OF FLOW PROJECTIONS, YEAR 2006

Parameter	Value
Average Flow, Year 2006	4.589 mgd
Total EDUs Connected, Year 2006	27,150 EDUs
Average Flow per EDU, Year 2006	169 gpd/EDU
Buildout EDUs	30,045 EDUs
Buildout Flow Based on 169 gpd/EDU	5.08 mgd average
Buildout Flow Based on 215 gpd/EDU	6.46 mgd average

Analysis of Peak Flows and EDUs

Tables 3-5 and 3-6 provide an analysis of wet weather flows and peaking factors using the more recent data added since the 2008 AMMP. Overall, the average flows remained the same as those presented in the 2008 AMMP, but the peak flows decreased. The 2008 AMMP concluded that the 1999 Wastewater Master Plan projections were adequate to handle the measured peak flows. Since the peak flows have decreased since the 2008 AMMP, the same conclusion holds.

In Table 3-5 an analysis is done for February 2008 which is the month with the highest peak 15 minute flow. The average flow for February 2008 was 4.280 mgd. Based on an estimated contribution during dry weather flow of 149 gallons per day per EDU, the estimated dry weather flow for this month would have been 4.142 mgd. Thus, in this peak monthly period, approximately 0.138 mgd of infiltration and inflow was received.

Using the 15 minute peak flow from February 2008, the peak infiltration and inflow rate is estimated to be approximately 2.291 mgd for a 15 minute period. Based on December 2010 data, the peak 1 hour infiltration and inflow rate is approximately 1.477 mgd. These numbers do not seem excessive for a wastewater system the size of the District, but efforts should be made to restrict infiltration and inflow as much as possible.

As shown in Table 3-6, the peaking factor associated with the December 2010 one hour peak event based on the District's planning number of 215 gallons per day/EDU is only 1.50. Based on the actual calculated flow per EDU, the peaking factor is approximately 2.17. The 215 gpd/EDU factor is greater than the 154 gpd/EDU experienced during the peak monthly flow to the District in February 2008.

The 1999 Wastewater Master Plan estimated the instantaneous peak wet weather flow for the District to be 13.7 mgd. The measured one hour peak in December 2010 was 8.981 mgd. The estimated peak flow in the 1999 Wastewater Master Plan is higher than the peak flow in December 2010. Therefore, additional peak wet weather capacity studies of the Leucadia Wastewater District's collection system do not appear to be warranted.

TABLE 3-5
ANALYSIS OF WET WEATHER FLOW FOR FEBRUARY 2008

Parameter	Value
Average Flow, February 2008	4.280 mgd
EDUs, December 2011 [1]	27,799 EDUs
Flow per EDU for February 2008	154 gpd/EDU
Sewage Flow Based on 149 gpd/EDU	4.142 mgd
Estimated Average Infiltration and Inflow for February 2008 (4.280 mgd – 4.142 mgd)	0.138 mgd
Peak Measured 15 minute Flow, February 2008	9.705 mgd
Estimated Peak Dry Weather Flow Based on 149 gpd/EDU and 1.79 Peaking Factor	7.414 mgd
Estimated Peak 15 minute Infiltration and Inflow (9.705 mgd – 7.414 mgd)	2.291 mgd
Peak Measured 1 Hour Flow (Maximum recorded Dec. 2010)	8.981 mgd
Estimated Peak 1 Hour Infiltration and Inflow (8.891 mgd – 7.414 mgd)	1.477 mgd

[1]Accurate EDU data for February 2008 is not available due to an accounting reconciliation for the EDU count completed in 2009. Based on the EDU data presented in the 2008 AMMP, the December 2011 EDU data is an acceptable estimate for the February 2008 EDU count.

TABLE 3-6
ANALYSIS OF PEAKING FACTORS

Parameter	Value
Measured Peak 1 Hour Flow for December 2010	8.981 mgd
Estimated February 2008 Flow Based on 149 gpd/EDU	4.142 mgd
Peaking Factor Based on 149 gpd/EDU	2.17
Estimated February 2008 Flow Based on 215 gpd/EDU	5.977 mgd
Peaking Factor Based on 215 gpd/EDU	1.50

DISTRICT SUBMETERS

The District maintains seven submeters throughout its boundary. The locations of the submeters are shown on Figure 3-2.

FIGURE 3-2. LEUCADIA WASTEWATER DISTRICT SUBMETERS

The District has been tracking the monthly average flow through all of these submeters since July 2008 and on a monthly basis compares the total District flow based on the submeters to the total District flow based on Batiquitos Pump Station flows less Moonlight Beach Pump Station flows. Additionally, the average gpd/EDU is tracked for each subbasin. Unfortunately, the District's distribution of EDUs across drainage basins (and submeter basins) is not revised on a monthly basis so we are not able to provide a monthly comparison of gpd/EDU by submeter. We can however provide a year-to-year comparison of flows though each meter, shown in Table 3-7.

Additionally, we can provide general trend information from July 2008 through October 2012 for each meter as discussed in the following section.

TABLE 3-7
SUBMETER GPD/EDU FOR DECEMBER 2011 AND DECEMBER 2010

Meter	Sub-basins	December 2011 Average Daily Flow, mgd	Peak Flow, mgd	EDUs	Average gpd/EDU	Peak gpd/EDU
L 01	1, 2, 3	0.550	0.707	3,871	142.1	182.6
L 02	8	0.970	1.089	3,768	257.4	289.0
L 03	5, 6, 7, 8, part 9	1.050	1.126	unk	unk	unk
L 04	10	0.550	0.597	3,530	155.8	169.1
L 05	5, 6, 7, 8, 9, 10, 11	2.170	2.298	22,732	95.5	101.1
L 06	4	0.200	-	1,196	167.3	-
L 07	11	0.690	-	4,672	147.7	-
Meter	**Sub-basins**	**December 2010 Average Daily Flow, mgd**	**Peak Flow, mgd**	**EDUs**	**Average gpd/EDU**	**Peak gpd/EDU**
L 01	1, 2, 3	0.570	0.938	3,821	149.2	245.4
L 02	8	1.030	1.631	3,996	257.7	408.1
L 03	5, 6, 7, 8, part 9	1.090	1.398	unk	unk	unk
L 04	10	0.590	1.069	3,519	167.7	303.7
L 05	5, 6, 7, 8, 9, 10, 11	3.300	4.403	22,578	146.2	195.0
L 06	4	0.160	-	1,194	134.1	-
L 07	11	0.630	-	4,529	139.1	-

unk - The number of EDUs in 9 which flow to this meter are unknown.

L 06 and L 07 are pump station meters, so peak flow data cannot be used for this analysis.

SUBMETER TRENDS

Table 3-7 illustrates that the gpd/EDU for the area tributary to meter L02 exceeds the District gpd/EDU under average and peak conditions. The area upstream of meter L02 is Drainage Basin 8. The 18-inch pipeline known as the Green Valley/Scotts Valley pipeline has recently been inspected revealing infiltration and inflow compounded by rain events. The District is planning to line approximately 1,000 feet of this pipeline in FY14. This CIP project is discussed in further detail in Chapter 4.

Table 3-8 provides the average monthly flow from July 2008 through October 2012 for each of the submeters and compares this to the difference between the District-wide flow as determined by Batiquitos Pump Station flows less Moonlight Beach Pump Station flows.

TABLE 3-8
MONTHLY AVERAGE SUBMETER FLOW DATA, JULY 2008 - OCTOBER 2012

flows in mgd	E1M	Bat	District Flow	L01	L02	L03	L04	L05[1]	L06	L07	District Flow	% Difference b/w District Totals
Month			Bat - E1M	Old Leucadia	Rancho Santa Fe	Village Park	La Costa East	N Grn Vly	Saxony	Alga Hills	Sum of L Meters	
July 2008	1.25	5.39	4.14	0.56	0.91	1.09	0.51	0.53	0.19	1.45	5.23	26
August 2008	1.25	5.45	4.20	0.57	0.87	1.10	0.52	0.54	0.18	1.28	5.05	20
September 2008	1.19	5.33	4.14	0.52	0.85	1.08	0.51	0.51	0.18	1.15	4.81	16
October 2008	0.98	5.26	4.28	0.52	0.83	1.07	0.50	0.50	0.18	1.02	4.61	8
November 2008	1.20	5.31	4.11	0.53	0.89	1.08	0.52	0.53	0.19	1.03	4.78	16
December 2008	1.12	5.25	4.13	0.54	0.98	1.10	0.56	0.50	0.20	1.14	5.02	21
January 2009	1.15	4.80	3.65	0.53	0.93	1.10	0.52	0.49	0.19	1.12	4.88	34
February 2009	1.15	5.30	4.14	0.57	0.98	1.09	0.52	0.47	0.19	1.20	5.03	21
March 2009	1.14	5.13	4.00	0.56	0.93	1.09	0.51	0.43	0.18	1.04	4.74	19
April 2009	1.09	5.16	4.07	0.56	0.88	1.04	0.48	0.45	0.18	1.12	4.71	16
May 2009	1.01	5.14	4.13	0.55	0.88	1.04	0.50	0.50	0.17	1.18	4.82	17
June 2009	1.01	5.12	4.11	0.57	0.82	1.03	0.50	0.61	0.17	1.25	4.95	20
July 2009	1.05	5.17	4.12	0.59	0.76	1.02	0.49	0.67	0.17	1.38	5.08	23
August 2009	1.05	5.22	4.18	0.56	0.76	1.04	0.49	0.63	0.17	1.43	5.09	22
September 2009	1.01	5.12	4.11	0.53	0.75	1.03	0.49	0.65	0.17	1.22	4.83	18
October 2009	1.00	5.00	3.99	0.54	0.75	1.02	0.49	0.64	0.17	1.07	4.67	17
November 2009	1.03	5.02	3.99	0.54	0.81	1.04	0.51	0.34	0.18	1.04	4.46	12
December 2009	1.05	4.98	3.92	0.56	0.84	1.04	0.52	0.35	0.18	1.06	4.56	16
January 2010	1.06	5.09	4.04	0.58	0.91	1.07	0.54	0.31	0.18	1.14	4.74	18
February 2010	1.03	4.98	3.95		0.90	1.05	0.54	0.27	0.19	1.20	4.16	5
March 2010	1.02	5.17	4.15		0.89	1.06	0.52	0.21	0.19	1.20	4.06	-2
April 2010	1.03	5.26	4.24		0.81	1.06	0.50	0.29	0.18	0.98	3.81	-10
May 2010	1.03	5.17	4.14	0.54	0.82	1.05	0.49	0.32	0.18	0.88	4.28	3
June 2010	1.01	5.17	4.16	0.52	0.83	1.06	0.50	0.43	0.17	0.81	4.32	4
July 2010	1.05	5.17	4.11	0.53	0.78	1.05	0.52	0.56	0.18	0.81	4.44	8
August 2010	1.06	5.22	4.16	0.53	0.79	1.06	0.52	0.51	0.18	0.78	4.38	5

TABLE 3-8
MONTHLY AVERAGE SUBMETER FLOW DATA, JULY 2008 - OCTOBER 2012

flows in mgd	E1M	Bat	District Flow	L01	L02	L03	L04	L05[1]	L06	L07	District Flow	% Difference b/w District Totals
Month			Bat - E1M	Old Leucadia	Rancho Santa Fe	Village Park	La Costa East	N Grn Vly	Saxony	Alga Hills	Sum of L Meters	
September 2010	1.04	5.08	4.04	0.54	0.80	1.06	0.51	0.51	0.17	0.87	4.46	10
October 2010	1.02	5.00	3.98	0.56	0.83	1.03	0.52	0.38	0.17	0.62	4.12	3
November 2010	1.05	5.07	4.02	0.52	0.87	1.06	0.53	0.22	0.18	0.50	3.88	-3
December 2010	1.08	5.51	4.43	0.57	1.03	1.09	0.59	0.16	0.21	0.66	4.33	-2
January 2011	1.02	5.21	4.19	0.58	1.01	1.08	0.54	0.15	0.19	0.62	4.17	0
February 2011	1.01	5.11	4.10	0.57	1.14	1.08	0.54	0.02	0.19	0.60	4.14	1
March 2011	1.00	5.28	4.28	0.59	1.11	1.08	0.55	0.06	0.19	0.53	4.11	-4
April 2011	1.01	5.35	4.34	0.58	0.99	1.05	0.52	0.14	0.18	0.61	4.05	-7
May 2011	1.02	5.29	4.27	0.58	0.98	1.06	0.52	0.15	0.18	0.91	4.37	2
June 2011	1.07	5.24	4.17	0.58	0.96	1.14	0.53	0.05	0.18	0.82	4.27	3
July 2011	1.11	5.26	4.15	0.61	0.94	1.08	0.52	0.10	0.17	1.17	4.59	11
August 2011	1.12	5.30	4.18	0.54	0.87	1.08	0.51	0.19	0.16	1.13	4.48	7
September 2011	1.06	5.25	4.20	0.54	0.89	1.07	0.51	0.17	0.13	1.14	4.44	6
October 2011	1.05	5.15	4.09	0.56	0.92	1.03	0.51	0.16	0.17	1.35	4.69	15
November 2011	1.08	5.14	4.07	0.55	0.94	1.06	0.53	0.16	0.22	1.48	4.94	21
December 2011	1.10	5.08	3.99	0.55	0.97	1.07	0.55	0.13	0.20	1.40	4.87	22
January 2012	1.08	5.14	4.06	0.55	0.96	1.06	0.51	0.18	0.18	1.20	4.65	14
February 2012	1.07	5.11	4.04	0.55	0.92	1.04	0.50	0.21	0.18	1.20	4.60	14
March 2012	1.07	5.14	4.07	0.56	0.92	1.04	0.47	0.22	0.18	1.16	4.57	12
April 2012	1.06	5.23	4.17	0.55	0.92	1.04	0.47	0.26	0.19	1.13	4.55	9
May 2012	1.05	5.25	4.20	0.54	0.94	1.05	0.51	0.28	0.20	1.17	4.70	12
June 2012	1.08	5.22	4.14	0.55	0.91	1.05	0.52	0.32	0.18	1.25	4.78	15
July 2012	1.09	5.29	4.20	0.57	0.88	1.05	0.51	0.35	0.18	1.40	4.92	17
August 2012	1.12	5.16	4.03	0.56	0.84	1.05	0.51	0.46	0.17	0.71	4.32	7
September 2012	1.06	5.11	4.06	0.54	0.81	1.03	0.51	0.47	0.17	0.76	4.29	6
October 2012	1.00	4.97	3.96	0.52	0.79	1.00	0.49	0.49	0.17	0.68	4.13	4

TABLE 3-8
MONTHLY AVERAGE SUBMETER FLOW DATA, JULY 2008 - OCTOBER 2012

flows in mgd	E1M	Bat	District Flow	L01	L02	L03	L04	L05[1]	L06	L07	District Flow	% Difference b/w District Totals
Month			Bat - E1M	Old Leucadia	Rancho Santa Fe	Village Park	La Costa East	N Grn Vly	Saxony	Alga Hills	Sum of L Meters	
Avg 7/08-6/09	1.13	5.22	4.09	0.55	0.90	1.08	0.51	0.51	0.18	1.16	4.88	19.54
Avg 7/09-6/10	1.03	5.11	4.08	0.55	0.82	1.04	0.51	0.43	0.18	1.12	4.51	10.51
Avg 7/10-6/11	1.04	5.21	4.17	0.56	0.94	1.07	0.53	0.24	0.18	0.69	4.23	1.32
Avg 7/11-6/12	1.08	5.19	4.11	0.55	0.93	1.06	0.51	0.20	0.18	1.23	4.65	13.22
Standard Deviation	0.04	0.05	0.04	0.01	0.05	0.01	0.01	0.15	0.00	0.24	0.28	7.56

[1] L05 herein is a calculation based on ADS meter flow L05 minus L02 minus L03

Flow data not available for the month

Flow data only available for part of the month

FLOW AND EDU ANALYSIS CONCLUSIONS

1. Flows in this chapter are District-only.

2. During the peak wet weather event of February 2005, the District's collection system conveyed all flows without incident. This event closely matched the peak flow design event for the system based on February 2005 EDUs. Peak wet weather events from February 2008 to December 2011 were less than the peak flow of February 2005 that was analyzed in the 2008 AMMP. Therefore, further study of the collection system to convey expected buildout flows is not needed at this time. Only if Encinitas or Carlsbad makes significant changes to their general plan, should the system be re-evaluated for buildout flows.

3. The current peak infiltration and inflow is near equal to the design infiltration and inflow. Existing District programs to control infiltration and inflow should be retained.

4. The 15 minute peak flow data is presented for information only. Due to attenuation of peaks in the sewer system, the one hour peak flow data should be used for design evaluation and capacity calculations.

5. This analysis did not evaluate the ability of Leucadia to store flows and mitigate abnormally high peaks through the overflow basins at the Leucadia and Batiquitos Pump Stations. These overflow basins would allow the Leucadia Wastewater District to accommodate higher peaks than were analyzed and provide a factor of safety for the analyses in this report.

6. The District should consider renaming the piping in Drainage Basins 8 and 9 which do not flow to the indicated basin.

7. The District should consider confirming the Ultimate EDU projection for each drainage basin.

8. Updating the Existing EDU count in each Drainage Basin and sub-metered area of the District as new EDUs are connected would allow for monthly trend monitoring of the gpd/EDU wastewater generation rate of each sub-metered area.

CHAPTER 4

GRAVITY SEWER PIPELINES

Gravity sewers represent the most substantial portion of the District's infrastructure from a quantity and value perspective. This chapter will describe how the 2008 AMMP has been implemented and recommendations for ongoing management of this asset category. Short-term (5-Year) and long-term (20-Year) CIP expenditures are also provided.

ASSET MANAGEMENT OVERVIEW

In the 2008 AMMP, a five-year planning, design, and construction cycle was recommended for facility replacement. Where the first year (generation of the 2008 AMMP), would include development of pipeline and manhole predictive failure models to estimate the remaining life for each pipeline reach and each manhole, and also the recommendation to evaluate those facilities with an estimated life of 20 years or less. The second year would be dedicated to visual, remote video, non-destructive testing, and other means of evaluation to develop a final list of facilities for replacement. The third year would be dedicated to design of the replacements or improvements and finally Years 4 and 5 would see the construction of the projects.

Through the District's implementation of the 2008 AMMP, the District determined the preferred approach to identifying those facilities in most need of repair was to systematically inspect each gravity sewer pipeline utilizing closed circuit television equipment (CCTV). Since the 2008 AMMP, the District has enhanced the quantity and quality of CCTV inspections of its gravity sewer pipelines through the purchase of a new state-of-the-art CCTV truck and additional training of its field service staff. This approach will provide the District with a baseline visual condition assessment of their entire gravity system and a specific list of isolated and chronic issues that the gravity system endures.

ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

The previous paragraph describes the key shift in the District's management of its gravity sewer pipeline assets. This section summarizes specific asset management activities which have occurred since development of the 2008 AMMP.

1. The 2008 AMMP recommended those facilities with 20 years remaining life and less be evaluated.

2. The District contracted IEC in 2009 to review CCTV tapes of 25 gravity sewer segments (most of which had a remaining useful life of zero). IEC graded the pipeline condition following the National Association of Sewer Service Companies (NASSCO) scale:

    1 – Failure unlikely in foreseeable future
    2 – Pipe unlikely to fail for at least 20 years
    3 – Pipe may fail in 10 to 20 years
    4 – Pipe will probably fail in 5 to 10 years
    5 – Pipe has failed or will likely fail within the next 5 years

    IEC revised the predictive failure model to exclude an adjustment for depth to diameter, resulting in a revised list of facilities with less than 20 years of life. They provided the following list of recommendations. The status of the recommendation is provided in italics.

    a. All pipes listed as grade 5 from the CCTV inspections should be replaced. *Status*: *All suggested segments were relined.*

    b. CCTV of sewers >18-inch with 0 years of useful life should be inspected. *Status: All segments <15-inch have been CCTV inspected. Those >15-inch are discussed in subparagraph d.*

    c. Remaining VCP pipes on concrete cradles should be inspected. *Status: The District completed inspecting the lines with concrete cradles from the original list. Subsequently, as the District continued its CCTV inspection program, it observed additional VCP segments with the characteristic 2:00 and 10:00*

position fractures. The additional fractured segments will be evaluated and repaired.

d. Complete CCTV inspections of remaining facilities with 0 years of remaining useful life. *Status: The District was unable to complete inspection of the large diameter lines in heavy traffic areas due to traffic control needs. The focus of the CCTV inspections shifted to lines on the SMA list, The SMA list inspection found several lines that required immediate repair. The urgent repairs were completed in FY12. Additionally, the District is using the SMA inspection results to develop a repair list for the FY13 Capital Improvement Projects (see paragraph 4 below). The District intends to inspect the large diameter lines in heavy traffic areas by the end of FY13, see paragraph 5 below.*

e. Complete CCTV inspections of remaining facilities with 5 years of remaining useful life. *Status: See subparagraph d above. The District intends to inspect these by the end of FY13.*

f. The IEC report identified seven locations requiring structural repair. *Status: Four areas have been repaired; the remaining three will be addressed in FY14.*

3. In 2010, the District conducted a comprehensive CCTV inspection of pipelines in the Alga Hills area of the District to assess the limits of the chronic scale problem encountered in the area (primarily in VCP pipe). The inspection found that while scale is scattered throughout the Alga Hills area, it is concentrated around Luciernaga Street, Corintia Street, and Unicornio Street. Additionally, field services staff has had success removing the scale with specialized jetter heads.

4. In early 2012, the District CCTV inspected all of its Special Maintenance Areas (SMAs). These locations throughout the District have historically required maintenance (e.g., hydrocleaning) above and beyond the regularly scheduled activities of the remainder of the District's pipelines. Dexter Wilson Engineering, Inc. was provided CCTV reports to review for development of a 5-Year CIP list. Based on these reports, 16 locations are recommended for spot repair (to be completed in FY13) and a trial lining project (FY13) was recommended to evaluate the viability of lining pipelines versus replacement as a long-term solution to chronic root problems and to evaluate technologies available to address laterals with roots. Details associated with the SMA evaluation can be found in Appendix B – 2012 SMA

Pipeline Evaluation. The District should review Appendix B as there are several pipeline sections which require additional follow-up and should also be reviewed to assess the ability to remove some pipelines from the SMA list.

5. In 2012, the District outlined a plan to hydro-clean and CCTV inspect the following large diameter sewers in FY13: (1) Rancho Santa Fe Road from Stagecoach Park to Olivenhain Road and from Calle Acevo to Olivenhain Road, (2) La Costa Avenue from Piraeus Street to Saxony Pump Station, and (3) El Camino Real between Encinitas Boulevard and La Costa Avenue. These locations require work to be completed at night due to the high volume of traffic during the day.

FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

Operation and Maintenance Discussion

At the end of FY12, the District purchased a new CCTV truck dedicated to systematically inspecting the District's system. The older CCTV truck the District owns is thus available on an as-needed basis to address unscheduled inspections (e.g., customer concerns). The District began this systematic inspection in October 2011 with Zone 1 (i.e. Drainage Basin 1) and was working in Zone 7 as of November 2012. At a completion rate of approximately 10 segments per day and an average length of 250 feet per segment, it will take the District approximately 390 field days (approximately June 2013) to CCTV all gravity sewer piping less than 12-inch.

Figure 4-1 tracks the progress of the District's CCTV efforts through November 2012 and should be updated as needed, particularly once the baseline inspection is complete. This figure can also be used to confirm those locations which require outside contractor assistance to CCTV (e.g., large diameter or easements that are difficult to access). For those locations which are difficult to access the District could utilize the portable camera of the CCTV equipment.

As District staff is conducting CCTV inspections, assessing the condition of the pipeline using the NASSCO scale or similar would allow for standardization and for a relative understanding of the condition of that particular pipeline segment. Although engineering staff would likely conduct additional inspections to define the scope and severity of an issue to define a project, staff's practiced assessment could strongly guide the initial prioritization of projects into items which require immediate attention, those which require

FIGURE 4-1

DISTRICT CCTV PROGRESS
February 2010 through November 2012

further assessment, and those which are in acceptable condition. The District should outline a clear path for the inspection results (i.e. condition of pipeline) to move from the inspector to supervisor, and then to the engineering and administrative sections of the District to plan for facilities replacement/repair if necessary. A proposed path is provided in Appendix C – Gravity Pipeline and Manhole Inspection Reporting Process.

With the plethora of CCTV video that the District is acquiring, it is recommended that a GIS-centric software system be evaluated for purchase to allow quick and easy access to prior inspections. For example, a layer could be created (which is accessible by field services and administrative staff) that illustrates progress on CCTV efforts. When clicking on a particular line segment, a list of historic inspections could be displayed and the actual video inspection could be viewed by clicking an item on the line. Whether a CCTV inspection is part of the programmatic inspection program or an as-needed response, viewing prior inspections of the same line segment prior to re-inspection would be valuable.

As discussed above, the District will complete its baseline CCTV efforts in approximately June 2013. At that time the District will have to confirm/decide the best utilization of the CCTV equipment going forward. It is presently planned to utilize both CCTV trucks for routine CCTV inspection. The older of the two trucks would be redirected as-needed to address other needs (e.g. spot inspections, responding to customer requests, pre- and post-construction inspections, and for monitoring areas of concern).

Work orders for routine maintenance are presently generated strictly based on geographic zone. This approach should be revised to also consider the associated requirements of the activity. For example, if it is decided that a large diameter sewer in Zone 1 which requires traffic control to hydroclean and is only planned to be cleaned every five years, a new work order should not be generated each time Zone 1 comes up for hydrocleaning. Rather, the work order would only be generated once every five years.

As a result of the 2012 AMP process there a few additional specific recommendations with respect to future management of the gravity sewers:

1. Review CCTV inspection of areas where concrete cradles are expected (i.e., all VCP and PVC locations deeper than 13 feet). These conditions are known to be problematic. Systematically replace those locations where any issue is identified. Appendix D – Possible Pipe Cradle Locations presents a list of locations based on the District's Accela database.

2. Consider comparison of Accela database file with GIS for quality control purposes.

3. Follow-up tasks and recommendations as a result of the SMA evaluations

    a. Conduct CCTV evaluation in vicinity of Neptune Avenue (LWD Pipe # 01-1300_01-1270 (S18)) and Basil Street between Coast Highway 101 and the alley (01-1450_01-1460 (S20)) for extent of scale problem prior to CIP projects in this area.

    b. Conduct CCTV evaluation in vicinity of Hillcrest Drive and Hillcrest Scenic Lane. Three pipes in this area (LWD Pipe # 03-0550_03-0540 (S36), 03-0555_03-0550 (S37), and 03-0560_03-0555 (S38)) all have cracks or offset joints.

    c. Check CCTV coding methodology, some areas marked as sags may just be changes in water level due to grit or grease or other deposits in the line.

Capital-Replacement Discussion

The SMA evaluations conducted in 2012 and Alga Hills evaluations conducted since 2010 have identified chronic root and scale problems (respectively), particularly in VCP pipe.

Roots can be found in pipe joints, at a private lateral connection to the District's pipeline, in the lateral itself, or some combination of all three. Roots are particularly proficient at penetrating clay pipe joints, which is one of the District's most common pipe materials. The challenge with correcting a root problem is multi-faceted.

For a pipeline which has root problems in the joints only, the preferred approach would be to structurally line the pipeline. This is the least invasive and certainly more cost effective than open-trench replacement of the existing line. However, if there are roots at the lateral connection to the pipeline, lining without addressing the lateral connection can nullify the benefit of the project as maintenance crews will have to continue to address roots in the District's line coming from the laterals. This raises the question of how a project should be done. Open trench replacement may become preferred over lining in this scenario if there are a significant number of laterals to address. Additionally, if there are substantial root problems coming in through laterals to the pipeline, the first step would be to work with a property owner to have them repair their lateral.

The legal authority associated with requiring a property owner to address an issue or for the District to the correct the problem itself, is something the District is presently working to better understand.

In addition to the chronic root problem in VCP pipe, the District has also identified a scale issue in the Alga Hills area of the District. The scale problem primarily occurs in VCP as a result of infiltration at the joints, but also due to the porous nature of VCP and high levels of groundwater in the area. The problem could potentially be eliminated by replacing the VCP with PVC (which would decrease the number of joints and is non-porous) but will have to weigh this option against chemical treatment and increased maintenance. The District is having good success at removing the scale with specialized jetter heads. Additionally, the District is increasing the frequency of utilizing the jetter head from once per year within a segment to twice per year.

In consideration of the need to address the root-impacted and scale-impacted areas of the District, we would recommend that the District begin to systematically replace all VCP pipe in the District beginning with these areas first. Subsequently, the oldest areas of the District should be replaced and then the remaining zones. This replacement-approach has been financially planned for in the AMP; however the District could alternatively address these issues by lining pipelines, increasing maintenance, and/or pursuing chemical treatment as discussed.

5-YEAR CIP

The following section summarizes projects recommended for inclusion in the District's 5-Year CIP as a result of the asset management implementation efforts to date and future recommendations.

Spot Repairs from IEC's 2009 Phase 1 AMMP Implementation Work

The 5-Year CIP should include the three spot repairs which were identified in the Phase 1 AMMP Implementation completed by IEC. Additionally, the District identified the need for a spot repair at 01-1780_01-1770 (West Glaucus Street). The cost to repair the four locations discussed in this section is $100,000 and is included in FY14 of the 5-Year CIP.

Spot Repairs from Dexter Wilson Engineering, Inc.'s 2012 SMA Review

Details of the SMA evaluation process and findings are provided in Appendix B. Table 4-1 lists the 16 locations which were recommended for spot repair as a result of these evaluations. The estimated cost to repair the 16 locations is $250,000 and is included in FY13 of the 5-Year CIP.

TABLE 4-1
SMA STRUCTURAL REPAIR LOCATIONS (CIP PROJECT)

DWE SMA Location – Description of Issue	District Pipeline ID
S08-roots at a joint that has caused the joint to partially collapse	01-0445_01-0440
S44-crack at manhole (1550)	04-1555_04-1550
S46- 5-joint offsets	04-1580_04-1555
S47- 4-joint offsets and broken pipe	04-1660_04-1650
S63- joint offset	09-1055_09-1050
S64- 3-joint offsets	09-1060_09-1055
S73- 3-joint offsets	10-1330_10-1325
S82-joint offset	11-0776_11-0775
S101-deformed area	11-6065_11-5000
S103-joint offset	11-9035_11-9030
108-one area with major infiltration	11-5015_11-5010
109-joint offset	10-0330_10-0320
S116-check this line because the last 40-feet couldn't be videoed, joint offset, roots bad at several joints	11-6020_11-6015
124-joint offset	01-0330_01-0320
125-joint offset and infiltration	01-0750_01-0740
U43-look at the drop at the end of this line.	11-9120_11-9050

Trial Lining Project from Dexter Wilson Engineering, Inc.'s 2012 SMA Review

Table 4-2 details the recommended location of the trial lining project based on District staff input. $250,000 is included in FY13 for this project.

TABLE 4-2
2012 AMP TRIAL LINING PROJECT (FY13)

CIP Project: 8" VCP Lining Project in Hygeia Avenue and Sanford Street

Item	Location *		Quantity & Units		Unit Cost, $	Total,$
Mobilization			1	LS	$15,000	$15,000
Traffic Control			1	LS	$15,000	$15,000
Segments to be Lined						
Line existing 8" VCP, 16.5' deep, installed 1970	1/ S35	03-0290_03-0280	350	LF	$50	$17,500
Line laterals, with T-liner			6	* EA	$5,000	$30,000
Line existing 8" VCP, 19' deep, installed 1970	2/ S34	03-0280_03-0275	253	LF	$50	$12,650
Line laterals, with top hat			8	* EA	$2,000	$16,000
Line existing 8" VCP, 8' deep, installed 1970	3	03-0380_03-0280	350	LF	$50	$17,500
Line laterals			7	** EA	$2,000	$14,000
Line existing 8" VCP, 8.5' deep, installed 1964	4	03-0270_03-0260	276	LF	$50	$13,800
Line laterals			6	** EA	$2,000	$12,000
Line existing 8" VCP, 9' deep, installed 1964	5	03-0260_03-0250	91	LF	$50	$4,550
Line laterals			6	** EA	$2,000	$12,000
Repair manholes			7	EA	$2,000	$14,000
Total Construction Cost (CC)						**$194,000**
Design, % of Total CC		10	%			$19,400
Contingency, % of Total CC		20	%			$38,800
PROJECT TOTAL					**$252,200**	

* Per CCTV report
** Estimated from GIS
Depth based on upstream manhole
03-0275_03-0270 installed in 2000
03-0276_03-0275 installed in 2003
1/2 part of SMA evaluation,
3/4/5 have roots per District field notes

Scott's Valley Pipeline Repair Project

Inflow and infiltration were found in two locations along the Scott's Valley Pipeline during CCTV inspections. The District is planning to line approximately 1,000 feet of this pipeline (one area in the vicinity of Rancho Santa Fe Road/Calle Barcelona and in the low lying area behind the Olivenhain Municipal Water District offices). FY14 includes $500,000 to complete this lining project.

Systematic VCP Replacement

There are 584,150 feet of VCP pipe in the District. There are 38,955 feet in Zone 1 (Old Leucadia) ranging in size from 6-inch to 12-inch and approximately 13,000 feet of VCP in the Alga Hills area. The planning cost to replace this piping is estimated to be $230 per foot and the lining cost would be approximately half. Therefore, at a spending rate of $1,500,000 per year it would take approximately six years to replace the Zone 1 area and two years to replace the Alga Hills area. Alternatively if these areas were lined (rather than replaced) it would take approximately three years to line Zone 1 and one year to line Alga Hills.

To replace all VCP pipe in the District, it would take approximately 90 years. To line all VCP pipe in the District, it would take approximately 45 years. Both timeframes assume the same spending rate as above of $1,500,000 per year. The actual work of removing all VCP pipe in the District will be a combination of replacement and lining. The preferred method would be evaluated on a zone-by-zone basis considering the specific needs of certain areas and specific locations within each zone.

The spending rate of $1,500,000 is generally based on consideration of the District's gravity sewer system age, estimated useful life, and the estimated value of the gravity sewer system. Financially planning for $1,500,000 in replacement projects would allow the District to replace all gravity sewer piping in 75 years (the estimated useful life of gravity sewer piping). In practice, the development of specific CIP projects will be based on the condition of the gravity sewer pipelines and the most feasible approach to improving these assets whether by replacement or lining. Therefore, it is possible and likely that the annual pipeline CIP projects total less than $1,500,000. Nevertheless, it is necessary for the District to be cognizant of the long-term costs associated with replacing aging infrastructure.

Purchase of GIS-based Work Management System

FY13 includes $125,000 for the procurement of a GIS-based work management system.

Miscellaneous Line Repair

The District has historically had a Miscellaneous Line Repair budget line item within the budget. We would recommend continuing to include the Miscellaneous Line Repair at $150,000.

Lateral Replacement Backflow Program

The District has historically had a Lateral Replacement Backflow Program budget line item with the budget. The 5-Year CIP shows this program continuing at its current funding level of $100,000.

20-YEAR CAPITAL EXPENDITURE SUMMARY

The pipeline predictive failure model created as part of the 2008 AMMP is utilized to provide a long-term estimate of expenditures. In summary the predictive failure model seeks to estimate when a pipeline will reach the end of its useful life and thus require replacement and is developed based on each pipeline's age, size, criticality, and the environment in which it is installed. Appendix E – Gravity Sewer Pipeline Predictive Failure Model contains the detail on the development and revisions subsequent to the 2008 AMMP. The estimated expenditures over the next 20 years based on the predictive failure model are $23,547,258.

Alternatively, based on the spending rate of $1,500,000 per year, the District would spend $30 million after 20 years. This equates to approximately 13 percent of the District's gravity sewer pipelines. If lining was preferred over replacement, the District would line approximately 260,870 feet over 20 years which represents approximately 25 percent of gravity sewer pipelines.

We would recommend the long-term financial planning numbers be based on the predictive failure model, spending $23,547,258 over the next 20 years.

CHAPTER 5

MANHOLES

The District's collection system includes approximately 5,000 manholes, all of which are constructed of precast concrete sections (with one exception, a plastic manhole). This chapter will describe how the 2008 AMMP has been implemented to date and will provide recommendations for ongoing management of this asset category. Short-term (5-Year) and long-term (20-Year) CIP expenditures will also be provided.

ASSET MANAGEMENT OVERVIEW

In the 2008 AMMP, a five-year planning, design, and construction cycle was recommended for facility replacement. The first year (development of the 2008 AMMP) would include development of the manhole predictive failure model and the recommendation to evaluate those facilities with 20 years remaining life and less. Subsequent years would be dedicated to evaluation and repair and replacement.

ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

Leading up to, and since, the 2008 AMMP, the District has visually inspected its manholes on an annual basis.

As of July 2012, 268 of the District's 5,006 manholes have been noted to be lined with a protective coating to prevent concrete corrosion. Lining presence is noted on the field services hydrocleaning work orders. The lined manholes are in part due to the District's 2006 revision to its Standard Specifications, requiring that all new manholes, existing manholes with new connections, and existing manholes with new manhole risers be lined. The remaining manholes were lined by the District subsequent to their installation to combat corrosion.

FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

The District is planning to enhance its technological capabilities and increase the quality of manhole inspections by maximizing the use of their camera equipment to photograph and videotape manholes. As with District CCTV inspections of gravity sewer pipelines, District staff should provide a cursory assessment of the manhole's condition as they are conducting the inspection and taking photos. Assessing the condition of the manhole using the NASSCO scale, or similar, would allow for a relative understanding of the condition of the manhole in relation to other District manholes.

Unlike the gravity pipelines, the field services staff (and their supervisors) assessment of a manhole's condition may be sufficient to determine whether the manhole should be lined. Nevertheless, a clear path should be outlined for the inspection results (i.e. condition) to move from the inspector to supervisor, and then to the engineering and administrative sections of the District to plan for rehabilitation (or replacement) if necessary. A proposed path is provided in Appendix C.

As with the gravity sewer pipelines, tracking and filing of photos and videos taken during manhole condition evaluations could be organized with a GIS-centric software system. This would allow quick access to prior inspections of the manhole for comparison of condition degradation (including those which are lined).

5-YEAR CIP

It is expected that the systematic manhole inspection and photographing will occur independently of the systematic CCTV inspections currently underway for the gravity sewer pipelines. As such, a separate budget item is recommended for the 5-Year CIP to rehabilitate manholes as-needed ("Annual Manhole Rehabilitation"). Depending on the proximity to pipeline lining projects, the manhole repair could alternatively be included as part of the pipeline project. At an estimated repair cost of $6,000 per manhole, the District could rehabilitate 25 manholes per year at a spending rate of $150,000 per year.

20-YEAR CAPITAL EXPENDITURE SUMMARY

The manhole predictive failure model created as part of the 2008 AMMP is utilized to provide a long-term estimate of expenditures by estimating when a manhole will reach the end of its useful life and thus require replacement. Appendix F – Gravity Sewer Manhole Predictive Failure Model contains the detail on the development and revisions subsequent to the 2008 AMMP. The estimated expenditures over the next 20 years based on the predictive failure model are $17,259,075. If this information is utilized for long-term financial planning, it is recommended to apply a replacement quotient of 0.5 to these construction numbers. The replacement quotient is intended to be a correction factor to match the predicted costs with actual costs.

The alternative approach to the predictive failure model for long-term capital spending is to assume that the District will continue to address manhole rehabilitation at the spending rate of $150,000 per year. Over the course of 20 years, this would amount to $3 million dollars in capital manhole spending, replacing approximately 500 manholes. This second approach is the recommended approach for long-term financial planning as it better reflects the District's approach of repairing manholes as field services inspections dictate rather than a programmatic rehabilitation of manholes. As the quality of manhole inspections increase with utilization of photo and video, the District may in the future either increase the annual manhole rehabilitation budget or decide that a programmatic rehabilitation of manholes is warranted.

CHAPTER 6

PUMP STATIONS

The District has ten pump stations, the characteristics of which were discussed in detail in Chapter 2 and summarized in Table 6-1 below. Long-term financial planning surrounding the District pump stations includes their respective force mains and are thus discussed together in that particular section of this chapter. Management of the force main assets and their 5-Year CIP projects are, however, discussed in Chapter 7.

TABLE 6-1
SUMMARY OF DISTRICT PUMP STATION CHARACTERISTICS

Pump Station	No. of Pumps	Capacity,[1] gpm	Motor Speed	Originally Built	Remarks
Batiquitos	4	8,440	Variable	1974	Electrical Upgrade 1998
Leucadia	4	4,880	Variable	1974	Station Improved & Pumps replaced in 2006
La Costa	2	2,200	Constant	1964	Pumps replaced in 1998
Saxony	2	900	Constant	1962	Rebuilt in 2000, except for force main
Avocado	2	300	Constant	1961	Station replaced in 2010 as submersible station
Diana	2	750	Constant	1963	Station replaced in 2010 as submersible station
Encinitas Estates	2	450	Constant	1974	Pumps replaced in 1998
Village Park 5	2	250	Constant	1974	-
Village Park 7	2	200	Constant	1973	-
Rancho Verde	2	250	Constant	1996	-

[1] Pump capacities represent nameplate information.

ASSET MANAGEMENT OVERVIEW

District field services staff visits each of the pump stations on a daily basis to inspect the general condition of the pump station, checking for odors, vandalism, water leaks, and performing necessary corrective and preventative maintenance tasks.

ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

Following the 2008 AMMP, in early 2009, IEC was tasked with the inspection of eight of the District's pump stations: Batiquitos, Village Park 7, Village Park 5, Encinitas Estates, La Costa, Leucadia, Saxony, and Rancho Verde. The remaining two pump stations, Avocado and Diana, were not evaluated as they were planned for complete replacement (including force mains) in 2010. Along with IEC, representatives from Simon Wong Engineering (structural engineers), RF Yeager Engineering (corrosion engineers), and Moraes, Pham and Associates (electrical engineers), conducted the condition evaluations. Projects which resulted directly from these evaluations include the major improvements at Batiquitos Pump Station presently under way, the generator replacement at Leucadia Pump Station, motor and impellor replacement at Village Park 7, La Costa Pump Station improvements currently in design, and future improvements at several other District pump stations. Appendix G – Pump Station Inspections and Improvements, details the improvements that were recommended by IEC.

FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

The approach of conducting a thorough condition evaluation/assessment by a specialized group of professional engineers has worked well for the District in the past. It is recommended to continue this approach with an inspection of all the District pump stations in FY14. This condition assessment should be completed prior to design of the FY14 and FY15 improvement projects presently in the 5-Year CIP as a result of the 2009 inspection.

As mentioned previously, Appendix G details the improvements which were recommended by IEC during the 2009 pump station evaluation. Appendix G also tracks which of the improvements were completed and in which fiscal year. It is recommended to revise Appendix G as future inspections are completed, recommendations made, and improvements completed. It would also be beneficial to track the cost associated with each improvement to better project future pump station expenditures.

5-YEAR CIP

The 5-Year CIP for pump stations is primarily based upon the 2009 pump station evaluations coordinated by IEC, but also includes projects identified by District field services staff. Each of the projects discussed below is included in the 5-Year CIP.

Rehabilitation of the Batiquitos Pump Station

The rehabilitation project will repair wet well lining, replace three of four pumps (at the existing capacity), improve pump station bypass piping, replace pump station suction valves, discharge valves and piping, install new meter vault and piping, remove air condition unit from roof, repair roof, and install new unit at ground level, install new chopper pump in emergency overflow basin, install new stairs, grating and handrails in wetwells, install new Programmable Logic Controls, install new feeder wire from main panel to Motor Control Center, replace emergency generator radiator, and install new bar screen at inlet. The projected completion date for these improvements is March 2013 at an estimated cost of $2,850,000.

Leucadia Pump Station Generator Replacement

The District completed a preliminary engineering report (PER) to determine the size, location, and fuel source of the emergency power generator at the Leucadia pump station in order to determine the best generator and location. The estimated replacement cost is $550,000 and the project is expected to commence in FY13.

Rehabilitation of the La Costa Pump Station

The design contract for improvements to this pump station was approved in June 2012. The improvements include recoating the MCC mounting channel, replacing the electrical switchboard and electrical transfer switch, installing bypass piping and valving for emergency pumping, installing a new uninterrupted power supply, and replacing both pumps and motors. The estimated rehabilitation cost is $240,000. Construction is anticipated to commence in FY13.

Condition Assessment of all District Pump Stations

A thorough condition assessment which evaluates all components (controls, electrical, mechanical, and structural) of the District pump stations should be completed in early FY14. If a field inspection is not completed for a particular pump station component due to a recent capital project, the final assessment report should still note the condition of the component so the report covers all components of all stations. The assessment should be completed prior to beginning design of the remaining CIP projects discussed in this section as these projects are a result of the 2009 inspection. The estimated cost for the condition assessment is $30,000.

Replacement of Power Monitors at Saxony and Rancho Verde

This project is recommended as a result of the 2009 IEC condition assessment and includes replacement of the power monitors at Saxony and Rancho Verde pump stations. The estimated cost of this project is $50,000 and should be designed after the FY14 pump station condition assessment.

Replacement of Pumps at the Saxony Pump Station

This project is recommended by field services staff and includes replacement of the two Saxony Pump Station pumps. The estimated cost of this project is $100,000 and should be designed after the FY14 pump station condition assessment.

Encinitas Estates Improvements

This project is recommended as a result of the 2009 IEC condition assessment and includes performing comprehensive corrosion survey, replacement of the MCC, installing a new standby generator, fusion-bonding and epoxy-coating of pump bowls, and installing new impellers and motors. The estimated cost of this project is $337,500 and should be designed after the FY14 pump station condition assessment.

Village Park 5 Improvements

This project is recommended as a result of the 2009 IEC condition assessment and includes assessing cathodic protection system for proper operation, moving pump controls above grade, replacement of the MCC, fusion-bonded epoxy-coating of pump bowls, and installing new impellers and motors, recoating pump station floor and sump pit with thick film organic coating, and applying mortar compound so that floor drains to sump. The estimated cost of this project is $337,500 and should be designed after the FY14 pump station condition assessment.

Village Park 7 Improvements

This project is recommended as a result of the 2009 IEC condition assessment and includes performing a comprehensive corrosion survey, enlarging the site area and repaving, moving pump controls above grade, replacement of the MCC, installing a new standby generator, recoating pump station floor and sump pit with thick film organic coating, and applying mortar compound so that floor drains to sump. The estimated cost of this project is $240,000 and should be designed after the FY14 pump station condition assessment.

General Pump Station Improvements

The 5-Year CIP also includes place holder expenses for improvements which are expected to result from the condition assessment ("General Pump Station Financially Planned PS Improvements") based on the pump station replacement charts maintained as part of the long-term expenditure forecast discussed in the next section. Specifically, these projects include the following and would be verified (or replaced with another project) as a result of the FY14 condition assessment.

FY15 $379,000 is included and calculated based on all expenditures expected in FY13-FY15 from the long-term forecast less FY13-FY15 CIP.

FY16 One-fifth of the total FY16-FY20 forecast expenditures ($1,493,100) is included.

FY17 $1,493,100 is included based on one-fifth of the total FY16-FY20 forecast expenditures.

20-YEAR CAPITAL EXPENDITURE SUMMARY

This section develops the estimated replacement cost for each pump station and corresponding force main(s) in the District based on a review of upgrades to the facilities since the 2008 AMMP and is intended primarily to aid the District in their long-term financial planning.

Replacement Categories

Pump stations were divided into five categories for replacement in addition to the force mains. These categories were controls, electrical, mechanical, structural, and regulations. Each of those areas will be discussed below.

Controls. It was assumed that the useful life of the control system of a pump station was 10 years. The controls replacement cost for the Batiquitos and Leucadia pump stations was estimated to be $250,000, and the controls replacement cost for all other pump stations was estimated to be $50,000.

Electrical. The useful life of electrical facilities at pump stations is related to age as well as how long a manufacturer supports a product for parts and maintenance. The useful life of the electrical equipment was assumed to be 10 years for the Batiquitos and Leucadia pump stations, and 20 years for all other pump stations. The electrical replacement cost for the station is dependent on the station horsepower and the emergency power source. Pump stations with a higher horsepower or with an emergency generator onsite are estimated to have a higher electrical replacement cost.

Mechanical. The useful life of mechanical systems at pump stations, which include all piping, pumps, compressors and similar equipment can vary based on the size and type of equipment. The useful life of the mechanical systems was assumed to be 10 years for the Batiquitos and Leucadia pump stations and 20 years for all other pump stations. The mechanical replacement costs were estimated to be higher for pump stations with a higher pump capacity, force main size, and station horsepower.

Structural. The structural life of the pump station depends on the construction of the wet well. For pump stations with a cast-in-place wet well, the useful life was assumed to be 100 years. For pump stations with a pre-case wet well, the useful life was assumed to be 50

years. The estimated structural replacement costs are for wet well replacement only for the smaller stations that do not have an onsite building. For the larger stations that do have an onsite building, the estimated structural replacement cost includes both the wet well and building replacement.

Regulations. A category for regulations was added to the replacement analysis. This is to try to anticipate costs due to increasing regulations for pump stations. For larger pump stations, a cost was added every 10 years for regulatory changes. For smaller pump stations, a cost was added every 20 years. The estimated regulations cost is based on the size of the pump station and the seriousness of the spill location. For example, a large capacity station in close proximity to a sensitive area will have a higher estimated regulations cost.

Summary of Pump Station Expenses

Table 6-2 provides a summary of the total estimated replacement cost for each station. Table 6-3 provides a summary of pump station and force main expenses between now and the Year 2065. Tables 6-4 through 6-13 provide the individual replacement reports for each station. All costs are in 2012 dollars.

For long-term financial planning, District pump station expenditures (including force mains) are expected to total approximately $ 39,474,000 over the next 20 years.

Comparison of Actual Costs

In 2010, the Avocado and Diana Pump Stations were completely replaced. In the case of the Avocado Pump Station, the total construction cost to replace the station and force main was $760,700. With an estimated 35% in soft costs, the total project cost was approximately $1.1 million.

For the Diana Pump Station, the total construction cost to replace the station and force main was $961,895. With an estimated 35% in soft costs, the total project cost was approximately $1.3 million.

In comparing the actual replacement costs with the predicted replacement costs, the predicted costs present reasonably accurate estimates of costs. Therefore the replacement quotient utilized in long-term planning should be 1.0. Tracking costs in Appendix G will insure that replacement reports generated in future asset planning are meeting (or exceeding) actual expenditures.

TABLE 6-2
SUMMARY OF PUMP STATION REPLACEMENT COSTS (in $1,000s)

Pump Station	Replacement Construction Cost	35% Soft Costs	Total Replacement Cost
Avocado	895	314	1,209
Batiquitos	8,150	2,853	11,003
Diana	1,450	508	1,958
Encinitas Estates	1,523	534	2,057
La Costa	1,905	667	2,572
Leucadia	9,020	3,157	12,177
Rancho Verde	687	241	928
Saxony	1,184	415	1,599
Village Park 5	1,280	448	1,728
Village Park 7	1,020	357	1,377

TABLE 6-3
5-YEAR PROJECTED PUMP STATION EXPENDITURES [1]

Pump Station	2013-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050	2051-2055	2056-2060	2061-2065	TOTAL
Avocado	20	320	20	355	20	70	20	355	20	320	215	**1,735**
Diana	20	70	20	455	675	70	20	455	20	725	265	**2,795**
Encinitas Estates	415	215	270	25	1,028	215	75	25	415	828	75	**3,586**
La Costa	965	430	90	330	90	825	90	330	90	430	485	**4,155**
Leucadia	1,000	4,210	4,360	850	1,000	850	1,000	850	1,000	850	1,000	**16,970**
Saxony	104	710	80	30	320	734	80	30	80	710	104	**2,982**
Village Park 5	120	20	460	160	655	20	265	160	120	555	265	**2,800**
Village Park 7	165	70	265	160	540	70	70	160	165	445	70	**2,180**
Rancho Verde	70	255	162	20	70	255	70	307	70	255	70	**1,604**
Construction Cost	2,879	6,300	5,727	2,385	4,398	3,109	1,690	2,672	1,980	5,118	2,549	**38,807**
35% Soft Costs	1,008	2,205	2,004	835	1,539	1,088	592	935	693	1,791	892	**13,582**
SUBTOTAL	**3,887**	**8,505**	**7,731**	**3,220**	**5,937**	**4,197**	**2,282**	**3,607**	**2,673**	**6,909**	**3,441**	**52,389**
Joint Facilities Batiquitos	1,800	600	6,650	600	1,350	600	1,350	600	1,350	600	1,350	**16,850**
35% Soft Costs	630	210	2,328	210	473	210	473	210	473	210	473	**5,898**
SUBTOTAL	**2,430**	**810**	**8,978**	**810**	**1,823**	**810**	**1,823**	**810**	**1,823**	**810**	**1,823**	**5,898**
TOTAL COST	**6,317**	**9,315**	**16,709**	**4,030**	**7,760**	**5,007**	**4,104**	**4,417**	**4,496**	**7,719**	**5,264**	**75,137**

[1] All numbers are in thousands of dollars.

TABLE 6-4
AVOCADO PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	0	5	10	5	0	0	20
2016-2020	50	5	10	5	0	250	320
2021-2025	0	5	10	5	0	0	20
2026-2030	50	100	150	5	50	0	355
2031-2035	0	5	10	5	0	0	20
2036-2040	50	5	10	5	0	0	70
2041-2045	0	5	10	5	0	0	20
2046-2050	50	100	150	5	50	0	355
2051-2055	0	5	10	5	0	0	20
2056-2060	50	5	10	5	0	250	320
2061-2065	0	5	10	200	0	0	215
TOTAL	**250**	**245**	**390**	**250**	**100**	**500**	**1,735**

[1] All numbers are in thousands of dollars.

TABLE 6-5
BATIQUITOS PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	250	50	500	500	500	0	1,800
2016-2020	0	500	50	50	0	0	600
2021-2025	250	50	500	50	500	5,300	6,650
2026-2030	0	500	50	50	0	0	600
2031-2035	250	50	500	50	500	0	1,350
2036-2040	0	500	50	50	0	0	600
2041-2045	250	50	500	50	500	0	1,350
2046-2050	0	500	50	50	0	0	600
2051-2055	250	50	500	50	500	0	1,350
2056-2060	0	500	50	50	0	0	600
2061-2065	250	50	500	50	500	0	1,350
TOTAL	**1,500**	**2,800**	**3,250**	**1,000**	**3,000**	**5,300**	**16,850**

[1] All numbers are in thousands of dollars.
[2] Force main includes both B2 and B3 replacement.

TABLE 6-6
DIANA PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	0	5	10	5	0	0	20
2016-2020	50	5	10	5	0	0	70
2021-2025	0	5	10	5	0	0	20
2026-2030	50	100	250	5	50	0	455
2031-2035	0	5	10	5	0	655	675
2036-2040	50	5	10	5	0	0	70
2041-2045	0	5	10	5	0	0	20
2046-2050	50	100	250	5	50	0	455
2051-2055	0	5	10	5	0	0	20
2056-2060	50	5	10	5	0	655	725
2061-2065	0	5	10	250	0	0	265
TOTAL	**250**	**245**	**590**	**300**	**100**	**1,310**	**2,795**

[1] All numbers are in thousands of dollars.

TABLE 6-7
ENCINITAS ESTATES PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	300	10	5	50	0	415
2016-2020	0	10	200	5	0	0	215
2021-2025	50	10	10	200	0	0	270
2026-2030	0	10	10	5	0	0	25
2031-2035	50	300	10	5	50	613	1,028
2036-2040	0	10	200	5	0	0	215
2041-2045	50	10	10	5	0	0	75
2046-2050	0	10	10	5	0	0	25
2051-2055	50	300	10	5	50	0	415
2056-2060	0	10	200	5	0	613	828
2061-2065	50	10	10	5	0	0	75
TOTAL	**300**	**980**	**680**	**250**	**150**	**1,226**	**3,586**

[1] All numbers are in thousands of dollars.

TABLE 6-8
LA COSTA PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	10	10	500	0	395	965
2016-2020	0	10	250	20	150	0	430
2021-2025	50	10	10	20	0	0	90
2026-2030	0	300	10	20	0	0	330
2031-2035	50	10	10	20	0	0	90
2036-2040	0	10	250	20	150	395	825
2041-2045	50	10	10	20	0	0	90
2046-2050	0	300	10	20	0	0	330
2051-2055	50	10	10	20	0	0	90
2056-2060	0	10	250	20	150	0	430
2061-2065	50	10	10	20	0	395	485
TOTAL	**300**	**690**	**830**	**700**	**450**	**1,185**	**4,155**

[1] All numbers are in thousands of dollars.

TABLE 6-9
LEUCADIA PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	0	500	50	50	400	0	1,000
2016-2020	250	50	500	50	0	3,360 [2]	4,210
2021-2025	0	500	50	50	400	3,360 [3]	4,360
2026-2030	250	50	500	50	0	0	850
2031-2035	0	500	50	50	400	0	1,000
2036-2040	250	50	500	50	0	0	850
2041-2045	0	500	50	50	400	0	1,000
2046-2050	250	50	500	50	0	0	850
2051-2055	0	500	50	50	400	0	1,000
2056-2060	250	50	500	50	0	0	850
2061-2065	0	500	50	50	400	0	1,000
TOTAL	**1,250**	**3,250**	**2,800**	**550**	**2,400**	**6,720**	**16,970**

[1] All numbers are in thousands of dollars.

[2] Replacement of L1

[3] Replacement of L2. Evaluation of ductile iron sections needed to delay replacement/repair.

TABLE 6-10
RANCHO VERDE PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	5	10	5	0	0	70
2016-2020	0	100	100	5	50	0	255
2021-2025	50	5	10	5	0	92	162
2026-2030	0	5	10	5	0	0	20
2031-2035	50	5	10	5	0	0	70
2036-2040	0	100	100	5	50	0	255
2041-2045	50	5	10	5	0	0	70
2046-2050	0	5	10	200	0	92	307
2051-2055	50	5	10	5	0	0	70
2056-2060	0	100	100	5	50	0	255
2061-2065	50	5	10	5	0	0	70
TOTAL	**300**	**340**	**380**	**250**	**150**	**184**	**1,604**

[1] All numbers are in thousands of dollars.

TABLE 6-11
SAXONY PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	10	10	10	0	24	104
2016-2020	0	300	200	10	200	0	710
2021-2025	50	10	10	10	0	0	80
2026-2030	0	10	10	10	0	0	30
2031-2035	50	10	10	250	0	0	320
2036-2040	0	300	200	10	200	24	734
2041-2045	50	10	10	10	0	0	80
2046-2050	0	10	10	10	0	0	30
2051-2055	50	10	10	10	0	0	80
2056-2060	0	300	200	10	200	0	710
2061-2065	50	10	10	10	0	24	104
TOTAL	**300**	**980**	**680**	**350**	**600**	**72**	**2,982**

[1] All numbers are in thousands of dollars.

TABLE 6-12
VILLAGE PARK 5 PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	5	10	5	50	0	120
2016-2020	0	5	10	5	0	0	20
2021-2025	50	200	10	200	0	0	460
2026-2030	0	5	150	5	0	0	160
2031-2035	50	5	10	5	50	535	655
2036-2040	0	5	10	5	0	0	20
2041-2045	50	200	10	5	0	0	265
2046-2050	0	5	150	5	0	0	160
2051-2055	50	5	10	5	50	0	120
2056-2060	0	5	10	5	0	535	555
2061-2065	50	200	10	5	0	0	265
TOTAL	**300**	**640**	**390**	**250**	**150**	**1,070**	**2,800**

[1] All numbers are in thousands of dollars.

TABLE 6-13
VILLAGE PARK 7 PUMP STATION FACILITY REPLACEMENT REPORT [1]

Year	Controls	Electrical	Mechanical	Structural	Regulations	Force Main	Subtotal
2013-2015	50	100	10	5	0	0	165
2016-2020	0	5	10	5	50	0	70
2021-2025	50	5	10	200	0	0	265
2026-2030	0	5	150	5	0	0	160
2031-2035	50	100	10	5	0	375	540
2036-2040	0	5	10	5	50	0	70
2041-2045	50	5	10	5	0	0	70
2046-2050	0	5	150	5	0	0	160
2051-2055	50	100	10	5	0	0	165
2056-2060	0	5	10	5	50	375	445
2061-2065	50	5	10	5	0	0	70
TOTAL	**300**	**340**	**390**	**250**	**150**	**750**	**2,180**

[1] All numbers are in thousands of dollars.

CHAPTER 7

FORCE MAINS

The District has 10 pump stations and approximately 11 miles of force mains. Recently, new force mains have been installed at five of the District's satellite pump stations. Each of the District's 10 pump stations has a single or dual force main system. These force mains range in size from 4-inch diameter to 24-inch diameter. The force mains are constructed of primarily of ductile iron (DIP) and polyvinyl chloride (PVC). Table 7-1 is a summary of the force main characteristics.

TABLE 7-1
SUMMARY OF DISTRICT FORCE MAIN CHARACTERISTICS

Force Main	Diameter, inches	Length, feet	Material	Discharge Manhole	Year Installed
Batiquitos, B2	24	10,240	DIP	LKT-1000	1980
Batiquitos, B3	24	10,134	DIP	LKT-2000	1988
Leucadia, L1	24	13,989	DIP	03-0980	1980
Leucadia, L2	24	14,000	PVC/DIP/HDPE	03-0992	1996/01/03
La Costa	10 12	1,127	Original*: CIP/PVC Parallel: PVC/HDPE	10-0128	1965/76 1998 parallel FM
Saxony**	8	80	DIP	LEUCFM	1999/2001
Avocado	6	275	Original: AC Parallel: PVC	03-0130	1962; 2010 parallel FM
Diana	10	2,300	Parallel: PVC (2)	03-0105	2010 parallel FM
Encinitas Estates	6	2,230	PVC	05-9080	2010
Village Park 5	6	1,945	PVC	06-0270	2008
Village Park 7	6	1,500	PVC	07-0330	2010
Rancho Verde	4	460	PVC	08-12160	1997

* The remaining CIP is a short section within the station. The Original 10-inch PVC force main also discharges to the 1998 HDPE section to cross San Marcos Creek.
**Pumps into L1 or L2, whichever is operational.

ASSET MANAGEMENT OVERVIEW

In the District's 2008 AMMP, force mains were primarily addressed as a component of the pump station with a recommended inspection frequency of an annual basis. Based upon the criticality of certain force mains (e.g. Batiquitos and Leucadia Pump Station) and materials of construction which are anticipated to have extended useful life, and the relative inaccessibility of force mains as compared to the remaining pump station components, this chapter is dedicated to managing the force main assets independently from the pump stations.

ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

Recognizing their critical nature and aging, in 2010, the District contracted Dexter Wilson Engineering, Inc. to develop a force main evaluation plan of the District's four most critical force mains: the parallel force mains leaving the Batiquitos and Leucadia Pump Stations. The plan provided a recommended inspection schedule and an approach to understand the level of internal corrosion in the DIP force mains to better understand the overall remaining useful life of these assets. As part of this work, RF Yeager Engineering developed a list of recommended cathodic protection improvements for these force mains as provided in Table 7-2.

TABLE 7-2
CATHODIC PROTECTION IMPROVEMENTS

Year	Phase	Activity	Estimated Cost
2011	1	Ultrasonic Testing of L1 to establish baseline corrosion	$27,000
		Locate and/or repair missing and damaged test stations on L1, L2, B2, and B3	$16,500
		L2 supplemental cathodic protection	$30,000
		B2 cathodic protection	$40,000
		B3 cathodic protection	$40,000
		TOTAL	$153,500
2016	2	Ultrasonic Testing of L1, B2, and B3	$90,000
2023	3	Replacement of B2 (8,463 ft)	$2,700,000
2025	4	Replacement of B3 (8332 ft)	$2,600,000
Annually, post Phase 1		Annual Cathodic Protection Surveys	$500 per year

As a result of the May 2010 break in B2, in early 2011, the IEC "Batiquitos Force Main Repair Project" replaced, in place, approximately 1,100 feet each of the B2 and B3 force mains (as well as the B1/Fail Safe line) from the Batiquitos Pump Station to the San Marcos Creek Bridge and approximately 400 feet each of B1, B2, and B3 from the northern end of the San Marcos Creek Bridge to the north. The B2 and B3 sections, both 24-inch DIP, were replaced with 24-inch DR18 C905 PVC. During this project, sections of B2, B3, and the Fail Safe line (B1) were inspected. IEC provided an estimated remaining useful life for B2 of 12 years (2023) and for B3, 14 years (2025).

FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

The District force mains vary in materials of construction. The following section will present discussion of the differing potential failure mechanisms by material and a recommended approach to inspection frequency and intensity.

Failure Mechanisms by Material

It is not expected that there would be corrosion failures of the PVC or HDPE portions of the force mains. The ductile iron portions of force mains, however, present a different scenario. This material is susceptible to both internal corrosion from the sewage flow (liquid and gaseous states), as well as external corrosion due to the environment in which the pipe is buried. The ductile iron pipe and fittings failure mechanism could be as follows:

A. Corrosion of the ductile iron either internally or externally pipe could cause failure.

B. Deterioration of the ductile iron pipe wall thickness could cause failure.

As such, for asset-planning purposes, plastic-based force mains (e.g., PVC, HPDE) are estimated to have a useful life of 50 years while a metallic-based force main's useful life is estimated to be 25 years. Each force main should be thoroughly inspected as it approaches the end of its useful life.

Implementation

Five of the District's ten pump station force mains (Avocado, Diana, Encinitas Estates, Village Park 5, and Village Park 7) have been replaced and/or parallel since 2008, all with PVC. Rancho Verde Pump Station's force main is PVC and was installed in 1997. The condition of these facilities should be evaluated as they approach the end of their estimated remaining useful life of 50 years. Additionally, an interim inspection (e.g. CCTV from discharge, evaluation of pump efficiency, etc) at approximately 20 years would be warranted. The District should continue to evaluate the most appropriate manner in which to conduct this interim inspection.

Saxony Pump Station's force main has ductile iron sections installed in 1999 and 2001. The force main should be evaluated as part of the overall pump station condition evaluation. The force main should be planned for replacement by 2024 unless the condition assessment recommends otherwise.

La Costa Pump Station's force mains are a combination of CIP (cast iron), PVC, and HPDE and were installed between 1963 and 1998. The CIP section is the oldest section (is within the station) and should be evaluated as part of the overall pump station evaluation. The remaining force main sections should be evaluated as they approach the end of their estimated remaining useful life.

As discussed previously, sections of the Batiquitos Pump Station force mains were replaced following a leak in 2010. Per IEC's 2011 evaluations, B2 is recommended to be replaced in FY2023 and B3 is recommended to be replaced in FY2025.

Leucadia Pump Station force main L1 is at the end of its theoretical remaining useful life and is planned for replacement in FY16/FY17. A corrosion evaluation is planned for FY13. This, and other evaluations, should be utilized to (1) determine whether this pipeline should be lined or replaced and (2) confirm planned replacement timeframe.

5-YEAR CIP

The following replacement-based capital improvement projects are recommended or are planned by the District and are included in the District's 5-Year CIP.

Cathodic Protection Improvements for L2, B2, and B3 (and annual testing)

This project consists of repairing and/or replacing missing and damaged cathodic test stations along L2, B2, and B3 (L1 test stations were located subsequent to the initial inspection). The estimated cost to do so is $212,500 and is included in the FY13 budget. Following completion of this project, RF Yeager Engineering recommends that a cathodic protection survey of the force mains be conducted annually around August or September of each year. The District can purchase the equipment to conduct the inspections for approximately $800 and receive training from RF Yeager for an additional $800. The fee for RF Yeager to evaluate the results, provide conclusions, and make recommendations on these force mains is estimated to be $500.

Integrity Inspection of L1

Ultrasonic inspection of L1 is recommended during FY13. The estimated cost to do so is $47,000.

Integrity Inspection of L1, B2, and B3 (Ultrasonic Testing)

Ultrasonic inspection of L1, B2, and B3 is recommended in FY16. The estimated cost to do so is $90,000.

Leucadia Pump Station Force Main L1 Replacement

Replacement of L1 is assumed to occur in FY16/FY17. The corrosion evaluation planned for FY13 shall confirm the timeframe of this CIP project. The estimated cost to replace L1 is $4,536,000.

20-YEAR CAPITAL EXPENDITURE SUMMARY

Long-term capital estimates for force main replacement are included in the pump station long-term capital replacement estimates. These include IEC's recommendation to replace B2 in FY2023 and B3 in FY2025.

CHAPTER 8

JOINTLY-OWNED GRAVITY SEWERS

This chapter describes those gravity sewers (the Batiquitos Influent Sewer, the Lanikai Gravity Sewer, and the Occidental Sewer) which the District owns with other sewer-providing agencies.

BATIQUITOS INFLUENT SEWER

The Batiquitos Influent Sewer is approximately 890 feet of 24-inch C905, 165 psi, PVC gravity sewer jointly owned by the District and Encinitas. Encinitas' Moonlight Beach pump station force main discharges into this pipeline, combining with District flows prior to entering the Batiquitos Pump Station. The Batiquitos Influent Sewer was replaced in FY10.

As the majority owner (the District has 77.86% ownership), and its proximity to the District and its facilities, the District is the responsible agency for the ongoing operation and maintenance of this pipeline, including capital repair and replacement. Along with the District's other gravity sewers which require additional resources to maintain (i.e., hydroclean and CCTV), the District should insure that maintenance work orders are generated at the frequency that is necessary for this particular asset.

LANIKAI GRAVITY SEWER

The Lanikai Gravity Sewer was originally installed in 1972 and is approximately 725 feet long. Sewage flows west to east, beginning at the discharge of the Batiquitos Pump Station force mains and connecting to the Occidental Sewer in Avenida Encinas. The Lanikai Gravity Sewer is jointly owned by the District (77.86 percent) and Encinitas (22.14 percent).

As the majority owner and due to its proximity to the District and its facilities, the District is the responsible agency for the ongoing operation and maintenance of this pipeline, including capital repair and replacement.

According to the District's work management system, the Lanikai Gravity Sewer consists of approximately 30 feet of 18-inch diameter piping and 694 feet of 21-inch diameter piping. However, IEC confirmed during its pre-design efforts for lining the railroad crossing section of the sewer that the entire length is in fact 21-inch. The District's work management system should be updated to reflect this.

Affordable Pipeline Services hydrocleaned and CCTV inspected the Lanikai Gravity Sewer in December 2010. This inspection resulted in the IEC project to line the eastern half of this line, CIP Project – Lanikai Line Repair. It is recommended to place this pipeline on a five year schedule for hydrocleaning and CCTV inspection. Along with the District's other gravity sewers, the District should insure that maintenance work orders are generated at the frequency that is necessary for the particular asset (in this case once every five years). Also, the District should develop a chronological summary of operation/maintenance and repair/replacement tasks associated with this line.

Approximately 300 feet of the Lanikai Gravity sewer will be lined in FY13. Carlsbad discharges into the eastern half of the pipeline via the manhole in Franciscan Road. The lining project will begin at this point and proceed east to the District connection to the Occidental Sewer. The estimated construction cost is $256,000.

OCCIDENTAL SEWER

The 39-inch, 42-inch, and 48-inch Occidental Sewer is jointly owned by the District, Carlsbad, and Encinitas. The District owns 40.3 percent of the facility, Carlsbad owns 40 percent, and Encinitas owns 19.7 percent of this facility.

Carlsbad is responsible for the operation and maintenance of the Occidental Sewer. Carlsbad has proposed to place this line on a cleaning schedule of once every five years. The District should develop a chronological summary of operation/maintenance and repair/replacement tasks associated with this line and should confirm that Carlsbad is executing their maintenance schedule as planned.

The eight manholes of the Occidental Sewer from the Lanikai Gravity Sewer connection to the Encina WPCF intake were planned for rehabilitation in FY13, along with two sections to be lined (totaling approximately 350 feet). The District's share of the estimated rehabilitation cost is $301,771. As of December 2012, seven of the eight Occidental Sewer

manholes and the CIPP lining were complete. Rehabilitation of the eighth Occidental Sewer manhole shall be completed with the District's Lanikai Gravity Sewer lining project in the coming months.

5-YEAR CIP

The following capital improvement projects are included in the District's 5-Year CIP for jointly owned gravity sewer facilities.

Lanikai Line Repair

For FY13, $256,000 has been budgeted for lining the eastern portion of this pipeline.

Occidental Line Repair

For FY13, $301,997 is included in the 5-Year CIP to cover the District share of repairing the eight Occidental manholes and lining a portion as well. Note that $171,500 was included in the District FY13 budget. This project was completed in late 2012.

20-YEAR CAPITAL EXPENDITURE SUMMARY

Long-term capital replacement expenditures for the Batiquitos Influent Sewer are included in the District's overall gravity sewer pipeline 20-Year Summary of Capital Expenditures.

Capital replacement expenditures for the Lanikai and Occidental Sewer are based on the replacement value of the asset as calculated in Appendix H. The 20-year estimate of expenditures for the Lanikai Gravity Sewer is $191,000. The 20-year estimate of expenditures for the Occidental Line is $675,700. Note that these values represent only the District's share of these pipelines.

CHAPTER 9

RECYCLED WATER FACILITIES

The District's recycled water facilities consist of the pump station at the Encina WPCF which pumps secondary effluent to the Gafner WRP via the force main B1 (also known as the fail-safe line). The Gafner WRP treats water to a tertiary level. The recycled water is then used for irrigation at the La Costa Golf Course.

Additionally, the District is participating in the North San Diego County Regional Recycled Water Project.

Secondary Effluent Pump Station at Encina WPCF

Recent improvements at the pump station include the update of radio alarm telemetry in FY12.

Financial Planning. There are no specific projects relative to the pump station planned in the 5-Year CIP. There is a line item for General Secondary Effluent Pump Station and Force Main Improvements which is based on the pump station replacement report provided in Appendix I. As such, based on the replacement report (and the addition of 35% soft costs), $480,800 is included in the 5-Year CIP for this pump station for potential projects. The District should inspect this pump station as part of the overall FY14 pump station condition assessment to confirm whether or not any specific projects are recommended.

Secondary Effluent Force Main (B1)

The secondary effluent force main (B1) is from the secondary effluent pump station at Encina WPCF to the Gafner WRP. A section of the 14-inch pipeline was replaced with PVC as part of the District's 2010 Batiquitos Force Main Repair Project.

Financial Planning. There are no specific projects relative to the force main planned in the 5-Year CIP. There is a line item for General Secondary Effluent Pump Station and Force Main Improvements which is based on the pump station replacement report provided

in Appendix I. However, based on the condition assessments conducted by RF Yeager Engineering and IEC during the Batiquitos Force Main Repair Project, replacement of the force main as indicated in the Appendix I facility replacement report shall be delayed.

Gafner WRP

Recent improvements at the Gafner WRP include:

- FY12 - Replaced two (2) Reclaimed Water Supply pumps and motors (for recycled water use onsite the Gafner WRP)
- FY11 - Replace pumps and repaint Gafner facilities
- FY10 - Gafner Sand Filter Replacement

Financial Planning. There are no specific projects relative to the Gafner WRP planned in the 5-Year CIP. There is a line item for General Gafner WRP Improvements which is based on the facility replacement report provided in Appendix I. As such, based on the replacement report (and the addition of 35% soft costs), $1,501,200 is included in the 5-Year CIP for this facility. The District should inspect this facility as part of a recycled water facilities condition assessment to confirm whether or not any specific projects are recommended.

Recycled Water Distribution

Two CIP projects relative to recycled water distribution are included in the 5-Year CIP.

A valve in the recycled water effluent line near the Gafner WRP needs to be replaced. The estimated cost for the Recycled Water Effluent Line Valve Repair is $110,800 and is planned to be completed in FY13. However, this project is dependent upon the District having a recycled water customer beyond June 2013.

The recycled water line to the La Costa Golf Course is approximately 2,000 feet in length and crosses San Marcos Creek prior to discharging into the golf course's pond. With completion of the Batiquitos Lagoon Restoration in the late 1990s the average water level of the Batiquitos Lagoon dropped. Over time this has caused bank and stream-bed erosion in the upstream section of San Marcos Creek. The recycled water line was previously buried

approximately 2 feet under the creek and is now exposed as a result of this erosion. We would recommend near-term replacement and realignment of the entire 2,000 feet of pipeline (which includes a new creek crossing) at an estimated construction cost of $250,000 (Recycled Water Effluent Line Creek Crossing).

North San Diego County Regional Recycled Water Project

The District is coordinating with other North County agencies on recycled water project for the area. In FY13, the District shall participate in a planning study at the cost of $81,500.

Pending a recycled water agreement with the Olivenhain Municipal Water District, a new pump station and piping would be constructed at the Gafner WRP to pump recycled water to Olivenhain's system in El Camino Real. The estimated cost for the pump station is $2 million and would be constructed in FY14. Subsequently, the Gafner WRP would be expanded in FY15 at an estimated cost of $1,325,000.

All projects discussed in this section are included in the 5-Year CIP.

20-YEAR CAPITAL EXPENDITURE SUMMARY

Long-term capital replacement expenditures for the secondary effluent pump station and force main and Gafner WRP are expected to total $16,324,200 over the next 20 years as provided in Appendix I. $7,328,000 is for the pump station and force main. The remaining $4,764,000 is for the Gafner WRP. No long-term financial planning is provided at this time for the North San Diego County Recycled Water Project as it has yet to be approved.

CHAPTER 10

ENCINA WASTEWATER AUTHORITY

For the 5-Year CIP and long-range financial planning, this chapter develops the District's share of the Encina Wastewater Authority (EWA) facility replacement costs. Replacement costs were developed using standard engineering cost estimates.

Encina WPCF Treatment

This paragraph provides an estimate of the replacement costs for the treatment capacity based on utilization of the developed plant site at the Encina WPCF. The estimated replacement cost for the District's 7.11 million gallons of capacity is $7.55 per gallon. If a new site is developed, the unit cost would be higher. Based on this replacement number, the replacement value of the District's treatment facilities is $53,680,500. If a 50-year life is used for these facilities, the yearly capital replacement will be $1,073,600. This calculation is summarized in Table 10-1.

TABLE 10-1
ENCINA WPCF TREATMENT
CAPITAL REPLACEMENT COST ESTIMATE

Item	Cost, $
District Treatment Capacity	7.11 mgd
Unit Replacement Cost, $ per gallon	$7.55
Total Replacement Cost	$53,680,000
Yearly Capital Expenditure based on 50-Year Life	$1,073,600

Encina WPCF Outfall

Table 10-2 provides an estimate of the capital replacement costs for the existing outfall if it is repaired in place. This table shows the value of the outfall facilities of $25,643,000. Previous estimates for construction of a new outfall were as high as $65,000,000 (as of 2008). Thus the $25,643,000 should be viewed as an estimate to repair and replace the existing outfall.

TABLE 10-2 ENCINA WPCF OUTFALL CAPITAL REPLACEMENT COST ESTIMATE			
Item	**Length**	**Unit Cost, $/ft**	**Total, $**
Piping			
	200' of 84-inch	$2,500	$500,000
	6,300' of 48-inch	$2,500	$15,750,000
	1,500' of 72-inch	$2,500	$3,750,000
Subtotal			*$20,000,000*
Pump Station and Surge Tank			$5,643,000
Total Replacement Cost			$25,643,000
District Leucadia Share, 16.42%			*$4,210,581*
Yearly Capital Expenditure based on 50-Year Life			$84,212

Annual Capital Replacement

The total of the Treatment and Outfall components represents the District's share of annual capital replacement costs of the Encina WPCF. This total is $1,157,812. Therefore, it is recommended that the District budget for $1,200,000 in capital Encina projects for the 5-Year CIP and as part of the long-term expenditure forecast. Over 20 years, this amounts to $24,000,000. The actual use of the funds shall be based on specific projects as defined by the EWA.

CHAPTER 11

5-YEAR CIP AND 20-YEAR SUMMARY OF CAPITAL EXPENDITURES

This chapter combines all of the 5-Year CIP projects discussed throughout this report into the complete 5-Year CIP as presented in Table 11-3 on the following page. Additionally, a 20-year summary of capital expenditures is provided.

DISTRICT 5-YEAR CIP

The District's 5-Year CIP is provided in Table 11-3 on the following page.

DISTRICT 20-YEAR SUMMARY AND DETAIL OF CAPITAL EXPENDITURES

The following tables 11-1 and 11-2 present the summary of the estimated wastewater and recycled water program expenditures by asset class over the next 20 years (through FY2032). These values are calculated based on the long-term expenditures forecast for each asset category. The final table in this chapter, Table 11-4, presents the 20-Year projected CIP for integration with the District's Financial Plan.

TABLE 11-1
20-YEAR SUMMARY
OF WASTEWATER CIP EXPENDITURES

Asset Category	Expenditures over 20 Years
Gravity Sewer Pipelines	$ 23,547,258
Manholes	$ 3,000,000
Pump Stations and Force Mains	$ 33,517,800
Joints-Owned Gravity Sewers	$866,700
Encina Wastewater Authority Projects	$ 24,000,000
TOTAL	**$84,931,758**

TABLE 11-2
20-YEAR SUMMARY
OF RECYCLED WATER CIP EXPENDITURES

Asset Category	Expenditures over 20 Years
Recycled Water Pump Station and Force Main	$ 7,328,000
Gafner Water Reclamation Plant	$ 4,764,000
TOTAL	**$12,092,000**

TABLE 11-3
District Capital Improvement Program (CIP) Detail in 1,000's

Wastewater Program	FY2013	FY2014	FY2015	FY2016	FY2017
Gravity Pipelines and Manholes					
Phase 1 AMMP Structural Repairs	-	100.0	-	-	-
SMA Structural Repairs	250.0	-	-	-	-
Trial Lining Project	250.0	-	-	-	-
Scott's Valley Pipeline Lining	-	500.0	-	-	-
VCP Programmatic Replacement	-	1,000.0	1,500.0	1,500.0	1,500.0
Annual Manhole Rehabilitation	-	150.0	150.0	150.0	150.0
New Work Management System Purchase	-	125.0	-	-	-
Miscellaneous Pipeline Rehabilitation	150.0	150.0	150.0	150.0	150.0
Lateral Replacement Backflow Program	100.0	100.0	100.0	100.0	100.0
Pump Stations					
Batiquitos Rehabilitation	2,850.0	-	-	-	-
Leucadia Generator Replacement	550.0	-	-	-	-
La Costa Rehabilitation	240.0	-	-	-	-
Condition Assessment	-	30.0	-	-	-
Saxony and Rancho Verde Power Monitors	-	50.0	-	-	-
Saxony Pump Replacement	-	100.0	-	-	-
Encinitas Estates Improvements	-	337.5	-	-	-
VP5 Improvements	-	-	337.5	-	-
VP7 Improvements	-	-	240.0	-	-
General Pump Station Improvements	-	-	379.0	955.8	955.8
Force Mains					
L2,B2, & B3 CP Improvements	212.0	-	-	-	-
Annual CP Testing - L1, L2, B2, and B3	-	0.5	0.5	0.5	0.5
L1 Corrosion Evaluation	47.0	-	-	-	-
L1, B2, and B3 Corrosion Evaluation	-	-	-	90.0	-
L1 FM Replacement	-	-	-	2,268.0	2,268.0
Jointly-Owned Gravity Sewers					
Lanikai Line Repair	256.0	-	-	-	-
Occidental Line Repair	301.8	-	-	-	-
Subtotal Wastewater Program	*5,206.8*	*2,643.0*	*2,857.0*	*5,214.3*	*5,214.3*
District Share of Encina CIP	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0
Total Wastewater Program	***6,406.8***	***3,843.0***	***4,057.0***	***6,414.3***	***6,324.3***
Recycled Water Program	**FY2013**	**FY2014**	**FY2015**	**FY2016**	**FY2017**
RW Effluent Line Valve Repair	110.8	-	-	-	-
RW Effluent Line Creek Crossing	-	250.0	-	-	-
North SD County Regional Project	81.5	2,000.0	1,325.0	-	-
General Secondary Eff PS & FM Imprvmnts	-	267.8	267.8	79.7	79.7
General Gafner WRP Improvements	-	724.5	724.5	315.9	315.9
Total Recycled Water Program	***192.3***	***3,242.3***	***1,920.4***	***395.6***	***395.6***
District Total CIP Expenses	**6,599.1**	**7,085.3**	**6,374.3**	**6,809.9**	**6,719.9**

TABLE 11-4
20-YEAR FINANCIAL PLAN

Capital Improvement Program (CIP) Detail

Project Name	Notes	Sources	Estimated 2013	Estimated 2014	Estimated 2015	Estimated 2016	Estimated 2017	Estimated 2018	Estimated 2019	Estimated 2020	Estimated 2021	Estimated 2022	Estimated 2023	Estimated 2024	Estimated 2025
Wastewater Program															
	(1) (2)		(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Gravity Pipelines and Manholes															
Phase 1 AMMP Structural Repairs			-	100,000	-	-	-	-	-	-	-	-	-	-	-
SMA Structural Repairs			250,000	-	-	-	-	-	-	-	-	-	-	-	-
Trial Lining Project			250,000	-	-	-	-	-	-	-	-	-	-	-	-
Scott's Valley Pipeline Lining			-	500,000	-	-	-	-	-	-	-	-	-	-	-
VCP Programmatic Replacement	(3)		-	1,000,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	-	-	-	-
Annual Manhole Rehabilitation	(4)		-	100,000	100,000	100,000	100,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
New Work Management System Purchase			-	125,000	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous Pipeline Rehabilitation	(5)		150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Lateral Replacement Backflow Program	(5)		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
General Pipeline Replacement	(6)		-	-	-	-	-	-	-	-	-	1,018,023	1,018,023	749,744	749,744
Subtotal			**750,000**	**2,075,000**	**1,850,000**	**1,850,000**	**1,850,000**	**1,800,000**	**1,800,000**	**1,800,000**	**1,800,000**	**1,318,023**	**1,318,023**	**1,049,744**	**1,049,744**
Pump Stations and Force Mains															
Leucadia Generator Replacement			550,000	-	-	-	-	-	-	-	-	-	-	-	-
La Costa Rehabilitation			240,000	-	-	-	-	-	-	-	-	-	-	-	-
Condition Assessment			-	30,000	-	-	-	-	-	-	-	-	-	-	-
Saxony and Rancho Verde Power Monitors			-	50,000	-	-	-	-	-	-	-	-	-	-	-
Saxony Pump Replacement			-	100,000	-	-	-	-	-	-	-	-	-	-	-
Encinitas Estates Improvements			-	337,500	-	-	-	-	-	-	-	-	-	-	-
VP5 Improvements			-	-	337,500	-	-	-	-	-	-	-	-	-	-
VP7 Improvements			-	-	240,000	-	-	-	-	-	-	-	-	-	-
L1, L2, B2, & B3 CP Improvements, Testing, Evaluation	(8)		259,000	500	500	90,500	500	500	500	500	500	500	500	500	500
General Pump Station Replacement	(9)				379,000	1,701,000	1,701,000	1,701,000	1,701,000	1,701,000	1,546,200	1,546,200	1,546,200	1,546,200	1,546,200
Subtotal			**1,049,000**	**518,000**	**957,000**	**1,791,500**	**1,701,500**	**1,701,500**	**1,701,500**	**1,701,500**	**1,546,700**	**1,546,700**	**1,546,700**	**1,546,700**	**1,546,700**
			-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Jointly-Owned Facilities															
Batiquitos Rehabilitation (District & Encinitas shares)			2,850,000	-	-	-	-	-	-	-	-	-	-	-	-
General Batiquitos Replacement (District & Encinitas sh	(7)		-	-	-	162,000	162,000	162,000	162,000	162,000	1,795,500	1,795,500	1,795,500	1,795,500	1,795,500
Lanikai Line Repair (District share)			256,000	-	-	-	-	-	-	-	-	-	-	-	-
General Lanikai Replacement (District share)			-	-	-	-	-	-	-	-	-	-	10,000	10,000	10,000
Occidental Line Repair (District share)			130,000	-	-	-	-	-	-	-	-	-	-	-	-
General Occidental Repair (District share)			-	-	-	-	-	-	-	-	-	-	34,000	34,000	34,000
Subtotal			**3,236,000**	**-**	**-**	**162,000**	**162,000**	**162,000**	**162,000**	**162,000**	**1,795,500**	**1,795,500**	**1,839,500**	**1,839,500**	**1,839,500**
Subtotal Wastewater Program			**5,035,000**	**2,593,000**	**2,807,000**	**3,803,500**	**3,713,500**	**3,663,500**	**3,663,500**	**3,663,500**	**5,142,200**	**4,660,223**	**4,704,223**	**4,435,944**	**4,435,944**
LWD Share of Encina CIP			2,038,195	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
TOTAL Waste Water CIP			**7,073,195**	**3,793,000**	**4,007,000**	**5,003,500**	**4,913,500**	**4,863,500**	**4,863,500**	**4,863,500**	**6,342,200**	**5,860,223**	**5,904,223**	**5,635,944**	**5,635,944**
Recycled Water Program															
North SD County Regional Project			81,500	2,000,000	1,325,000	-	-	-	-	-	-	-	-	-	-
RW Effluent Line Valve Repair			110,800	-	-	-	-	-	-	-	-	-	-	-	-
RW Effluent Line Creek Crossing			-	250,000	-	-	-	-	-	-	-	-	-	-	-
General Secondary Eff PS & FM Improvements	(10)		-	267,750	267,750	79,650	79,650	79,650	79,650	79,650	1,655,100	1,655,100	1,655,100	1,655,100	1,655,100
General Gafner WRP Improvements	(10)		-	724,500	724,500	315,900	315,900	315,900	315,900	315,900	288,900	288,900	288,900	288,900	288,900
Total Recycled Water Program			**192,300**	**3,242,250**	**2,317,250**	**395,550**	**395,550**	**395,550**	**395,550**	**395,550**	**1,944,000**	**1,944,000**	**1,944,000**	**1,944,000**	**1,944,000**
District Total CIP Expenses			**7,265,495**	**7,035,250**	**6,324,250**	**5,399,050**	**5,309,050**	**5,259,050**	**5,259,050**	**5,259,050**	**8,286,200**	**7,804,223**	**7,848,223**	**7,579,944**	**7,579,944**

Notes
(1) From 12-13-2012 5-Year CIP
(2) From long-term expenditure forecasts.
(3) Assuming 6 years to remove and replace VCP from Zone 1 and 2 years in Alga Hills.
(4) FY13-FY17 based on AMP rate of spending, >FY17 based on District rate of spending
(5) Continuous District CIP programs
(6) Does not begin until after completion of VCP in Zone 1 and Alga Hills. Source: AMP Table D-4. FY22-23 is 0-10 Rmng Life Cost less VCP ($12M). FY24-28 is 11-15 Rmng Life Cost. FY29-33 is 16-20 Rmng Life Cost.
(7) Source for FY16 and > is AMP Table 6-5 plus 35%.
(8) Combination of four 5-Year CIP cathodic protection force main projects.
(9) AMP Table 6-3 Subtotal (without Batiquitos) less planned CIP projects divided by number of years.
(10) From AMP App H Tables

TABLE 11-4
20-YEAR FINANCIAL PLAN

Capital Improvement Program (CIP) Detail

Project Name	Notes	Sources	Estimated 2026	Estimated 2027	Estimated 2028	Estimated 2029	Estimated 2030	Estimated 2031	Estimated 2032	Estimated 2033	20 Yr Total
Wastewater Program											
	(1) (2)		(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	
Gravity Pipelines and Manholes											-
Phase 1 AMMP Structural Repairs			-	-	-	-	-	-	-	-	100,000
SMA Structural Repairs			-	-	-	-	-	-	-	-	-
Trial Lining Project			-	-	-	-	-	-	-	-	-
Scott's Valley Pipeline Lining			-	-	-	-	-	-	-	-	500,000
VCP Programmatic Replacement	(3)		-	-	-	-	-	-	-	-	11,500,000
Annual Manhole Rehabilitation	(4)		50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	1,200,000
New Work Management System Purchase			-	-	-	-	-	-	-	-	125,000
Miscellaneous Pipeline Rehabilitation	(5)		150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	3,000,000
Lateral Replacement Backflow Program	(5)		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	2,000,000
General Pipeline Replacement	(6)		749,744	749,744	749,744	1,252,498	1,252,498	1,252,498	1,252,498	1,252,498	12,047,258
Subtotal			**1,049,744**	**1,049,744**	**1,049,744**	**1,552,498**	**1,552,498**	**1,552,498**	**1,552,498**	**1,552,498**	30,472,258
Pump Stations and Force Mains											
Leucadia Generator Replacement			-	-	-	-	-	-	-	-	-
La Costa Rehabilitation			-	-	-	-	-	-	-	-	-
Condition Assessment			-	-	-	-	-	-	-	-	30,000
Saxony and Rancho Verde Power Monitors			-	-	-	-	-	-	-	-	50,000
Saxony Pump Replacement			-	-	-	-	-	-	-	-	100,000
Encinitas Estates Improvements			-	-	-	-	-	-	-	-	337,500
VP5 Improvements			-	-	-	-	-	-	-	-	337,500
VP7 Improvements			-	-	-	-	-	-	-	-	240,000
L1, L2, B2, & B3 CP Improvements, Testing, Evaluation	(8)		500	500	500	500	500	500	500	500	100,000
General Pump Station Replacement	(9)		644,000	644,000	644,000	644,000	644,000	1,187,400	1,187,400	1,187,400	23,397,200
Subtotal			**644,500**	**644,500**	**644,500**	**644,500**	**644,500**	**1,187,900**	**1,187,900**	**1,187,900**	24,592,200
			-	-	-	-	-	-	-	-	-
Subtotal			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-
Jointly-Owned Facilities											
Batiquitos Rehabilitation (District & Encinitas shares)			-	-	-	-	-	-	-	-	-
General Batiquitos Replacement (District & Encinitas sh	(7)		162,000	162,000	162,000	162,000	162,000	364,500	364,500	364,500	11,691,000
Lanikai Line Repair (District share)			-	-	-	-	-	-	-	-	-
General Lanikai Replacement (District share)			10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	110,000
Occidental Line Repair (District share)			-	-	-	-	-	-	-	-	-
General Occidental Repair (District share)			34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	374,000
Subtotal			**206,000**	**206,000**	**206,000**	**206,000**	**206,000**	**408,500**	**408,500**	**408,500**	12,175,000
Subtotal Wastewater Program			**1,900,244**	**1,900,244**	**1,900,244**	**2,402,998**	**2,402,998**	**3,148,898**	**3,148,898**	**3,148,898**	67,239,458
LWD Share of Encina CIP			1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	24,000,000
TOTAL Waste Water CIP			**3,100,244**	**3,100,244**	**3,100,244**	**3,602,998**	**3,602,998**	**4,348,898**	**4,348,898**	**4,348,898**	91,239,458
Recycled Water Program											
North SD County Regional Project			-	-	-	-	-	-	-	-	3,325,000
RW Effluent Line Valve Repair			-	-	-	-	-	-	-	-	-
RW Effluent Line Creek Crossing			-	-	-	-	-	-	-	-	250,000
General Secondary Eff PS & FM Improvements	(10)		18,900	18,900	18,900	18,900	18,900	160,650	160,650	160,650	9,785,700
General Gafner WRP Improvements	(10)		72,900	72,900	72,900	72,900	72,900	434,700	434,700	434,700	6,141,600
Total Recycled Water Program			**91,800**	**91,800**	**91,800**	**91,800**	**91,800**	**595,350**	**595,350**	**595,350**	19,502,300
											-
District Total CIP Expenses			**3,192,044**	**3,192,044**	**3,192,044**	**3,694,798**	**3,694,798**	**4,944,248**	**4,944,248**	**4,944,248**	110,741,758

Notes
(1) From 12-13-2012 5-Year CIP
(2) From long-term expenditure forecasts.
(3) Assuming 6 years to remove and replace VCP from Zone 1 and 2 years in Alga Hills.
(4) FY13-FY17 based on AMP rate of spending, >FY17 based on District rate of spending
(5) Continuous District CIP programs
(6) Does not begin until after completion of VCP in Zone 1 and Alga Hills. Source: AMP Ta
(7) Source for FY16 and > is AMP Table 6-5 plus 35%.
(8) Combination of four 5-Year CIP cathodic protection force main projects.
(9) AMP Table 6-3 Subtotal (without Batiquitos) less planned CIP projects divided by numt
(10) From AMP App H Tables