# LEUCADIA WASTEWATER DISTRICT
# ASSET MANAGEMENT PLAN
# 2018 UPDATE

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Job No. 103-017

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# 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 District presently serves 28,477 equivalent dwelling units (EDUs), at 89.1% of buildout, with a buildout projection of 31,974 EDUs. This is an increase to the prior (1999) buildout projection, with a significant portion due to the potential for accessory dwelling units on single-family residential parcels, particularly in the City of Encinitas.

At present, wastewater flows are approximately 3.8 mgd, a generation rate of 133 gpd/EDU on average across the District. The generation rate has declined in recent years. In comparison, existing flows at the time of the 1999 Master Plan were approximately 4.0 mgd; which equates to a generation rate of 185 gpd/EDU at that time.

Buildout flows for the District are projected to be 4.7 mgd (based on 133 gpd/EDU and a 10% safety factor). In comparison, the 1985 Planning Study projected 9.6 mgd (based on 238 gpd/EDU) and the 1999 Master Plan projected 6.5 mgd (based on 215 gpd/EDU) for buildout flows.

Long-term pipeline model capacity evaluations are based on measured flows and attenuated pump flows to better model actual conditions. Based on these conditions, there are no pipeline capacity projects recommended.

The District prepares its asset management plans (AMP) on a 5-year cycle in order to: (1) capture the District's progress in the management of its wastewater and recycled water assets, (2) provide recommendations for operation and assessment/replacement cycle improvements to each of the asset classes, and (3) develop the recommended 5-Year and 20-Year CIP.

The District's existing wastewater system encompasses approximately 200 miles of gravity sewer pipeline, 5,000 manholes, 10 pump stations, and 11 miles of force mains. 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

- Track areas, frequency, and cost of where root foam is used as part of the SSMP process (treatments to date are $4,959 in December 2015 and $3,791 in March 2017). Conduct financial evaluation comparing the cost of root foam treatment against lining these areas with top hats. Confirm if root foam areas are on Repair Priority List.

- Consider submetering of Drainage Basin 2 to continue identifying the source of inflow and infiltration.

- Improve accessibility of prior CCTV Inspections on a particular line segment to aid in planning and understanding of the individual asset. This could be done when placing a segment on the Repair Priority List for review.

- Add pipeline Install Date and Age columns to Repair Priority List.

- Add step to Rating Repair Lines/Manholes SOP to review previous repairs in the pipeline or manhole which is being added to Repair Priority List. Add "Yes/No" column to indicate whether the line has previously been repaired.

- Track Repair Priority List Completions, Miscellaneous Line Repairs, and Capital Improvement Projects in GIS/Inframap to aid in decision making as to how best repair/replace an asset. This will provide field services staff with knowledge of linings, top hats, etc., to exercise caution when hydrocleaning. Additionally, it will provide staff with the ability to view previous repairs within a line segment to decide whether spot repairs should continue or a pipeline/manhole should be replaced.

A sample of the database is shown below.

| Line Segment | Street | Defect(s) | Repair Type | Repair Priority | Pipe Size, inches | Repair Length, ft | Repair Location, ft from DwnMH | Comp-leted By | Comp-leted Date | Cost | Source of Funds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-2850_ 04-2840 | La Costa Ave Esmnt | Asbestos Pipe | CIPPL | 3 | 12 | | | | | | |

- Export CMMS repair data from Repair Priority List Completions and Miscellaneous Line Repairs to GIS.

- When lining a pipeline in an area with chronic root issues, the lateral joints should be addressed, via either a top hat, T-liner, or other means.

- When possible, spot repairs of pipelines should be addressed by lining the entire pipe segment, particularly on pipes greater than 40 years in age.

- Consider repair of all Grade 2 and Grade 1 defects and/or programmatic VCP replacement in Drainage Basins 1, 2, 3, and 11. Repair/replacement of Grade 3 and Grade 4 defects discovered within the 5-year time frame would take precedence.

- Procure mylar and electronic (PDF and DWG) record drawings for all CIP projects. AMP process identified the need for electronic record drawings for the FY16 Gravity Rehabilitation Project.

- Historical bid results indicate significant unit cost savings when CIP projects include several thousand feet of lining.

## MANHOLES

- Procure mylar and electronic (PDF and DWG) record drawings for all CIP projects. AMP process identified the need for electronic record drawings for the FY16 Gravity Rehabilitation Project.

- Transfer manhole lining data from Sussex to Inframap.

- Consider revising the CCTV and/or Hydrocleaning SOPs to include notations as to whether a manhole is lined or not.

- Add the installation date and age to the Repair Priority List for each manhole to aid in facility planning.

- Consider an additional column on the Repair Priority List to note whether repairs have occurred previously within the manhole. Alternatively, revise the CMMS form to require completion of the lining field prior to closing the work order.

- Consider revising the CCTV and/or Hydrocleaning SOPs to include notations as to whether an inflow dome is present on a manhole. Alternatively, revise the CMMS form to require completion of the inflow dome field prior to closing the work order.

- Track Repair Priority List Completions, Miscellaneous Line Repairs, and Capital Improvement Projects in GIS/Inframap to aid in decision making as to how best repair/replace an asset.

- Consider increasing the quality of manhole inspections by maximizing the use of their camera equipment to photograph and videotape manholes. As with the gravity sewer pipelines, 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.

## PUMP STATIONS

- Reevaluate pump size at each station based on actual flow generation rates and anticipated peak buildout flows.

- Consider bypassing the Batiquitos Pump Station (for a portion of the District's flow) by pumping directly from the Leucadia Pump Station into one of the Batiquitos force mains.

- Stagger future inspection efforts be based on the previous inspection, age of the asset, needs identified by the District, and the projected date of project implementation.

- The District should consider the preparation of a detailed checklist of component inspection for each station. The basis for this would be prior inspection reports by Infrastructure Engineering Corporation (IEC), and others, with additions by staff as appropriate.

- The District should also consider the maintenance of a pump station component tracking database. This would be used to track improvements and associated costs to better project future spending.

- The following replacement-based capital improvement projects are included in the District's 5-Year CIP:
  - Avocado Pump Station Upgrade Project
  - Avocado Emergency Overflow
  - Batiquitos Generator Replacement Project
  - Diana Pump Station Upgrade Project
  - Diana Emergency Overflow Project
  - Diana Emergency Generator Project
  - Encinitas Estates Pump Station Replacement Project
  - Leucadia Pump Station Rehabilitation Project
  - Rancho Verde Pump Station Improvement Project
  - Village Park 5 Pump Station Replacement Project (completed)
  - Village Park 7 Pump Station Rehabilitation Project
  - L07 Meter Relocation
  - Pump Station Condition Assessment
  - 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 $48 million over the next 20 years.

## FORCE MAINS

- 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.
  - Force Main Corrosion Control
  - Batiquitos (B3) Rehab/Replacement Project – Phase 1
  - Leucadia (L1) West Section Replacement (completed)
  - Leucadia (L1) Final Replacement

## JOINTLY-OWNED GRAVITY SEWERS

- Recommendations regarding the Batiquitos Influent Sewer
  - Ensure that maintenance work orders are generated at the frequency that is necessary for this particular asset.

- Recommendations regarding the Lanikai Gravity Sewer
  - Ensure that maintenance work orders are generated at the frequency that is necessary for the particular asset (in this case once every five years).
  - Continue to maintain a chronological summary of operation/maintenance and repair/replacement tasks associated with this line as part of the District's annual SSMP audit.
  - The following capital improvement projects are included in the District's 5-Year CIP (District's share of cost only): Poinsettia Station Gravity Pipeline.

- Recommendations regarding the Occidental Sewer
  - Continue to maintain 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.

- For long-term financial planning, the District's share of the Lanikai Gravity Sewer expenditures is expected to total $200,000 and for the Occidental Sewer, $680,000. Long-term financial planning for the Batiquitos Influent Sewer is included with the remaining District gravity pipelines.

## RECYCLED WATER

- The District should inspect portions of the Encina Secondary Effluent Pump Station as part of the overall FY19 pump station condition assessment to confirm the project scope.

- Continue coordinating with other North County agencies on the North San Diego Water Reuse Coalition (NSDWRC) Regional Recycled Water Project.

- The following capital improvement projects are included in the District's 5-Year CIP.
  - General Secondary Effluent Pump Station and Force Main Improvements
  - Relocation of the portion of B1 within the Encina WPCF
  - FY18 Gafner AWT Improvement Project (completed)

- For long-term financial planning, District recycled water expenditures for pumpback facilities at Encina are estimated to total $10,775,000 over the next 20 years. The Gafner Water Reclamation Plant expenses are expected to total $6,925,000 over the next 20 years.

## ENCINA WASTEWATER AUTHORITY

- The District's average annual share of EWA's capital projects should be estimated by adjusting the EWA's planed costs for the next 10 years. Beyond 2028, the District's annual share should be estimated as 1,540,806 based on the average cost from the past 5 fiscal years.

- For long-term financial planning, the District's share of EWA projects is estimated to be $40,051,686 over the next 20 years.

## 5-YEAR CIP

Table ES-1 presents the District's recommended 5-Year CIP as a culmination of all CIP projects discussed throughout the report.

**TABLE ES-1**
**DISTRICT 5-YEAR CIP PROJECTS[1]**

| Wastewater Program | FY2018 | FY2019 | FY2020 | FY2021 | FY2022 |
|---|---|---|---|---|---|
| Gravity Pipelines and Manholes | | | | | |
| FY 2016 Gravity Pipeline Rehab.* | 92.9 | - | - | - | - |
| Orchard Wood Rd. Sewer Rehab. | - | 194.7 | - | - | - |
| FY17/FY18 CIPP Project | 800.0 | - | - | - | - |
| La Costa Alteration and Quebrada | 475.0 | - | - | - | - |
| Pipeline Repair Priority List - CIPP | - | - | 675.0 | - | - |
| Pipeline Repair Priority List - Open Trench | - | - | - | 675.0 | - |
| Pipeline Repair Priority List - CIPP | - | - | - | - | 675.0 |
| Misc. Pipeline/Manhole Rehab. | 163.0 | 163.0 | 163.0 | 163.0 | 163.0 |
| Asset Management Plan Update | 100.0 | - | - | - | - |
| HQ Building Metering Switchboard Install. | 69.9 | - | - | - | - |
| Lateral Repl./Backflow Preventer Prog. | 102.0 | 102.0 | 102.0 | 102.0 | 102.0 |
| Pump Stations | | | | | |
| Avocado PS Upgrade Project | - | - | 452.3 | - | - |
| Batiquitos Generator Replacement | - | - | 700.0 | - | - |
| Diana PS Upgrade Project | - | - | 600.8 | - | - |
| Encinitas Estates PS Replacement | - | 1,195.0 | - | - | - |
| Leucadia PS Rehabilitation | 3,670.0 | - | - | - | - |
| Rancho Verde Improvements | - | - | - | 371.3 | - |
| Village Park No. 5 PS Replacement* | 814.6 | - | - | - | - |
| Village Park No. 7 PS Rehab Project | - | - | - | - | 625.0 |
| L07 Meter Relocation | - | 20.0 | - | - | - |
| Pump Station Condition Assessment | - | 30.0 | - | - | - |
| General Pump Station Improvements | - | 1,670.8 | - | 576.0 | 1,601.1 |
| Additional Pump Station Projects | | | | | |
| Avocado Emergency Overflow | - | - | 348.8 | - | - |
| Diana Emergency Generator | - | 350.0 | - | - | - |
| Diana Emergency Overflow | - | - | - | - | 900.0 |
| Force Mains | | | | | |
| Leucadia (L1) West Section Replacement* | 100.0 | - | - | - | - |
| Force Main Corrosion Control | 35.0 | - | - | - | - |
| L1 Final Replacement | - | - | - | 2,880.0 | - |
| B3 Rehab/Replace Project - Phase 1 | - | 115.0 | 1,378.0 | - | - |
| Jointly-Owned Gravity Sewers | | | | | |
| Poinsettia Station Gravity Pipeline Project (Lanikai) | 714.4 | - | - | - | - |
| General Lanikai Replacement (District Share) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| General Occidental Replacement (District Share) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 |
| *Subtotal Wastewater Program* | *7,180.8* | *3,884.5* | *4,463.8* | *4,811.3* | *4,110.1* |
| District Share of Encina CIP | 1,875.1 | 2,725.6 | 2,779.4 | 1,970.4 | 1,802.6 |
| ***Total Wastewater Program*** | ***9,055.9*** | ***6,610.1*** | ***7,243.2*** | ***6,781.6*** | ***5,912.7*** |

| TABLE ES-1<br>DISTRICT 5-YEAR CIP PROJECTS[1] | | | | | |
|---|---|---|---|---|---|
| **Recycled Water Program** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** |
| Encina Secondary Effluent PS Rehab Project | - | - | 370.0 | - | - |
| General Encina Secondary Improvements (less FM) | - | - | 98.3 | 34.0 | 34.0 |
| B1 Force Main - North Section Replacement. | - | 440.0 | - | - | - |
| Gafner AWT Improv. | 758.2 | - | - | - | - |
| North SD Water Reuse Coalition Project | 109.1 | - | - | - | - |
| B1 Force Main Final Replacement | - | - | - | - | 2,198.6 |
| No. SD County Regional RW Project | - | 392.0 | - | - | - |
| ***Total Recycled Water Program*** | ***867.3*** | ***832.0*** | ***468.3*** | ***34.0*** | ***2,232.6*** |
| **District Total CIP Expenses** | **9,923.2** | **7,442.1** | **7,711.5** | **6,815.6** | **8,145.3** |
| **Optional Projects** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** |
| Drainage Basin #11 VCP Line/Replace | - | - | - | - | - |
| Island Area Implementation - Eolus North | - | - | - | 1577.3 | - |
| Island Area Implementation - Eolus/Glaucus | - | - | - | - | 1163.3 |
| Island Area Implementation - Naiad | - | - | - | - | - |
| ***Total Optional Projects*** | ***0.0*** | ***0.0*** | ***0.0*** | ***1,577.3*** | ***1,163.3*** |

[1] All numbers are in thousands of dollars
* Completed project, actual cost

## 20-YEAR CIP

Table ES-2 and Table ES-3 present a summary of the estimated wastewater and recycled water program expenditures by asset class, respectively, over the next 20 years (through FY2037). Table ES-4 presents the 20-Year CIP.

| TABLE ES-2<br>20-YEAR SUMMARY OF<br>WASTEWATER CIP EXPENDITURES | |
|---|---|
| **Asset Category** | **Expenditures over 20 Years** |
| Gravity Sewer Pipelines and Manholes | $ 21,790,421 |
| Pump Stations and Force Mains | $ 47,958,087 |
| Joints-Owned Gravity Sewers | $ 1,594,400 |
| Encina Wastewater Authority Projects | $ 40,051,686 |
| **TOTAL** | **$111,394,594** |

**TABLE ES-3**
**20-YEAR SUMMARY OF**
**RECYCLED WATER CIP EXPENDITURES**

| Asset Category | Expenditures over 20 Years |
|---|---|
| Recycled Water Pump Station and Force Main | $ 1,941,333 |
| Gafner Water Reclamation Plant | $ 4,327,300 |
| North County Regional Recycled Water Project | $ 8,849,235 |
| **TOTAL** | **$15,117,868** |

**TABLE ES-4**
**LEUCADIA WASTEWATER DISTRICT CAPITAL IMPROVEMENT PROGRAM - FINANCIAL ANALYSIS**

| Location Code | Project Name | Project Cost | FY2018 | FY2019 | FY2020 | FY2021 | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | FY2037 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WASTEWATER PROGRAMS** | | | | | | | | | | | | | | | | | | | | | | |
| **Gravity Pipelines and Manholes** | | | | | | | | | | | | | | | | | | | | | | |
| *Specific Pipeline and Manhole Replacement/Rehabilitation Projects* | | | | | | | | | | | | | | | | | | | | | | |
| 0353 | FY 2016 Gravity Pipeline Rehab.* | $493,395 | $92,903 | | | | | | | | | | | | | | | | | | | |
| 0365 | Orchard Wood Rd. Sewer Rehab. | $194,700 | | $194,700 | | | | | | | | | | | | | | | | | | |
| | FY17/FY18 CIPP Project | $800,000 | $800,000 | | | | | | | | | | | | | | | | | | | |
| | La Costa Alteration and Quebrada | $475,000 | $475,000 | | | | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - CIPP | $675,000 | | | $675,000 | | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - Open Trench | $675,000 | | | | $675,000 | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - CIPP | $675,000 | | | | | $675,000 | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - Open Trench | $675,000 | | | | | | $675,000 | | | | | | | | | | | | | | |
| | Drainage Basin #1 VCP Line/Replace | $6,100,000 | | | | | | | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | | | | | | |
| 0077 | Misc. Pipeline/Manhole Rehab. | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 |
| | Buildout-Capacity Based Projects | | | | | | | | | | | | | | | | | | | | | |
| *Subtotal Specific Pipeline and Manhole Replacement/Re* | | *$10,926,095* | *$1,530,903* | *$357,700* | *$838,000* | *$838,000* | *$838,000* | *$838,000* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$163,000* | *$163,000* | *$163,000* | *$163,000* | *$163,000* | *$163,000* |
| *General Pipeline and Manhole Replacement Projects* | | $713,790 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $550,790 | $550,790 | $550,790 | $550,790 | $550,790 | $550,790 |
| *Additional Pipeline and Manhole Projects* | | | | | | | | | | | | | | | | | | | | | | |
| 0368 | Asset Management Plan Update | $550,000 | $100,000 | | | | | $125,000 | | | | | $150,000 | | | | | $175,000 | | | | |
| 0369 | HQ Building Metering Switchboard Install. | $69,918 | $69,918 | | | | | | | | | | | | | | | | | | | |
| 0323 | Lateral Repl./Backflow Preventer Prog. | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 |
| **Total Gravity Pipelines and Manholes** | | **$19,587,261** | **$1,802,821** | **$459,700** | **$940,000** | **$940,000** | **$940,000** | **$1,065,000** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$1,177,500** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$815,790** | **$990,790** | **$815,790** | **$815,790** | **$815,790** | **$815,790** |
| **Pump Stations and Force Mains** | | | | | | | | | | | | | | | | | | | | | | |
| *Specific Pump Station Improvement Projects* | | | | | | | | | | | | | | | | | | | | | | |
| | Avocado PS Upgrade Project | $452,250 | | | $452,250 | | | | | | | | | | | | | | | | | |
| | Batiquitos Generator Replacement | $700,000 | | | $700,000 | | | | | | | | | | | | | | | | | |
| | Batiquitos Pump Station Rehabilitation | $4,000,000 | | | | | | $4,000,000 | | | | | | | | | | | | | | |
| | Diana PS Upgrade Project | $600,750 | | | $600,750 | | | | | | | | | | | | | | | | | |
| 0364 | Encinitas Estates PS Replacement | $1,195,000 | | $1,195,000 | | | | | | | | | | | | | | | | | | |
| | La Costa Pump Station Replacement | $2,835,000 | | | | | | | | | | | | | | | | | | $2,835,000 | | |
| 0358 | Leucadia PS Rehabilitation | $3,670,000 | $3,670,000 | | | | | | | | | | | | | | | | | | | |
| | Rancho Verde Improvements | $371,250 | | | | $371,250 | | | | | | | | | | | | | | | | |
| 0354 | Village Park No. 5 PS Replacement* | $814,587 | $814,587 | | | | | | | | | | | | | | | | | | | |
| | Village Park No. 7 PS Rehab Project | $625,000 | | | | | $625,000 | | | | | | | | | | | | | | | |
| | L07 Meter Relocation | $20,000 | | $20,000 | | | | | | | | | | | | | | | | | | |
| | Pump Station Condition Assessment | $30,000 | | $30,000 | | | | | | | | | | | | | | | | | | |
| *Subtotal Specific Pump Station Projects* | | *$15,313,837* | *$4,484,587* | *$1,245,000* | *$1,753,000* | *$371,250* | *$625,000* | *$4,000,000* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$2,835,000* | *$0* | *$0* |
| **Force Mains** | | | | | | | | | | | | | | | | | | | | | | |
| 0345 | Leucadia (L1) West Section Replacement* | $100,000 | $100,000 | | | | | | | | | | | | | | | | | | | |
| 0366 | Force Main Corrosion Control | $35,000 | $35,000 | | | | | | | | | | | | | | | | | | | |
| | L1 Final Replacement | $2,880,000 | | | | $2,880,000 | | | | | | | | | | | | | | | | |
| | B2 Metallic Section Evaluation | $100,000 | | | | | | | | $100,000 | | | | | | | | | | | | |
| | B3 Metallic Section Evaluation | $100,000 | | | | | | | | $100,000 | | | | | | | | | | | | |
| | B3 Rehab/Replace Project - Phase 1 | $1,493,000 | | $115,000 | $1,378,000 | | | | | | | | | | | | | | | | | |
| | B3 Rehab/Replace Project - Phase 2 | $1,992,000 | | | | | | | $1,992,000 | | | | | | | | | | | | | |
| *Subtotal Specific Force Mains Projects* | | *$6,700,000* | *$135,000* | *$115,000* | *$1,378,000* | *$2,880,000* | *$0* | *$0* | *$1,992,000* | *$0* | *$200,000* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* |
| **Subotal of Specific Pump Station Replacement Projects** | | | **$4,619,587** | **$1,360,000** | **$3,131,000** | **$3,251,250** | **$625,000** | **$4,000,000** | **$1,992,000** | **$0** | **$200,000** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$2,835,000** | **$0** | **$0** |
| *General Pump Station Projects* | | | *$0* | *$1,670,750* | *$0* | *$576,000* | *$1,601,125* | *$0* | *$917,625* | *$1,913,625* | *$403,450* | *$603,450* | *$603,450* | *$603,450* | *$2,204,575* | *$2,958,825* | *$2,197,950* | *$2,041,200* | *$3,954,825* | *$0* | *$1,047,600* | *$1,047,600* |
| *Additional Pump Station Projects* | | | | | | | | | | | | | | | | | | | | | | |
| | Avocado Emergency Overflow | $348,750 | | | $348,750 | | | | | | | | | | | | | | | | | |
| | Diana Emergency Generator | $350,000 | | $350,000 | | | | | | | | | | | | | | | | | | |
| | Diana Emergency Overflow | $900,000 | | | | | $900,000 | | | | | | | | | | | | | | | |
| **Total Pump Stations and Force Mains** | | **$47,958,087** | **$4,619,587** | **$3,380,750** | **$3,479,750** | **$3,827,250** | **$3,126,125** | **$4,000,000** | **$2,909,625** | **$1,913,625** | **$603,450** | **$603,450** | **$603,450** | **$603,450** | **$2,204,575** | **$2,958,825** | **$2,197,950** | **$2,041,200** | **$3,954,825** | **$2,835,000** | **$1,047,600** | **$1,047,600** |
| Jointly-Owned Gravity Sewers | | | | | | | | | | | | | | | | | | | | | | |
| 0361 | Poinsettia Station Gravity Pipeline Project (La | $714,400 | $714,400 | | | | | | | | | | | | | | | | | | | |
| | General Lanikai Replacement (District Share) | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | General Occidental Replacement (District Sh | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 |
| **Subtotal Jointly-Owned Gravity Sewers** | | **$1,594,400** | **$758,400** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** |
| | | | | | | | | | | | | | | | | | | | | | | |
| **Subtotal Wastewater Program** | | **$69,139,748** | **$7,180,808** | **$3,884,450** | **$4,463,750** | **$4,811,250** | **$4,110,125** | **$5,109,000** | **$3,981,125** | **$2,985,125** | **$1,674,950** | **$1,674,950** | **$1,824,950** | **$1,674,950** | **$3,276,075** | **$4,030,325** | **$3,057,740** | **$3,075,990** | **$4,814,615** | **$3,694,790** | **$1,907,390** | **$1,907,390** |
| | District Share of Encina CIP | $39,324,876 | $1,875,134 | $2,725,632 | $2,779,434 | $1,970,388 | $1,802,556 | $3,492,216 | $2,857,554 | $2,095,758 | $2,137,716 | $2,180,430 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 |
| ***Total Wastewater Program*** | | ***$108,464,624*** | ***$9,055,942*** | ***$6,610,082*** | ***$7,243,184*** | ***$6,781,638*** | ***$5,912,681*** | ***$8,601,216*** | ***$6,838,679*** | ***$5,080,883*** | ***$3,812,666*** | ***$3,855,380*** | ***$3,365,756*** | ***$3,215,756*** | ***$4,816,881*** | ***$5,571,131*** | ***$4,598,546*** | ***$4,616,796*** | ***$6,355,421*** | ***$5,235,596*** | ***$3,448,196*** | ***$3,448,196*** |
| | | | | | | | | | | | | | | | | | | | | | | |
| **RECYCLED WATER PROGRAM** | | | | | | | $33,215,097 | | | $61,165,871 | | | | $25,958,774 | | | | | | | | |
| | Encina Secondary Effluent PS Rehab Project | $370,000 | | | $370,000 | | | | | | | | | | | | | | | | | |
| | General Encina Secondary Improvements (Ie | $1,131,333 | $0 | $0 | $98,333 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $54,000 | $54,000 | $54,000 | $54,000 | $54,000 | $79,000 | $79,000 | $79,000 | $79,000 | $79,000 | $99,000 | $99,000 |
| 0367 | B1 Force Main - North Section Repla. | $440,000 | | $440,000 | | | | | | | | | | | | | | | | | | |
| 0360 | Gafner AWT Improv. | $758,200 | $758,200 | | | | | | | | | | | | | | | | | | | |
| | Gafner AWT Improvements (Phase 2) | $1,221,100 | | | | | | $1,221,100 | | | | | | | | | | | | | | |
| | General Gafner Improvements | $2,348,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $54,000 | $54,000 | $54,000 | $54,000 | $54,000 | $322,000 | $322,000 | $322,000 | $322,000 | $322,000 | $234,000 | $234,000 |
| 0328 | North SD Water Reuse Coalition Project | $109,100 | $109,100 | | | | | | | | | | | | | | | | | | | |
| | B1 Force Main Final Replacement | $2,164,573 | | | | | $2,164,573 | | | | $100,000 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| ***Total Recycled Water Program*** | | ***$8,542,306*** | ***$867,300*** | ***$440,000*** | ***$468,333*** | ***$34,000*** | ***$2,198,573*** | ***$1,255,100*** | ***$34,000*** | ***$34,000*** | ***$208,000*** | ***$108,000*** | ***$108,000*** | ***$108,000*** | ***$108,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$333,000*** | ***$333,000*** |
| **DISTRICT TOTAL CIP EXPENSES** | | **$117,006,929** | **$9,923,242** | **$7,050,082** | **$7,711,517** | **$6,815,638** | **$8,111,254** | **$9,856,316** | **$6,872,679** | **$5,114,883** | **$4,020,666** | **$3,963,380** | **$3,473,756** | **$3,323,756** | **$4,924,881** | **$5,972,131** | **$4,999,546** | **$5,017,796** | **$6,756,421** | **$5,636,596** | **$3,781,196** | **$3,781,196** |

*Since the projects were complete as of the AMP completion, the FY18 costs are actual costs (versus planning costs) for the FY16 Gravity PL, VP5 PS, and L1 West FM projects.

OPTIONAL PROJECTS - Not included in "District Total CIP Expenses"

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Drainage Basin #11 VCP Line/Replace | | | | | | | | | | | | $0 | $0 | $0 | | | | | | | |
| | Island Area Implementation - Eolus North | $1,577,250 | | | | $1,577,250 | | | | | | | | | | | | | | | | |
| | Island Area Implementation - Eolus/Glaucus | $1,163,250 | | | | | $1,163,250 | | | | | | | | | | | | | | | |
| | Island Area Implementation - Naiad | $721,800 | | | | | | $721,800 | | | | | | | | | | | | | | |
| | No. SD County Regional RW Project | $4,410,990 | | $392,040 | | | | $1,944,000 | $2,074,950 | | | | | | | | | | | | | |

# CHAPTER 1

## INTRODUCTION

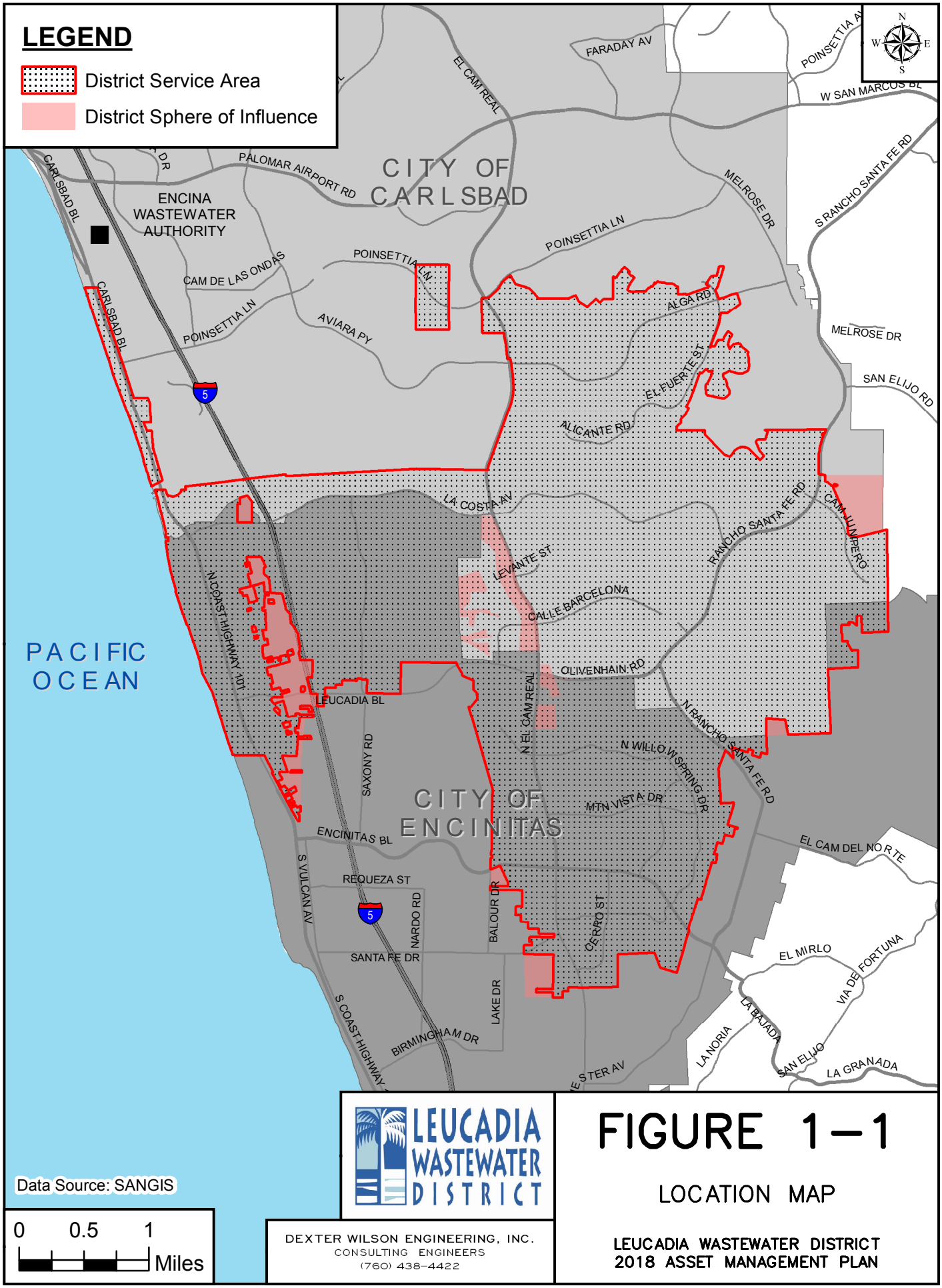
The Leucadia Wastewater District (District) is located in northern, coastal, San Diego County, and is a special district that provide wastewater and recycled water services to portions of the cities of Encinitas and Carlsbad as shown in Figure 1-1.

The District's wastewater collection system consists of over 200 miles of gravity sewer and ten lift stations; wastewater treatment is provided by the Encina Wastewater Authority, of which the District is a member agency. Recycled water is produced by the District's Gafner Water Reclamation Plant for distribution to the South La Costa Golf Course.

## BACKGROUND

The preparation of a master plan for a growing agency is typically driven by the parallel need to apply sound methodology to a financial plan for improvements driven by anticipated future development, in addition to replacement of existing infrastructure due to capacity or condition. In the District's case, with the vast majority of development complete and minor growth anticipated due to accessory dwelling units, the approach to a master plan shifted focus to primarily a replacement-based approach.

To that end, in 2008, the District worked with Dexter Wilson Engineering, Inc. to develop a methodology to forecast where improvements would be required, published as the Asset Management Master Plan. In the case of pipelines and manholes, the District's largest asset classes, this meant development of a predictive failure model whereby each pipeline was assigned a set of criteria based on its installation environment (soils, slope, depth), criticality, and age, to guide the District to locations for detailed inspection. Closed-circuit television (CCTV) analyses were conducted on those locations identified as most likely to have an issue, and then planned for replacement or repair as necessary. A similar approach, on a broader level, was developed for pump stations; the history of major pump station components led to development of detailed inspections, and ultimately planned improvements.


LEGEND
District Service Area
District Sphere of Influence
CITY OF CARLSBAD
ENCINA WASTEWATER AUTHORITY
CITY OF ENCINITAS
PACIFIC OCEAN
FARADAY AV
EL CAM REAL
POINSETTIA AV
W SAN MARCOS BL
PALOMAR AIRPORT RD
CARLSBAD BL
CAM DE LAS ONDAS
POINSETTIA LN
AVIARA PY
MELROSE DR
S RANCHO SANTA FE RD
ALGA RD
EL FUERTE ST
SAN ELIJO RD
ALICANTE RD
LA COSTA AV
RANCHO SANTA FE RD
CAMINO DEL NORTE
LEVANTE ST
CALLE BARCELONA
OLIVENHAIN RD
N COAST HIGHWAY 101
LEUCADIA BL
SAXONY RD
N EL CAM REAL
N WILLOWSPRING DR
N RANCHO SANTA FE RD
MTN VISTA DR
ENCINITAS BL
S VULCAN AV
REQUEZA ST
NARDO RD
BALOUR DR
CERRO ST
EL CAM DEL NORTE
SANTA FE DR
LAKE DR
S COAST HIGHWAY
BIRMINGHAM DR
EL MIRLO
VIA DE FORTUNA
LA BAJADA
LA NORIA
SAN ELIJO
LA GRANADA
Data Source: SANGIS
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DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422
LEUCADIA WASTEWATER DISTRICT
FIGURE 1-1
LOCATION MAP
LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN
DEXTER WILSON ENGINEERING INC.
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The Asset Management Plan was revised in 2013 to capture the results of the asset inspections which occurred during the prior five years. In 2011 the District began to shift its primary focus of gravity pipeline maintenance from hydrocleaning to CCTV Inspection. In 2012 the District purchased a CCTV Truck, adding a second CCTV Inspection vehicle to its fleet, to increase the amount of CCTV Inspections performed.

At the time the 2013 document was being developed, the District was, on average, CCTV inspecting 10 percent of the District on an annual basis. Presently, in the previous two fiscal years 2016 and 2017, the District has CCTV inspected approximately 50 percent of its gravity sewers each year, exceeding the District's Sewer System Management Plan (SSMP) CCTV goal of 33 percent per year.

The proficiency and expediency, of the inspections, however, is just one piece of the puzzle. In tandem with the collection of the condition data is the internal procedure to document the asset that requires repair, maintain an accurate and prioritized list of repairs, and fund budgets which allow the execution of these repairs through a capital improvement project. As a result, the District developed the Repair Priority List and its corresponding procedure. The District is continually updating and improving these elements of the planning process with each project, as well as through the annual audit of its SSMP.

## PURPOSE

The purpose of this 2018 update is three fold, consisting of:

1. Capturing the District's progress in the management of its wastewater and recycled water infrastructure assets since 2013,

2. Providing recommendations to the asset assessment/replacement cycle by asset class, and

3. Developing an updated 5-Year and 20-Year CIP based on:
    a. Infrastructure condition assessments, and
    b. Capacity assessment. Note that although the District is largely developed, recent state legislation and local ordinances have been adopted to ease the administrative and financial burden to single family home owners to add accessory dwelling units to their parcels. As such, an update to the District's projection of buildout Equivalent Dwelling Units (EDUs) is warranted. The buildout projections, and anticipated generation rates, are then utilized to evaluate long-term capacity needs in the gravity system as well as the pump station infrastructure.

## ORGANIZATION

Chapter 2 of the document provides a detailed description of the District's asset categories. Chapter 3 reviews the distribution of existing dwelling units within the District, and the wastewater flow generation rates within the various meter basins across the District, and the District as a whole. Chapter 4 then presents the development of the Ultimate Buildout EDU projections for the District in consideration of the land use agencies' plans and recent legislation at the State and local level to encourage Accessory Dwelling Units. With Buildout projections of EDUs, hydraulic analyses are developed to identify the need for long-term capacity-based replacement projects.

Chapter 5 focuses on the District's most significant asset classes from a quantity and value perspective – pipelines and manholes. The chapter describes the evolution of the management of these asset classes, identifies CIP projects, and provides recommendations for the future. Chapters 6 and 7 present a similar analysis for pump stations and force mains, respectively. Chapter 8 focuses on facilities which are jointly-owned with other agencies. Chapter 9 summarizes the District's ownership in the Encina Water Pollution Control Facility. The aforementioned assets comprise the District's Wastewater Program.

Chapter 10 focuses on the District's Recycled Water Program.

The anticipated capital expenditures across all the asset classes are summarized in Chapter 11 with presentation of the recommended 5 Year and 20 Year CIP plan.

# CHAPTER 2

## EXISTING SYSTEM DESCRIPTION

The District sewerage system contains over 200 miles of pipelines, 10 pump stations, a water reclamation plant, and two treatment plants. The District collection system is split into 11 drainage basins. Figure 2-1 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.

# LEGEND

- District Service Area
- District Sphere of Influence

**Existing Drainage Basin**

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- Flows out of District

**Facilities**

- Gravity Sewer
- Pump Station
- Force Main

PACIFIC OCEAN

CITY OF CARLSBAD

CITY OF ENCINITAS

CITY OF SAN MARC

COUNTY OF SAN DIEGO

COUNTY OF

SAXONY

BATIQUITOS

LA COSTA

LEUCADIA

AVOCADO

DIANA

ISLAND AREA

OPEN SPACE

RANCHO VERDE

VILLAGE PARK 7

VILLAGE PARK 5

ENCINITAS ESTATES

MOONLIGHT BEACH (ENCINITAS)

PASEO DEL NORTE

POINSETTIA LN

AVIARA PY

AVNDA ENCINAS

CARLSBAD BL

ALGA RD

MELROSE DR

RANCHO SANTA FE RD

SAN ELIJO RD

EL FUERTE ST

ALICANTE RD

EL CAMINO REAL

LA COSTA AV

CAMINO JUNIPERO

LEUCADIA BL

SAXONY RD

CALLE BARCELONA

OLIVENHAIN RD

GARDEN VIEW RD

N WILLOW SPRING DR

MTN VISTA DR

VILLAGE FARM DR

N COAST HIGHWAY 101

ENCINITAS BL

REQUEZA ST

S VULCAN AV

S COAST HIGHWAY 101

SANTA FE DR

NARDO RD

MACKINNON AV

BIRMINGHAM DR

LAKE DR

BALOUR DR

CERRO ST

N RANCHO SANTA FE RD

EL CAM DEL NORTE

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LEUCADIA WASTEWATER DISTRICT

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

# FIGURE 2–1

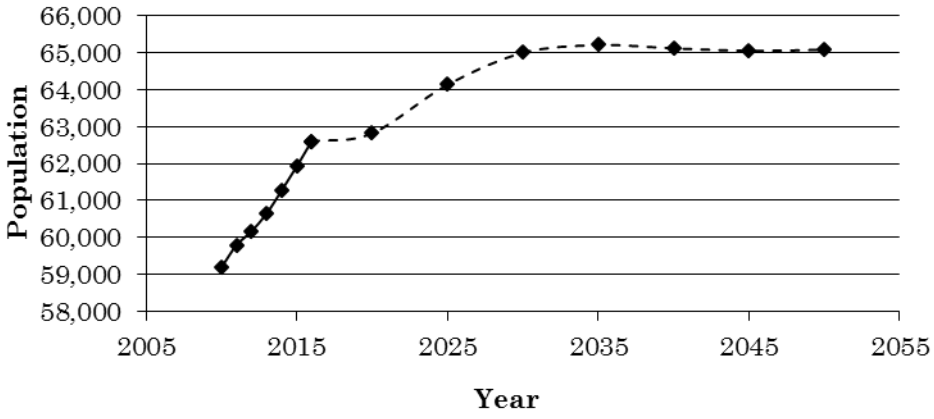
EXISTING COLLECTION SYSTEM AND DRAINAGE BASINS

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

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 62,607 as of 2016 (provided by the San Diego Association of Governments, SANDAG). SANDAG also provided an estimate of population growth within the District from their Series 13 Forecast (2012 base year). SANDAG projects a 2050 population of 65,095, this is a 6.35% decrease from the Series 12 Forecast 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.




## EQUIVALENT DWELLING UNITS

As of August 2017, there are 28,477 equivalent dwelling units within the District. These EDUs are split between the two cities, with 14,192 within the City of Carlsbad and 14,285 within the City of Encinitas.

Table 2-1 summarizes the number of existing EDUs by drainage basin.

**TABLE 2-1**
**LWD EDUs DRAINAGE BASIN**

| Drainage Basin | Connected EDUs |
|---|---|
| 1 | 2,325.65 |
| 2 | 526.29 |
| 3 | 1,153.7 |
| 4 | 1,267.88 |
| 5 | 1,085.78 |
| 6 | 2,047.6 |
| 7 | 1,995.98 |
| 8 | 4,325.1 |
| 9 | 5,706.23 |
| 10 | 3,492.41 |
| 11 | 4,550.45 |
| **TOTAL** | **28,477.07** |

## 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.

### 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. A small portion of this basin, located north of Grandview Street, does not flow to Avocado Pump Station, but rather gravity flows to North Coast Highway 101 by way of Moorgate Road.

**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 Avenue. 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.

## 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 2-2 provides a summary of the length of pipeline by size in the District. Table 2-3 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 2-2**
**SUMMARY OF GRAVITY SEWER PIPING BY DIAMETER**

| Pipe Diameter, inch | Pipe Length, Feet |
|---|---|
| 6 | 9,459 |
| 8 | 897,902 |
| 9 | 92 |
| 10 | 31,300 |
| 12 | 29,602 |
| 14 | 1,088 |
| 15 | 24,979 |
| 16 | 1,208 |
| 18 | 13,520 |
| 20 | 378 |
| 21 | 5,323 |
| 24 | 1,748 |
| 30 | 777 |
| Unknown | 3,158 |
| **TOTAL** | **1,020,534** |

Excludes Lanikai and Occidental Lines
Source: 11-21-17 District GIS

**TABLE 2-3**
**SUMMARY OF GRAVITY SEWER PIPING BY MATERIAL**

| Pipe Material | Pipe Length, Feet |
|---|---|
| ACP | 2,024 |
| CIP | 561 |
| DIP | 279 |
| HDPE | 125 |
| PVC | 571,529 |
| VCP | 44,940 |
| PVC/VCP | 612 |
| Unknown | 4,464 |
| **TOTAL** | **1,020,534** |

Excludes Lanikai and Occidental Lines
Source: 11-21-17 District GIS

## MANHOLES

There are approximately 4,733 manholes in the gravity sewer system and 390 cleanouts. The vast majority of the manholes are constructed of precast concrete sections. According to the District's GIS database provided to DWEI in September 2017, 268 of the District's 4,733 manholes are lined with a protective coating to prevent concrete corrosion, 4,465 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. Three of these are prefabricated Smith and Loveless package stations. All of the pump stations are described below. Table 2-4 contains a summary of the pump stations' operational characteristics; descriptions of each pump station and its service area are provided in the sections following.

**TABLE 2-4**
**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 | Station improved and pumps replaced in 2013 |
| 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 2014 |
| Leucadia | 4 | 4,880 | Variable | 1974 | Station improved & pumps replaced in 2006 |
| Rancho Verde | 2 | 185 | Constant | 1996 | - |
| Saxony | 2 | 900 | Constant | 1962 | Rebuilt in 2016, except for force main |
| Village Park 5 | 2 | 215 | Constant | 1974 | Station replaced in 2017 with submersible station |
| Village Park 7 | 2 | 200 | Constant | 1973 | - |

[1] Pump capacities represent nameplate information.

## Avocado Pump Station

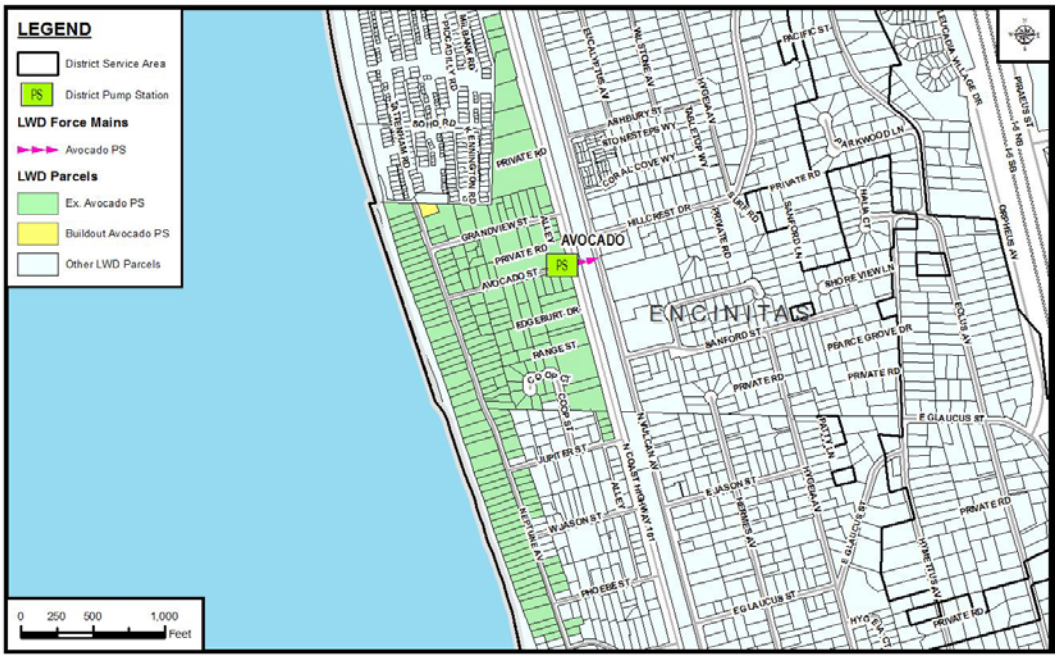



**FIGURE 2-2. AVOCADO PUMP STATION BASIN**

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

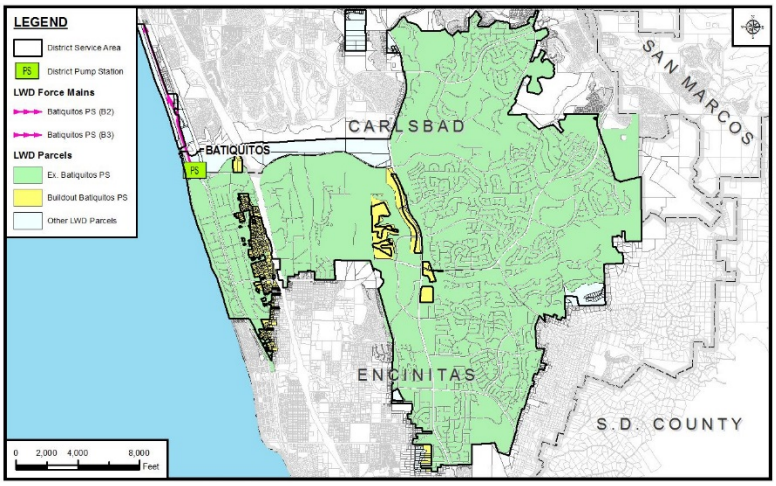



**FIGURE 2-3. BATIQUITOS PUMP STATION BASIN**

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, if needed. 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. This station also has an emergency diesel generator that can run the station for approximately 20 hours.

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, 2005, and 2013. The 2013 rehabilitation project cleaned grit and debris from the wet well, repaired the wet well linings, cored two openings to connect the east and west wet well sections, replaced three of four pumps (at the existing capacity), improved pump station bypass piping, and completed other miscellaneous improvements.

## Diana Pump Station

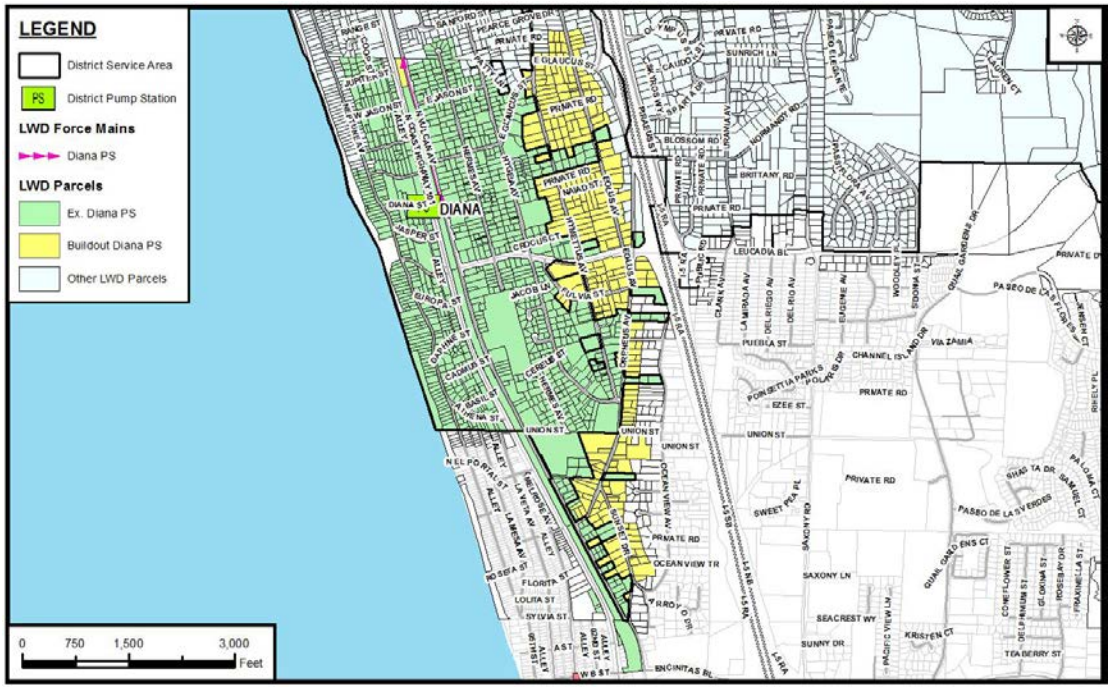



**FIGURE 2-4. DIANA PUMP STATION BASIN**

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

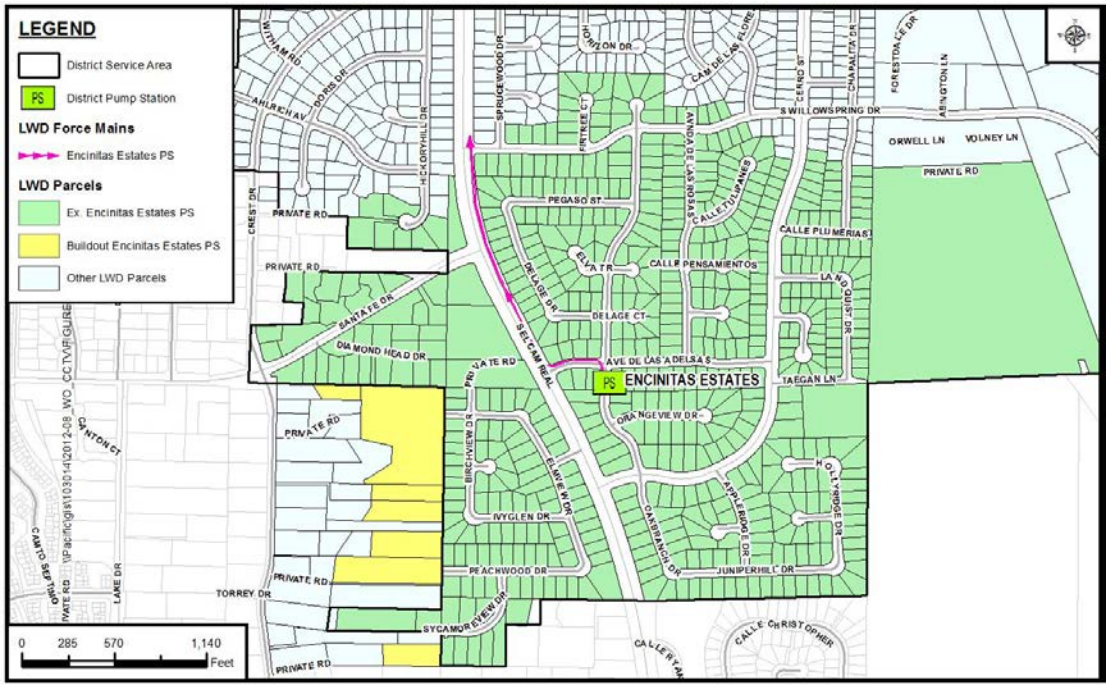



**FIGURE 2-5. ENCINITAS ESTATES PUMP STATION BASIN**

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. There is also an emergency natural gas generator onsite. The station is located at 2501 Oak Branch Drive in the southern portion of the District's service area.

## La Costa Pump Station


**FIGURE 2-6. LA COSTA PUMP STATION BASIN**

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. The station also has an emergency generator onsite that can run the station for approximately 17 hours.

Improvements to this pump station were completed in 2014. The improvements included 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

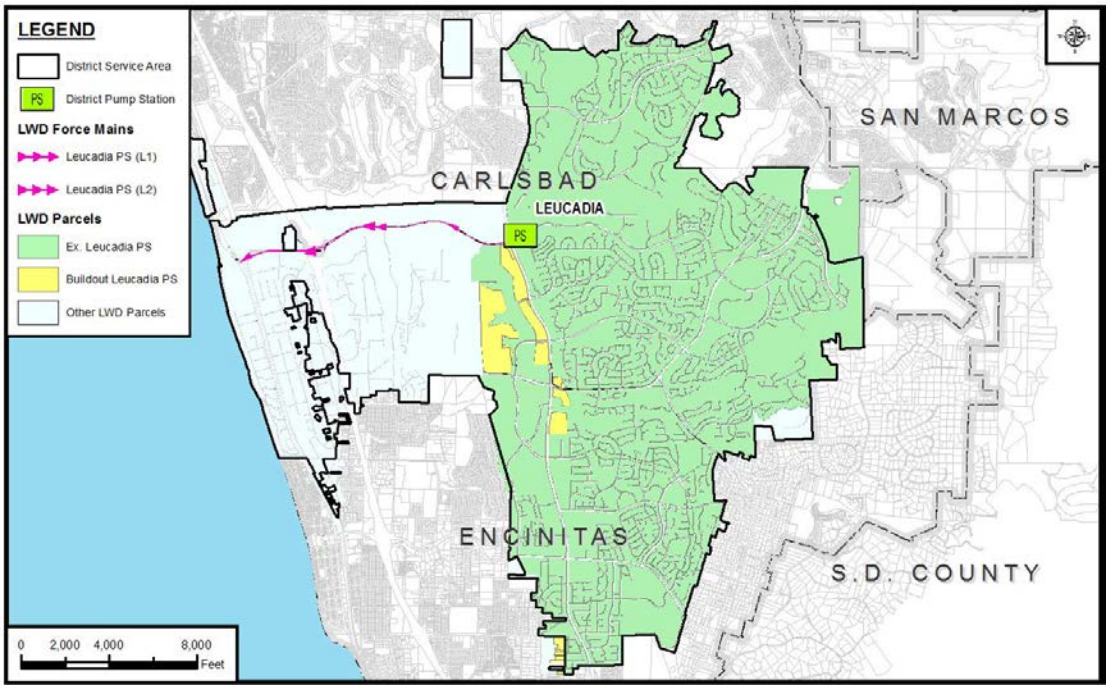



**FIGURE 2-7. LEUCADIA PUMP STATION BASIN**

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. In 2013, the District also added an emergency power generator at the Leucadia pump station. The District recently completed a Preliminary Design Report and is transitioning into the final design phase of a pump station rehabilitation project. It is anticipated that project construction will be in early 2019.

## Rancho Verde Pump Station

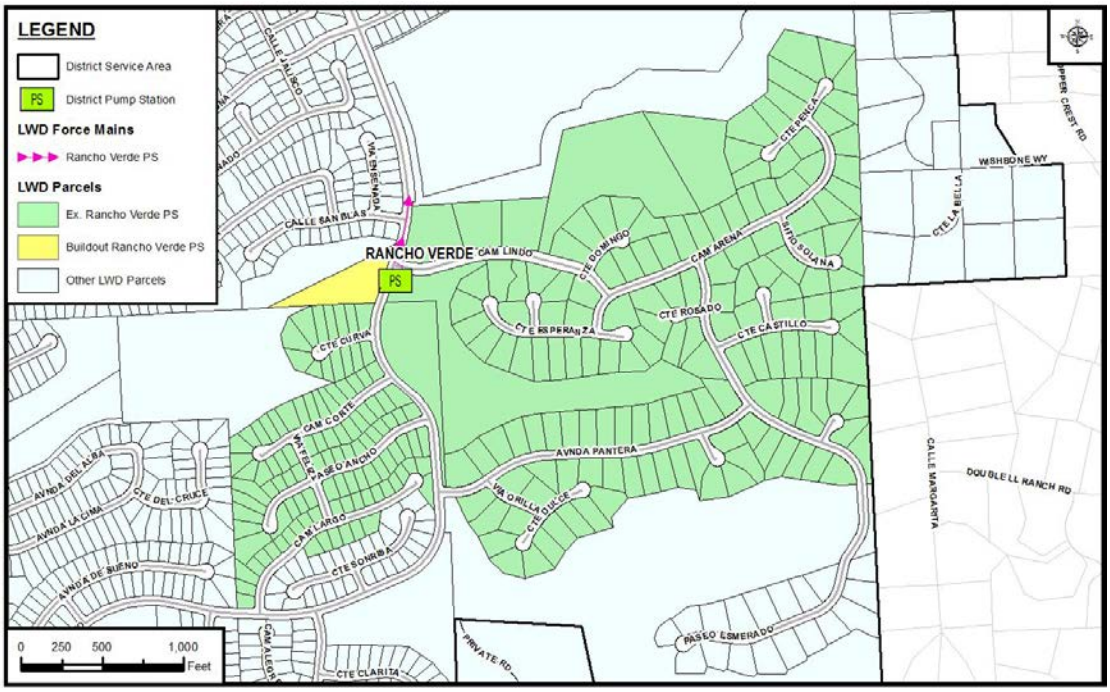



**FIGURE 2-8. RANCHO VERDE PUMP STATION BASIN**

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 185 gallons per minute. Each of the pumps has a 5 horsepower motor. The station is located at the corner of Camino Lindo and Calle Acervo.

## Saxony Pump Station

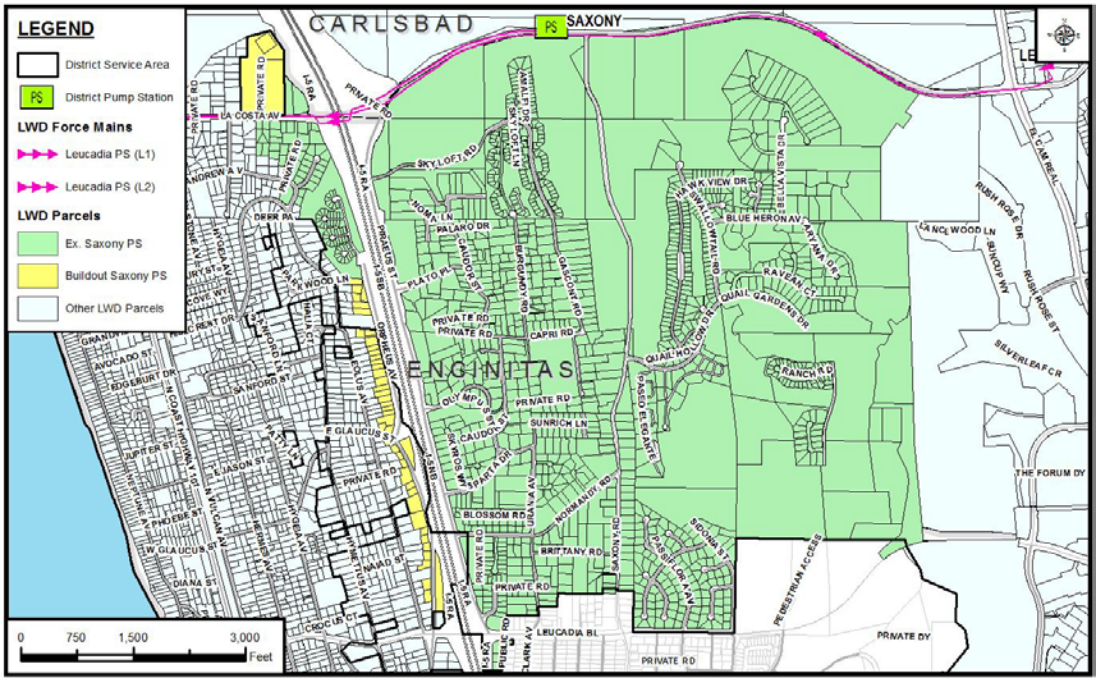



**FIGURE 2-9. SAXONY PUMP STATION BASIN**

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 station has an emergency diesel generator that can run the station for approximately 30 hours. In 2016, a rehabilitation project was completed at the station which replaced both submersible pumps, completed some electrical upgrades, replaced valve vault piping, and other miscellaneous improvements. 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

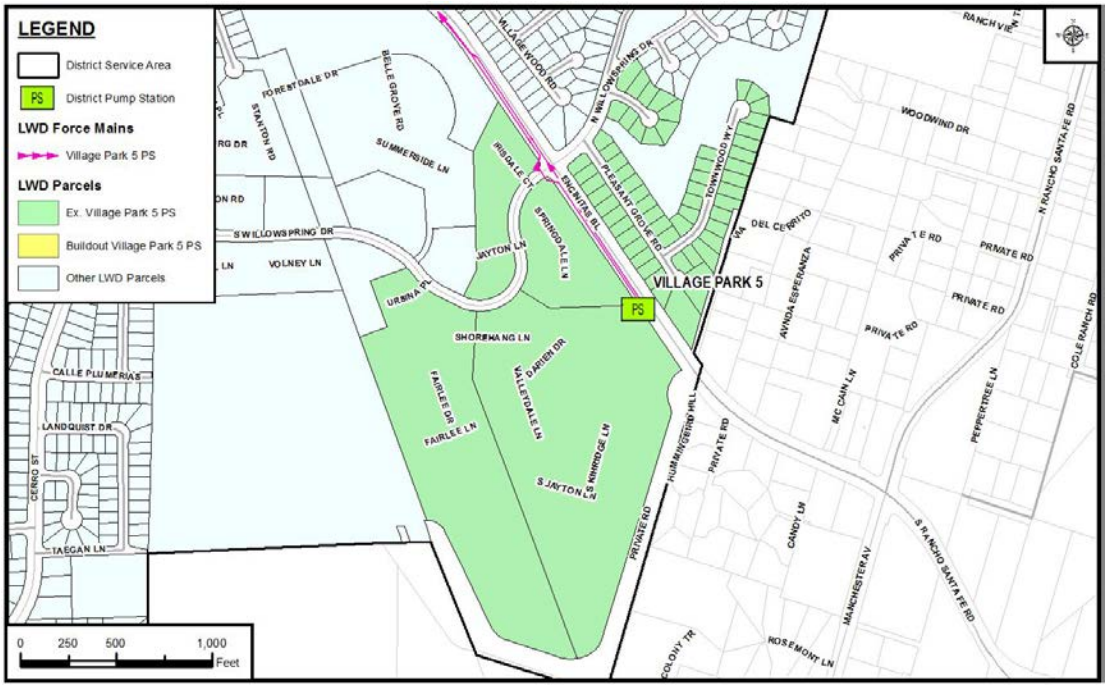



**FIGURE 2-10. VILLAGE PARK 5 PUMP STATION BASIN**

The Village Park #5 Pump Station was a Smith and Loveless package station built in 1974. In 2017, the entire station was replaced with a submersible station. The pump station contains two pumps, duty and standby, each of which has a capacity of 215 gallons per minute. Each of the pumps is driven by a 11-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. There is also an emergency generator onsite that can power the station for approximately 20 hours. The station is located on Encinitas Boulevard south of the intersection of Willow Springs Drive.

## Village Park 7 Pump Station

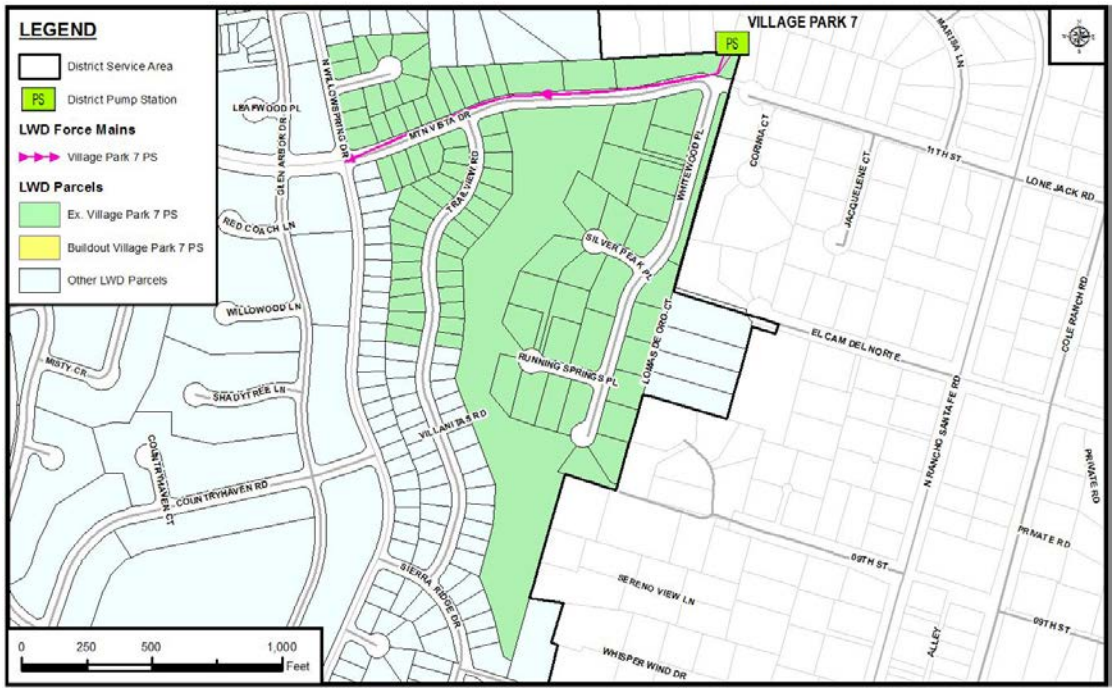



**FIGURE 2-11. VILLAGE PARK 7 PUMP STATION BASIN**

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 2-5 contains a summary of the force main characteristics.

**TABLE 2-5**
**SUMMARY OF DISTRICT FORCE MAIN CHARACTERISTICS**

| Force Main | Diameter, inches | Length, feet | Material | Discharge Manhole | Year Installed |
|---|---|---|---|---|---|
| Avocado | 6 | 275 | Original: AC (PVC-lined)<br>Parallel: PVC | 03-0130 | Original: 1962 (2010)<br>Parallel: 2010 |
| Batiquitos, B2<br>Batiquitos, B3 | 24<br>24 | 10,240<br>10,134 | PVC<br>DIP | LKT-1000<br>LKT-2000 | 1996/2011/2015<br>1988/1996/2011 |
| Diana | 10 | 2,300 | Parallel: PVC (2250' Paralleled | 03-0105 | 2010 |
| Encinitas Estates | 6 | 2,230 | PVC | 05-9080 | 2010 |
| La Costa | 10<br>12 | 1,127 | Original*: CIP/PVC<br>Parallel: PVC/HDPE | 10-0128 | Original: 1965/76<br>Parallel: 1998 |
| Leucadia, L1<br>Leucadia, L2 | 24<br>24 | 13,989<br>14,000 | DIP/PVC<br>PVC/DIP/HDPE | 03-0980<br>03-0992 | 1979/98/01/17<br>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 2-6 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 2-6**
**JOINT CONVEYANCE FACILITIES OWNERSHIP**

| Facility | District Ownership, Percent |
|---|---|
| Batiquitos Influent Sewer | 77.86 |
| Batiquitos Pump Station<br>- Pump Station<br>- Generator<br>- 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 flows west to east, starting 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 Encinitas and the District. The District 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. Carlsbad is responsible for inspecting and maintaining the Occidental Truck Line and the associated manholes.

## 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 16.80 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 2-7 summarizes the District's treatment facilities.

**TABLE 2-7**
**SUMMARY OF TREATMENT PLANT CAPACITY**

| Plant | Ownership, percent | Capacity |
|---|---|---|
| Gafner | 100 | 1.0 mgd (tertiary only) |
| Encina | 16.80 (Unit I liquid)<br>16.42 (Unit J outfall, Unit I solids) | 7.11 mgd<br>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. A portion of secondary effluent is pumped back to the District for treatment to a tertiary level at the Gafner WRP for recycled water use.

## 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 South 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 constructed in 2010.

# CHAPTER 3

## EXISTING EDU AND FLOW EVALUATION

This chapter presents an overview of the number of EDUs the District presently serves and also discusses historical flow patterns within the District. Chapter 4 describes the projection of buildout EDUs within the District and discusses buildout flows. All instances of "year" in this chapter refer to calendar year unless otherwise specified.

## EXISTING EDUs

Table 3-1 provides a summary of existing EDUs as of August 2017 and also provides the existing EDU count at the time of the 2013 Asset Management Plan. The comparison is provided to show changes within each of the drainage basins. Existing EDU figures are current as of August 2017.

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 in the 2013 Asset Management Plan provided a detailed compilation of the agreements and detachments; Appendix A of this 2018 Master Plan provides updates and potential changes since 2013.

**TABLE 3-1**
**COMPARISON OF EXISTING EDU**
**BY DRAINAGE BASIN**

| Description | 2013 Master Plan Existing EDUs[1] | 2018 Master Plan Existing EDUs[2] |
|---|---|---|
| Drainage Basin #1 | 2,274 | 2,326 |
| Drainage Basin #2 | 847 | 526 |
| Drainage Basin #3 | 751 | 1,154 |
| Drainage Basin #4 | 1,196 | 1,268 |
| Drainage Basin #5 | 1,128 | 1,086 |
| Drainage Basin #6 | 2,106 | 2,048 |
| Drainage Basin #7 | 1,811 | 1,996 |
| Drainage Basin #8 | 3,996 | 4,325 |
| Drainage Basin #9 | 5,489 | 5,706 |
| Drainage Basin #10 | 3,530 | 3,492 |
| Drainage Basin #11 | 4,672 | 4,550 |
| **SYSTEM TOTAL** | **27,799** | **28,477** |

[1] As of December 2011 as provided by District staff.
[2] As of August 2017 as provided by District staff.

## HISTORIC FLOWS

The following section presents an analysis of historic average and peak flows.

### Average Flows

Table 3-2 presents historic flows over the last ten years. Figure 3-1 shows historic flows dating back to 1997 (the detailed data to generate this figure can be found in Appendix B). 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, an average generation rate of 203 gallons per day per EDU.

It is also of interest to note that in 2014 the average yearly flow fell below 4 mgd for the first time since 1999.

### Peak Flows

In addition to average flows, Table 3-2 and Figure 3-1 also present the District-only peak flows and rainfall measured in each month from January 2008 to June 2017. Additional historic flow data dating back to 1997 can be found in Appendix B. The following was observed from this data regarding peak flows:

- 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 1.74 based on the monthly peak dry flow from days without a wet weather event.

- Measured peaks are greater in wet years than in dry years.

- The highest hourly peak from data back to 1997 was 13.215 mgd and occurred in January 2005. The ratio of this peak to average measured flow was 2.84. The next highest hourly peak was 9.940 mgd and occurred in February 2017. The ratio of this peak to average measured flow was 2.49 (note that December 2014 had a slightly greater ratio at 2.51).

- 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 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 next highest 15-minute peak was in December 2014 and was 11.194 mgd. The ratio of this peak flow to the average measured flow was 2.89.

**TABLE 3-2**
**HISTORIC FLOW DATA**

| Month/Year | Rainfall, Inches Per Month | Average Daily Flow, mgd [1] | 15 Minute Peak Flow, mgd | Ratio, 15 Min. to Avg. | 1 Hour Peak Flow, mgd | Ratio, 1 Hour to Avg. |
|---|---|---|---|---|---|---|
| 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 |
| 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 |

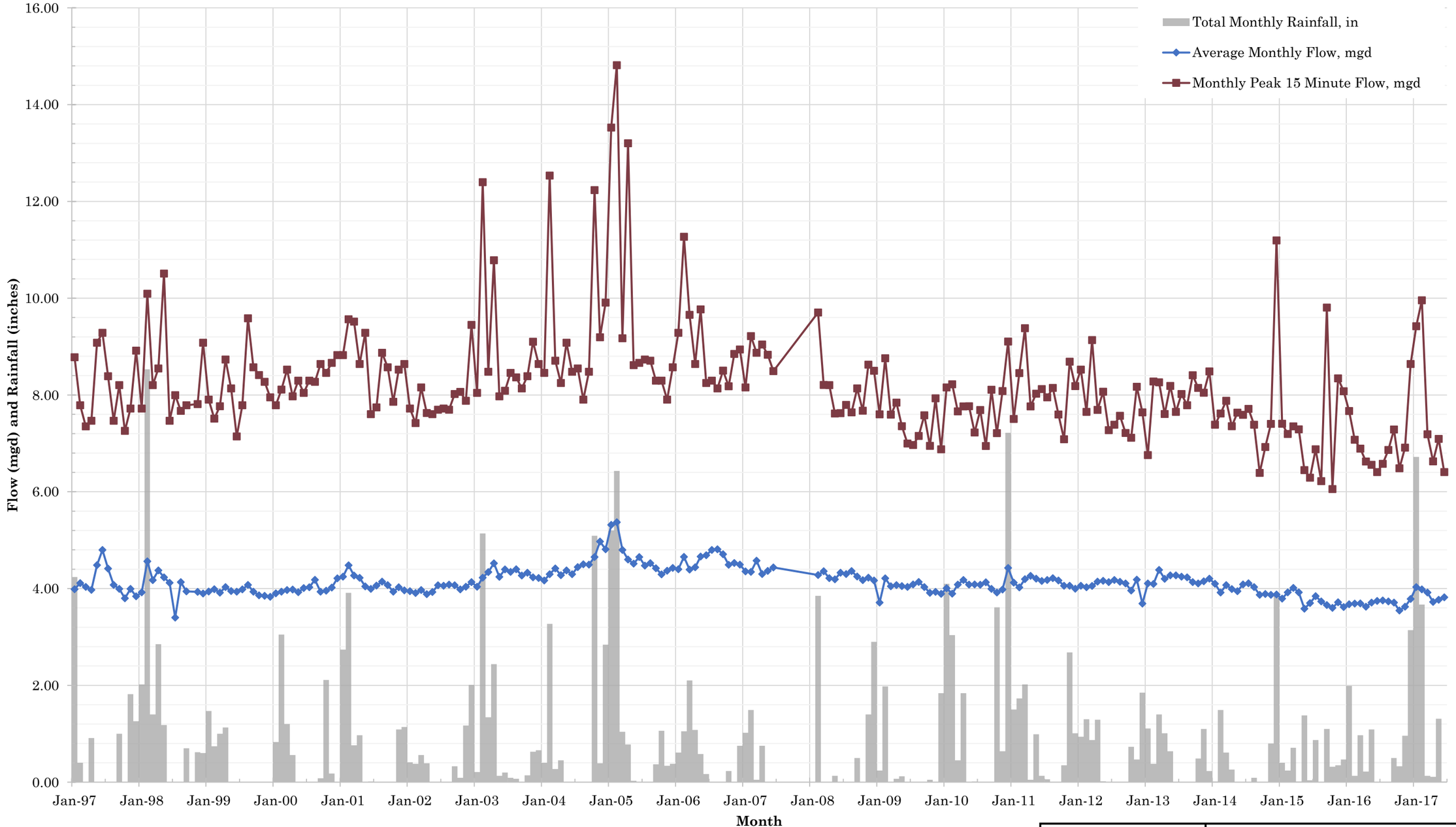
**TABLE 3-2**
**HISTORIC FLOW DATA**

| Month/Year | Rainfall, Inches Per Month | Average Daily Flow, mgd [1] | 15 Minute Peak Flow, mgd | Ratio, 15 Min. to Avg. | 1 Hour Peak Flow, mgd | Ratio, 1 Hour to Avg. |
|---|---|---|---|---|---|---|
| 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 |
| Jul-12 | 0.00 | 4.176 | 7.385 | 1.77 | 6.977 | 1.67 |
| Aug-12 | 0.00 | 4.139 | 7.57 | 1.83 | 7.072 | 1.71 |
| Sep-12 | 0.00 | 4.107 | 7.216 | 1.76 | 6.925 | 1.69 |
| Oct-12 | 0.73 | 3.958 | 7.118 | 1.80 | 6.609 | 1.67 |
| Nov-12 | 0.47 | 4.186 | 8.171 | 1.95 | 7.604 | 1.82 |
| Dec-12 | 1.85 | 3.691 | 7.642 | 2.07 | 7.291 | 1.98 |
| *Yearly Average Daily Flow* | | **4.070** | | | | |
| Jan-13 | 1.11 | 4.106 | 6.76 | 1.65 | 6.465 | 1.57 |
| Feb-13 | 0.38 | 4.096 | 8.28 | 2.02 | 7.186 | 1.75 |
| Mar-13 | 1.40 | 4.385 | 8.261 | 1.88 | 7.474 | 1.70 |
| Apr-13 | 1.01 | 4.203 | 7.607 | 1.81 | 7.207 | 1.71 |
| May-13 | 0.64 | 4.274 | 8.188 | 1.92 | 7.522 | 1.76 |
| Jun-13 | 0.00 | 4.272 | 7.65 | 1.79 | 7.147 | 1.67 |
| Jul-13 | 0.00 | 4.245 | 8.021 | 1.89 | 7.29 | 1.72 |
| Aug-13 | 0.00 | 4.231 | 7.788 | 1.84 | 7.335 | 1.73 |
| Sep-13 | 0.00 | 4.132 | 8.407 | 2.03 | 7.785 | 1.88 |
| Oct-13 | 0.49 | 4.107 | 8.147 | 1.98 | 7.129 | 1.74 |
| Nov-13 | 1.10 | 4.15 | 8.047 | 1.94 | 7.605 | 1.83 |
| Dec-13 | 0.23 | 4.206 | 8.487 | 2.02 | 7.528 | 1.79 |
| *Yearly Average Daily Flow* | | **4.201** | | | | |
| Jan-14 | 0.01 | 4.1 | 7.387 | 1.80 | 7.02 | 1.71 |
| Feb-14 | 1.49 | 3.919 | 7.617 | 1.94 | 6.966 | 1.78 |
| Mar-14 | 0.61 | 4.071 | 7.88 | 1.94 | 6.899 | 1.69 |
| Apr-14 | 0.26 | 3.989 | 7.354 | 1.84 | 7.032 | 1.76 |
| May-14 | 0.00 | 3.945 | 7.634 | 1.94 | 6.955 | 1.76 |
| Jun-14 | 0.00 | 4.084 | 7.59 | 1.86 | 6.867 | 1.68 |
| Jul-14 | 0.00 | 4.11 | 7.714 | 1.88 | 6.816 | 1.66 |
| Aug-14 | 0.09 | 4.032 | 7.387 | 1.83 | 6.888 | 1.71 |
| Sep-14 | 0.00 | 3.871 | 6.39 | 1.65 | 6.955 | 1.80 |
| Oct-14 | 0.00 | 3.888 | 6.927 | 1.78 | 6.738 | 1.73 |
| Nov-14 | 0.80 | 3.872 | 7.404 | 1.91 | 6.906 | 1.78 |
| Dec-14 | 3.90 | 3.878 | 11.194 | 2.89 | 9.746 | 2.51 |
| *Yearly Average Daily Flow* | | **3.980** | | | | |

**TABLE 3-2**
**HISTORIC FLOW DATA**

| Month/Year | Rainfall, Inches Per Month | Average Daily Flow, mgd [1] | 15 Minute Peak Flow, mgd | Ratio, 15 Min. to Avg. | 1 Hour Peak Flow, mgd | Ratio, 1 Hour to Avg. |
|---|---|---|---|---|---|---|
| Jan-15 | 0.40 | 3.794 | 7.407 | 1.95 | 6.811 | 1.80 |
| Feb-15 | 0.24 | 3.923 | 7.194 | 1.83 | 6.96 | 1.77 |
| Mar-15 | 0.71 | 4.015 | 7.35 | 1.83 | 6.745 | 1.68 |
| Apr-15 | 0.01 | 3.923 | 7.29 | 1.86 | 7.005 | 1.79 |
| May-15 | 1.38 | 3.585 | 6.447 | 1.80 | 6.395 | 1.78 |
| Jun-15 | 0.04 | 3.7 | 6.29 | 1.70 | 6.005 | 1.62 |
| Jul-15 | 0.87 | 3.844 | 6.877 | 1.79 | 6.376 | 1.66 |
| Aug-15 | 0.00 | 3.734 | 6.22 | 1.67 | 5.98 | 1.60 |
| Sep-15 | 1.10 | 3.661 | 9.807 | 2.68 | 8.39 | 2.29 |
| Oct-15 | 0.32 | 3.603 | 6.057 | 1.68 | 5.859 | 1.63 |
| Nov-15 | 0.35 | 3.719 | 8.344 | 2.24 | 7.46 | 2.01 |
| Dec-15 | 0.47 | 3.618 | 8.077 | 2.23 | 7.32 | 2.02 |
| *Yearly Average Daily Flow* | | **3.760** | | | | |
| Jan-16 | 1.99 | 3.677 | 7.667 | 2.09 | 6.639 | 1.81 |
| Feb-16 | 0.13 | 3.691 | 7.077 | 1.92 | 6.56 | 1.78 |
| Mar-16 | 0.97 | 3.694 | 6.89 | 1.87 | 6.535 | 1.77 |
| Apr-16 | 0.22 | 3.627 | 6.626 | 1.83 | 6.312 | 1.74 |
| May-16 | 1.09 | 3.71 | 6.557 | 1.77 | 6.302 | 1.70 |
| Jun-16 | 0.00 | 3.745 | 6.406 | 1.71 | 6.379 | 1.70 |
| Jul-16 | 0.00 | 3.754 | 6.579 | 1.75 | 6.14 | 1.64 |
| Aug-16 | 0.00 | 3.736 | 6.865 | 1.84 | 6.251 | 1.67 |
| Sep-16 | 0.50 | 3.712 | 7.287 | 1.96 | 6.553 | 1.77 |
| Oct-16 | 0.33 | 3.547 | 6.484 | 1.83 | 5.97 | 1.68 |
| Nov-16 | 0.96 | 3.625 | 6.913 | 1.91 | 6.73 | 1.86 |
| Dec-16 | 3.14 | 3.785 | 8.641 | 2.28 | 8.254 | 2.18 |
| *Yearly Average Daily Flow* | | **3.692** | | | | |
| Jan-17 | 6.72 | 4.032 | 9.421 | 2.34 | 8.752 | 2.17 |
| Feb-17 | 3.67 | 3.984 | 9.956 | 2.50 | 9.940 | 2.49 |
| Mar-17 | 0.13 | 3.92 | 7.189 | 1.83 | 6.799 | 1.73 |
| Apr-17 | 0.11 | 3.723 | 6.628 | 1.78 | 6.278 | 1.69 |
| May-17 | 1.31 | 3.769 | 7.091 | 1.88 | 6.477 | 1.72 |
| Jun-17 | 0.01 | 3.82 | 6.407 | 1.68 | 6.188 | 1.62 |
| *Yearly Average Daily Flow* | | **3.779** | | | | |

[1] As calculated from the District Batiquitos flow meter minus an average of the Encinitas Moonlight meter.




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 Oceanside Marina

LEUCADIA WASTEWATER DISTRICT

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# FIGURE 3-1

DISTRICT FLOWS FROM JANUARY 1997 TO JUNE 2017

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

## ANALYSIS OF EXISTING DISTRICT FLOWS

The District's standard generation rate is 215 gallons per day per EDU (gpd/EDU) as established in the 1994 Planning Study Update (April 1995, Parsons Engineering Science, Inc., Section 3, pg. 3-1.)

Table 3-3 presents the average gpd/EDU across the District in comparison to the gpd/EDU calculated in the 2013 and 2008 planning efforts highlight the decrease in generation rates over the last 10 years.

**TABLE 3-3**
**GENERATION RATE CALCULATIONS**
**2018 AMP GENERATION RATE, YEAR 2016**

| Parameter | Value |
|---|---|
| Average Flow, Year 2016 | 3.692 mgd |
| Total EDUs Connected, Year 2016 | 28,477 EDUs |
| Average Flow per EDU, Year 2016 | 129 gpd/EDU |
| **2012 AMP, 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 |
| **2008 AMMP, 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 |

### Analysis of Infiltration Rates

This section presents a comparison of inflow and infiltration rates within the preceding 10 years. December 2014 is the month with the highest peak 15-minute flow. The average flow for December 2014 was 3.878 mgd. Based on an estimated contribution during dry weather flow of 129 gallons per day per EDU, the estimated dry weather flow for this month would have been 3.665 mgd. Thus, in this peak monthly period, approximately 0.213 mgd of infiltration and inflow was received. The estimated inflow and infiltration rate over the peak hour was 3.563 mgd. The estimated 15 minute inflow and infiltration rate was 4.817 mgd. These numbers

do not seem excessive for a wastewater system the size of the District, however efforts should continue to be made to minimize inflow and infiltration as much as possible. Table 3-4 presents the calculation steps of the above.

In comparison, the inflow and infiltration rates evaluated in the last asset management plan (Table 3-5) are lower. The phenomenon of higher inflow and infiltration rates at lower flows is common across collection systems.

**TABLE 3-4**
**ANALYSIS OF WET WEATHER FLOW FOR DECEMBER 2014**

| Parameter | Value |
|---|---|
| Average Flow, December 2014 | 3.878 mgd |
| EDUs, December 2014 | 28,409 EDUs |
| Flow per EDU for December 2014 | 136 gpd/EDU |
| Sewage Flow Based on 129 gpd/EDU | 3.665 mgd |
| *Estimated Average Infiltration and Inflow for December 2014* | *0.213 mgd* |
| Peak Measured 15-minute Flow, December 2014 | 11.194 mgd |
| Estimated Peak Dry Weather Flow Based on 129 gpd/EDU | 6.377 mgd |
| *Estimated Peak 15-minute Infiltration and Inflow* | *4.817 mgd* |
| Peak Measured 1 Hour Flow (Maximum recorded Feb. 2017) | 9.940 mgd |
| *Estimated Peak 1 Hour Infiltration and Inflow* | *3.563 mgd* |

**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* | *0.138 mgd* |
| Peak Measured 15 minute Flow, February 2008 | 9.705 mgd |
| Estimated Peak Dry Weather Flow Based on 149 gpd/EDU | 7.414 mgd |
| *Estimated Peak 15 minute Infiltration and Inflow* | *2.291 mgd* |
| Peak Measured 1 Hour Flow (Maximum recorded Dec. 2010) | 8.981 mgd |
| *Estimated Peak 1 Hour Infiltration and Inflow* | *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.

**Analysis of Peak Factors**

The trend of greater peaking at lower flows can also be seen in a comparison of peaking factors themselves. Table 3-6 and 3-7 present an analysis of peaking factors illustrating that although flows have decreased, peaking factors have increased.

**TABLE 3-6**
**ANALYSIS OF PEAK HOUR PEAKING FACTORS,**
**2017 RAIN EVENT**

| Parameter | Value |
|---|---|
| Measured Peak 1 Hour Flow for February 2017 | 9.940 mgd |
| Estimated February 2017 Flow Based on 129 gpd/EDU | 3.687 mgd |
| Peaking Factor Based on 129 gpd/EDU | 2.70 |
| Estimated February 2017 Flow Based on 215 gpd/EDU | 6.146 mgd |
| Peaking Factor Based on 215 gpd/EDU | 1.62 |

**TABLE 3-7**
**ANALYSIS OF PEAK HOUR PEAKING FACTORS,**
**2010 RAIN EVENT**

| 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.

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.

Part of the work associated with development of this document included confirmation of the count of EDUs within each drainage basin and submeter basin. Table 3-8 provides a flow summary of each meter basin. The gpd/EDU projections are based on the EDU count as of August 2017 which provides a fair approximation of generation within each meter basin and fair comparison amongst the meter basins.

From discussions with District staff, there are concerns as to the accuracy of the L07 meter. This meter is located on the discharge piping of the La Costa Pump Station in close proximity to the pumps. The meter should be relocated.

## SUBMETER TRENDS

Figure 3-3 and Table 3-8 illustrate that the gpd/EDU for the area tributary to meters L01, L02, L04, and L06 exceed the current District average 129 gpd/EDU, while basins L03, L05, and L07 are less. As Figure 3-2 shows, the District's submeters are located at key points throughout the service area. Meter L01 serves the Old Leucadia area which is a mix of residential and commercial customers. This area is known to have a higher gpd/EDU because of the aging infrastructure present and root intrusion. Meter L02 and L03 serve predominantly residential areas that contribute to the North and South Green Valley Interceptors. Immediately upstream of Meter L02 is the Scott's Valley Pipeline which was recently lined by the District in order to reduce inflow and infiltration within the basin. The submeter basin served by Meter L05 contains the L02 and L03 basins as well as several commercial customers on the west side of El Camino Real. Meter L04 and L07 are located on the Saxony and La Costa Pump Station force main discharges, respectively.

## LEGEND

District Service Area

**Meter Sub-Basin**

- 1
- 2
- 3
- 4
- 5
- 6
- 7

**Facilities**

- Gravity Sewer
- Pump Station
- Force Main

**Metered Locations**

- Meter Sub-Basins

PACIFIC OCEAN

CITY OF CARLSBAD

CITY OF ENCINITAS

CITY OF SAN MARC

COUNTY OF SAN DIEGO

COUNTY OF

Data Source: SANGIS, LWWD

0 0.5 1 2 Miles

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LEUCADIA WASTEWATER DISTRICT

# FIGURE 3-2

EXISTING
SUB-METER BASINS

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

Date Saved: 5/14/2018 10:54:22 AM
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DEXTER WILSON ENGINEERING INC.

**FIGURE 3-3**
**LEUCADIA WASTEWATER DISTRICT SUBMETER gpd/EDU FROM FY09-FY17**

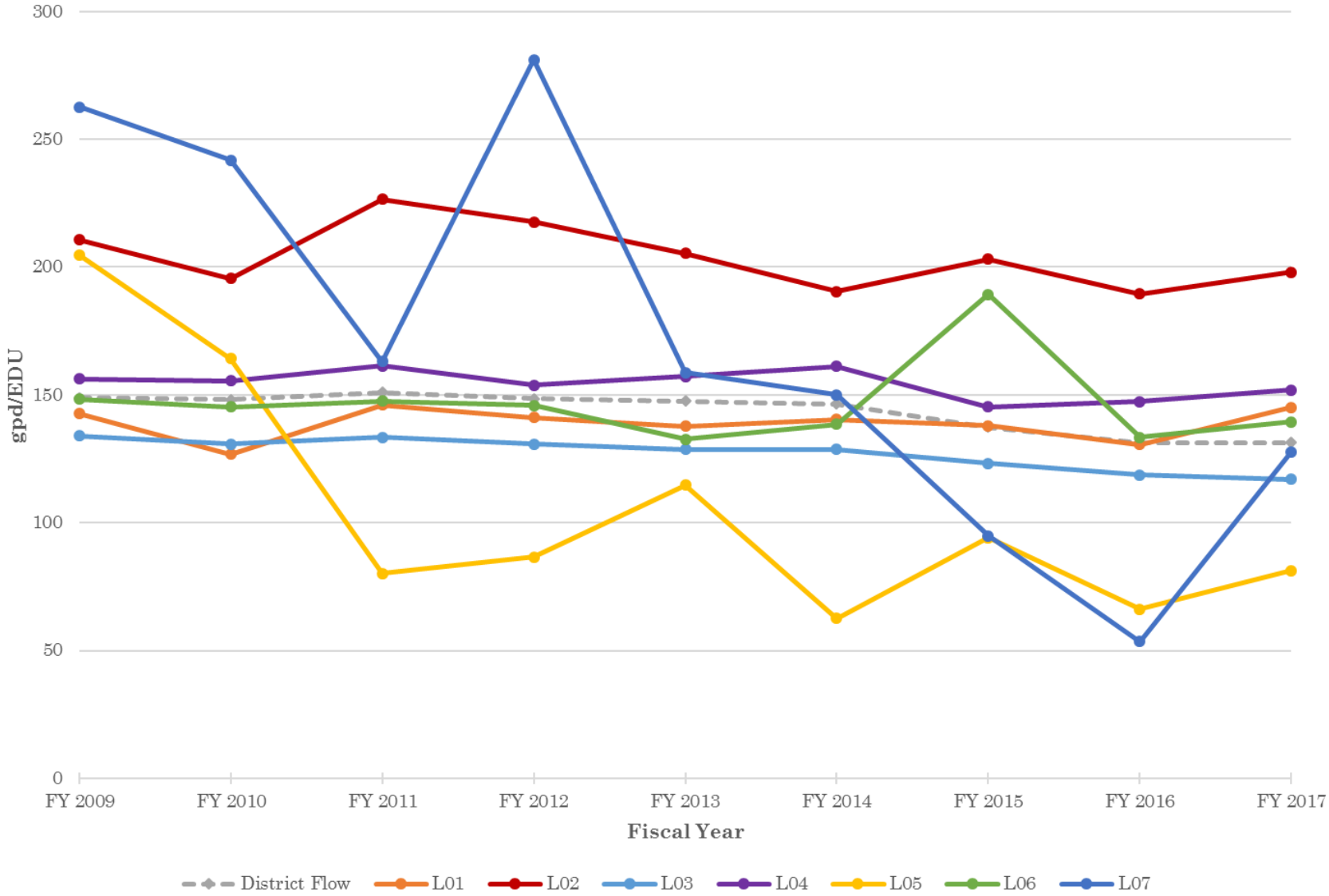

**TABLE 3-8**
**EXISTING SUBMETER GPD/EDU FLOW DATA FOR FY17**

| | District Flow | L01 | L02 | L03 | L04 | L05 [1] | L06 [2] | L07 [2] |
|---|---|---|---|---|---|---|---|---|
| | Bat - E1M | Old Leucadia | Rancho Santa Fe | Village Park | La Costa East | N Grn Vly | Saxony | La Costa |
| Existing EDUs | 28,477 | 3,797 | 4,325 | 8,243 | 3,377 | 2,610 | 1,268 | 4,550 |
| Annual Average Flow, mgd | 3.740 | 0.580 | 0.860 | 0.969 | 0.515 | 0.213 | 0.178 | 0.584 |
| gpd/EDU | 131 | 153 | 199 | 117 | 153 | 82 | 140 | 128 |
| Peak Hour Flow, mgd | 9.940 | 1.856 | 2.042 | 2.401 | 1.605 | -- | 0.762 | 1.975 |
| Peaking Factor | 2.66 | 3.20 | 2.37 | 2.48 | 3.11 | -- | 4.29 | 3.38 |
| Peak 15 min Flow, mgd | 9.956 | 1.908 | 2.063 | 2.915 | 1.677 | -- | 0.799 | 1.980 |
| Peaking Factor | 2.66 | 3.29 | 2.40 | 3.01 | 3.25 | -- | 4.50 | 3.39 |

[1] L05 herein is a calculation based on ADS meter flow L05 minus L02 minus L03, because of this it was excluded from the peak flow analysis. It should be noted that the remaining EDUs in L5 are mostly commercial.
[2] L06 and L07 are meters located on pump station discharge piping.

Table 3-8 also analyzes the peak flow for FY17. The peak flows for this fiscal year occurred in February 2017 which, as previously mentioned, was a design event for the District as a whole, but was also a design event for several of the District's submeters. Table 3-9 analyzes the December 2014 event which was also a design event for some of the District's submeters.

Table 3-10 provides the average annual flow from 2008 through 2017 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. Detailed monthly flow information for each submeter can be found in Appendix C.

**TABLE 3-9**
**EXISTING SUBMETER PEAK FLOW DATA FOR DECEMBER 2014 EVENT**

| | District Flow | L01 | L02 | L03 | L04 | L05 [1] | L06 [2] | L07 [2] |
|---|---|---|---|---|---|---|---|---|
| | Bat - E1M | Old Leucadia | Rancho Santa Fe | Village Park | La Costa East | N Grn Vly | Saxony | La Costa |
| Annual Average Flow, mgd | 3.910 | 0.551 | 0.881 | 1.018 | 0.492 | 0.247 | 0.241 | 0.433 |
| Peak Hour Flow, mgd | 9.746 | 1.610 | 1.808 | 1.971 | 1.200 | -- | 0.899 | 1.623 |
| Peaking Factor | 2.49 | 2.92 | 2.05 | 1.94 | 2.44 | -- | 3.74 | 3.75 |
| Peak 15 min Flow, mgd | 11.194 | 1.875 | 1.679 | 2.103 | 1.460 | -- | 0.868 | 1.910 |
| Peaking Factor | 2.86 | 3.40 | 1.91 | 2.07 | 2.97 | -- | 3.61 | 4.41 |

[1] L05 herein is a calculation based on ADS meter flow L05 minus L02 minus L03 , because of this it was excluded from the peak flow analysis. It should be noted that the remaining EDUs in L5 are mostly commercial.
[2] L06 and L07 are meters located on pump station discharge piping.

**TABLE 3-10**
**ANNUAL AVERAGE SUBMETER FLOW DATA, 2008 – 2017**

| 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 | 1.11 | 5.20 | 4.09 | 0.55 | 0.88 | 1.07 | 0.51 | 0.52 | 0.18 | 1.16 | 4.87 | 19.12 |
| Avg 7/09-6/10 | 1.03 | 5.11 | 4.08 | 0.49 | 0.82 | 1.05 | 0.51 | 0.42 | 0.18 | 1.07 | 4.45 | 9.12 |
| Avg 7/10-6/11 | 1.04 | 5.22 | 4.18 | 0.57 | 0.96 | 1.07 | 0.53 | 0.20 | 0.18 | 0.72 | 4.24 | 1.48 |
| Avg 7/11-6/12 | 1.07 | 5.19 | 4.12 | 0.55 | 0.92 | 1.05 | 0.51 | 0.22 | 0.18 | 1.25 | 4.68 | 13.71 |
| Avg 7/12-6/13 | 1.06 | 5.16 | 4.10 | 0.54 | 0.87 | 1.04 | 0.52 | 0.29 | 0.16 | 0.71 | 4.14 | 0.85 |
| Avg 7/13-6/14 | 1.02 | 5.10 | 4.08 | 0.55 | 0.81 | 1.04 | 0.53 | 0.16 | 0.17 | 0.67 | 3.94 | -3.48 |
| Avg 7/14-6/15 | 0.98 | 4.89 | 3.91 | 0.55 | 0.88 | 1.02 | 0.49 | 0.25 | 0.24 | 0.43 | 3.82 | -2.07 |
| Avg 7/15-6/16 | 0.95 | 4.70 | 3.75 | 0.52 | 0.83 | 0.98 | 0.50 | 0.17 | 0.17 | 0.25 | 3.35 | -10.58 |
| Avg 7/16-6/17 | 0.95 | 4.69 | 3.74 | 0.58 | 0.86 | 0.97 | 0.52 | 0.21 | 0.18 | 0.58 | 3.90 | 4.25 |
| Standard Deviation | 0.05 | 0.18 | 0.14 | 0.02 | 0.05 | 0.03 | 0.01 | 0.13 | 0.02 | 0.35 | 0.49 | 9.15 |

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

## 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 December 2014 to February 2017 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 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 District to accommodate higher peaks than were analyzed and provide a factor of safety for the analyses in this report.

6. Revise EDU by sub-metered area in the Board Operations packet to reflect the current count of EDUs per basin.

7. 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.

8. Relocate District meter L07 as it is too close to the pump station discharge. This could occur as part of the Leucadia Pump Station Rehabilitation Project or as a stand-alone project.

# CHAPTER 4

## BUILDOUT EDU AND FLOW PROJECTIONS

Buildout EDU projections for the District were last prepared as part of the 1999 Wastewater Master Plan. Subsequent master plans have relied on these projections as the District has historically been approximately 92% built out. In recent years, commercial development, particularly in The Old Leucadia area, has increased. Additionally, recent State legislation has been passed to encourage residential densification through the addition of accessory dwelling units. As such, revision of the buildout EDU projections for the District is warranted at this time.

In addition to describing the methodology to develop the buildout EDU projections, this chapter discusses the corresponding impact to projected buildout wastewater flows within the District.

## BUILDOUT EDUs

The process to generate the anticipated additional EDUs within the District boundary are comprised of two different methodologies based on the planning activities of the two land planning agencies within the District: City of Carlsbad and City of Encinitas. The approach was further refined based on whether the projections were for residential parcels, non-residential parcels, or for accessory dwelling units. The ultimate buildout year is assumed to be 2050. Additional documentation on the buildout EDU projection approach can be found in Appendix D.

Table 4-1 presents the projection of ultimate EDUs by drainage basin.

**TABLE 4-1**
**PROJECTION OF BUILDOUT**
**EDUS BY DRAINAGE BASIN**

| Description | Buildout EDUs |
|---|---|
| Drainage Basin #1 | 2,801 |
| Drainage Basin #2 | 629 |
| Drainage Basin #3 | 1,822 |
| Drainage Basin #4 | 1,648 |
| Drainage Basin #5 | 1,252 |
| Drainage Basin #6 | 2,187 |
| Drainage Basin #7 | 2,115 |
| Drainage Basin #8 | 4,669 |
| Drainage Basin #9 | 6,201 |
| Drainage Basin #10 | 4,030 |
| Drainage Basin #11 | 4,620 |
| **SYSTEM TOTAL** | **31,974** |

**Residential Land Use EDU Projections – City of Carlsbad**

The City of Carlsbad provided their database of housing projections within the District service area based on the City's 2015 General Plan and development updates since its adoption. The database provided a parcel by parcel projection of the number of residential housing units anticipated. In conformance with the District's Ordinance 135, each new residential unit was assigned 1.0 EDU.

**Residential Land Use EDU Projections – City of Encinitas**

Projections of residential units within the City of Encinitas were based on the San Diego Association of Governments (SANDAG) Series 13 Growth Forecast. This forecast has a base year of 2012 and the forecast (i.e., buildout) year of 2050. The forecast projects the number and type (single-family versus multi-family) of residential units anticipated across the City. Unit counts were adjusted based on District staff input to account for development which has occurred since the base year of 2012. In conformance with the District's Ordinance 135, each new residential unit was assigned 1.0 EDU.

**Non-Residential Land Use EDU Projections – City of Carlsbad**

City of Carlsbad planning staff provided a list of non-residential parcels within the District boundary which are either vacant or anticipated to redevelop within the buildout timeframe. The list of parcels and their associated EDUs are provided in the Buildout EDU Appendix D.

**Non-Residential Land Use EDU Projections – City of Encinitas**

The SANDAG growth projections identify (on a parcel by parcel basis) land use changes, development of vacant parcels, and redevelopment of parcels as part of the forecast effort. This allows for the population, employment, and housing projections which SANDAG is tasked with developing. While the forecasts project a specific number of residential units, they do not project the square footage of non-residential development or redevelopment within a parcel that would allow a seamless estimate of EDUs. As such, to develop the non-residential buildout EDUs for (1) vacant parcels, a City-wide (District portion only) average of non-residential EDUs per acre was utilized and for (2) non-residential infill areas, the existing EDUs were increased by 20%.

**Accessory Dwelling Units**

Common to both jurisdictions is the recent State legislation which provides homeowners with greater flexibility to build an accessory dwelling unit. Cities are not required to adopt ordinances (the State legislation would govern); however, the legislation does allow for some discretion on the land use agency's part and thus city ordinances may follow.

Accessory dwelling units generally occur in one of three ways: as a detached unit, an attached unit, or repurposed existing space (e.g., garage conversion or bedroom conversion). For the purposes of this master plan, the addition of a detached accessory dwelling unit would impact the number of EDUs within a parcel, whereas the addition of attached square footage to an existing residence or the conversion of existing space would not. It is assumed that the additional flow generated by an accessory dwelling unit of the attached unit-type or space conversion-type would be captured within the conservative flow generation factor for each existing EDU within the District. The following sections summarize the approach for stand-alone accessory dwelling units which is detailed further in Appendix D.

**City of Carlsbad Approach**

The City of Carlsbad adopted an accessory dwelling unit ordinance that went into effect in the fall of 2017. The ordinance limits the size of accessory dwelling units to 640 square feet (sf). Based on the number of permits that have been processed historically and input from City Planning staff, 320 stand-alone accessory dwelling units are projected at buildout. Because City ordinance limits the size to 640 sf, each accessory dwelling unit was assigned 0.5 EDUs. As such, 160 EDUs from accessory dwelling units are projected at buildout within the City of Carlsbad area of the District.

**City of Encinitas Approach**

The City of Encinitas is in the process of drafting an accessory dwelling unit ordinance and is looking for the addition of accessory units to fill a portion of its housing needs. It is anticipated that the ordinance will not reduce the 1,200 sf size currently in place with the State legislation. Additionally, the ordinance may allow for adjustments to lot requirements to further the construction of accessory dwelling units. Based on the number of permits requested in recent years, and conversations with City Planning staff, 689 accessory dwelling units are projected at buildout. Each unit was assigned 1.0 EDU. As such, 689 EDUs from accessory dwelling units are projected at buildout within the City of Encinitas area of the District.

## COMPARISON TO HISTORIC PROJECTIONS

The last projection of buildout EDUs was prepared as part of the 1999 Wastewater Master Plan. Table 4-2 shows the existing and buildout counts in comparison to the existing and buildout EDU counts developed as part of this 2018 AMP.

For reference, 42 percent of the District's existing EDUs are within the City of Carlsbad and 58 percent are within the City of Encinitas. Additionally, District drainage basins within the City of Carlsbad are 10 and 11. District drainage basins within the City of Encinitas are 1-7. Drainage Basins 8 and 9 are partially within each city.

**TABLE 4-2**
**SUMMARY OF EDU GROWTH PROJECTIONS**
**BY DRAINAGE BASIN**

| Description | 2013 Master Plan | | 2018 Master Plan | |
|---|---|---|---|---|
| | Existing EDUs[1] | Ultimate EDUs[2] | Existing EDUs[3] | Ultimate EDUs |
| Drainage Basin #1 | 2,274 | 2,556 | 2,326 | 2,801 |
| Drainage Basin #2 | 847 | 959 | 526 | 629 |
| Drainage Basin #3 | 751 | 1,088 | 1,154 | 1,822 |
| Drainage Basin #4 | 1,196 | 1,578 | 1,268 | 1,648 |
| Drainage Basin #5 | 1,128 | 1,151 | 1,086 | 1,252 |
| Drainage Basin #6 | 2,106 | 2,072 | 2,048 | 2,187 |
| Drainage Basin #7 | 1,811 | 2,012 | 1,996 | 2,115 |
| Drainage Basin #8 | 3,996 | 4,690 | 4,325 | 4,669 |
| Drainage Basin #9 | 5,489 | 5,588 | 5,706 | 6,201 |
| Drainage Basin #10 | 3,530 | 3,582 | 3,492 | 4,030 |
| Drainage Basin #11 | 4,672 | 4,769 | 4,550 | 4,620 |
| **SYSTEM TOTAL** | **27,799** | **30,045** | **28,477** | **31,974** |

[1] As of December 2011 as provided by operations staff.
[2] Source: 2008 AMMP.
[3] As of October 2017 based on the District GIS database.

## ANALYSIS OF DISTRICT FLOWS

Table 4-3 provides flow projections for the District based on the ultimate EDUs shown in Table 4-1. 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 FY17 and the approximate number of EDUs connected to the system at that time.

As shown in Table 4-3, a design factor of 215 gallons per EDU per day leads to an ultimate District average flow of 6.87 mgd which is greater than the ultimate average flow of 6.5 mgd estimated in the 1999 Wastewater Master Plan and less than the 1985 Planning Study projection of 9.6 mgd. Based on 129 gpd/EDU obtained from the Year 2017 flow and EDU data, the ultimate District average flow would be 4.12 mgd.

**TABLE 4-3**
**2018 AMP COMPARISON OF FLOW PROJECTIONS, YEAR 2017**

| Parameter | Value |
|---|---|
| Average Flow, Year 2017 | 3.678 mgd |
| Total EDUs Connected, Year 2017 | 28,477 EDUs |
| Average Flow per EDU, Year 2017 | 129 gpd/EDU |
| Buildout EDUs | 31,974 EDUs |
| Buildout Flow Based on 129 gpd/EDU | 4.12 mgd average |
| Buildout Flow Based on 215 gpd/EDU | 6.87 mgd average |

Tables 4-4 and 4-5 provide the same evaluation for historical comparison, highlighting the average gpd/EDU since 2008 has decreased from 169 to 149 to 129 gpd/EDU. The most recent flows in the 2017-2018 time frame are averaging approximately 133 gpd/EDU.

For the purposes of this Master Plan, the buildout flow for the District is projected to be 4.7 mgd, based on 133 gpd/EDU and a 10% safety factor.

**TABLE 4-4**
**2013 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 4-5**
**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 |

## HYDRAULIC MODEL ANALYSIS OF BUILDOUT FLOWS

Long-term pipeline model capacity evaluations developed using InfoSewer modeling software are based on measured flows and attenuated pump flows to better model actual conditions. Based on these conditions, there are no pipeline capacity projects recommended.

### Survey of Manhole Invert Elevations

It is recommended that the District (or its contractor) survey the inverts of the existing manholes in its system to help verify the District's current sewer model. As previously noted, the District has pipelines that range in age from new to over 50 years old. A common issue for sewer systems that have been built over many decades is that the datum for surveying inverts changes over time leading to model inaccuracies. Surveying the manhole inverts will help validate the Districts current model and improve the accuracy of future hydraulic modeling.

# CHAPTER 5

## GRAVITY SEWER PIPELINES AND MANHOLES

Gravity sewers and manholes represent the most substantial portion of the District's infrastructure from a quantity and value perspective. This chapter will describe how the District presently manages these asset classes and will provide short-term (5-Year) and long-term (20-Year) CIP recommendations and cost estimates. Historically, these two assets have been presented separately; however, the procedures by which the assets are evaluated and prioritized are nearly identical.

## ASSET MANAGEMENT OVERVIEW

Over the last ten years, the District has invested significant time and resources into identifying those facilities in most need of repair by systemically inspecting each gravity sewer pipeline utilizing closed circuit television (CCTV) equipment. At the time the 2013 AMP was developed, approximately 50% of the system had been CCTV inspected within the previous 5 years. In comparison, the available CCTV work for this Asset Management Plan is more comprehensive as 99% of the District has been CCTV inspected within the last three years (with the majority in the last two). Figure 5-1, from the District's Sewer System Management Plan (SSMP), illustrates this fact. CCTV not only provides a baseline visual condition assessment of the entire gravity system, but it also identifies issues to be repaired.

## MANHOLES

Manholes are addressed in the same manner as pipelines since they are visually inspected during hydrocleaning and CCTV activities. They are then added to the Repair Priority List following the process of the Rating Repair Lines/Manholes SOP.

## LEGEND

- District Service Area
- District Sphere of Influence

**CCTV Gravity Sewer**

**Inspection by Date**

- July 2016 - June 2017
- July 2015 - June 2016
- July 2014 - June 2015
- July 2013 - June 2014
- 5 Years Since CCTV

PACIFIC OCEAN

CITY OF CARLSBAD

CITY OF ENCINITAS

CITY OF SAN MARC

COUNTY OF SAN DIEGO

Data Source: SANGIS, LWWD

0 0.5 1 2 Miles

# FIGURE 5-1

GRAVITY SEWER
CCTV COMPLETIONS
AS OF JUNE 2017

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

DEXTER WILSON ENGINEERING INC.
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## ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

Activities related to the District's management of gravity sewers can be classified into general activities (such as changes in operations) and specific activities (such as CIP projects); significant updates to each are discussed below. The most significant of these activities since the last asset management plan update is the implementation of the Repair Priority List.

### General Activities

- Leading up to, and since, the 2013 AMP, the District has visually inspected its manholes on an annual basis.

- As of July 2013, 268 of the District's 4,733 manholes have been lined with a protective coating (e.g., Sancon, epoxy, T-lock, etc.) to prevent concrete corrosion. Lining 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. Some existing manholes were lined after their installation by the District to combat corrosion, inflow, and/or infiltration.

- Since the 2013 AMP, the District has completed its evaluation of VCP and PVC pipelines with concrete cradles. Areas with concrete pipe cradles have shown a higher number of incidence where they needed repair. All the areas have been CCTV inspected, addressed as necessary, and will continue to be addressed as part of the CCTV/Repair Priority List approach.

- Scale in the Alga Hills area of the District (Drainage Basin #11) was discovered in 2002. CCTV inspections show that while scale is scattered throughout the Alga Hills area, it is concentrated around Luciernaga Street, Corintia Street, and Unicornio Street. The majority of these sewer mains were installed in the early 1970's. The District-continues to address the scale impacted areas by following a six-month schedule of hydro cleaning and CCTV inspections. Use of specialized cleaning heads has been sufficient to manage the reoccurring scale.

- As part of the 2013 AMP, all the District's Special Maintenance Areas (SMAs) were reviewed to determine if either (1) a capital project could be implemented to remove the line from the SMA list, (2) the SMA was a legacy item that could be considered for removal, or (3) it was appropriate to remain on the list. The follow-up items identified in the 2013 AMP were complete by FY16 and the status tracked via the SSMP annual audit process. The evaluation of the SMAs are therefore complete and are thus addressed through the standard Repair Priority List process as the District cleans and inspects these areas.

- While the majority of the District's gravity sewers are readily accessible for hydro cleaning and CCTV purposes, there are segments which require additional effort to CCTV due to either their location in easements or in roadways with heavy traffic. As part of the District's annual SSMP audit process, figures are developed to track those areas which require specialized attention. The figure from the District's most recent FY17 audit is Figure 5-2.

- In FY16, the District began introducing foam treatments in pipelines and manholes for the treatment of roots. The initial results were favorable and the District has incorporated foam treatment into the regular schedule of preventative maintenance activities. Twelve additional line segments utilized foam treatment for root control in FY17. The root foam treatment has primarily occurred in Drainage Basins 3 and 11, with some in Drainage Basins 4 and 10.

## LEGEND

Leucadia Wastewater District Boundary

**Existing Facilities**

- Lift Station
- Manhole

**Existing Pipelines**

- Gravity Sewer
- Force Main

**Category**

- Easement Inspection
- Hydroclean
- Traffic Control

N W E S

### CCTV INSPECTIONS WITH ADDITIONAL REQUIREMENTS

| Location # | Location | Additional Requirements Needed | Status | Clean/CCTV Frequency |
|---|---|---|---|---|
| 1 | RSF Road - Camino De Los Coches to Avenida Aragon | Traffic Control | CCTV'd in FY16 | 3 |
| 2 | RSF Road - Calle Acevo to Avenida Aragon | Traffic Control | CCTV'd in FY16 | 3 |
| 3 | La Costa Ave - Piraeus St to Saxony PS | Traffic Control | CCTV'd in FY17 | 3 |
| 4 | ECR - Encl Blvd to Leucadia Blvd | Night Work | CCTV'd in April 2015 | 3 |
| 5 | ECR - Leucadia Blvd to Levante (Green Valley ) | Easement hydro-cleaning | CCTV'd in March 2015 | 3 |
| 6 | ECR - Levante to 300' north of La Costa Ave | Traffic Control | TC plans done FY15, CCTV'd in April 2015 | 3 |
| 7A | La Costa Golf Course (North Portion) | Coordination w/ golf course | Most Lines CCTV'd in FY17 | 3 |
| 7B | La Costa Golf Course (East Portion) | Coordination w/ golf course | CCTV'd in May 2013 | 3 |
| 9 | Alga Road and El Camino Real | Traffic Control | CCTV'd in FY17 | 3 |
| 10 | La Costa Ave | Traffic Control | CCTV'd in FY17 | 3 |
| 11 | RSF Road - Paseo Lupino to La Costa Avenue | Traffic Control | CCTV'd in FY17 | 3 |
| 12 | Scotts Valley Easement | Night Work | CCTV'd by Contractor in FY16 | 3 |
| 13 | Influent Gravity Line to Batiquitos PS | Night Work | CCTV'd in April 2012 | 3 |

Last revised 11-13-2017

0 1,500 3,000 6,000 Feet


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LEUCADIA WASTEWATER DISTRICT

# FIGURE 5-2

GRAVITY SEWER PREVENTATIVE MAINTENACE ACTIVITIES

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN


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- The District is currently developing a plan to perform smoke testing within the Avocado and Diana Pump Station basins. These older areas of Leucadia have been identified because they are known to have higher inflow and infiltration rates.

- The District continues to utilize both CCTV vehicles for routine inspection, spot inspections, responding to customer requests, pre- and post-construction inspections, and for monitoring areas of concern. The CCTV truck was purchased at the end of FY12 and the CCTV van purchased in 2016 allows easier access to tight areas such as narrow streets and the South La Costa Golf Course.

- CCTV data is presently being accumulated on the District's server to provide all staff with access to video inspections. Current inspections are wirelessly uploaded to the server once the CCTV truck and van are in proximity to the administrative building. Historical inspections located on external hard drives are also being transferred. All LWD staff will have access to the CCTV data once the transfer is complete.

**Specific Activities**

- As a result of the SMA evaluation completed in the 2013 AMP, a trial lining project (part of the FY13 Gravity Rehabilitation Project) 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. More specifically, the trial portion of the project (located in Drainage Basin #3 along Hygeia Avenue and Sanford Street) was to not only CIPP line 1,636 feet of pipeline, but to install "full circumference top hats" (a method to eliminate roots at lateral joints and depicted in Figure 5-3) in the 37 laterals within the lining area. The 2013 AMP contemplated testing T-liners as well, however only top hats were pursued. Field staff's recent review of CCTV tapes for this area show no issues at the lateral connection and thus the top hat seems to be successful.

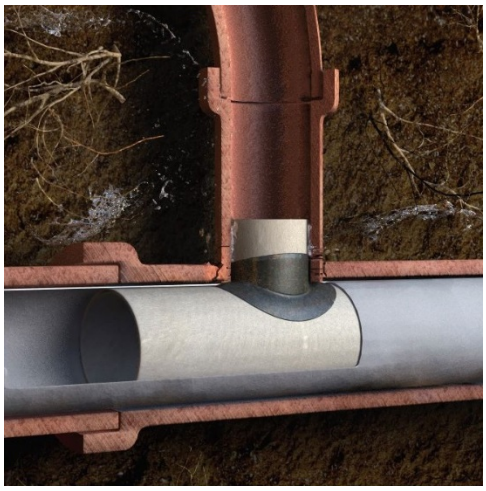

**FIGURE 5-3. LATERAL LINING "TOP HATS"**

- The FY13 Gravity Rehabilitation Project included the CIPP lining of 2,390 feet of pipeline (in addition to the trial lining project described above).

- In FY15, the District purchased a new GIS-based work management system known as Inframap.

- The FY15 Gravity Rehabilitation Project included the CIPP lining of approximately 1,873 feet of pipeline and replacement of 808 feet of 8-inch VCP pipeline.

- The FY16 Gravity Rehabilitation Project included the CIPP lining of approximately 1,148 feet of pipeline and replacement of 90 feet of 8-inch VCP pipeline.

- In FY16, a CIP project was completed to line approximately 678 feet of VCP pipeline known as the Scott's Valley Pipeline (Drainage Basin #8), as seen in Figure 5-4. The project also installed three cured in place manhole liners in manholes along the Scott's Valley Pipeline and epoxy lined six manholes in the Circulo-Ardorno area. This area was known to contribute inflow and infiltration. In review of dry weather and wet weather flow data, summarized in Table 5-1, lining this length of pipeline did help decrease infiltration into the District's system. The average and peak dry weather flow measured at submeter 2 just downstream of Scott's Valley decreased by approximately 6 percent after the segment was lined. During wet weather flow, however, inflow still occurs in this area and has actually slightly increased. It should

be noted that it rained approximately 1.68 inches during the December 2014 event and approximately 1.27 inches during the February 2017 event. The overall gpd/EDU for submeter basin 2 is also 199 gpd/EDU which is greater than the District average of 129 gpd/EDU. Submetering could be considered to further identify the source of the inflow and infiltration in the basin.

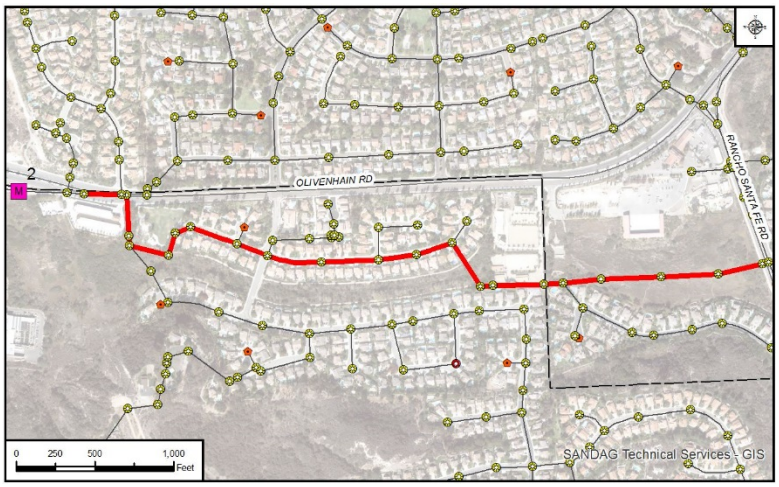


**FIGURE 5-4. SCOTT'S VALLEY PIPELINE ALIGNMENT**

**TABLE 5-1**
**SUBMETER BASIN 2 FLOW ANALYSIS BEFORE AND AFTER THE LINING OF SCOTTS VALLEY PIPELINE**

| | Average Dry[1] | | Peak Dry[1] | | Average Wet[2] | | Peak Wet[2] | |
|---|---|---|---|---|---|---|---|---|
| | **mgd** | **gpd/EDU** | **mgd** | **gpd/EDU** | **Mgd** | **gpd/EDU** | **mgd** | **gpd/EDU** |
| L02 Flows Before Lining | 0.799 | 185.7 | 1.412 | 328.0 | 0.918 | 212.4 | 2.000 | 462.9 |
| L02 Flows After Lining | 0.757 | 175.0 | 1.328 | 307.1 | 0.957 | 220.0 | 2.063 | 474.5 |
| **PERCENT CHANGE** | **-5.34%** | **-5.78%** | **-5.95%** | **-6.39%** | **4.23%** | **3.59%** | **3.15%** | **2.52%** |

[1] L05 herein is a calculation based on ADS meter flow L05 minus L02 minus L03
[2] Flows from before lining based on December 2014 and flows from after lining based on February 2017

## Repair Priority List

In addition to dedicating field efforts to CCTV inspection of the entire collection system, a corollary administrative effort must occur to turn the results of the CCTV inspections and manhole inspections into projects for immediate repair or projects for capital replacement. Since the 2013 AMP, staff has developed a detailed standard operating procedure (SOP) to accomplish this task. In following that procedure, if a defect is found in a pipeline or manhole, the asset is placed on the District's Repair Priority List. The asset is rated on a scale from 0 to 4, where a "0" means the asset is defect free and a rating of "4" corresponds with imminent failure. Generally, assets rated as 4 are repaired/replaced immediately (through the use of the Miscellaneous Pipeline/Manhole Repair Account), whereas assets rated 3 are planned for repair in the next fiscal year's gravity pipeline capital rehabilitation project. Those assets rated as 2 or 1 remain on the Repair Priority List allowing the District to monitor those assets. The District may also decide to repair or rehabilitate the level 1 and 2 pipelines in the future.

## Repair Priority List Completions

Repair Priority List completions from the last three fiscal years are summarized in Table 5-2 below, with the detailed list of completions in Appendix E.

**TABLE 5-2**
**REPAIR PRIORITY LIST COMPLETIONS**
**SUMMARY BY FISCAL YEAR**

| Fiscal Year | Feet of Pipeline Lined | Feet of Pipeline Replaced | Manholes |
|---|---|---|---|
| 2015 | 2,836 | 808 | 23 Lined<br>1 Rehab<br>4 New |
| 2016 | 0 | 8 | 0 |
| 2017 | 1,989 | 0 | 0 |

## Repair Priority List Open Items

The Repair Priority List as of the end of November 2017 is provided in Table 5-7 at the end of this chapter and includes the addition of the age of the pipeline. Table 5-3 below summarizes the length of pipeline on the Repair Priority List by severity and age. This list represents 28% of the District system. Note that the FY18 Cured-In-Place Lining Project and the La Costa Alteration and Quebrada Project scheduled for completion in the spring of 2018 include those pipelines with the Severity of 3. Therefore, upon completion of these two projects, only those pipelines with the Severity of 1 or 2 will remain to be addressed (unless additional 3 and 4 severity pipelines have been discovered subsequent to the design of these two projects).

**TABLE 5-3**
**SUMMARY OF REPAIR PRIORITY LIST**
**PIPELINE SEVERITY AND AGE**

| Pipe Severity | Length of Pipe(in feet) by Age (in years) | | | | | | Total Feet |
|---|---|---|---|---|---|---|---|
| | 10-19 | 20-29 | 30-39 | 40-49 | > 50 | Unknown | |
| 1 | 274 | 0 | 415 | 4,215 | 2,815 | 0 | 7,719 |
| 2 | 0 | 0 | 275 | 2,859 | 3,560 | 250 | 6,944 |
| 3 | 15 | 109 | 275 | 3,814 | 1,560 | 320 | 6,093 |
| **TOTAL** | **289** | **109** | **965** | **10,888** | **7,935** | **570** | **20,756** |

RPL as of November 2017

Figure 5-5 displays the location of pipelines and manholes on the Repair Priority List, the severity, and whether or not the asset is included in an FY18 CIP project.

## Lateral Replacement Backflow Program

The District developed the Lateral Replacement Backflow Program to provide financial assistance to customers for the replacement of their private laterals. Lateral reimbursement letters are sent to customers when a CCTV inspection finds roots or other defects at their lateral connections. Additionally, letters are also sent when the District responds to calls about slow drains or private lateral spills at a residence. In FY17, there were 12 lateral reimbursements that totaled $31,018. In addition, there were 26 lateral reimbursement letters sent to customers.

## LEGEND

- District Service Area
- District Sphere of Influence

**Gravity Sewer Pipe Age (2017)**

- 0 - 9 years
- 10 - 19 years
- 20 - 29 years
- 30 - 39 years
- 40 - 49 years
- 50 -59 years
- Unknown

**Pipe/MH Priority (October 2017)**

- #4 Grade 4 Severity (None)
- #3 Grade 3 Severity
- #2 Grade 2 Severity
- #1 Grade 1 Severity
- Root Foam Application
- FY18 CIP Projects

PACIFIC OCEAN

CAM VIDA ROBLE
POINSETTIA LN
POINSETTIA
CAM DE LAS ONDAS
PASEO DEL NORTE
POINSETTIA LN
AVIARA
CARLSBAD BL
AVNDA ENCINAS
MELROSE DR
S RANCHO SANTA FE RD
MELROSE
SAN ELIJO RD
SAN ELIJO
EL PIN FOREST
ALGA
EL CAMINITO
ALICANTE
EL FUERTE
LA COSTA AV
RANCHO SANTA FE RD
CAM JUNIPERO
LEVANTE ST
CALLE BARCELONA
OLIVENHAIN RD
WILLOWSPRING
GARDEN VIEW
N EL CAM REAL
MTN VISTA
ENCINITAS BL
VILLAGE PARK
CERRO
N RANCHO SANTA FE RD
EL CAM DEL NORTE
EL MIRLO
MANCHESTER
S EL CAM REAL
BIRMINGHAM
BIRMINGHAM DR
LAKE
MACKINNON
SAN ELIJO
SANTA FE DR
NARDO
BALOUR
VULCAN
F
REQUEZA
S COAST HIGHWAY 101
N COAST HIGHWAY 101
LEUCADIA
LEUCADIA BL
SAXONY

0 750 1,500 3,000 Feet


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LEUCADIA WASTEWATER DISTRICT

# FIGURE 5-5

REPAIR PRIORITY LIST
AS OF NOVEMBER 2017

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

## FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

### Historical CCTV Access

Hydrocleaning and CCTV of the gravity sewers should remain the District's primary approach toward condition assessment of this asset class. In recent months, the District has added the ability to automatically upload CCTV data from the vehicles to internal servers (to which all LWD staff have access). Additionally, staff has been working to transfer historical CCTV inspections located on external hard drives to the same server location. This process is anticipated to be complete within the next month and will provide access to about 4 years of historical CCTV data.

With the plethora of CCTV video that the District is acquiring, there are three key ways in which the historical CCTV data can be utilized: reviewing prior to an upcoming CCTV inspection, reviewing during a CCTV inspection, and reviewing following a CCTV inspection as necessary. One, both, or all of these could be incorporated into the District's SOPs and are discussed further below.

Reviewing the previous CCTV video (or condition report) prior to initiating routine maintenance for cleaning and inspection of the same segment would provide field staff with notes on previous defects coded such as roots, sags, scale, cracks, etc. as well as the presence of liners, tophats, and other alterations to the original pipe. Review of prior CCTV tapes prior to conducting a new inspection may be most beneficial as part of a service call or other as-needed response, rather than as part of routine maintenance. This could be done in the office or in the field. Implementing this would require additional staff time which may be challenging to monitor. Additionally, the presence of liners and other improvements can be brought to the attention of field crews in other ways as discussed later in this section.

Having access to CCTV video during inspection would allow field crews to review the progress of a defect such as a crack. The access would also allow a confirmation of features such as the number of laterals to confirm whether illicit connections have been made. This approach would require remote access to the historical data in the field.

Review of historical CCTV inspections after an inspection would occur as part of the Repair Priority List process whereby all pipelines coded with a severity other than 0 would be reviewed as part of the assignment of the new pipeline severity. The collection of historical videos would be made available for the Field Services Supervisor and other decision makers to aid in the process of prioritizing and aggregating projects. This would be done in the office.

It is recommended that CCTV tapes be reviewed prior to and during inspections on a case-by-case basis. However, review of CCTV tapes in concert with development of the Repair Priority List is a recommended update to that SOP.

## GIS Tracking of CCTV

Under the current arrangement, locating a historical CCTV video requires a search of the database. Additionally, CCTV progress is tracked visually on an annual basis as part of the SSMP audit process to confirm the District is meeting its target of CCTV inspecting 100 percent of its gravity sewers every three years. Given CCTV completions are entered in as work orders, Inframap may be able to create a display view that would allow this same visual check on an ongoing basis and may also provide a list of historical inspections when a particular line segment is selected. Ideally, this visual display would be accessible by not only field services staff, but by administrative staff as well. This may be a "view only" type accessibility to Inframap by administrative staff.

## Repair Priority List Future Considerations

We would recommend the District add facility age to the Repair Priority List to aid in decision making. Although not the primary factor for replacement, it is a contributing factor to infrastructure degradation.

The District should also consider identifying whether or not a repair has previously occurred on the pipeline.

The Repair Priority List Completions should be retained in a single database for easy importation to GIS or Inframap at a future date. A sample of the database is shown below.

| Line Segment | Street | Defect(s) | Repair Type | Repair Priority | Pipe Size | Repair Length, ft | Repair Location, ft from DwnMH | Comp-leted By | Comp-leted Date | Cost | Source of Funds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-2850_ 04-2840 | La Costa Ave Esmnt | Asbestos Pipe | CIPPL | 3 | 12” | | | | | | |

The District should consider maintaining a layer within GIS for the current Repair Priority List (as shown in Figure 5-5) and Completed Repairs. Alternatively, rather than maintaining a separate GIS layer, fields could be added to Inframap to be populated so that field crews are aware of the status.

## Manholes

The Repair Priority List in Table 5-7 identifies those manholes that are part of the CIP projects which are included in the FY17/FY18 CIPP Lining Project or as part of other separate pipeline repair projects, as necessary. In addition to continuing to manage the manholes through the Repair Priority List, the District should consider the following:

1. Transfer manhole lining data from Sussex to Inframap.

2. Consider revising the CCTV and/or Hydrocleaning SOPs to include notations as to whether a manhole is lined or not. Alternatively, revise the CMMS form to require completion of the lining field prior to closing the work order.

3. Consider revising the CCTV and/or Hydrocleaning SOPS to include notations as to whether an inflow dome is present on a manhole. Alternatively, revise the CMMS form to require completion of the inflow dome field prior to closing the work order.

4. Add the installation date and age to the Repair Priority List for each manhole to aid in facility planning.

5. Consider an additional column on the Repair Priority List to note whether repairs have occurred previously within the manhole. Alternatively, revise the CMMS form to require completion of the lining field prior to closing the work order.

6. Track Repair Priority List Completions, Miscellaneous Line Repairs, and Capital Improvement Projects in GIS/Inframap to aid in decision making as to how best repair/replace an asset.

7. Consider increasing the quality of manhole inspections by maximizing the use of their camera equipment to photograph and videotape manholes. As with the gravity sewer pipelines, 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.

## Capital Replacement Discussion and Future Considerations

The District's asset management practices with respect to the gravity sewers has evolved significantly over the last ten years. With completion of the FY18 Cured-in-Place Lining Project and the La Costa Alteration and Quebrada Project, the District will have addressed all known grade 4 and grade 3 defects within the system, leaving only those pipelines with grade 2 and grade 1 defects to address. Be that as it may, management and replacement of the gravity sewers should consider not only the structural integrity of the facilities but operation and maintenance issues associated with the pipes with emphasis on roots in particular (which may or may not be a structural issue). When lining a pipeline in an area with chronic root issues, the lateral joints should be addressed if the CCTV Inspection indicates the lateral joint is the issue, via either a top hat, T-liner, or other means. We recommend this to be the District's standard practice when lining or replacing in areas of known root intrusion.

Since the District has CCTV inspected 99% of the system over the last three years, the Repair Priority List effectively removes all speculation as to the condition of the gravity sewer system and therefore, if all were corrected, one could make the general statement that the gravity sewer system is largely defect free.

As such we recommend the District consider repairing all pipeline with Grade 2 and Grade 1 defects.

Subsequently, given that 99% of the gravity system has been CCTV inspected in the last three years and that the FY18 projects will address all remaining defects with the severity of 3, the District should also consider programmatic replacement of aged VCP sewer in areas which are prone to roots and inflow/infiltration if greater priority repairs have not been identified. This was previously recommended in the 2013 AMP along with the alternatives such as increased maintenance or chemical treatment. Increasing maintenance in the scale impacted areas has been successful as well as foaming treatments for roots. The District should continue to utilize these methods, provided the structural integrity of the pipe remains intact.

The programmatic replacement (or lining with top hats) should begin in the downtown Leucadia area. The drainage basins that serve these areas (# 1, 2, and 3) average 153 gpd/EDU versus the District-wide average of 129 gpd/EDU (Source: Table 3-8). Additionally, the piping in this area is the oldest within the District. Finally, reducing flow caused by inflow and infiltration in these areas will reduce flows to pump stations and thus reduce pump station wear and operation and maintenance costs, most notably electricity. For these reasons, VCP replacement work is recommended to begin with Drainage Basin #1. There are approximately 30,500 feet of VCP pipeline that is older than 50 years of age in Drainage Basin #1. At a lining cost of $200 per foot, the cost to line Drainage Basin #1 would be $6,100,000. Drainage Basin #2 and Drainage Basin #3 would follow.

The other concentrated area of aged VCP pipelines in the District is the southwest corner of Drainage Basin #11. There is approximately 26,000 feet of VCP pipelines that is older than 50 years of age in Drainage Basin #11. At a lining and manhole repair cost of $200 per foot, the cost to line Drainage Basin #11 would be $5,200,000.

This approach matches well with the Repair Priority List in that those areas listed for root reasons are primarily within Drainage Basins 1 and 11.

## HISTORICAL SPENDING EVALUATION

Historically, projects completed using the Miscellaneous Pipeline/Manhole Repair Account have consisted of spot repairs, while capital projects are a combination of spot repairs and lining of the entire line (with the occasional replacement). Use of the Miscellaneous Pipeline/Manhole Repair Account is typically reserved for emergency repairs (Severity of 4) and those of Severity of 3 are addressed in a capital project. In some cases, spot repairs are necessary in order to line a pipeline. If lining is possible however without the spot repair, we would recommend lining the entire line segment if the reach is 40 years or older to maximize the cost efficiency of the project.

Table 5-4 below analyzes the expenditures under the Miscellaneous Line Repairs for FY16 and FY17. Table 5-5 presents the unit cost analysis for the FY 13 Gravity Sewer Rehabilitation Project updated to today's costs. Table 5-6 analyses the expenditures for the recently bid FY18 Cured-in-Place Lining Project.

**TABLE 5-4**
**MISCELLANEOUS LINE REPAIR EXPENDITURES**
**FOR FY16 AND FY17**

| **FISCAL YEAR 2017** | |
|---|---|
| **Expense Type** | **Cost** |
| Raising manholes w/new frame and cover | $ 99,153 |
| CIPP Liner ~4 feet (assumed) | $ 14,223 ($3,560 per foot) |
| Two Pipeline Spot Repairs | $ 33,878 ($16,940 per repair) |
| **TOTAL, FY2017** | **$147,254** |
| **FISCAL YEAR 2016** | |
| **Expense Type** | **Cost** |
| Manhole Covers and Frames | $ 37,025 |
| Two Manhole Lining/Repairs | $ 26,990 ($13,500 per repair) |
| Five Pipeline Spot Repairs | $ 64,772 ($13,000 per repair) |
| CIPP Liner, South La Costa Golf Course (353') | $ 41,040 ($116 per foot) |
| Miscellaneous | $ 12,170 |
| **TOTAL, FY2016** | **$181,997** |

**TABLE 5-5**
**UNIT COST ANALYSIS OF FY13 GRAVITY SEWER REHABILITATION PROJECT**

| Site # | Exist Facility | CIPPL Patch (LF) | CIPPL Reach (LF) | Top Hat (Qty.) | Line Manhole (VF) | New 8" PVC | Winning Bid | ENR Unit Cost * | Average Cost for Planning Consideration |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 8" VCP | 7 | | | | | $13,470 | $3,592 | |
| 6 | 8" VCP | 7 | | | | | $13,557 | $3,615 | |
| 8 | 8" VCP | 8 | | | | | $2,530 | $590 | |
| 18 | 8" VCP | 5 | | | | | $2,000 | $747 | |
| 4 | 8" VCP | | 15 | | | | $5,470 | $681 | |
| 1 | 8" VCP | | 363 | | | | $15,965 | $82 | |
| 3 | 8" VCP | | 350 | | | | $15,470 | $83 | |
| 13 | 8" VCP | | 400 | | | | $16,370 | $76 | |
| 16 | 8" VCP | | 292 | | | | $13,270 | $85 | |
| 19 | 8" VCP | | 257 | 1 | | | $12,960 | $94 | |
| 20 | 8" VCP | | 92 | 2 | 8.5 | | $11,850 | $240 | |
| 21 | 8" VCP | | 276 | 9 | 8 and 9 | | $27,980 | $189 | |
| 22 | 8" VCP | | 254 | 7 | 8 | | $21,950 | $161 | |
| 23 | 8" VCP | | 350 | 9 | 17.5 | | $26,580 | $142 | |
| 24 | 8" VCP | | 320 | 9 | 8 and 20 | | $29,640 | $173 | |
| 5 | 8" VCP | | | | | 26 | $18,453 | $1,325 | |
| 25 | 8" VCP | | | | | 6 | $11,165 | $3,473 | |
| 15 | 8" VCP | | | | | 178 | $34,907 | $366 | |
| 12 | 8" VCP | | 216 | | | 172 | $36,495 | $396 | |

$1,845 per ft for lining alone of short segments

$81 per ft for lining alone of longer segments

$167 per ft for lining with top hat and MH lining

$2,399 per ft for replacement of short segments

* Cost adjusted from 2013 using ENR and includes the following multipliers: 10% for mobilization, 35% for soft costs, and 20% contingency.

**TABLE 5-6**
**UNIT COST ANALYSIS OF FY18 CIPP LINING PROJECT**

| Bid Item # | Exist Facility | CIPPL Reach (LF) | Line Manhole (VF) | New 8" PVC | New Manhole (VF) | Winning Bid | Unit Cost* | Average Cost for Planning Consideration |
|---|---|---|---|---|---|---|---|---|
| 4 | 8" VCP | 286 | | | | $10,815 | $67 | |
| 5 | 8" VCP | 203 | | | | $7,985 | $70 | |
| 6 | 8" VCP | 276 | | | | $10,742 | $69 | |
| 7 | 8" VCP | 346 | | | | $13,400 | $69 | |
| 10 | 8" VCP | 965 | | | | $36,475 | $67 | |
| 11 | 8" VCP | 359 | | | | $13,570 | $67 | |
| 12 | 8" VCP | 126 | | | | $5,800 | $82 | |
| 14 | 8" VCP | 487 | | | | $18,410 | $67 | |
| 15 | 8" VCP | 613 | | | | $23,175 | $67 | |
| 26 | 8" CIP | 811 | | | | $33,390 | $73 | |
| 28 | 8" VCP | 301 | | | | $11,380 | $67 | |
| 29 | 8" VCP | 452 | | | | $17,100 | $67 | |
| 30 | 8" VCP | 281 | | | | $10,625 | $67 | |
| 32 | 8" VCP | 226 | | | | $8,550 | $67 | |
| 34 | 8" VCP | 240 | | | | $9,400 | $70 | |
| 13 | 15" VCP | 358 | | | | $23,350 | $116 | |
| 35 | 12" DIP/14" DIP | 282 | | | | $25,192 | $159 | |
| 8 | MH | | 5.5 | | | $8,996 | $2,915 | |
| 9 | MH | | 8.5 | | | $10,382 | $2,177 | |
| 16 | MH | | 5 | | | $10,382 | $3,700 | |
| 17 | MH | | 9 | | | $10,382 | $2,056 | |
| 18 | MH | | 8.5 | | | $10,382 | $2,177 | |
| 19 | MH | | 5 | | | $4,588 | $1,635 | |
| 20 | MH | | 13.5 | | | $10,382 | $1,370 | |
| 21 | MH | | 9.5 | | | $10,382 | $1,947 | |
| 22 | MH | | 15 | | | $10,382 | $1,233 | |
| 23 | MH | | 10 | | | $4,588 | $818 | |
| 24 | MH | | 11 | | | $10,382 | $1,682 | |
| 25 | MH | | 9 | | | $10,382 | $2,056 | |
| 27 | MH | | 13 | | | $10,382 | $1,423 | |
| 31 | MH | | 48 | | | $41,115 | $1,526 | |
| 36 | MH | | 14 | | | $20,763 | $2,643 | |
| 3 | 8" VCP | 352 | | 55 | | $68,842 | $301 | |
| 33 | 8" PVC/CO | 104 | | | 9 | $42,925 | $736 | |

*Cost includes the following multipliers: 10% for mobilization, 35% for soft costs, and 20% for contingency

$69 per ft for lining alone of longer segments

$138 per ft for lining alone of larger diameter segments

$1,957 per ft for lining manholes

In FY13, it cost the District on average $1,764 less per foot to line longer reaches than to line short segments. By FY18, the average cost of lining longer stretches of pipe dropped an additional $12 per foot. Lining longer segments also prevents the District from having to perform several miscellaneous short repairs over the course of several years. Overall, the unit cost savings are significant when multiple, longer segments of pipeline are lined.

## 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. All costs are planning costs unless noted otherwise.

### FY 2016 Gravity Pipeline Rehabilitation Project

This project was completed in early FY18; the CIP amount of $92,903 reflects actual FY18 expenditures.

### Orchard Wood Road Sewer Rehabilitation Project

Replacement of an SMA area with a significant sag. A total of $194,700 has been budgeted in FY18 for design and construction of the project.

### FY18 Cured-in-Place Lining Project

This project is a combination of the cured-in-place lining portions of the FY17 Gravity Rehabilitation Project and the new FY18 Gravity Rehabilitation Project.

### La Costa Alteration and Quebrada Project

During the design phase for the 2016 Gravity Pipeline Rehabilitation Project, it was observed that a section of the La Costa South Golf Course gravity line that was designated for repair was exposed where it crossed San Marcos Creek. Emergency Cured-In-Place Pipe (CIPP) lining of the exposed section was completed in November 2015 as a temporary structural reinforcement of the pipeline in anticipation of the predicted El Nino weather pattern. Due to the complexity of permitting and design with the permanent repair of the San Marcos Creek crossing and the remaining section of the gravity line in the golf course, other repair or pipeline realignment options were evaluated, and it was decided to separate the rehabilitation of this line into its own project. Project design is complete and a new easement has been obtained from Omni La Costa Resort & Spa for the new gravity line.

This project, along with the Quebrada easement section of the FY17 Gravity Pipeline Rehabilitation Project, and sections of the FY17 and FY18 gravity pipeline projects will be completed via open trench construction methods and are thus grouped together. The projected cost of $475,000 is the estimated construction cost of the new-combined project.

**Pipeline Repair Priority List Grade 2 Project**

Replace or rehabilitate all remaining pipelines coded as a Grade 2 severity on the Repair Priority List. The final list of pipelines should be based on the Repair Priority List status as of December 31; this provides a logical demarcation as to when the cut-off in scope would occur. Grade 2 defects discovered in 2018 would be part of a future CIP project based on the prioritization of future projects.

**Pipeline Repair Priority List Grade 1 Project**

Replace or rehabilitate all remaining pipelines coded as a Grade 1 severity on the Repair Priority List. The final list of pipelines should be based on the Repair Priority List status as of December 31; this provides a logical demarcation as to when the cut-off in scope would occur. Grade 1 defects discovered in 2018 would be part of a future CIP project based on the prioritization of future projects.

**Drainage Basin #1 VCP Lining/Replacement Cost**

This project would include the replacement (or lining with top hats) of approximately 30,500 feet of VCP that has chronic root issues and represents some of the oldest piping in the District. At an estimated cost of $200 per foot, the project cost would be $6,100,000. At an annual spending rate of $762,500, it will take eight years to complete this project.

**Drainage Basin #11 VCP Lining/Replacement Cost**

This optional project would include the replacement (or lining with top hats) of approximately 26,000 feet of VCP that has chronic root issues and represents some of the oldest piping in the District. At an estimated cost of $200 per foot, the project cost would be $5,200,000.

**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 the current amount of $163,000 per year.

**Lateral Replacement Backflow Program**

The 5-Year CIP shows this program continuing at a 2% increased funding level of $102,000.

## 20-YEAR CAPITAL EXPENDITURE SUMMARY

To determine the long-term spending demands on the District, projections must be made as to when facilities will require replacement and what the cost to do so will be. With regard to when a facility would require replacement, age is often a key element. However, it is not the only contributing factor, hence the detailed development of the Predictive Failure Model in previous versions of District's planning documents to forecast the longevity of the pipeline asset based on properties of the pipeline itself (material, diameter, etc.) and installation environment (soil type, groundwater presence, etc.). The comparison of the projected timing of when facilities may require replacement to the District's actual and projected rates of replacement provide context as to how the District's current practices fare in comparison to potential future need.

The 2013 AMP projected that the 20-Year time frame would require an average pipeline replacement rate of 19,038 feet per year. At a replacement cost of $400 per foot, the annual expenditures would be $7,615,200 and at a lining cost of $200 per foot, the annual expenditures would be $3,807,600. Over 5 years, this would be 95,190 feet of pipeline to address at a lining cost of $19,038,000.

In comparison, the District's actual spending (based on implementation of the Repair Priority List and corollary CIP planning) was $3,073,000 which lined or replaced approximately 8,550 feet of pipeline (along with associated manholes, as necessary) via CIP or Miscellaneous Line Repair projects. This level of spending is sufficient since the District assesses the condition of its lines on an ongoing basis and thus is replacing truly based on an identified need.

At a long-term spending rate of approximately $713,000 (with $163,000 toward Miscellaneous Line Repair and $550,000 toward gravity pipelines and manholes). The District will be able to line approximately 2,750 feet of pipeline (with manholes) per year.

For comparison purposes, the FY18 CIP Lining Project addressed all remaining Grade 3 defects (7,068 feet of pipelines and 15 manholes) at a bid price of approximately $670,000. As such, the $550,000 is on par with the anticipated spending needs given the Repair Priority List present status, provided that the projects are grouped sufficiently enough to continue to see the economies of scale recognized in the FY18 project.

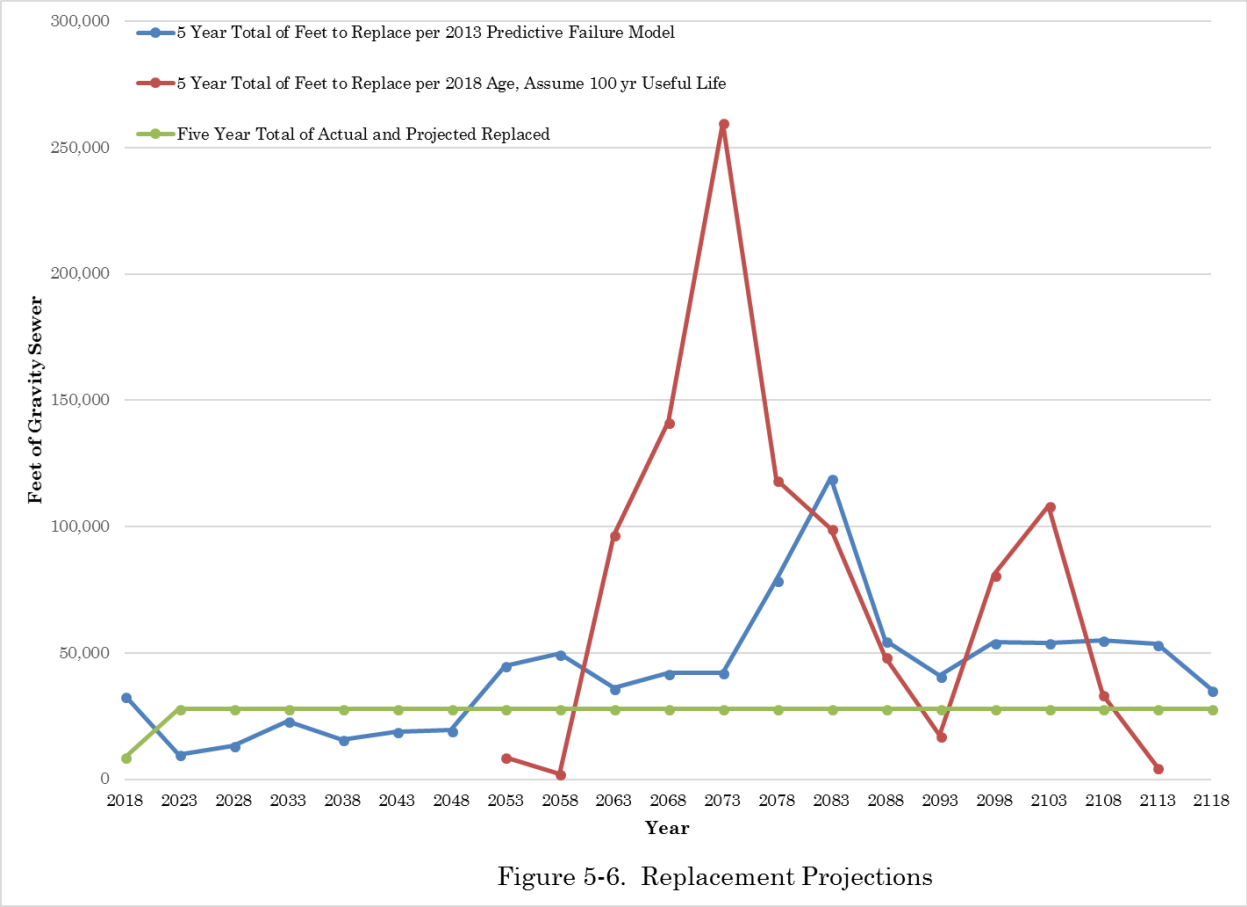



Figure 5-6. Replacement Projections

## SUMMARY OF RECOMMENDATIONS

1. Track areas, frequency, and cost of where root foam is used as part of the SSMP process (treatments to date are $4,959 in December 2015 and $3,791 in March 2017). Conduct financial evaluation comparing the cost of root foam treatment against lining these areas with top hats. Confirm if root foam areas are on Repair Priority List.

2. Consider submetering of Drainage Basin 2 to continue identifying the source of inflow and infiltration.

3. Improve accessibility of prior CCTV Inspections on a particular line segment to aid in planning and understanding of the individual asset. Update SOP to include historical review as part of Repair Priority list SOP.

4. Add pipeline Install Date and Age columns to Repair Priority List.

5. Add step to Rating Repair Lines/Manholes SOP to review previous repairs in the pipeline or manhole which is being added to Repair Priority List. Add "Yes/No" column to indicate whether the line has previously been repaired.

6. Track Repair Priority List Completions, Miscellaneous Line Repairs, and Capital Improvement Projects in GIS/Inframap to aid in decision making as to how best repair/replace an asset. This will provide field services staff with knowledge of linings, top hats, etc., to exercise caution when hydrocleaning. Additionally, it will provide staff with the ability to view previous repairs within a line segment to decide whether spot repairs should continue or a pipeline/manhole should be replaced.

A sample of the database is shown below.

| Line Segment | Street | Defect(s) | Repair Type | Repair Priority | Pipe Size, inches | Repair Length, ft | Repair Location, ft from DwnMH | Comp-leted By | Comp-leted Date | Cost | Source of Funds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-2850_ 04-2840 | La Costa Ave Esmnt | Asbestos Pipe | CIPPL | 3 | 12 | | | | | | |

7. Transfer manhole lining data from Sussex to Inframap.

8. Consider revising the CCTV and/or Hydrocleaning SOPs to include notations as to whether a manhole is lined or not. Alternatively, revise the CMMS form to require completion of the lining field prior to closing the work order.

9. Consider revising the CCTV and/or Hydrocleaning SOPS to include notations as to whether an inflow dome is present on a manhole. Alternatively, revise the CMMS form to require completion of the inflow dome field prior to closing the work order.

10. Export CMMS repair data from Repair Priority List Completions and Miscellaneous Line Repairs to GIS.

11. When lining a pipeline in an area with chronic root issues, the lateral joints should be addressed, via either a top hat, T-liner, or other means.

12. When possible, spot repairs of pipelines should be addressed by lining the entire pipe segment, particularly on pipes greater than 40 years in age.

13. Consider repair of all Grade 2 and Grade 1 defects and/or programmatic VCP replacement in Drainage Basins 1, 2, 3, and 11. Repair/replacement of Grade 3 and Grade 4 defects discovered within the 5-year time frame would take precedence.

14. Procure mylar and electronic (PDF and DWG) record drawings for all CIP projects. AMP process identified the need for electronic record drawings for the FY15 Gravity Rehab Project, the FY16 Gravity Rehabilitation Project.

15. Historical bid results indicate significant unit cost savings when CIP projects include several thousand feet of lining.

Table 5-7
Repair Priority List

| Date Found | Facility Type | Line Segment / Manhole | Street | Segment Footage | Defect(s) | Pipe Type | Repair Type | Repair Priority | Depth (in feet) | Pipe Size (inches) | Year Installed | Pipe Age | Age Range | Estimated Cost to Repair | CIP Project Name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/16/2015 | Pipe | 04-2170_04-0390 | Ocean View/Piraeus Easemt | 350 | Continuous cracks throughout line | VCP | Reline | 3 | 12 | 8 | | | | $ 21,760 | FY17/FY18 CIPP Lining Project |
| | Pipe | 05-0640_05-0600 | Doris/Crest St. Easement | 290 | Broken pipe at offset joint | VCP | Reline | 3 | 8 | 8 | | | | | FY17/FY18 CIPP Lining Project |
| 7/27/2015 | Pipe | 04-1530_04-1520 | Caudor Street | 272 | Broken pipe, multiple cracks | VCP | Reline | 3 | 15 | 8 | | | | $ 28,000 | FY17/FY18 CIPP Lining Project |
| 5/26/2015 | Pipe | 07-9590_07-9580 | Willowspring Drive | 276 | Continuous cracks | VCP | Reline | 3 | 9 | 8 | | | | $ 22,080 | FY17/FY18 CIPP Lining Project |
| 11/27/2012 | Pipe | 07-9580_07-9570 | Mountain Vista Drive | 350 | SMA - Continuous cracks, roots | VCP | Reline | 3 | 9 | 8 | | | | $ 28,000 | FY17/FY18 CIPP Lining Project |
| 6/1/2017 | Pipe | 04-2480_04-2460 | St. Albans Drive | 355 | Continuous cracks | VCP | Liner | 3 | 17 | 8 | | | | | FY17/FY18 CIPP Lining Project |
| | Pipe | 04-2460_04-2410 | St. Albans Drive | 289 | Continuous cracks | VCP | Liner | 3 | 15 | 8 | | | | | FY17/FY18 CIPP Lining Project |
| 1/5/2012 | Pipe | 01-1210_01-1200 | Vulcan Ave. | 331 | Offset joint with broken pipe 276' downstream | VCP | Short liner | 3 | 8 | 8 | | | | $ 6,000 | FY17/FY18 CIPP Lining Project |
| | Pipe | Private_10-0712 | La Costa Golf Course | 99 | New line segment | | | 3 | | | | | | | La Costa and Quebrada Replacement Project |
| | Pipe | 10-0715_10-0190 | | 111 | New line segment | | | 3 | | | | | | | La Costa and Quebrada Replacement Project |
| 1/1/2013 | Pipe | 08-10870_08-10860 | Quebrada | 263 | Major sag - heavy grease/grit | VCP | Dig up | 3 | 9 | 8 | | | | $ 52,600 | La Costa and Quebrada Replacement Project |
| 1/2/2013 | Pipe | 08-10860_08-0545 | Quebrada | 312 | Major sag - heavy grease/grit | VCP | Dig up | 3 | 15 | 8 | | | | $ 62,400 | La Costa and Quebrada Replacement Project |
| 10/29/2012 | Pipe | 08-1665_08-0155 | Orchard Wood Easement | 258 | Line has a huge belly-creates major grease | PVC | Dig up | 3 | 6.5 | 8 | | | | $ 51,600 | Orchard Wood Road Line Repair Project - design in progress |
| 7/21/2017 | Pipe | 05-5070_05-5060 | Taegan Lane | 200 | Major sag - heavy grease/debris | PVC | Dig up | 3 | 6 | 8 | 1984 | 33 | 30-39 | | FY17/FY18 CIPP Lining Project |
| 2/8/2017 | Pipe | 02-0370_02-0360 | Neptune Ave. | 291 | Large offset joint | VCP | Dig up | 3 | 12.5 | 8 | 1964 | 53 | > 50 | | FY17/FY18 CIPP Lining Project |
| 8/17/2016 | Pipe | 10-1750_10-1745 | Navarra Drive | 157 | Broken pipe | VCP | Dig up/repair | 3 | 13 | 8 | 1968 | 49 | 40-49 | $ 12,560 | FY17/FY18 CIPP Lining Project |
| 8/11/2016 | Pipe | 10-1385_10-1380 | Galleon Way | 239 | Major roots/multiple cracks | VCP | Dig up/Liner | 3 | 9 | 8 | 1970 | 47 | 40-49 | $ 19,120 | FY17/FY18 CIPP Lining Project |
| 7/7/2016 | Pipe | 11-0680_11-0110 | Golf Course Tennis Courts | 335 | Pipe has deposits/encrustation | CIP | Liner | 3 | 14 | 8 | 1964 | 53 | > 50 | $ 26,800 | FY17/FY18 CIPP Lining Project |
| 11/7/2016 | Pipe | 11-3085_11-3080 | Corinitia St. | 300 | Broken pipe at joint | VCP | Short liner | 3 | 8 | 7 | 1971 | 46 | 40-49 | $ 7,500 | FY17/FY18 CIPP Lining Project |
| 1/20/2017 | Pipe | 11-0810_11-0805 | Mar Azul Easement | 306 | Roots throughout line | VCP | Liner | 3 | 9 | 8 | 1964 | 53 | > 50 | $ 24,480 | FY17/FY18 CIPP Lining Project |
| 1/20/2017 | Pipe | 11-0805_11-0765 | Mar Azul Easement | 150 | Multiple cracks/roots throughout line | VCP | Liner | 3 | 8 | 8 | 1964 | 53 | > 50 | $ 12,000 | FY17/FY18 CIPP Lining Project |
| 6/26/2017 | Pipe | 04-1240_04-1230 | Caudor Street | 296 | Multiple cracks/roots throughout line | VCP | Liner | 3 | 17 | 8 | 1968 | 49 | 40-49 | $ 23,680 | FY17/FY18 CIPP Lining Project |
| 6/26/2017 | Pipe | 04-1260_04-1240 | Caudor Street | 196 | Multiple cracks/roots throughout line | VCP | Liner | 3 | 20 | 8 | 1968 | 49 | 40-49 | $ 15,680 | FY17/FY18 CIPP Lining Project |
| 4/4/2017 | Pipe | 02-0540_02-0530 | Moorgate Road | 146 | Continuous cracks | VCP | Liner | 3 | 32 | 8 | 1972 | 45 | 40-49 | $ 11,680 | FY17/FY18 CIPP Lining Project |
| 4/4/2017 | Pipe | 02-0530_02-0520 | Moorgate Road | 113 | Continuous cracks | VCP | Liner | 3 | 28 | 8 | 1972 | 45 | 40-49 | $ 9,040 | FY17/FY18 CIPP Lining Project |
| 4/4/2017 | Pipe | 02-0520_02-0490 | Moorgate Road | 297 | Continuous cracks | VCP | Liner | 3 | 15 | 8 | 1972 | 45 | 40-49 | $ 23,760 | FY17/FY18 CIPP Lining Project |
| 5/5/2017 | Pipe | 10-1331_10-1330 | Primavera Way | 285 | Multiple cracks | VCP | Short liner | 3 | 10 | 8 | 1970 | 47 | 40-49 | $ 7,500 | FY17/FY18 CIPP Lining Project |
| 4/18/2017 | Pipe | 03-0120_03-0130 | Vulcan Ave. | 349 | Multiple cracks | VCP | Liner | 3 | 8.5 | 15 | 1962 | 55 | > 50 | $ 27,920 | FY17/FY18 CIPP Lining Project |
| 3/16/2017 | Pipe | 01-0120_01-0130 | Vulcan Ave. | 129 | Roots in majority of joints | VCP | Liner | 3 | 9 | 8 | 1962 | 55 | > 50 | $ 10,320 | FY17/FY18 CIPP Lining Project |
| 11/9/2016 | Pipe | 11-3025_11-3020 | Abejorro Street | 225 | Infiltration | VCP | Liner | 3 | 10 | 8 | 1970 | 47 | 40-49 | $ 18,000 | FY17/FY18 CIPP Lining Project |
| 8/4/2017 | Pipe | 09-1783_09-1780 | Oak Burl Lane | 75 | Broken Cleanout cap | PVC | Dig up | 3 | 7 | 8 | 1981 | 36 | 30-39 | | FY17/FY18 CIPP Lining Project |
| 5/10/2012 | Pipe | 04-2400_04-2380 | Oldham Way | 112 | Broken Cleanout cap | VCP | Dig up | 3 | 4 | 8 | 1973 | 44 | 40-49 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| 2/23/2016 | Pipe | 09-11125_09-11120 | Quebrada Circle | 110 | Broken Cleanout cap | PVC | Dig up | 3 | 8 | 8 | | 2017 | | | FY17/FY18 CIPP Lining Project |
| 2/10/2016 | Pipe | 08-0870_08-0850 | La Duela | 94 | Broken Cleanout cap | VCP | Dig up | 3 | 7.5 | 8 | 1976 | 41 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 2/16/2016 | Pipe | 08-0990_08-0980 | Amargosa Drive | 175 | Broken Cleanout cap | VCP | Dig up | 3 | 8.5 | 8 | 1976 | 41 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 2/17/2016 | Pipe | 08-0640_08-0630 | La Tinada Court | 42 | Broken Cleanout cap | VCP | Dig up | 3 | 7 | 8 | 1974 | 43 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 11/7/2016 | Pipe | 11-4010_11-4005 | Corinitia St. | 175 | Broken Cleanout cap | VCP | Dig up | 3 | 7 | 8 | 1972 | 45 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 9/30/2011 | Pipe | 11-1350_11-1345 | Via Candrejo | 109 | Broken Cleanout cap | PVC | Liner | 3 | 6.5 | 8 | 1989 | 28 | 20-29 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| 9/20/2011 | Pipe | 11-1965_11-1960 | Babilonia St. | 155 | Broken Cleanout cap | VCP | Dig up | 3 | 7 | 8 | 1972 | 45 | 40-49 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| 3/24/2014 | Pipe | 03-0755_03-0750 | Andrew St. | 85 | Broken Cleanout cap | PVC | Dig up | 3 | 11 | 8 | 1975 | 42 | 40-49 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| 4/17/2013 | Pipe | 08-102171_08-102151 | Vista Nuez | 15 | Broken Cleanout cap | PVC | Dig up | 3 | 8 | 8 | 2002 | 15 | 10-19 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| 3/27/2012 | Pipe | 06-1490_06-1480 | Rodney Ave. | 214 | Broken Cleanout cap | VCP | Dig up | 3 | 9 | 8 | 1972 | 45 | 40-49 | $ 5,000 | FY17/FY18 CIPP Lining Project |
| | Pipe | 08-0810_08-0800 | Los Pinos Circle | N/A | Broken Cleanout cap | VCP | Dig up | 3 | | | 1976 | 41 | 40-49 | | FY17/FY18 CIPP Lining Project |
| | Pipe | 04-1525_04-1520 | Caudor Street | N/A | Broken Cleanout cap | | Dig up | 3 | | | 1969 | 48 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 11/8/2017 | Pipe | 06-1780_06-1760 | Village Run East | 168 | Major sag | VCP | Dig up | 3 | 12 | 8 | 1971 | 46 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 11/8/2017 | Pipe | 06-1760_06-1740 | Village Run East | 340 | Multiple cracks/broken pipe throughout | VCP | Liner | 3 | 15 | 8 | 1970 | 47 | 40-49 | | FY17/FY18 CIPP Lining Project |
| 5/3/2017 | Manhole | MH 10-7020 | Carvallo Court Easement | N/A | Major roots | N/A | Liner | 3 | 12 | N/A | | 2017 | | $ 8,000 | FY17/FY18 CIPP Lining Project |
| 10/20/2016 | Manhole | MH 09-1590 | El Camino Real | N/A | Infiltration/deterioration | N/A | MH Rehab. | 3 | 8.5 | N/A | | 2017 | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| 10/20/2016 | Manhole | MH 05-9095 | El Camino Real | N/A | Infiltration/deterioration | N/A | MH Rehab. | 3 | 8 | N/A | | 2017 | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| 10/20/2016 | Manhole | MH 05-0120 | El Camino Real | N/A | Infiltration/deterioration | N/A | MH Rehab. | 3 | 8 | N/A | | 2017 | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| 8/1/2016 | Manhole | MH 10-3000 | Hataca Road | N/A | Infiltration | N/A | MH Rehab. | 3 | 10 | N/A | | 2017 | | $ 8,000 | FY17/FY18 CIPP Lining Project |
| 8/1/2016 | Manhole | MH 10-4000 | Brava St./Del Rey Avenue | N/A | Infiltration | N/A | MH Rehab. | 3 | 12 | N/A | | 2017 | | $ 8,000 | FY17/FY18 CIPP Lining Project |
| 8/1/2016 | Manhole | MH 10-2090 | Hataca Road | N/A | Infiltration | N/A | MH Rehab. | 3 | 8 | N/A | | 2017 | | $ 8,000 | FY17/FY18 CIPP Lining Project |
| 8/1/2016 | Manhole | MH 10-3070 | Del Rey Avenue | N/A | Infiltration | N/A | MH Rehab. | 3 | 10 | N/A | | 2017 | | $ 8,000 | FY17/FY18 CIPP Lining Project |
| 7/27/2016 | Manhole | MH 03-0670 | Ashbury Street | 330 | Roots in vertical dropline-creates offset joint | VCP | Dig up/repair | 3 | 11 | 8 | | | | $ 7,500 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 03-0520 | Hillcrest Drive | N/A | MH ring offset, infiltration/deterioration | N/A | MH Lining | 3 | 5.5 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 07-0950 | Edgefield Lane | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 8 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 10-1005 | Mallorca Pl. Easement | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 6 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 11-0110 | By La Costa Pump Station | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 13.5 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 11-0700 | Costa Del Mar | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 9.5 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 11-1380 | Altiva Easement | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 16 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |
| | Manhole | MH 11-1745 | Via Ostiones Easement | N/A | Infiltration/deterioration | N/A | MH Lining | 3 | 7.5 | N/A | | | | $ 12,000 | FY17/FY18 CIPP Lining Project |

Table 5-7
Repair Priority List

| Date Found | Facility Type | Line Segment / Manhole | Street | Segment Footage | Defect(s) | Pipe Type | Repair Type | Repair Priority | Depth (in feet) | Pipe Size (inches) | Year Installed | Pipe Age | Age Range | Estimated Cost to Repair | CIP Project Name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/5/2017 | Pipe | 05-0560_05-0550 | Witham Road | 203 | line has multiple cracks | VCP | Liner | 2 | 9 | 8 | 1973 | 44 | 40-49 | $ 37,555 | |
| 10/19/2016 | Pipe | 11-9250_11-9225 | El Gavilan Court | 172 | Cracked pipe | PVC | Short liner | 2 | 15 | 8 | 1977 | 40 | 40-49 | $ 31,820 | |
| 9/8/2015 | Pipe | 03-0930_03-0920 | La Costa Avenue | 63 | Broken pipe at inlet - drop | VCP | Short liner / top hat | 2 | 11 | 8 | 1970 | 47 | 40-49 | $ 11,655 | |
| 5/26/2015 | Pipe | 04-2270_04-2260 | Brittany Road | 300 | Medium offset joint | VCP | Dig up | 2 | 7.5 | 8 | 1969 | 48 | > 50 | $ 55,500 | |
| 3/3/2014 | Pipe | 05-0120_05-0110 | El Camino Real | 305 | Broken pipe at joint 298' downstream | VCP | Short liner | 2 | 10 | 8 | 1973 | 44 | 40-49 | $ 56,425 | |
| 3/5/2014 | Pipe | 09-0970_09-0960 | El Camino Real | 400 | Broken pipe at lateral 251' downstream | VCP | Short liner | 2 | 9 | 8 | 1966 | 51 | > 50 | $ 74,000 | |
| 1/5/2012 | Pipe | 01-1200_01-1190 | Vulcan Ave. | 200 | Small cracks/roots in every joint | VCP | Liner | 2 | 8 | 8 | 1962 | 55 | > 50 | $ 37,000 | |
| 3/23/2015 | Pipe | 01-0730_01-0740 | Hermes Ave. | 270 | Roots in nearly every joint | VCP | Liner | 2 | 8 | 6 | 1963 | 54 | > 50 | $ 49,950 | |
| 1/16/2014 | Pipe | 11-1950_11-1945 | Obelisco Circle | 202 | Broken Pipe 173' downstream at joint | VCP | Short liner | 2 | 8.5 | 8 | 1972 | 45 | 40-49 | $ 37,370 | |
| 2/6/2014 | Pipe | 11-0640_11-0590 | Estrella Del Mar | 202 | Roots in majority of joints | VCP | Liner | 2 | 8 | 8 | 1964 | 53 | > 50 | $ 37,370 | |
| 11/29/2011 | Pipe | 01-1820_01-1810 | Phoebe St. | 238 | Broken pipe at joint 10' downstream | VCP | Short liner | 2 | 7 | 8 | 1962 | 55 | > 50 | $ 44,030 | |
| 10/29/2013 | Pipe | 10-0920_10-0915 | Easement #45 / La Coruna | 145 | Broken pipe at joint 84' downstream | VCP | Liner | 2 | 7 | 8 | 1968 | 49 | 40-49 | $ 26,825 | |
| 1/28/2014 | Pipe | 11-6075_11-6070 | Corinitia St. | 117 | Multiple cracks from 114' - 117' downstream | VCP | Liner | 2 | 6.5 | 8 | 1971 | 46 | 40-49 | $ 21,645 | |
| 1/28/2014 | Pipe | 11-6070_11-6065 | Corinitia St. | 219 | Multiple cracks throughout line | VCP | Liner | 2 | 7 | 8 | 1971 | 46 | 40-49 | $ 40,515 | |
| 6/18/2012 | Pipe | 04-1310_04-1300 | Barbara Lane | 148 | Multiple cracks throughout line | VCP | Liner | 2 | 6 | 8 | 1968 | 49 | 40-49 | $ 27,380 | |
| 4/24/2013 | Pipe | 05-0950_05-0940 | Santa Fe Dr. | 275 | Pipe with 90 degree angle 45' downstream | PVC | Dig up | 2 | 10 | 8 | 1982 | 35 | 30-39 | $ 15,000 | |
| 6/30/2014 | Pipe | 10-1005_10-0940 | Easement #46 / Mallorca Place | 223 | Cracked pipe/root in joints | VCP | Liner | 2 | 10 | 8 | 1968 | 49 | 40-49 | $ 41,255 | |
| 7/28/2015 | Pipe | 04-1650_04-1640 | Burgundy Road | 321 | Multiple cracks/roots in joints | VCP | Liner | 2 | 15 | 8 | 1969 | 48 | 40-49 | $ 59,385 | |
| 8/23/2012 | Pipe | 05-6040_05-6010 | Cerro St. | 250 | Offset joints | VCP | Liner | 2 | 8 | 8 | | 2017 | | $ 46,250 | |
| 8/11/2015 | Pipe | 04-1210_04-1200 | Burgundy Road Easement | 110 | | VCP | Dig up | 2 | 8 | 8 | 1969 | 48 | 40-49 | $ 20,350 | |
| 8/11/2015 | Pipe | 04-1215_04-1210 | Burgundy Road Easement | 115 | | VCP | Dig up | 2 | 8 | 8 | 1969 | 48 | 40-49 | $ 21,275 | |
| 8/11/2015 | Pipe | 04-1715_04-1710 | Burgundy Road | 290 | Broken joint at 206' - lost cleanout | VCP | Liner | 2 | 9 | 6 | 1969 | 48 | 40-49 | $ 53,650 | |
| 5/20/2014 | Pipe | 09-0840_09-0830 | GV I - El Camino Real | 350 | Medium roots in joint | VCP | Liner | 2 | 9 | 12 | 1966 | 51 | > 50 | $ 64,750 | |
| 11/17/2011 | Pipe | 01-1420_01-1430 | Neptune Ave. | 299 | Roots | VCP | Liner | 2 | 10 | 8 | 1964 | 53 | > 50 | $ 55,315 | |
| 1/31/2012 | Pipe | 02-0400_02-0390 | Neptune Ave. | 350 | Roots | VCP | Liner | 2 | 13.5 | 8 | 1964 | 53 | > 50 | $ 64,750 | |
| 11/17/2011 | Pipe | 01-1430_01-1440 | Neptune Ave. | 370 | Roots | VCP | Liner | 2 | 9 | 8 | 1964 | 53 | > 50 | $ 68,450 | |
| 11/15/2011 | Pipe | 01-1380_01-1370 | Neptune Ave. | 263 | Roots in joints | VCP | Liner | 2 | 8 | 8 | 1964 | 53 | > 50 | $ 48,655 | |
| 12/8/2014 | Pipe | 01-0160_01-0150 | Vulcan Ave. | 318 | Circum. Crack/roots | VCP | Short liner | 2 | 12 | 8 | 1962 | 55 | > 50 | $ 58,830 | |
| 1/22/2014 | Pipe | 11-9040_11-9030 | Unicornio Street | 226 | Infiltration/scale | VCP | Short liner | 2 | 11 | 8 | 1970 | 47 | 40-49 | $ 41,810 | |
| **GRADE 2 PIPELINE SUBTOTAL** | | | | **6,944** | | | | | | | | | | **$ 1,248,765** | |
| | Manhole | MH 04-1000 | Kildeer Court Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 12,000 | |
| | Manhole | MH 04-2810 | Andrew Ave. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 6 | N/A | | 2017 | | $ 12,000 | |
| | Manhole | MH 10-0220 | La Costa Ave. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 12,000 | |
| | Manhole | MH 10-9640 | Managua Pl. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 12,000 | |
| | Manhole | MH 10-9440 | Llama St. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 6 | N/A | | 2017 | | $ 10,000 | |
| | Manhole | MH 10-9680 | Managua Pl. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 6 | N/A | | 2017 | | $ 10,000 | |
| | Manhole | MH 11-1665 | El Fuerte St. Easement | N/A | Infiltration/deterioration | N/A | MH Rehab. | 2 | 6.5 | N/A | | 2017 | | $ 10,000 | |
| | Manhole | MH 04-0200 | Piraeus Street | N/A | Infiltration | N/A | MH Rehab. | 2 | 8.5 | N/A | | 2017 | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-10840 | Leucadia Blvd. | N/A | CLASS 2 | N/A | MH Rehab. | 2 | 9 | 8 | | 2017 | | $ 1,500 | |
| 10/10/2013 | Manhole | MH 09-10850 | Leucadia Blvd. | N/A | CLASS 2 | N/A | MH Rehab. | 2 | 10 | 8 | | 2017 | | $ 6,000 | |
| 10/10/2013 | Manhole | MH 09-10910 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 2 | 12 | 8 | | 2017 | | $ 7,500 | |
| 10/10/2013 | Manhole | MH 09-7130 | Town Center | N/A | H2S Damage | N/A | MH Rehab. | 2 | 14 | 8 | | 2017 | | $ 1,500 | |
| 1/13/2014 | Manhole | MH 11-0520 | Easement #26 / Golf Course | N/A | H2S Damage on shelf | N/A | MH Rehab. | 2 | 8 | 8 | | 2017 | | $ 10,000 | |
| 2/3/2014 | Manhole | MH 01-0290 | Hermes/Cereus St. | N/A | H2S Damage | N/A | MH Rehab. | 2 | 8.5 | 8 | | 2017 | | $ 1,500 | |
| 3/17/2015 | Manhole | MH 11-0540 | Easement #26 / Costa Del Mar | N/A | Sancon Peeling Off | N/A | Rehab | 2 | 6 | N/A | | 2017 | | $ 10,000 | |
| 1/23/2014 | Manhole | MH 11-0680 | Easement #25 / Golf Course | N/A | Blisters on Sancon | N/A | Rehab | 2 | 14 | N/A | | 2017 | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-7400 | Leucadia Blvd. | N/A | H2S Damage on shelf | N/A | MH Rehab. | 2 | 12 | N/A | | 2017 | | $ 10,000 | |
| 12/30/2014 | Manhole | MH 04-2850 | La Costa Avenue | N/A | H2S Damage | N/A | MH Rehab. | 2 | 7.5 | N/A | | 2017 | | $ 10,000 | |
| 5/19/2014 | Manhole | MH 09-0860 | El Camino Real | N/A | Roots | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 10,000 | |
| 3/20/2014 | Manhole | MH 03-0850 | N. Vulcan Rd. | N/A | Roots | N/A | MH Rehab. | 2 | 14.5 | N/A | | 2017 | | $ 10,000 | |
| 4/14/2014 | Manhole | MH 04-2880 | La Costa Avenue | N/A | H2S Damage on shelf | N/A | MH Rehab. | 2 | 10 | N/A | | 2017 | | $ 10,000 | |
| 10/29/2012 | Manhole | MH 08-1665 | Orchard Wood Easement | N/A | Infiltration - roots | N/A | MH Rehab. | 2 | 6.5 | N/A | | 2017 | | $ 10,000 | |
| 6/12/2014 | Manhole | MH 07-0660 | Linda Sue Lane | N/A | Roots/Infiltration | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 10,000 | |
| 6/12/2014 | Manhole | MH 07-0680 | Recluse Lane | N/A | Roots/Infiltration | N/A | MH Rehab. | 2 | 9 | N/A | | 2017 | | $ 10,000 | |
| 6/12/2014 | Manhole | MH 07-0480 | Raphael Ct. | N/A | Roots/Infiltration | N/A | MH Rehab. | 2 | 8 | N/A | | 2017 | | $ 10,000 | |
| 6/18/2013 | Manhole | MH 07-0950 | Edge Field Lane | N/A | Infiltration | N/A | MH Rehab. | 2 | 10 | N/A | | 2017 | | $ 10,000 | |
| 2/26/2014 | Manhole | MH 11-0700 | Costa Del Mar | N/A | Infiltration | N/A | MH Rehab. | 2 | 9.5 | N/A | | 2017 | | $ 10,000 | |
| 1/22/2014 | Manhole | MH 11-9030 | Unicornio Street | N/A | Infiltration/scale in channel | N/A | MH Lining | 2 | 10 | N/A | | | | $ 7,500 | FY17/FY18 CIPP Lining Project |
| 1/22/2014 | Manhole | MH 11-9025 | Unicornio Street | N/A | Infiltration/scale in channel | N/A | MH Lining | 2 | 6 | N/A | | | | $ 7,500 | FY17/FY18 CIPP Lining Project |
| 1/23/2014 | | SAXONY P.S. | Wetwell | N/A | Sancon Peeling Off | N/A | Rehab | 2 | 11 | N/A | | 2017 | | | |
| 8/11/2015 | Pipe | 04-1590_04-1580 | Caudor Street | 65 | | VCP | Liner | 1 | 9 | 6 | 1968 | 49 | 40-49 | $ 12,025 | |
| 3/25/2013 | Pipe | 08-0570_08-0560 | Easement - Jacaranda | 148 | Minor roots in joint | VCP | Liner | 1 | 10 | 8 | 1974 | 43 | 40-49 | $ 27,380 | |
| 7/16/2015 | Pipe | 07-7070_07-7060 | Woodmoss St. Easement | 347 | Infiltration at joint | PVC | Short liner | 1 | 12 | 8 | 1977 | 40 | 40-49 | $ 64,195 | |

Table 5-7
Repair Priority List

| Date Found | Facility Type | Line Segment / Manhole | Street | Segment Footage | Defect(s) | Pipe Type | Repair Type | Repair Priority | Depth (in feet) | Pipe Size (inches) | Year Installed | Pipe Age | Age Range | Estimated Cost to Repair | CIP Project Name |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/27/2011 | Pipe | 01-0440_01-0420 | Easement #99 | 225 | Offset joint | PVC | Dig up | 1 | 7.5 | 8 | 1975 | 42 | 40-49 | $ 41,625 | |
| 6/28/2013 | Pipe | 10-0480_10-0470 | South Golf Course | 300 | Roots | VCP | Liner | 1 | 4 | 18 | 1970 | 47 | 40-49 | $ 55,500 | |
| 7/22/2015 | Pipe | 04-1280_04-1270 | Noma Lane | 318 | Multiple cracks/roots in joints | VCP | Liner | 1 | 8.5 | 8 | 1968 | 49 | 40-49 | $ 58,830 | |
| 11/6/2013 | Pipe | 10-0720_10-0715 | La Costa south unit #3 | 194 | Roots | VCP | Liner | 1 | 7 | 8 | 1969 | 48 | 40-49 | $ 35,890 | |
| 10/25/2012 | Pipe | 08-0290_08-0280 | Easement #60 - Scott's Valley | 350 | Minor infiltration | VCP | Liner | 1 | 7.5 | 18 | 1973 | 44 | 40-49 | $ 64,750 | |
| 10/25/2012 | Pipe | 08-0295_08-0290 | Easement #60 - Scott's Valley | 345 | Minor infiltration | VCP | Liner | 1 | 7.5 | 18 | 1973 | 44 | 40-49 | $ 63,825 | |
| 6/28/2013 | Pipe | 10-0200_10-0190 | South Golf Course | 312 | Roots | VCP | Liner | 1 | 7 | 18 | 1970 | 47 | 40-49 | $ 57,720 | |
| | Pipe | 05-0495_05-0490 | Encinitas Blvd | 167 | Minor roots | VCP | | 1 | 11 | 8 | 1973 | 44 | 40-49 | $ 30,895 | |
| | Pipe | 01-0690_01-0700 | Hermes | 350 | Minor infiltration | VCP | | 1 | 9 | 8 | 1963 | 54 | > 50 | $ 64,750 | |
| 10/29/2014 | Pipe | 01-1540_01-1530 | Daphne Street | 244 | Minor roots | VCP | | 1 | 4.5 | 8 | 1964 | 53 | > 50 | $ 45,140 | |
| 11/8/2011 | Pipe | 01-1320_01-1310 | Neptune Ave. | 256 | Roots | VCP | Liner | 1 | 10.5 | 8 | 1964 | 53 | > 50 | $ 47,360 | |
| 12/20/2013 | Pipe | 11-0170_11-2225 | Golf Course | 274 | Roots | PVC | Liner | 1 | 11 | 15 | 2003 | 14 | 10-19 | $ 15,000 | |
| 12/20/2013 | Pipe | 11-0460_11-0465 | Golf Course - Easement #22 | 87 | Roots | VCP | Liner | 1 | 6.5 | 8 | 1965 | 52 | > 50 | $ 16,095 | |
| 6/28/2013 | Pipe | 10-0600_10-0590 | South Golf Course | 177 | Roots | VCP | Liner | 1 | 5 | 15 | 1970 | 47 | 40-49 | $ 32,745 | |
| 6/28/2013 | Pipe | 10-0620_10-0590 | Alicante Hills - Easement #27 | 289 | Roots | PVC | Liner | 1 | 10 | 10 | 1973 | 44 | 40-49 | $ 53,465 | |
| 11/15/2011 | Pipe | 01-1390_01-1380 | Neptune Ave. | 294 | Roots | VCP | Liner | 1 | 10 | 8 | 1964 | 53 | > 50 | $ 54,390 | |
| 6/28/2013 | Pipe | 10-0590_10-0580 | South Golf Course | 261 | Roots | VCP | Liner | 1 | 6 | 15 | 1970 | 47 | 40-49 | $ 48,285 | |
| 11/8/2011 | Pipe | 01-1330_01-1320 | Neptune Ave. | 154 | Roots | VCP | Liner | 1 | 10 | 8 | 1964 | 53 | > 50 | $ 28,490 | |
| 9/3/2013 | Pipe | 10-1830_10-0540 | La Costa south unit #5 | 236 | Roots | VCP | Liner | 1 | 8 | 8 | 1969 | 48 | 40-49 | $ 43,660 | |
| 4/24/2012 | Pipe | 03-0900_03-0890 | La Costa Avenue | 212 | Roots | VCP | Liner | 1 | 8 | 8 | 1966 | 51 | > 50 | $ 39,220 | |
| 11/14/2011 | Pipe | 01-1300_01-1270 | Neptune Ave. | 290 | Roots | VCP | Liner | 1 | 9 | 8 | 1964 | 53 | > 50 | $ 53,650 | |
| 3/8/2012 | Pipe | 02-0620_02-0610 | Parliament Road | 64 | Crack | VCP | Liner | 1 | 13 | 8 | 1972 | 45 | 40-49 | $ 11,840 | |
| 2/1/2012 | Pipe | 02-0420_02-0410 | Neptune Ave. | 375 | Crack | VCP | Liner | 1 | 12.5 | 8 | 1964 | 53 | > 50 | $ 69,375 | |
| 2/19/2014 | Pipe | 11-1675_11-1670 | Easement #18 / Acuna Court | 280 | Roots in joint | PVC | Short liner | 1 | 5 | 8 | 1975 | 42 | 40-49 | $ 51,800 | |
| 12/5/2012 | Pipe | 07-0710_07-0190 | Overland Rd. | 193 | Cracked line due to unknow object penetrating line | PVC | Short liner | 1 | 6 | 8 | 1978 | 39 | 30-39 | $ 15,000 | |
| 10/23/2014 | Pipe | 01-0030_01-0020 | Vulcan Ave. | 222 | Broken pipe | PVC | Liner | 1 | 5 | 6 | 1986 | 31 | 30-39 | $ 15,000 | |
| 4/4/2012 | Pipe | 03-0550_03-0540 | Hillcrest Drive | 350 | Section with multiple cracks | VCP | Liner | 1 | 7 | 8 | 1966 | 51 | > 50 | $ 64,750 | |
| 1/19/2012 | Pipe | 01-0130_01-1220 | Vulcan Ave. | 203 | Crack near manhole | VCP | Short liner | 1 | 15 | 8 | 1962 | 55 | > 50 | $ 37,555 | |
| 9/5/2013 | Pipe | 10-1325_10-1070 | Easement #47 | 137 | Offset joint | VCP | Short liner | 1 | 7 | 8 | 1970 | 47 | 40-49 | $ 25,345 | |
| **GRADE 1 PIPELINE SUBTOTAL** | | | | | | | | | | | | | | **$ 1,345,550** | |
| 10/8/2013 | Manhole | MH 09-10830 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 1 | 9 | N/A | | | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-10875 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 1 | 10 | N/A | | | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-10880 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 1 | 14 | N/A | | | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-10900 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 1 | 18 | N/A | | | | $ 10,000 | |
| 10/10/2013 | Manhole | MH 09-9500 | Leucadia Blvd. | N/A | H2S Damage | N/A | MH Rehab. | 1 | 8 | N/A | | | | $ 10,000 | |
| 6/2/2014 | Manhole | MH 11-0530 | Easement #26 / Golf Course | N/A | Roots penetrating MH Lining | N/A | MH Rehab. | 1 | 10 | N/A | | | | $ 10,000 | |
| 3/17/2015 | Manhole | MH 11-0550 | Easement #27 / Costa Del Mar | N/A | Sancon Peeling/Bubbling | N/A | Rehab | 1 | 12 | N/A | | | | $ 10,000 | |
| 12/3/2014 | Manhole | MH 04-1890 | Olympus St. | N/A | Roots from Joint | N/A | MH Rehab. | 1 | 7.5 | N/A | | | | $ 10,000 | |
| 4/9/2014 | Manhole | MH 04-1860 | Sparta St. | N/A | Roots | N/A | MH Rehab. | 1 | 5.5 | N/A | | | | $ 10,000 | |
| 4/2/2014 | Manhole | MH 04-1750 | Capri/Gascony Rd. | N/A | Roots from Joint | N/A | MH Rehab. | 1 | 12.5 | N/A | | | | $ 10,000 | |
| 8/1/2013 | Manhole | MH 08-1740 | Meadowglen Way | N/A | Roots | N/A | MH Rehab. | 1 | 9 | N/A | | | | $ 10,000 | |
| 1/22/2015 | Manhole | MH 08-1830 | Starflower/Scott Ct. | N/A | Roots | N/A | MH Rehab. | 1 | 21 | N/A | | | | $ 10,000 | |

# CHAPTER 6

## PUMP STATIONS

The District has ten pump stations, the characteristics of which were discussed in detail in Chapter 2 and are summarized in Table 2-4 and reproduced as Table 6-1 below. This chapter describes the pump station overview sheets that were created for each station, the projection of flows anticipated at each station, recommendations for management of the pump station assets, and finally specific projects to implement in the 5-Year and 20-Year CIP. Long-term (20-Year) financial planning for the District pump stations, including their respective force mains, is discussed in this chapter. However, the management of the force main assets and their 5-Year CIP projects are discussed in Chapter 7.

**TABLE 6-1**
**SUMMARY OF DISTRICT PUMP STATION CHARACTERISTICS**

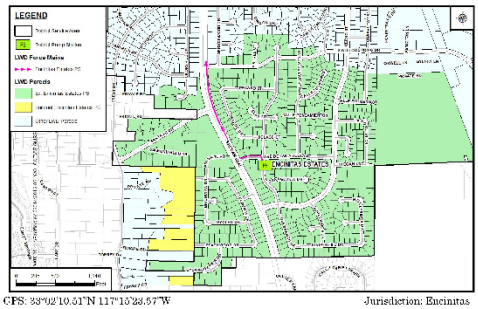
| Pump Station | No. of Pumps | Capacity,[1] gpm | Motor Speed | Originally Built | Remarks |
|---|---|---|---|---|---|
| Avocado | 2 | 300 | Constant | 1961 | Station replaced in 2010 as submersible station |
| Batiquitos | 4 | 8,440 | Variable | 1974 | Station Improved in 2013 |
| Diana | 2 | 750 | 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 2014 |
| Leucadia | 4 | 4,880 | Variable | 1974 | Station Improved & Pumps replaced in 2006 |
| Rancho Verde | 2 | 185 | Constant | 1996 | - |
| Saxony | 2 | 900 | Constant | 1962 | Station Improved & Pumps replaced in 2016 |
| Village Park 5 | 2 | 215 | Constant | 1974 | Station replaced in 2017 as submersible station |
| Village Park 7 | 2 | 200 | Constant | 1973 | - |

[1] Pump capacities represent nameplate information.

## PUMP STATION OVERVIEW SHEETS

As part of this master plan, detailed pump station overview sheets have been developed with critical information on each pump station. These are provided in Appendix F (sample below) and should be updated as components are revised.

**ENCINITAS ESTATES PUMP STATION OVERVIEW**




GPS: 33°02'10.51"N 117°15'23.57"W Jurisdiction: Encinitas

Design Information

**Pumps** – 2 Wet Pit/Dry Pit installed in 1999 Smith & Loveless package pump station
Size: 450 gpm each at 145 ft. Static Lift: 110 ft.

**Power**
480V 3Ø Motors: 40 HP and 1,760 RPM
Generator: Yes 45 kW Fuel Storage: Natural Gas
Soft Start: Yes VFD: No
ATS: Yes Auto Transfer back to Commercial: No
Emergency Generator Hookup: Yes, with manual transfer switch

**Security** –Fenced

**Force Main** – 1 with a diameter of 6" made of PVC
Length: 2,230 ft. Velocity at 450 gpm: 5.11 fps
Meter Onsite: No Discharge MH #: 05-9080

Date Revised: 5/16/2018

Operational Information

**Existing EDUs and Flow**
EDUs to Station: 654.5
Existing gpd/EDU: 117 gpd/EDU
Flow to Station:
0.077 mgd = 53 gpm (117 gpd/EDU)
0.141 mgd = 98 gpm (215 gpd/EDU)
Peak Hr. Flow to Station: Factor 2.48
0.190 mgd = 132 gpm (117 gpd/EDU)
0.349 mgd = 242 gpm (215 gpd/EDU)
Peak 15 Min. Flow to Station: Factor 3.01
0.230 mgd = 160 gpm (117 gpd/EDU)
0.424 mgd = 294 gpm (215 gpd/EDU)

**Buildout EDUs and Flow**
EDUs to Station: 713
Buildout gpd/EDU: 117 gpd/EDU
Flow to Station:
0.083 mgd = 58 gpm (117 gpd/EDU)
0.153 mgd = 106 gpm (215 gpd/EDU)
Peak Flow to Station: Factor 2.48
0.207 mgd = 144 gpm (117 gpd/EDU)
0.380 mgd = 264 gpm (215 gpd/EDU)
Peak 15 Min. Flow to Station: Factor 3.01
0.251 mgd = 174 gpm (117 gpd/EDU)
0.461 mgd = 320 gpm (215 gpd/EDU)

**Design Control Information**
Wet Well Set Points: 87" Lead On
32" Lead Off
Other Set Points:
Operational Volume: 970 gal
Design Pump Starts: 6 per hour

**Actual Control Information**
Actual Set Points: 47" Lead On
36" Lead Off
Other Set Points: 50"/36" Lag On/Off
56"/60" HWL/HHWL
Actual Operational Volume: 195 gal
Actual Pump Starts: 14 per hour

**Emergency Storage Volume**
Wet Well Storage: 1,330 gal
Overflow Basin Storage: 0 gal
Average Storage Time: 25 min
Bypass Pumping Capability: Yes
Spills Before Station: Yes
MH# for Spill Over Point: 05-7070

Date Revised: 5/16/2018

## BUILDOUT FLOW COMPARISON

The number of buildout EDUs anticipated within each pump station basin was determined. Additionally, utilizing the District's seven submeters, an average wastewater generation rate in gpd/EDU was determined based on FY17 data. The FY17 data was also utilized to estimate the Peak Hour and Peak 15 Minute wet weather flow factors relative to the average dry weather flow. The results of this analysis are summarized in Table 6-2.

**TABLE 6-2**
**PUMP STATION BASIN EDUS, GENERATION RATES, AND PEAKING FACTORS**

| Pump Station | Buildout EDUs | Meter gpd/EDU | Peak Hour Factor | Peak 15 min Factor |
|---|---|---|---|---|
| Avocado | 629 | 153 | 3.20 | 3.40 |
| Batiquitos | 31,974 | 138 | 2.66 | 2.86 |
| Diana | 2,801 | 153 | 3.20 | 3.40 |
| Encinitas Estates | 713 | 117 | 2.48 | 3.01 |
| La Costa[1] | 4,620 | 128 | 3.11 | 3.25 |
| Leucadia[2] | 25,074 | 136 | 2.65 | 2.89 |
| Rancho Verde | 255 | 199 | 2.37 | 2.40 |
| Saxony | 1,648 | 140 | 4.29 | 4.50 |
| Village Park 5 | 298 | 117 | 2.48 | 3.01 |
| Village Park 7 | 91 | 117 | 2.48 | 3.01 |

[1] Peaking factors based on submeter L4 rather than L7 because of inconsistent data readings by L7.
[2] Peaking Factors based on an average of submeters L2, L3, and L4 due to inconsistent data readings by L5.

Utilizing the data from Table 6-2, Table 6-3 was created to compare the buildout Peak Hour and Peak 15 Minute flows that are anticipated at each station against the pumping rate from the station at peak flow.

Several stations have peak flow pumping rates that match very closely to the buildout peak wet weather flow rates assuming the 215 gpd/EDU generation rate but may be oversized when considering actual generation rates in the basin. These include Avocado, Diana[1], La Costa, and Leucadia. For these stations, it is recommended to closely evaluate current and anticipated flows to the station at the time that replacement of the pumps is necessary to determine whether pumping capacity should be reduced to better match existing generation rates. If pumping capacity is reduced, the evaluation also needs to consider flow velocity within the force mains to prevent buildup of solids.

1. See additional discussion of flows to the Diana Pump Station later in this chapter.

Four pump stations' peak flow pumping capacity exceeds all flow projections; namely Encinitas Estates, Rancho Verde, Village Park 5, and Village Park 7. For these pump stations, the District could consider flow monitoring upstream of the station to validate the wastewater generation rates and/or evaluate pump run time information prior to implementation of pump replacements. In particular, this would occur at Encinitas Estates, Rancho Verde, and Village Park 7.

At the Saxony Pump Station, there is insufficient pumping capacity at the 215 gpd/EDU generation rate, but sufficient capacity exists at the current average 140 gpd/EDU generation rate within the basin (and up to 180 gpd/EDU). Revising the pump size should be evaluated when the condition of the pumps warrants their replacement.

At the Batiquitos Pump Station, the table below only includes the District flows. The District should contact Encinitas to understand their buildout flow projections at the time pump improvements are necessary at the station.

**TABLE 6-3**
**PUMP STATION CAPACITY VERSUS BUILDOUT FLOWS**

| Pump Station | Number of Pumps at Peak Flows | Pumping Rate at Peak Flow (gpm) | Peak Hour Buildout Flow (gpm) | | Peak 15 min Buildout Flow (gpm) | |
|---|---|---|---|---|---|---|
| | | | 215 gpd/EDU | Meter gpd/EDU[1] | 215 gpd/EDU | Meter gpd/EDU[1] |
| Avocado | 1 of 2 | 300 | 301 | 214 | 319 | 227 |
| Batiquitos[2] | 2 of 4 | 16,880 | 12,699 | 8,170 | 13,653 | 8,784 |
| Diana | 2 of 2 | 1,500 | 1,338 | 952 | 1,422 | 1,012 |
| Encinitas Estates | 1 of 2 | 450 | 264 | 144 | 320 | 174 |
| La Costa | 1 of 2 | 2,200 | 2,145 | 1,277 | 2,242 | 1,335 |
| Leucadia | 2 of 4 | 9,760 | 9,921 | 6,267 | 10,819 | 6,835 |
| Rancho Verde | 1 of 2 | 185 | 90 | 84 | 91 | 85 |
| Saxony | 1 of 2 | 900 | 1,056 | 687 | 1,107 | 721 |
| Village Park 5 | 1 of 2 | 215 | 110 | 60 | 134 | 73 |
| Village Park 7 | 1 of 2 | 200 | 34 | 18 | 41 | 22 |

[1] See Table 6-2.

[2] Flow rates are District only; however, Pumping Rate is total station (serving District and Encinitas).

**Batiquitos Bypass Pumping**

As existing flows and future flow projections have dropped over time, the District could consider bypassing the Batiquitos Pump Station (for a portion of the District's flow) by pumping directly from the Leucadia Pump Station into one of the Batiquitos force mains. This would reduce the equipment wear at Batiquitos Pump Station and the District's overall electricity costs. The required improvements are shown in Figure 6-1. Additional engineering analysis should be completed; however, preliminary calculations indicate the approach to be viable.

## EMERGENCY POWER

In the event of a power failure, emergency power is provided to each of the pump stations via either a permanent, on-site generator or connection of one of the District's trailer-mounted portable generators. The emergency power supply for each station is summarized in Table 6-4 below.

**TABLE 6-4**
**PUMP STATION EMERGENCY POWER SUPPLY**

| Pump Station | Permanent Generator Onsite | Trailer-Mounted Portable Generator |
|---|---|---|
| Avocado | No | Yes |
| Batiquitos | Yes | No |
| Diana | No | Yes |
| Encinitas Estates | Yes | Yes |
| La Costa | Yes | No |
| Leucadia | Yes | No |
| Rancho Verde | No | Yes |
| Saxony | Yes | Yes |
| Village Park 5 | Yes | Yes |
| Village Park 7 | No | Yes |

## LEGEND

- PS — District Pump Station
- Batiquitos Bypass
- District Gravity Sewers
- District Force Mains
- B1 Failsafe

B2 Force Main

B3 Force Main

IE: 2.26

IE: 2.22

BATPS

PS

CARLSBAD BL

PRIVATE RD

IE: 39.81

IE: 43.87

LA COSTA AV

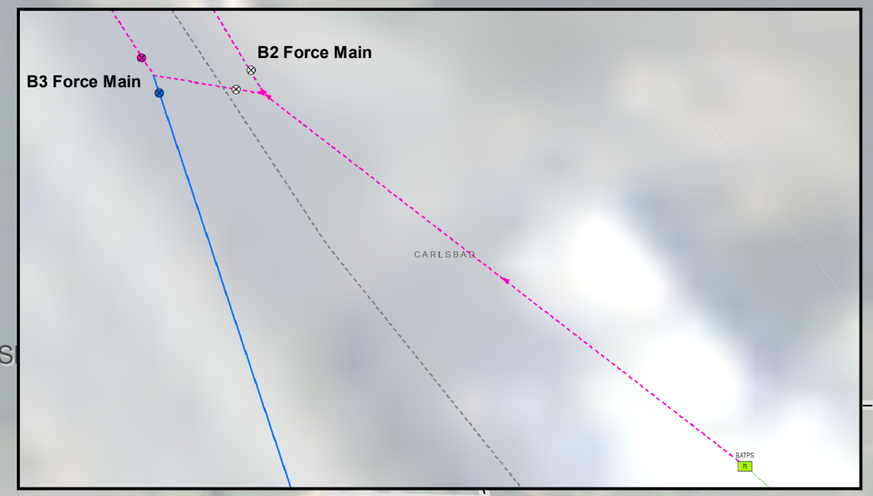
N VULCAN AV

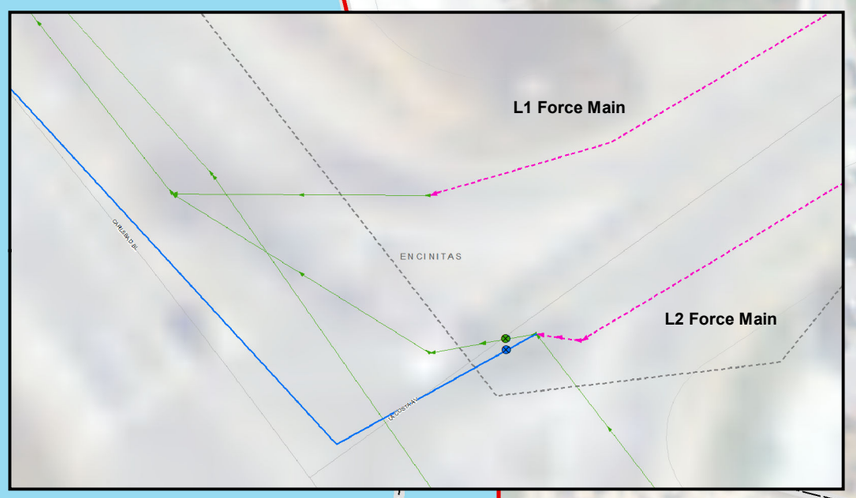
ENCINITAS

L1 Force Main

L2 Force Main

Moonlight Force Main




0 100 200 400 Feet

\\Articlgis\103017\Report Figures\1st_Submittal\Figure_6-1_Batiquitos Bypass.mxd

LEUCADIA WASTEWATER DISTRICT

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# FIGURE 6–1

BATIQUITOS BYPASS
FORCE MAIN

LEUCADIA WATERWATER DISTRICT
2018 ASSET MANAGMENT PLAN

## ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

District field services staff visits each of the pump stations on a weekly basis to inspect the general condition of the pump station, checking for odors, vandalism, water leaks, and performing necessary corrective and preventative maintenance tasks. Detailed condition assessments of pump stations have occurred as described below.

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.

Following the 2013 AMP, in 2014, IEC was again tasked with inspection of the District's pump stations, this time for all ten pump stations. Projects completed or nearly complete since the assessment include replacement of the Village Park No. 5 Pump Station as well as upgrades to the Batiquitos, La Costa, and Saxony Pump Stations. Appendix G – Pump Station Inspections and Improvements, summarizes the improvements that have occurred at each station on a fiscal year basis.

Annual cathodic protection inspections of the pump station force mains for Leucadia and Batiquitos of approximately $1,000 is captured in the Operations and Maintenance budget. La Costa and Village Park 7 Pump Stations both have impressed current cathodic protection systems.

## FUTURE ASSET MANAGEMENT PLAN IMPLEMENTATION

The approach of conducting a thorough condition evaluation/assessment by a specialized group of professional engineers has worked well. In FY14, all pump stations were inspected except for the La Costa Pump Station as it was going through an upgrade at the time of inspection. The 2014 inspection resulted in a prioritized list of projects which, for the most part, have been implemented. Going forward, it is recommended that future pump station inspection efforts be staggered based on the previous inspection, age of the asset, needs identified by the District, and the projected date of project implementation.

To that end, for the FY19 assessment, inspection should be a full condition assessment (Controls, Mechanical, Electrical, and Structural) for Avocado Pump Station, Diana, Rancho Verde Pump Station, and Village Park 7. The FY19 assessment would also include the inspection of the La Costa Pump Station wet well. Table 6-5 summarizes the inspection cycles recommended by component at each of the stations. The condition assessments should be completed in the year prior to the planned CIP project (or sooner). For the specific components types, the general replacement and inspection schedule will be as follows:
:

- Controls – Replace every ten years, thus inspect after nine years.

- Electrical – Replace every 20 years at satellite stations and 10 years at Batiquitos and Leucadia. Inspect all after nine years.

- Mechanical – Replace every 20 years at satellite stations and 10 years at Batiquitos and Leucadia. Inspect all after nine years.

- Structural – Replace cast-in-place larger stations after 100 years and precast smaller stations after 50 years. Inspect after nine years for 10-year maintenance.

**TABLE 6-5**
**PUMP STATION INSPECTION/ASSESSMENT SCHEDULE**
**BY FISCAL YEAR AND COMPONENT**

| Pump Station | FY19 | FY20 | FY21 | FY22 | FY23 |
|---|---|---|---|---|---|
| Avocado | Full | - | - | - | - |
| Batiquitos | S (Emer. Wet Well | - | - | Full | - |
| Diana | Full | - | - | - | - |
| Encinitas Estates | - | - | - | - | - |
| La Costa | S (Wet Well) | - | E, C | - | - |
| Leucadia | - | C | - | - | - |
| Rancho Verde | - | Full | - | - | - |
| Saxony | - | - | M, E | - | - |
| Village Park 5 | - | - | - | - | - |
| Village Park 7 | - | - | Full | - | - |

Full = Full Assessment of Controls (C), Electrical (E), Mechanical (M), and Structural (S)

The District should consider the preparation of a detailed checklist of component inspection for each station. The basis for this would be prior inspection reports by IEC (and others) with additions by staff as appropriate.

The District should also consider the maintenance of a pump station component tracking database. This would be used to track improvements and associated costs to better project future spending. This would combine the efforts already occurring as part of the SSMP audit process as well as the financial tracking done for capital asset depreciation.

## 5-YEAR CIP AND DISCUSSION

The 5-Year CIP for pump stations is primarily based upon the 2014 pump station evaluations coordinated by IEC, as well as projects subsequently identified by District field services staff. Each of the projects discussed below is included in the 5-Year CIP, the scope of which may be revised based on inspections.

### Avocado Pump Station Projects

**Avocado Pump Station Upgrade Project.** The estimated cost for this project is $452,250 based on the replacement planning costs for controls, electrical, and mechanical. Project scope (to be confirmed during inspection) includes:

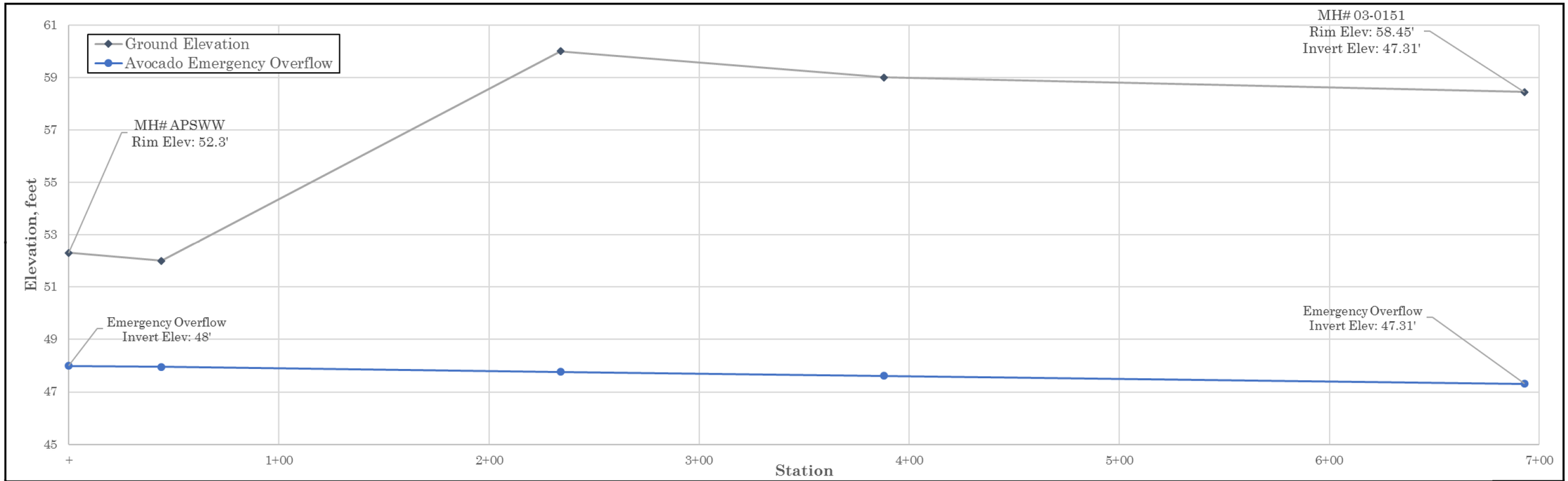
From FY14 report:

- upgrade controls from Opto-22 to Allen Bradley
- Replace main breaker

Staff Input

- Replace pumps with chopper pumps and purchase 3rd spare pump (existing pumps installed in 2010).

**Avocado Emergency Overflow.** The Avocado Pump Station does not presently have back-up power. Additionally, the station does not have emergency storage. One option for the District to consider is an emergency gravity overflow line. For Avocado Pump Station, approximately 693 feet of gravity sewer would be constructed. This 12-inch emergency overflow line would be approximately 3 feet below the surface and discharge to existing MH 03-0151. Figure 6-2 shows the conceptual plan and profile for the overflow line. The estimated cost for this line is approximately $350,000.







## LEGEND

- Avocado Emergency Overflow

**Gravity Sewer**

- Avocado Gravity Sewer
- Batiquitos Gravity Sewer

**Force Mains**

- Avocado PS Force Main
- Moonlight PS Force Main

0 40 80 160 Feet

LEUCADIA WASTEWATER DISTRICT

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# FIGURE 6-2

AVOCADO PUMP STATION
EMERGENCY GRAVITY OVERFLOW

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

DEXTER WILSON ENGINEERING INC.
Document Path: \Arti\gis\103017\Report Figures\1st_Submittal\Figure_6-2 Avocado Emergency Overflow.mxd
Date Saved: 4/26/2018 10:54:49 AM

## Batiquitos Pump Station Projects

**Batiquitos Generator Replacement Project.** This project consists of replacing the existing 500kW generator with one of the same size. The estimated cost is $700,000 as provided by the District based on the Leucadia Pump Station generator replacement.

## Diana Pump Station Projects

Presently, with two pumps operating and two force mains operating, the station is not able to keep up with peak wet weather flows. In review of the count of existing EDUs, average flow rates in the meter basin, and typical peaking factors, the 1,400 gpm pumping capacity of the station should be sufficient to accommodate the influent flows. The need to bring in pumping support during a peak wet weather event indicates that either (1) the pumping capacity is not as anticipated (i.e. is less than 1,400 gpm) or (2) there is significant inflow and/or infiltration during peak wet weather events. The pumps should be evaluated to confirm they are pumping at 1,400 gpm. Additionally, the District should focus on reducing inflow and infiltration into the gravity system in this basin via inflow domes in manholes, smoke testing, and lining projects with lateral top hats.

**Diana Pump Station Upgrade Project.** The estimated cost for this project is $600,750 based on the replacement planning costs for controls, electrical, and mechanical. Project scope includes:

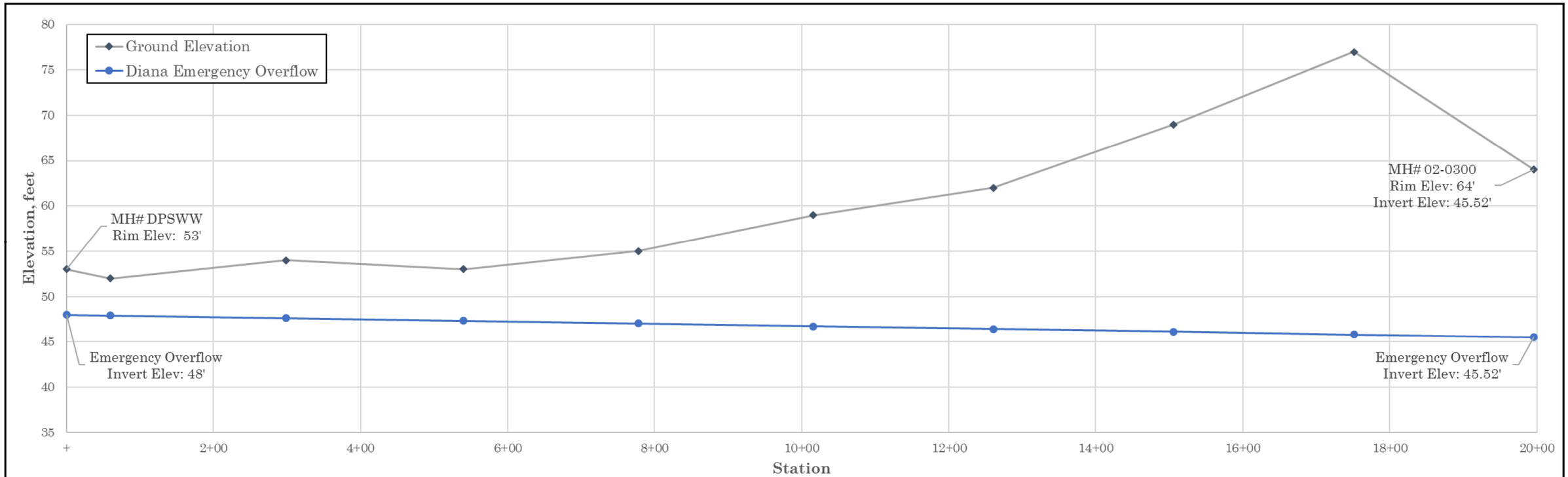
From FY14 report:

- upgrade controls from Opto-22 to Allen Bradley
- Replace main breaker

Staff Input

- Improve weather-proof enclosure
- Replace pumps with chopper pumps and purchase 3rd spare pump (existing pumps installed in 2010)

**Diana Emergency Overflow Project.** The Diana Pump Station does not presently have back up power. Additionally, the station does not have emergency storage. For Diana Pump Station, approximately 1,996 feet of gravity sewer would be constructed. This emergency overflow line would be approximately 3 feet below the surface at its shallowest point and discharge to existing MH 02-0300. Figure 6-3 shows the conceptual plan and profile for the overflow line. The estimated cost for this line is approximately $900,000.







## LEGEND

Diana Emergency Overflow

**Gravity Sewer**

- Diana Gravity Sewer
- Avocado Gravity Sewer
- Batiquitos Gravity Sewer

**Force Mains**

- Diana PS Force Main
- Moonlight PS Force Main

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# FIGURE 6-3

DIANA PUMP STATION
EMERGENCY GRAVITY OVERFLOW

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

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DEXTER WILSON ENGINEERING INC.
Document Path: \Art\cigis\10301?\Report Figures\1st_Submittal\Figure_6-3 Diana Emergency Overflow.mxd

**Diana Emergency Generator Project.** A possible alternative to the Diana Emergency Overflow would be the addition of an emergency generator for the Diana Pump Station. The City of Encinitas is currently in the process of renovating Leucadia's North Coast Highway 101 Corridor which would be an ideal opportunity to add a generator on the east side of Highway 101 across form Diana Street. This project would require the approval of the North County Transit District because the proposed location is within their right of way.

## Encinitas Estates Replacement Project

The FY14 condition assessment recommended complete replacement with submersible station (except for the force mains). This project is currently planned for FY19. Conduct assessment prior to replacement. The planning level cost for this project is $1,195,000.

## Leucadia Pump Station Projects

**Leucadia Pump Station Rehabilitation Project.** FY18 project includes replacement of VFDs, pumps and associated piping and valving replacement as well as remaining miscellaneous items from the FY14 assessment (lighting, concrete, etc.) as described in Appendix H. The planning level cost as provided in the preliminary design report is $3,670,000.

## Rancho Verde Pump Station Improvement Project

The estimated cost for this project is $371,250 based on the replacement planning costs for controls, electrical, and mechanical. Project scope (to be confirmed during inspection) includes:

From FY14 report:

- upgrade controls from Opto-22 to Allen Bradley
- Replace select mechanical, electrical, and site components including check valves, isolation valves, bypass piping, level controls, and site paving (among others)

Staff input:

- Line wet well (on RPL)
- Evaluate whether 480V service is possible

**Village Park 5 Pump Station Replacement Project**

The replacement of this station completed in early FY18. The force main and emergency generator were not replaced. The FY18 costs associated with this project were $814,587.

**Village Park 7 Pump Station Rehabilitation Project**

The estimated cost for this project is $371,250 based on the replacement planning costs for controls, electrical, and mechanical. The FY14 report recommended rehabilitation in the five year time frame and replacement in 20 years.

**Additional Pump Station Projects**

**L07 Meter Relocation.** This meter is located on the force main discharge of the La Costa Pump Station and should be relocated based on erratic meter readings. This could be part of the overall La Costa Pump Station Replacement if the station is relocated, or if the station is replaced where it is, the meter could be relocated. A planning cost of $20,000 is included in the 5-Year CIP.

**Pump Station Condition Assessment**. A planning cost of $30,000 is included in FY19 to conduct the pump station inspections outlined previously in this chapter.

**General Pump Station Improvements**

The 5-Year CIP also includes placeholder expenses for improvements which are expected to result from the condition assessment ("General Pump Station Projects") based on the pump station replacement charts maintained as part of the long-term expenditure forecast discussed in the next section.

## 20-YEAR CAPITAL EXPENDITURE SUMMARY

This section describes those specific projects that are anticipated in the 20 year time as well as the approach to long-term capital spending estimates. A comparison of recent actual costs is also provided.

### Specific Projects

**Batiquitos Pump Station Rehabilitation**. This project is projected to occur in FY2023 and constitutes a significant upgrade to the station. The previous rehabilitation project occurred in 2013 at a cost of $3,422,000. A planning cost of $4,000,000 is utilized for the FY2023 project.

### Long-term Capital Replacement

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 2013 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 $280,000, and the controls replacement cost for all other pump stations was estimated to be $55,000.

**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. This also relates to air quality regulations.

## Summary of Pump Station Expenses

Table 6-6 provides a summary of the total estimated replacement cost for each station. Table 6-7 provides a summary of pump station and force main expenses between now and the Year 2065. Appendix I provide the individual replacement reports for each station. All costs are in 2018 dollars.

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

| Pump Station | Replacement Construction Cost | 35% Soft Costs | Total Replacement Cost |
|---|---|---|---|
| Avocado | 990 | 347 | 1,337 |
| Batiquitos | 8,610 | 3,014 | 11,624 |
| Diana | 1,610 | 564 | 2,174 |
| Encinitas Estates | 1,690 | 592 | 2,282 |
| La Costa | 2,100 | 735 | 2,835 |
| Leucadia | 6,330 | 2,216 | 12,434 |
| Rancho Verde | 755 | 265 | 1,020 |
| Saxony | 1,305 | 457 | 1,762 |
| Village Park 5 | 1,425 | 499 | 1,924 |
| Village Park 7 | 1,130 | 396 | 1,526 |

For long-term financial planning, District pump station expenditures (including force mains) are expected to total approximately $47,958,087 over the next 20 years.

## Comparison of Actual Costs

In 2017, the Village Park 5 Pump Station was almost completely replaced. The main components not replaced during this project were the generator and the force main. The total construction cost for this project was $780,751. With an estimated 35% in soft costs, the total project cost was $1.1 million.

In comparing the actual replacement cost of Village Park 5 with the predicted replacement cost, the predicted cost presents a reasonably accurate estimate, considering the generator and force main were not replaced. Therefore, the replacement quotient utilized in long-term planning should be 1.0. Tracking costs in Appendix J will insure that replacement reports generated in future asset planning are meeting (or exceeding) actual expenditures.

**TABLE 6-7**
**5-YEAR PROJECTED PUMP STATION EXPENDITURES [1]**

| Pump Station | 2018-2020 | 2021-2025 | 2026-2030 | 2031-2035 | 2036-2040 | 2041-2045 | 2046-2050 | 2051-2055 | 2056-2060 | 2061-2065 | 2066-2070 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avocado | 340 | 300 | 130 | 20 | 340 | 20 | 130 | 20 | 340 | 520 | 130 | **2,290** |
| Diana | 180 | 20 | 400 | 755 | 180 | 20 | 400 | 20 | 915 | 295 | 400 | **3,585** |
| Encinitas Estates | 840 | 25 | 80 | 765 | 620 | 25 | 80 | 80 | 1,305 | 25 | 80 | **3,925** |
| La Costa | 210 | 635 | 365 | 365 | 650 | 95 | 365 | 365 | 210 | 535 | 365 | **4,160** |
| Leucadia | 3,830 | 4,885 | 950 | 1,120 | 950 | 1,120 | 950 | 1,120 | 950 | 1,120 | 950 | **17,945** |
| Saxony | 255 | 85 | 30 | 895 | 280 | 85 | 30 | 625 | 255 | 110 | 30 | **2,680** |
| Village Park 5 | 20 | 75 | 20 | 1,110 | 20 | 75 | 20 | 510 | 620 | 75 | 240 | **2,785** |
| Village Park 7 | 560 | 75 | 20 | 495 | 340 | 75 | 20 | 75 | 760 | 75 | 20 | **2,515** |
| Rancho Verde | 335 | 125 | 75 | 20 | 335 | 20 | 400 | 20 | 335 | 20 | 75 | **1,760** |
| **Construction Cost** | 6,570 | 6,225 | 2,070 | 5,545 | 3,715 | 1,535 | 2,395 | 2,835 | 5,690 | 2,775 | 2,290 | **41,645** |
| **35% Soft Costs** | 2,300 | 2,179 | 725 | 1,941 | 1,300 | 537 | 838 | 992 | 1,992 | 971 | 802 | **14,576** |
| **SUBTOTAL** | **8,870** | **8,404** | **2,795** | **7,486** | **5,015** | **2,072** | **3,233** | **3,827** | **7,682** | **3,746** | **3,092** | **56,221** |
| Joint Facilities Batiquitos | 165 | 7,950 | 165 | 2,015 | 165 | 2,015 | 165 | 2,015 | 165 | 2,015 | 165 | **17,000** |
| **35% Soft Costs** | 58 | 2,783 | 58 | 705 | 58 | 705 | 58 | 705 | 58 | 705 | 58 | **5,950** |
| **SUBTOTAL** | **223** | **10,733** | **223** | **2,720** | **223** | **2,720** | **223** | **2,720** | **223** | **2,720** | **223** | **22,950** |
| **TOTAL COST** | **9,092** | **19,136** | **3,017** | **10,206** | **5,238** | **4,793** | **3,456** | **6,548** | **7,904** | **6,467** | **3,314** | **79,171** |

[1] All numbers are in thousands of dollars.

## SUMMARY OF RECOMMENDATIONS

1. Evaluate pump size at each station based on actual flow generation rates and anticipated peak buildout flows.

2. Further evaluate bypassing the Batiquitos Pump Station (for a portion of the District's flow) by pumping directly from the Leucadia Pump Station into one of the Batiquitos force mains.

3. Stagger future pump station inspection efforts based on the previous inspection, age of the asset, needs identified by the District, and the projected date of project implementation, as shown in Table 6-5.

4. Consider the preparation of a detailed checklist of component inspection for each station. The basis for this would be prior inspection reports by IEC (and others) with additions by staff as appropriate.

5. Consider the maintenance of a pump station component tracking database. This would be used to track improvements and associated costs to better project future spending. This would combine the efforts already occurring as part of the SSMP audit process as well as the financial tracking done for capital asset depreciation.

6. Evaluate the Diana Pump Station pumps and force main system to improve pumping capacity.

7. Reduce inflow and infiltration in the Diana Pump Station basin via inflow domes in manholes, smoke testing, and lining projects with lateral top hats.

8. 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.
    a. Avocado Pump Station Upgrade Project
    b. Avocado Emergency Overflow
    c. Batiquitos Generator Replacement Project
    d. Force Main Corrosion Control
    e. Batiquitos (B3) Rehab/Replacement Project – Phase 1
    f. Diana Pump Station Upgrade Project
    g. Diana Emergency Overflow Project

h. Diana Emergency Generator Project
i. Encinitas Estates Replacement Project
j. Leucadia Pump Station Rehabilitation Project
k. Rancho Verde Pump Station Improvement Project
l. Village Park 5 Pump Station Replacement Project (complete)
m. Village Park 7 Pump Station Rehabilitation Project
n. L07 Meter Relocation
o. Pump Station Condition Assessment
p. The 5-Year CIP also includes place holder expenses for improvements which are expected to result from the condition assessment ("General Pump Station Improvements")

9. For long-term financial planning, District pump station expenditures (including force mains) are expected to total approximately $48 million over the next 20 years.

# CHAPTER 7

## FORCE MAINS

The District has 10 pump stations and approximately 11 miles of force mains. Within the last 10 years, new force mains have been installed at five of the District's pump stations along with replacements of portions of the Leucadia and Batiquitos pump stations. 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), welded steel (WS), polyvinyl chloride (PVC), asbestos cement (AC), and high-density polyethylene (HDPE). Table 7-1 contains 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 |
|---|---|---|---|---|---|
| Avocado | 6 | 275 | Original: AC (PVC-lined)<br>Parallel: PVC | 03-0130 | Original: 1962 (2010)<br>Parallel: 2010 |
| Batiquitos, B2<br>Batiquitos, B3 | 24<br>24 | 10,240<br>10,134 | PVC<br>DIP | LKT-1000<br>LKT-2000 | 1996/2011/2015<br>1988/1996/2011 |
| Diana | 10 | 2,300 | 250' Paralleled | 03-0105 | 2010 |
| Encinitas Estates | 6 | 2,230 | PVC | 05-9080 | 2010 |
| La Costa | 10<br>12 | 1,127 | Original*: CIP/PVC/HDPE<br>Parallel: PVC/HDPE | 10-0128 | Original: 1965/76/98<br>Parallel: 1998 |
| Leucadia, L1<br>Leucadia, L2 | 24<br>24 | 13,989<br>14,000 | DIP/PVC<br>PVC/DIP/HDPE | 03-0980<br>03-0992 | 1979/98/01/17<br>1996/01/03 |
| Rancho Verde | 4 | 460 | PVC | 08-12160 | 1997 |
| Saxony** | 8 | 80 | DIP | L1/L2 FM | 1999/2001 |
| Village Park 5 | 6 | 1,945 | PVC | 06-0270 | 2008 |
| Village Park 7 | 6 | 1,500 | PVC | 07-0330 | 2010 |

* The remaining CIP is a short section within the station. 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.

## ASSET MANAGEMENT PLAN IMPLEMENTATION TO DATE

Since the 2013 AMP, force main work has been limited to the Leucadia and Batiquitos Pump Station Force Mains. Cathodic protection surveys are completed on these four force mains on an annual basis. Detailed tracking of the asset replacement activities for these four force mains can be found in Figures 7-1 through 7-4. Additional observations regarding other pump stations can be found below.

### Avocado Pump Station

The 6-inch asbestos cement (AC) force main at the Avocado Pump Station is the last AC force main within the District but was lined in 2010. The 2018 AMP assumes the replacement, if required, would be in the 2021-2025 time frame. Note that due to the size of the wet well, both force mains at this pump station are continually in operation (i.e., although the force mains are parallel, they are not redundant).

### Diana Pump Station

Note that due to the size of the wet well, both force mains at this pump station are continually in operation (i.e., although the force mains are parallel, they are not redundant). Note also that only approximately 250 of the 2,300 feet are paralleled.

## Leucadia Pump Station Force Main L1

**TABLE 7-2**
**L1 FORCE MAIN HISTORY**

| YEAR | EVENT | Station Begin | Station End | Length, feet |
|---|---|---|---|---|
| 1979 | L1 installed, ductile iron | 0+17 | 139+45 | 13,928 |
| 1998 | L1 18" Railroad bridge crossing removed and replaced | ~137+40 | ~138+68 | 128 |
| Early 2001 | Installation of cathodic protection (Carlsbad Dwg. No. 358-2) | 13+11 | 96+48 | 8,337 |
| Late 2001 | • L1 replaced with PVC<br>• L1 lined with 70psi cured-in-place-pipe (CIPP) | 0+40<br>6+10 | 6+10<br>19+50 | 570<br>1,340 |
| 2009 | Replacement of gravity section at La Costa/Highway 101 Interchange (discharge) | - | - | - |
| 2017 | Replacement of L1 West Section, C905 DR18 PVC | - | - | 2,450 * |
| 2017 | CIPP lined railroad bridge section | - | - | 150 * |

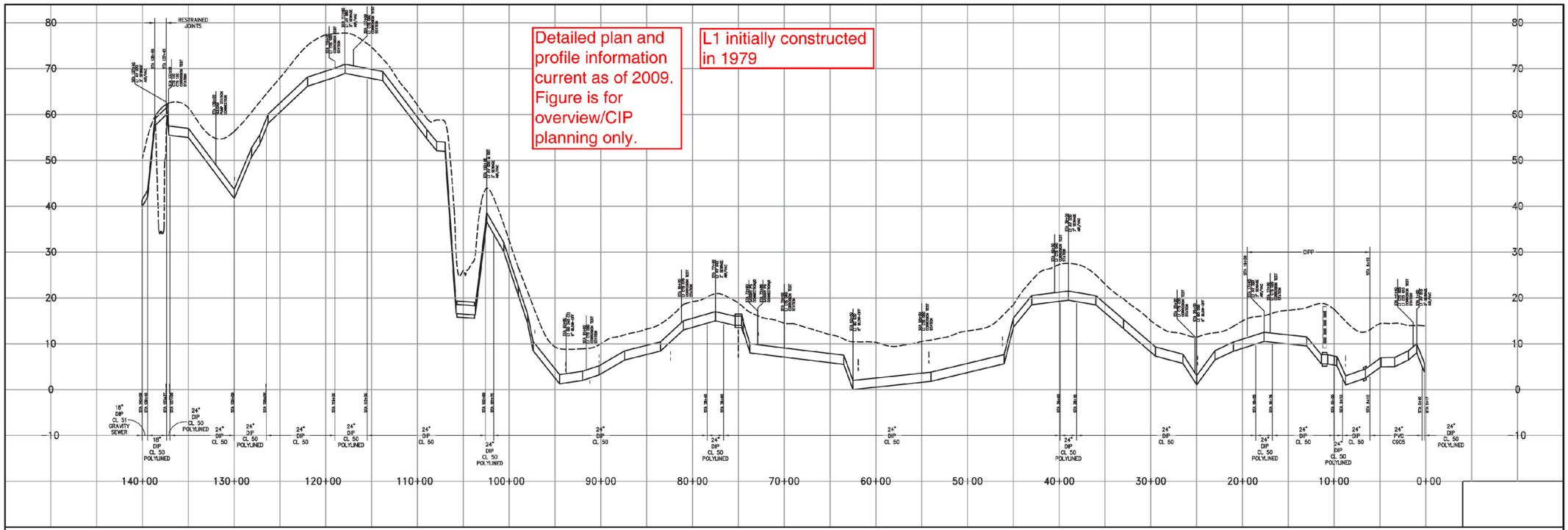
* Confirm footage with as-built drawings

In FY17 and FY18, project improvements replaced approximately 2,450 feet with 24-inch PVC and CIPP lined the approximately 150 feet long above-ground railroad bridge crossing (approximately $100,000 in FY18 costs). With completion of these projects, approximately 9,000 feet of the original 1979 ductile iron installation remains.

To address the remainder of the original ductile installation, the following is the planned approach:

- Replace three high points with 50 feet of new PVC line in either direction (2021)
- Excavate low spot and inspect baggie and underside of pipe (2021)
- Delay scheduled replacement of remainder to 2029
- Consider storing piping or couplings at the District for emergency needs

For financial planning purposes, the CIP assumes a lining cost of $2,880,000 in 2021 (0.5 times the FY17 replacement costs of approximately $640 per foot).





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# FIGURE 7-1

FORCEMAIN L1
PLAN AND PROFILE HISTORY

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

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## Leucadia Pump Station Force Main L2

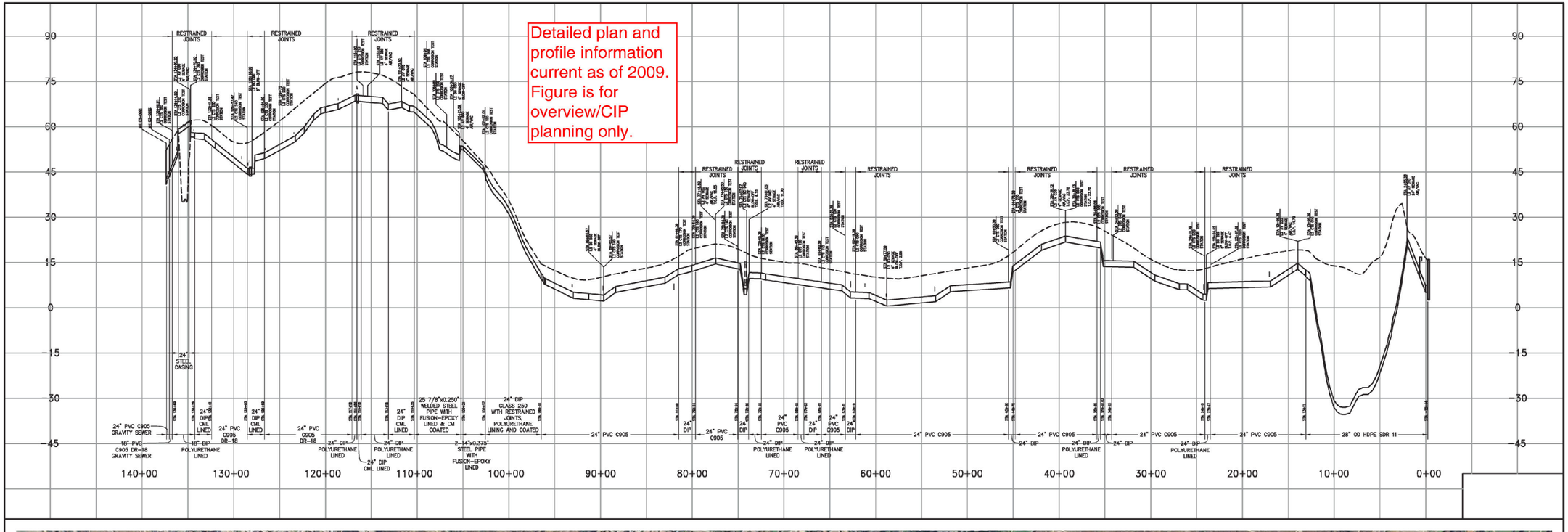
**TABLE 7-3**
**L2 FORCE MAIN HISTORY**

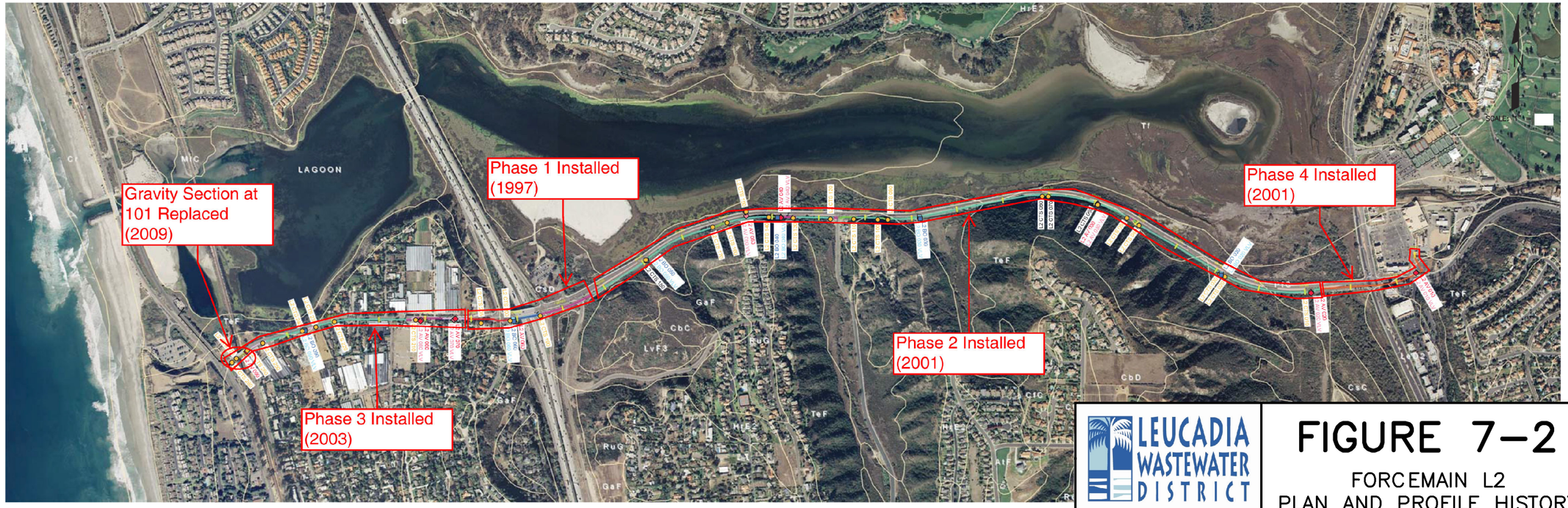
| YEAR | EVENT | Station Begin | Station End | Length, feet |
|---|---|---|---|---|
| 1996-1997 | L2 Phase 1 installed, welded steel (lined) (CalTrans Interstate 5 Interchange) | 96+48 | 110+39 | 1,391 |
| Early 2001 | L2 Phase 2 installed, PVC w/DIP sections (some lined, some not) (from El Camino Real to east side of I-5) | 13+11 | 96+48 | 8,337 |
| Late 2001 | L2 Phase 4 (LWD CAD Ref. No. 1228_75)<br>• L2 HDPE installation (from Leucadia Pump Station through El Camino Real) | -0+18.44 | 13+11 | 1,329 |
| 2003 | L2 Phase 3 installed, PVC and DIP (lined) (west side of I-5 to Coast Highway 101/Carlsbad Blvd, LWD CAD Ref. No. 1493-76) | 110+39 | 136+79 | 2,640 |
| 2009 | Replacement of gravity section at La Costa/Highway 101 Interchange (discharge) | - | - | - |

Although the L2 force main is primarily PVC, there are sections of welded steel and ductile iron (some lined, some not).

Annual cathodic protection evaluations are performed by RFYeager Engineering. The completed FY18 project improvements included replacing the existing anodes at CTS 070 and CTS 140 due to declining anode current outputs.

Detailed plan and profile information current as of 2009. Figure is for overview/CIP planning only.




LEUCADIA WASTEWATER DISTRICT

# FIGURE 7–2

FORCEMAIN L2
PLAN AND PROFILE HISTORY

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN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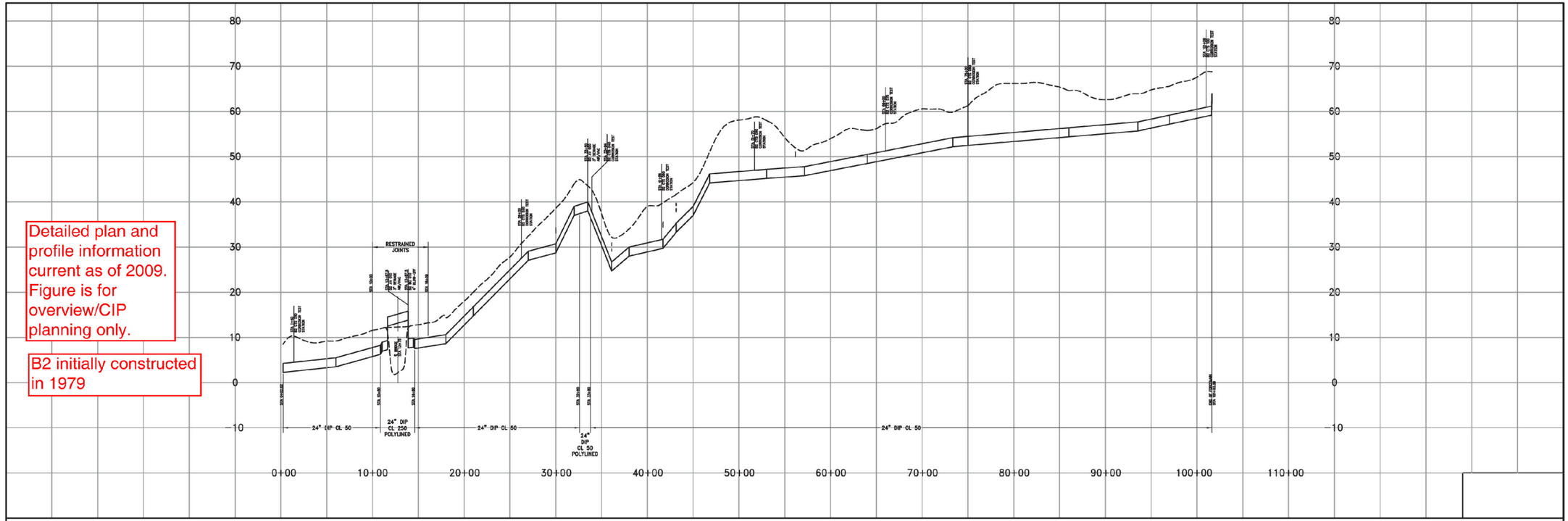
## Batiquitos Pump Station Force Main B2

The installation history of the B2 force main is summarized in the table below. The oldest section is the 25-year-old above-ground, polylined, ductile iron bridge crossing, with the remaining PVC pipeline less than 10 years old. A project has been added to the 20 Year CIP to line the ductile iron section when the segment reaches 30 years of age in 2026.

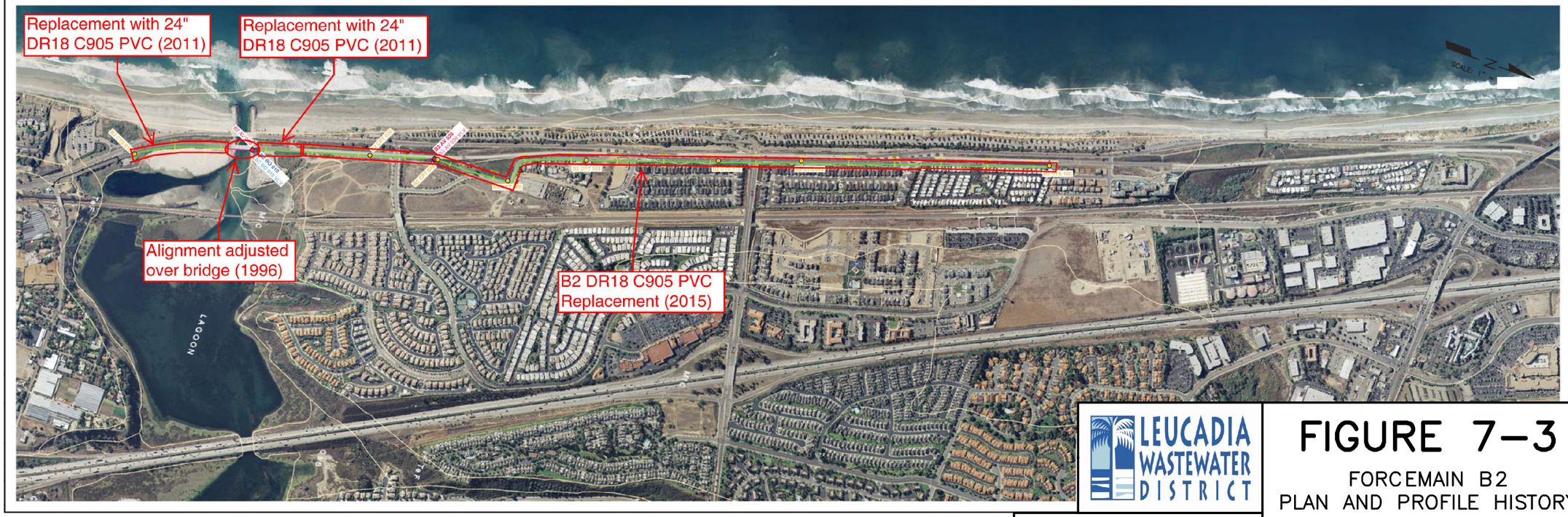
**TABLE 7-4**
**B2 FORCE MAIN HISTORY**

| Year | Event | Station Begin | Station End | Length, feet |
|---|---|---|---|---|
| 1979 | B2 Phase 2 installed – ductile iron | 0+22.62 | 102+63.29 | 10,240.67 |
| 1996 | Adjust B2 alignment over Batiquitos Lagoon bridge – ductile iron (lined) | 10+80 | 14+60 | 380 |
| 2011 | Partial replacement from the Batiquitos Pump Station to the San Marcos Creek Bridge. Force Main was replaced with 24-inch DR18 C905 PVC. | - | - | 1,100 |
| 2011 | Partial replacement from the San Marcos Creek Bridge to the north. Force Main was replaced with 24-inch DR18 C905 PVC. | - | - | 400 |
| 2015 | B2 replacement – DR18 C905 PVC (same trench as B1) | - | - | 8,463 |




Detailed plan and profile information current as of 2009. Figure is for overview/CIP planning only.

B2 initially constructed in 1979




LEUCADIA WASTEWATER DISTRICT

# FIGURE 7–3

FORCEMAIN B2
PLAN AND PROFILE HISTORY

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

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**Batiquitos Pump Station Force Main B3**

The installation history of the B3 force main is summarized in the table below. Approximately 80% of this pipeline is ductile iron 30 years in age. The pipeline was evaluated by IEC in 2011 and recommended for replacement in FY25 at that time.

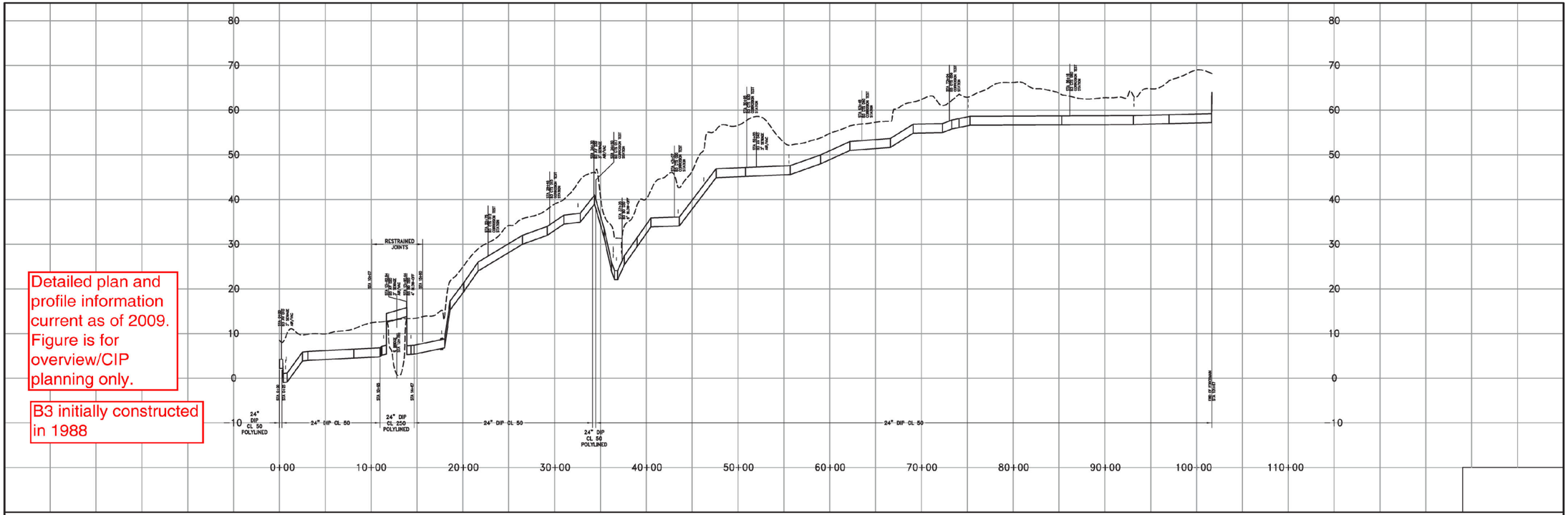
A project has been added to the 5-Year CIP to remove 50 to 100 feet at the discharge end of the pipe to allow for CCTV inspection (and to replace said 50 to 100 feet with PVC piping at a slope that lends itself to future CCTV inspections). Based on the results of the CCTV inspection, future replacement efforts will be planned for. For financial planning purposes, a replacement project for 25% of the line is assumed in FY20 and the remaining 75% in FY24.

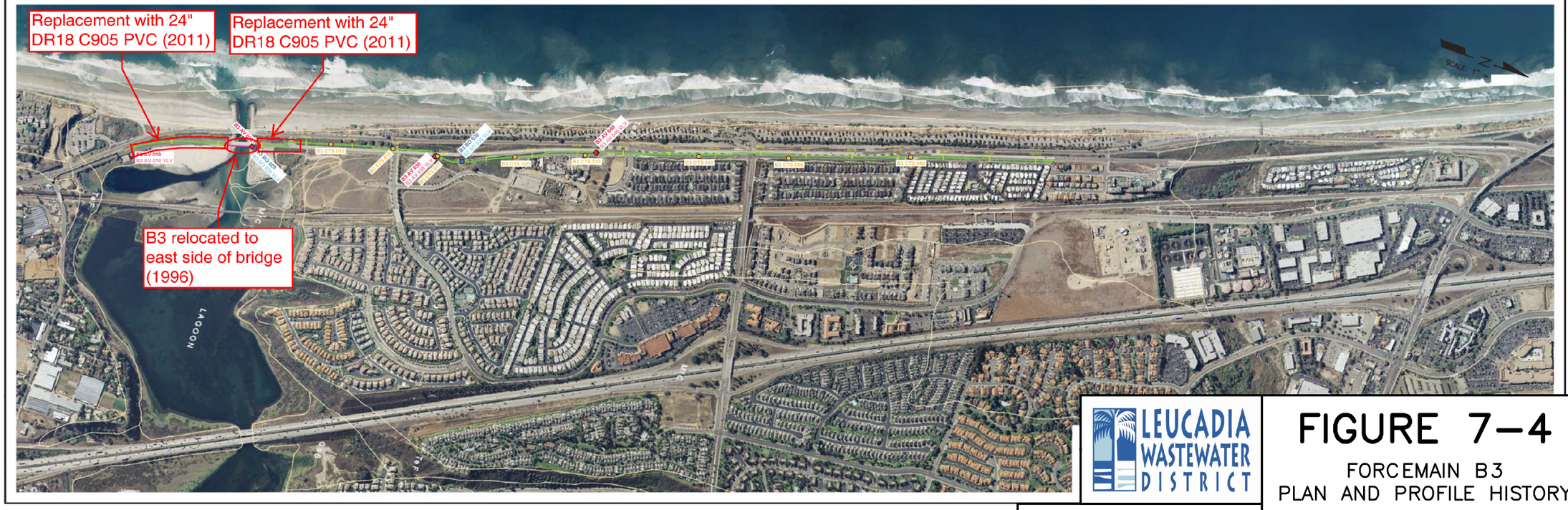
A project has been added to the 20 Year CIP to line the ductile iron section when the segment reaches 30 years of age in 2026 to address the bridge crossing section.

**TABLE 7-5**
**B3 FORCE MAIN HISTORY**

| YEAR | EVENT | Station Begin | Station End | Length, feet |
|---|---|---|---|---|
| 1988 | B3 Phase 3 installed – ductile iron | 0+00 | 101+67 | 10,167 |
| 1996 | Relocate B3 to east side of Batiquitos Lagoon bridge | 10+95 | 14+67 | 372 |
| 2011 | Partial replacement from the Batiquitos Pump Station to the San Marcos Creek Bridge. Force Main was replaced with 24-inch DR18 C905 PVC. | - | - | 1,100 |
| 2011 | Partial replacement from the San Marcos Creek Bridge to the north. Force Main was replaced with 24-inch DR18 C905 PVC. | - | - | 400 |

Annual cathodic protection evaluations are performed by RFYeager Engineering. The completed FY18 project improvements included repair or replacement of the non-functioning anodes at CTS 060 and CTS 070.




LEUCADIA WASTEWATER DISTRICT

# FIGURE 7–4

FORCEMAIN B3
PLAN AND PROFILE HISTORY

LEUCADIA WASTEWATER DISTRICT
2018 ASSET MANAGEMENT PLAN

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## SUMMARY OF RECOMMENDATIONS

1. 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.
    a. Force Main Corrosion Control
    b. Batiquitos (B3) Rehab/Replacement Project – Phase 1
    c. Leucadia (L1) West Section Replacement (completed)
    d. Leucadia (L1) Final Replacement
2. Update composite figures for each force main based on record drawings of recent improvements.

# 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 wastewater collection 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 located immediately upstream of the Batiquitos Pump Station. Encinitas' Moonlight Beach Pump Station force main discharges into a manhole connected to 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 given 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.

Affordable Pipeline Services hydrocleaned and CCTV inspected the Lanikai Gravity Sewer in December 2010. This inspection resulted in the lining of the eastern half of this line (CIP Project – Lanikai Line Repair). Subsequently, approximately 385 feet of the sewer was lined in FY14/15 as part of the B2 Replacement Project.

In 2016 the North County Transit District (NCTD) and San Diego Association of Governments (SANDAG) approached District staff about the Poinsettia Train Station improvement project which planned to construct an underground pedestrian tunnel at the station and shift the railroad tracks to the west. The project recently began construction and consists of moving the railroad tracks, thus requiring an extension of the existing protective casings around the Lanikai Gravity Trunk Sewer and the District's Secondary Effluent Force Main (B1). This project also includes the construction of a parallel line under the railroad tracks.

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 continue to maintain the chronological summary of operation/maintenance and repair/replacement tasks associated with this line as part of the District's annual SSMP audit. The current tracking summary can be seen in Table 8-1.

**TABLE 8-1**
**LANIKAI GRAVITY SEWER ASSET TRACKING (District is Lead Agency)**

| Date | Activity Type | Description |
|---|---|---|
| Dec-10 | O&M | Hydroclean and CCTV Inspection by Affordable Pipeline Services. Resulted in recommendation to CIPP line eastern portion from Franciscan Rd to Occidental Line. |
| | | Design Complete |
| | | Contract Issued |
| | | Construction Begins |
| | | Abandoned due to B2 break |
| FY13 | --- | CIPP Project still on hold due to B2 break |
| | Capital | Metallic manhole rings and cover were replaced with composite rings and covers |
| FY14/15 | Capital | The portion from Franciscan to the Occidental manhole was lined as part of the B2 Replacement (approx. 385 ft). |
| 2015 | O&M | Hydrocleaned and CCTV Inspected |
| FY17 | O&M | Hydrocleaned in Fall of 2016 |
| *2020/2021* | *O&M* | *Planned Hydrocleaning and CCTV Inspection (every 5 years)* |

*Items in Italics are Planned*

## 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.

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 continue to maintain 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 current tracking summary can be seen in Table 8-2.

**TABLE 8-2**
**OCCIDENTAL SEWER ASSET TRACKING (Carlsbad is Lead Agency)**

| Date | Activity Type | Description |
|---|---|---|
| Dec-10 | O&M | Hydroclean and CCTV Inspection (as possible) by Affordable Pipeline Services and confined space entry MH inspection by V&A. Resulted in rehab recommendations. Also, V&A recommended 5 year inspection. |
| Nov-11 | Repair | Carlsbad bid and subsequent award to Charles King Company. |
| Dec-12 | Repair | 7 of the 8 manholes were rehabilitated by the Charles King Company. Section CIPP lined. |
| | Repair | 8th manhole (at Lanikai) to be rehabilitated when Lanikai Lining Project resumes |
| FY14 | Repair | The junction manhole was lined by Carlsbad |
| FY17 | O&M | Hydroclean in Fall of 2016 by Carlsbad |
| *FY18* | *O&M* | *Planned Hydroclean and CCTV Inspection every 5 years* |

*Items in Italics are Planned*
Updated: November 2017

Seven of the Occidental Sewer's manholes were rehabilitated in FY13, along with the lining of two sewer sections (totaling approximately 350 feet). The remaining eighth manhole, located at the junction between the Lanikai and Occidental Sewers, was lined in FY14.

## 5-YEAR CIP

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

### Poinsettia Station Gravity Pipeline

For FY18, $714,400 has been budgeted for extending the steel casing of the Lanikai Gravity Trunk Sewer and B1 Force Main underneath the NCTD tracks and the construction of a 24-inch parallel gravity line inside a steel casing.

## 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 K. The 20-year estimate of expenditures for the Lanikai Gravity Sewer is $200,000. The 20-year estimate of expenditures for the Occidental Line is $680,000. Note that these values represent only the District's share of these pipelines.

## SUMMARY OF RECOMMENDATIONS

1. Recommendations regarding the Batiquitos Influent Sewer
    a. Insure that maintenance work orders are generated at the frequency that is necessary for this particular asset.

2. Recommendations regarding the Lanikai Gravity Sewer
    a. Insure that maintenance work orders are generated at the frequency that is necessary for the particular asset (in this case once every five years).
    b. Continue to maintain a chronological summary of operation/maintenance and repair/replacement tasks associated with this line as part of the District's annual SSMP audit.

3. Recommendations regarding the Occidental Sewer
    a. Continue to maintain 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.

4. The following capital improvement projects are included in the District's 5-Year CIP (District's share of cost only).
    a. Poinsettia Station Gravity Pipeline

5. For long-term financial planning, the District's share of the Lanikai Gravity Sewer expenditures is expected to total $200,000 and for the Occidental Sewer, $680,000. The Batiquitos Influent Sewer is planned for in the remaining District gravity pipelines.

# CHAPTER 9

# 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.

## Historical Encina Expenditures

Table 9-1 presents the District's share of Encina Capital Costs over the last five fiscal years. Historically, the EWA has budgeted considerably more for capital improvement projects and acquisitions than expended. Table 9-2 presents the District's share of the planned Encina Capital Costs. The yearly average District share from this table is $2,247,771 while the average billed cost from Table 9-1 is only $1,540,806, approximately 32% less.

**TABLE 9-1**
**DISTRICT SHARE OF EWA CAPITAL COSTS,**
**ACTUAL FY13 – FY17**

| | FY2013 | FY2014 | FY2015 | FY2016 | FY2017 |
|---|---|---|---|---|---|
| Acquisitions | $84,509 | $66,052 | $87,931 | $87,206 | $34,836 |
| Capital Projects | $1,675,955 | $983,645 | $1,908,577 | $947,636 | $1,827,681 |
| **TOTAL CAPITAL** | **$1,760,464** | **$1,049,696** | **$1,996,508** | **$1,034,843** | **$1,862,518** |

**TABLE 9-2**
**DISTRICT SHARE OF EWA CAPITAL COSTS,**
**PLANNED FY14 – FY18**

| | FY2014 | FY2015 | FY2016 | FY2017 | FY2018 |
|---|---|---|---|---|---|
| Capital Acquisitions | $695,215 | $709,000 | $723,000 | $737,000 | $752,000 |
| Capital Improvement Projects | $7,074,000 | $10,471,000 | $10,499,000 | $10,576,000 | $10,536,000 |
| Planned Asset Replacement | $781,150 | $797,000 | $813,000 | $829,000 | $846,000 |
| Personnel Expenses | $1,933,584 | $1,972,000 | $2,011,000 | $2,051,000 | $2,092,000 |
| **TOTAL CAPITAL** | **$10,483,949** | **$13,949,000** | **$14,046,000** | **$14,193,000** | **$14,226,000** |
| **LWD'S SHARE** | **$1,761,303** | **$2,343,432** | **$2,359,728** | **$2,384,424** | **$2,389,968** |

## Future Encina Expenditures

Table 9-3 presents EWA's planned 5 and 10 Year Capital Budget. It is recommended that the District use this budget to estimate future expenditures, but an adjustment should be included to account for the difference between planned and actual Encina Capital Costs that was previously discussed. Table -4 uses this method to estimate the District's share of future costs by reducing EWA's budget by 25%. The total 5-year cost to the District is estimated to be $11,153,144 and the 10-year cost is estimated to be $23,916,818. For forecasting costs beyond 2028 it is recommended that the District estimate the yearly cost based on the average cost from the past 5 fiscal years, $1,540,806 per year. This results in a 20-year total cost to the District of $40,051,686.

**TABLE 9-3**
**EWA CAPITAL PROJECT BUDGET,**
**ALL MEMBER AGENCIES FY18 – FY27**

| Fiscal Year | Capital Improvement | Planned Asset Replacement | Capital Acquisitions & Minor Plant Rehabilitation | Personnel Expense | Total |
|---|---|---|---|---|---|
| 2018 | $10,973,500 | $736,600 | $769,900 | $2,402,012 | $14,882,012 |
| 2019 | $17,646,000 | $751,000 | $785,000 | $2,450,000 | $21,632,000 |
| 2020 | $17,993,000 | $766,000 | $801,000 | $2,499,000 | $22,059,000 |
| 2021 | $11,491,000 | $781,000 | $817,000 | $2,549,000 | $15,638,000 |
| 2022 | $10,076,000 | $797,000 | $833,000 | $2,600,000 | $14,306,000 |
| **5 YEAR TOTAL** | **$68,179,500** | **$3,831,600** | **$4,005,900** | **$12,500,012** | **$88,517,012** |
| 2023 | $23,401,000 | $813,000 | $850,000 | $2,652,000 | $27,716,000 |
| 2024 | $18,278,000 | $829,000 | $867,000 | $2,705,000 | $22,679,000 |
| 2025 | $12,144,000 | $846,000 | $884,000 | $2,759,000 | $16,633,000 |
| 2026 | $12,387,000 | $863,000 | $902,000 | $2,814,000 | $16,966,000 |
| 2027 | $12,635,000 | $880,000 | $920,000 | $2,870,000 | $17,305,000 |
| **10 YEAR TOTAL** | **$147,024,500** | **$48,062,600** | **$8,428,900** | **$26,300,012** | **$189,816,012** |

**TABLE 9-4**
**DISTRICT PROJECTED SHARE OF**
**EWA CAPITAL BUDGET**

| Fiscal Year | EWA Planned Total[1] | District Share (16.8%) | Adjusted District Share (25% Reduction) |
|---|---|---|---|
| 2018 | $14,882,012 | $2,500,178 | $1,875,134 |
| 2019 | $21,632,000 | $3,634,176 | $2,725,632 |
| 2020 | $22,059,000 | $3,705,912 | $2,779,434 |
| 2021 | $15,638,000 | $2,627,184 | $1,970,388 |
| 2022 | $14,306,000 | $2,403,408 | $1,802,556 |
| **5 YEAR TOTAL** | **$88,517,012** | **$14,870,858** | **$11,153,144** |
| 2023 | $27,716,000 | $4,656,288 | $3,492,216 |
| 2024 | $22,679,000 | $3,810,072 | $2,857,554 |
| 2025 | $16,633,000 | $2,794,344 | $2,095,758 |
| 2026 | $16,966,000 | $2,850,288 | $2,137,716 |
| 2027 | $17,305,000 | $2,907,240 | $2,180,430 |
| **10 YEAR TOTAL** | **$189,816,012** | **$31,889,090** | **$23,916,818** |

[1] Table 9-3

## SUMMARY OF RECCOMENDATIONS

1. The District's average annual share of EWA's capital projects should be estimated by adjusting the EWA's planed costs for the next 10 years. Beyond 2028, the District's annual share should be estimated as $1,540,806 based on the average cost from the past 5 fiscal years.

2. For long-term financial planning, the District's share of EWA projects is estimated to be $40,051,686 over the next 20 years.

# CHAPTER 10

# 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 WRF via the force main B1 (also known as the fail-safe line). The Gafner WRF treats water to a tertiary level. The recycled water is then used for irrigation at the South 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:

- FY16 – Rehabilitation of Pump #2
- FY15 – Rehabilitation of Pump #1 and upgrade to cellular telemetry
- FY12 – Update of radio alarm telemetry

The Secondary Effluent Pump Station was included in the 2014 Pump Station Assessment. Some of those recommendations were completed in FY15 and FY16. The outstanding recommendations are included in the Encina Effluent Pump Station Rehab Project (minor mechanical improvements, painting, and others). The detailed components of the projects may be found with the remainder of the pump stations in Appendix H

**Financial Planning.** There is one specific pump station project identified 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), $536,333 is included in the 5-Year CIP for this pump station for potential projects. The District should inspect portions of this pump station as part of the overall FY19 pump station condition assessment to confirm the project scope.

## Secondary Effluent Force Main (B1)

The secondary effluent force main (B1) is from the secondary effluent pump station at Encina WPCF to the Gafner WRF. Sections of the force main have been replaced over time, as summarized in Table 10-1. That portion of B1 that is within the Encina WPCF property will be relocated to Avenida Encinas at a future date as either a NSDWRC project or a District project. The design for this relocation is complete.

**TABLE 10-1**
**B1 FORCE MAIN (FAIL-SAFE) HISTORY**

| YEAR | EVENT | Station Begin | Station End | Length, feet |
|---|---|---|---|---|
| | B1 installed | - | - | ~24,000 |
| 2011 | Partial replacement from the Batiquitos Pump Station to the San Marcos Creek Bridge. Force Main was replaced with 14-inch PVC.* | - | - | 1,100 |
| 2011 | Partial replacement from the San Marcos Creek Bridge to the north. Force Main was replaced with 14-inch PVC.* | - | - | 400 |
| 2015 | B1 Replacement from Lanakai to the north side of Batiquitos Lagoon. Force Main was replaced with 14-inch PVC. Replaced in the same trench as B2. | - | - | 8,580 |
| 2016 | Repair in northern most section of B1 with 16-inch PVC. | - | - | 50 |
| 2018 | Portion of force main within Encina property relocated into Avenida Encinas – waiting on NSDWRC project or completed internally (design is complete) | - | - | |

* Part of the 2010 Batiquitos Force Main Repair Project

**Financial Planning.** Relocation of the portion of B1 within the Encina WPCF will occur in the 5-Year CIP. The remainder of the original segments of B1 are within La Costa Avenue. The estimated cost to line this pipeline is $2,164,573. This project may occur as part of the NSDWRC Regional Recycled Water Project or may be District led.

## Gafner Water Reclamation Facility

Recent improvements at the Gafner WRF include:

- FY15 – PLC replacement
- FY18 – Upgrade project which included pump replacement, safety upgrades
- FY16 – IEC performed a condition assessment of the Gafner WRF
- FY12 – Replaced two (2) Reclaimed Water Supply pumps and motors (for recycled water use onsite the Gafner WRF)
- FY11 – Replace pumps and repaint Gafner facilities
- FY10 – Gafner Sand Filter Replacement

**Financial Planning.** The 2016 condition assessment recommended approximately $971,000 in improvements. These recommendations were prioritized, resulting in a near-term project to correct the most critical compliance related items at a construction cost of $368,000. This project is the FY18 Gafner AWT Improvement Project. The total budget for the project is $758,200 based on actual bid results and soft costs ($561,630 in construction costs and $196,570 in soft costs, 35%, approximately). The remaining items were not identified to be replaced in the 5-Year timeframe and are thus included in the 20-Year CIP (Phase 2 Improvements). Based on the bid results of the FY18 project, the original construction cost estimate for the remaining Phase 2 items has been increased by a factor of 1.5 ($561,630/$368,000) to $1,221,075, calculated by $971,000 - $368,000 = $603,000 * 1.5 = $904,500 * 1.35 = $1,221,100.

## Recycled Water Distribution

There are currently no projects planned in regards to recycled water distribution.

**North San Diego County Regional Recycled Water Project**

The District is coordinating with ten other North County agencies on a combined recycled water project for the area known as the North San Diego Water Reuse Coalition (NSDWRC) Regional Recycled Water Project. The project and the associated Feasibility Study (funded in part by LWD previously) are being used to apply for US Bureau of Reclamation Title XVI grant funds, San Diego Integrated Regional Water Management Proposition 84 grant funding, and Water Resources Reform and Development Act funding. In FY18, the District shall participate in ongoing lobbying efforts for grant funding at the cost of $81,500.

As part of this project, LWD received a $90,000 allocation of grant funding to design a recycled water pump station to deliver water from the Gafner WRF to the recycled water distribution system of the Olivenhain Municipal Water District. The preliminary design has been completed and the project is now waiting for the $90,000 reimbursement from the grant.

Future projects, the anticipated timing of the expenditure, and estimated total cost are provided in Table 10-2 below.

**TABLE 10-2**
**NSDWRC REGIONAL RECYCLED WATER PROJECT,**
**LWD EXPENDITURES**

| Description | Year | Cost | |
|---|---|---|---|
| Secondary Effluent Force Main (B1) Replacement | FY22 | $3,132,700 * Construction Cost<br><br>$4,229,145 Total Cost ** | |
| Gafner WRF Tertiary Expansion | FY24 | $1,537,000 | $3,267,400 3 Project Construction Cost<br><br>$4,410,990 3 Project Total Cost ** |
| 12-inch Pipeline Connection to OMWD | FY19 | $290,400 | |
| Recycled Water Distribution Pump Station at Gafner (prelim design complete) | FY23 | $1,440,000 | |
| **TOTAL** | | $6,400,100 4 Project Construction Cost<br><br>**$8,640,135 4 Project Total Cost** | |

* DWEI Replacement Cost estimated at ~$5MM
** Construction Cost + 35% Soft Costs

## 20-YEAR CAPITAL EXPENDITURE SUMMARY

Long-term capital replacement expenditures for the secondary effluent pump station and force main and Gafner WRF are expected to total $17,700,000 over the next 20 years as provided in Appendix K. A majority of the funding, ($10,775,000), is for the pump station and force main. The remaining $6,925,000 is for the Gafner WRF. Dollar amounts beyond the specific CIP projects discussed above have not been included in the 20-Year CIP. Additionally, 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.

## SUMMARY OF RECOMMENDATIONS

1. The District should inspect portions of this pump station as part of the overall FY19 pump station condition assessment to confirm the project scope.

2. Continue coordinating with other North County agencies on the North San Diego Water Reuse (NSDWR) Regional Recycled Water Project.

3. The following capital improvement projects are included in the District's 5-Year CIP.
    a. General Secondary Effluent Pump Station and Force Main Improvements
    b. Relocation of the portion of B1 within the Encina WPCF
    c. FY18 Gafner AWT Improvement Project (completed)

4. For long-term financial planning, District recycled water expenditures for pumpback facilities at Encina are estimated to total $10,775,000 over the next 20 years. The Gafner Water Reclamation Plant expenses are expected to total $6,925,000 over the next 20 years.

# CHAPTER 11

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

This chapter assembles all of the recommended CIP projects into a recommended CIP program. The complete list of projects, a brief description, and their associated costs are provided in Table 11-1.

## DISTRICT 5-YEAR CIP

The District's 5-Year CIP is provided in Table 11-2 on the following page.

## DISTRICT 20-YEAR SUMMARY AND DETAIL OF CAPITAL EXPENDITURES

The following Tables 11-3 and 11-4 present the summary of the estimated wastewater and recycled water program expenditures by asset class over the next 20 years (through FY2037). These values are calculated based on the long-term expenditures forecast for each asset category. The final table in this chapter, Table 11-5, presents the 20-Year projected CIP for integration with the District's Financial Plan.

**TABLE 11-1**
**RECOMMENDED CIP PROJECTS**

| Location Code | Project Name | Project Overview | Detailed Project Description | CIP Project Cost |
|---|---|---|---|---|
| 0353 | FY 2016 Gravity Pipeline Rehab.* | Lining and Replacement of Gravity Sewers and Manholes | CIPP lining of 1,143 LF of existing VCP gravity sewer, replacement of 90 LF of existing 8" VCP sewer with new 8" PVC, and CIPML of one existing manhole. Cost shown is total project cost including prior to FY18. | $493,395 |
| 0365 | Orchard Wood Rd. Sewer Rehab. | Replacement of an SMA area | Replacement of a sewer maintenance area with a significant sag. | $194,700 |
| | FY17/FY18 CIPP Project | Lining and Replacement of Gravity Sewers and Manholes | Combination of FY17 & FY18 CIPP Projects. The CIPP lining of over 7,000 LF of existing gravity sewer and the rehabilitation of 20 manholes. Project bid at $668,000. With a 15% contingency and 35% soft costs, assume total project cost of $800,000. | $800,000 |
| | La Costa Alteration and Quebrada | Open Trench Repair of the South La Costa Golf Course, Quebrada, and other FY17 Gravity Sewers | Permanent repair of the San Marcos Creek crossing, the remaining section of the gravity line in the South La Costa Golf Course, the gravity line in the Quebrada easement, and the open trench line replacements from the FY17/18 gravity pipeline projects. | $475,000 |
| | Pipeline Repair Priority List - CIPP | Yearly Gravity Sewer Rehab | Estimated $500,000 construction cost with 35% soft costs. | $675,000 |
| | Pipeline Repair Priority List - Open Trench | Yearly Gravity Sewer Rehab | Estimated $500,000 construction cost with 35% soft costs. | $675,000 |
| | Pipeline Repair Priority List - CIPP | Yearly Gravity Sewer Rehab | Estimated $500,000 construction cost with 35% soft costs. | $675,000 |
| | Pipeline Repair Priority List - Open Trench | Yearly Gravity Sewer Rehab | Estimated $500,000 construction cost with 35% soft costs. | $675,000 |
| | Drainage Basin #1 VCP Line/Replace | Replacement and Lining of VCP Lines with Age > 50 years | In DB#1 (downtown Leucadia), line/replace VCP pipe >50 years. Includes top hats for laterals and MH lining in unit cost. | $6,100,000 |
| 0077 | Misc. Pipeline/Manhole Rehab. | Miscellaneous Gravity System Repair | Budget allocation for miscellaneous projects. Yearly cost is presented in this table. | $163,000 |
| | Buildout-Capacity Based Projects | | | |
| 0368 | Asset Management Plan Update | 5-year Updates to District AMP | | $550,000 |
| 0369 | HQ Building Metering Switchboard Install. | | | $69,918 |
| 0323 | Lateral Repl./Backflow Preventer Prog. | Continuation of District Program for Lateral Replacement | District program to aid customers with failing and damaged laterals. This project continues funding the program. | $102,000 |
| | Avocado PS Upgrade Project | Replace Main Breaker and Pumps | Replace existing pumps (installed 2010) with chopper pumps (2 installed and 1 spare) and replace main breaker. Control update from Opto-22 to Allen Bradley required. Cost based on DWEI replacement reports for controls, electrical, and mechanical. | $452,250 |
| | Batiquitos Generator Replacement | Replace Generator | Replace existing 500kW with one of the same size. | $700,000 |
| | Batiquitos Pump Station Rehabilitation | | Projected rehab of BPS. Total expenditure for completion of previous rehab in JUL 2013 was $3,422,000. Est. $4M. | $4,000,000 |
| | Diana PS Upgrade Project | Pump and Electrical Improvements | Replace existing pumps (installed 2010) with chopper pumps (2 installed and 1 spare), replace main breaker, and add generator if feasible. Also provide better weather-proof enclosure. Control update from Opto-22 to Allen Bradley required. Cost based on DWEI replacement reports for controls, electrical, and mechanical. | $600,750 |
| 364 | Encinitas Estates PS Replacement | Complete Pump Station Replacement | The complete replacement of the Encinitas Estates Pump Station except for the force main. Cost provided by District and aligns with DWEI pump station replacement cost (less force main). | $1,195,000 |
| | La Costa Pump Station Replacement | Remove, Relocate, or Replace La Costa PS | Evaluate and implement either (1) remove via gravity improvements, (2) relocate as submersible station (consider parking lot or other), and/or (3) replace as submersible station. Draft cost based on replacement value of pump station and force main. Electrical upgrades completed in FY12, pumps replaced in FY15, FY14 assessment recommended 2035 replacement, confirm based on 2019 Condition Assessment. | $2,835,000 |
| 0358 | Leucadia PS Rehabilitation | Pump Replacement and Misc. Upgrades | Replace pumps, VFD and associated piping and valving along with miscellaneous upgrades from the FY14 assessment. PDR estimate of $3.67 million. | $3,670,000 |
| | Rancho Verde Improvements | Pump Station Upgrades | Replace select mechanical, electrical, and site components including check valves, isolation valves, bypass piping, level controls, and site paving (among others). Also, evaluate whether 480V service is possible. Control update from Opto-22 to Allen Bradley required. Placeholder cost, verify rehab/replacement scope in FY19 assessment. | $371,250 |
| 354 | Village Park No. 5 PS Replacement* | Pump Station Replacement with Submersible Station | Project completed in FY18. total pump station replacement with a submersible station except force main and generator. Cost provided by District. | $814,587 |
| | Village Park No. 7 PS Rehab Project | Pump Station Rehab/Replacement | Station constructed in 1973. Wet well lining on RPL. Cost from FY14 assessment is $625,000 which includes controls, some mechanical, electrical, and site work. Also, evaluate whether 480V service is possible. Placeholder cost, verify rehab/replacement scope in FY19 assessment. | $625,000 |
| | L07 Meter Relocation | Relocate LWD Meter L07 | This meter is located on the force main discharge of the La Costa Pump Station and should be relocated. This could be part of the La Costa PS Replacement if the station is relocated or relocated if the station is replaced where it is. Cost is a placeholder. | $20,000 |
| | Pump Station Condition Assessment | | | $30,000 |
| | General Pump Station Improvements | General Pump Station Rehabilitation, expenditures, and Misc. Projects | Based on projected replacements. For years where CIP projects exist, CIP amount is subtracted from General Replacement Amount for that year. The amounts are averaged over five years. There should be enough here for capital acquisitions. Negative values are shown as 0. | |
| | Avocado Emergency Overflow | Add Gravity Sewer for Emergency Overflow | Install ~700 feet of 12-inch pipe from wet well to MH 03-0151. | $348,750 |
| | Diana Emergency Generator | Add an Emergency Generator to Diana PS | Addition of an emergency generator for Diana Pump Station across Highway 101 in the NCTD right of way. Construction and planning to be integrated with the City of Encinitas Leucadia Streetscape project. | $350,000 |
| | Diana Emergency Overflow | Add Gravity Sewer for Emergency Overflow | Install ~2,000 feet of 12-inch pipe from wet well to MH 02-0300. | $900,000 |
| 345 | Leucadia (L1) West Section Replacement* | L1 Force Main West Section Replacement | Approximately 2,450 LF of force main replaced with 24" PVC. Estimate from District on project costs incurred in FY 18. | $100,000 |
| 366 | Force Main Corrosion Control | Repair and Replacement of Non-Functioning Anodes | Replace anodes at CTS 070 and CTS 140 on L2 due to declining anode current outputs; locate (uncover) CTS 030 on B2 and test; and repair or replace the non-functioning anodes at CTS 060 and CTS 070 on B3. | $35,000 |

**TABLE 11-1**
**RECOMMENDED CIP PROJECTS**

| Location Code | Project Name | Project Overview | Detailed Project Description | CIP Project Cost |
|---|---|---|---|---|
| | L1 Final Replacement | Replace Remaining 1979 Force Main | Current District Approach - Replace the 3 high points in 2021 and then delay replacing the remainder of L1. Store long-lead items at the District. Excavate and inspect low spots. Financial Model Approach - Replace remaining ~9,000 ft of original 1979 installation. Replacement costs for FY17 project were approx. $640/ft. Use same cost basis with multiplier of 0.5 to account for potential lining approach. | $2,880,000 |
| | L2 Metallic Section Evaluation | | | |
| | B2 Metallic Section Evaluation | Evaluate Metallic above-ground Bridge Crossing | Ductile iron bridge crossing installed in 1996. Inspect to confirm whether replacement required. Consider lining. | $100,000 |
| | B3 Metallic Section Evaluation | Evaluate Metallic above-ground Bridge Crossing | Ductile iron bridge crossing installed in 1996. Inspect to confirm whether replacement required. Consider lining. | $100,000 |
| | B3 Rehab/Replace Project - Phase 1 | Rehab/Replace B3 Discharge | IEC's 2011 evaluation recommended replacement in 2025. Replace immediate discharge end and CCTV in FY19. Assume rehab/replacement of the remaining 8,300 ft of DI pipe shall be completed in two phases, addressing the discharge end of the force main first as this is the area where corrosion is anticipated. Costs assume 25% is replaced in this project at a cost of $640 per ft (based on L1 actual costs). | $1,378,000 |
| | B3 Rehab/Replace Project - Phase 2 | Rehab/Replace remaining Metallic B3 Sections | IEC's 2011 evaluation recommended replacement in 2025. Rehab/replacement shall be completed in two phases; this is the second phase of the project to rehab/replace the remaining original ductile iron sections of B3. | $3,984,000 |
| 361 | Poinsettia Station Gravity Pipeline Project (Lanikai) | Rehab of Railroad Crossing and Construction of Parallel Line | The extension of the protective casings around the Lanikai Gravity Trunk Sewer and (B1) and the construction of a parallel line to the Lanikai Gravity Sewer. | $714,400 |
| | General Lanikai Replacement (District Share) | General Maintenance and Replacement Costs | Estimated District's share of the yearly expenditures for replacement and maintenance of the Lanikai Gravity Sewer. Yearly cost is presented in this table. | $10,000 |
| | General Occidental Replacement (District Share) | General Maintenance and Replacement Costs | Estimated District's share of the yearly expenditures for replacement and maintenance of the Occidental Gravity Sewer. Yearly cost is presented in this table. | $34,000 |
| | District Share of Encina CIP | District Share of Encina Capital Costs | Estimated District Share of Encina Capital Costs including CIP Projects and Acquisitions. | $39,324,876 |
| | Encina Secondary Effluent PS Rehab Project | Pump Station Rehab of Controls, Pumps, Electrical, and other Misc. Mechanical Items | 2014 assessment had total cost estimate of $283,905 less cost for pumps ($100,000) and telemetry upgrade ($4,000). Use DWEI Replacement Report for Controls, Elect. 50% Mech to cover miscellaneous mechanical, painting, and site improvements. Control update from Opto-22 to Allen Bradley required. Placeholder cost, verify rehab/replacement scope in FY19 assessment. | $370,000 |
| | General Encina Secondary Improvements (less FM) | | General Replacement Costs excluding FM which is included in Regional RW Project. | $1,131,333 |
| 367 | B1 Force Main - North Section Replacement. | | Part of No. County Coalition and is for section onsite Encina only. | $440,000 |
| 360 | Gafner AWT Improv. | High Priority Improvements to Gafner WRF | High priority items identified in 2016 condition assessment. ~$358,000 in IEC report for construction cost estimate. Cost here is actual bid plus soft costs. | $758,200 |
| | Gafner AWT Improvements (Phase 2) | Remaining Improvements to Gafner WRF | Remaining items from 2016 condition assessment with costs increased relatively based on FY18 bid results in comparison to 2016 memo cost estimates. | $1,221,100 |
| | General Gafner Improvements | General Maintenance and Replacement Costs | | $2,348,000 |
| 328 | North SD Water Reuse Coalition Project | Grant Application and Lobbying | FY18 LWD share of NSDWRC project. Used for ongoing lobbying efforts for grant funding. | $109,100 |
| | B1 Force Main Final Replacement | Secondary Effluent Force Main Replacement | This is one of 4 projects in the NSD Reg RW Project, but is a separate CIP project. | $4,329,145 |
| | No. SD County Regional RW Project | Expansion of District Recycled Water System | Remaining three of 4 projects - Gafner Expansion, OMWD connection, and new PS. | $4,410,990 |
| | Drainage Basin #11 VCP Line/Replace | Replacement/Lining of VCP Lines with Age > 50 years | In DB#11 (Estrella Del Mar Rd and Almaden Ln. and south of Alga Road and east of ECR), line/replace VCP pipe >50 years. Includes top hats for laterals and MH lining in unit cost. Relocate lines outside of easements if possible. | |
| | Island Area Implementation - Eolus North | District Funded Island Area Project | Extension of the existing sewer in Eolus Ave. south to potentially connect 74 lots. | $1,577,250 |
| | Island Area Implementation - Eolus/Glaucus | District Funded Island Area Project | Extension of the existing sewer in Glaucus St. east to potentially connect 52 lots. | $1,163,250 |
| | Island Area Implementation - Naiad | District Funded Island Area Project | Extension of the existing sewer in Hymettus Ave. south to Naid St. potentially connect 47 lots. | $721,800 |

**TABLE 11-2**
**5-YEAR CIP PROJECTS[1]**

| **Wastewater Program** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** |
|---|---|---|---|---|---|
| Gravity Pipelines and Manholes | | | | | |
| FY 2016 Gravity Pipeline Rehab.* | 92.9 | - | - | - | - |
| Orchard Wood Rd. Sewer Rehab. | - | 194.7 | - | - | - |
| FY17/FY18 CIPP Project | 800.0 | - | - | - | - |
| La Costa Alteration and Quebrada | 475.0 | - | - | - | - |
| Pipeline Repair Priority List - CIPP | - | - | 675.0 | - | - |
| Pipeline Repair Priority List - Open Trench | - | - | - | 675.0 | - |
| Pipeline Repair Priority List - CIPP | - | - | - | - | 675.0 |
| Misc. Pipeline/Manhole Rehab. | 163.0 | 163.0 | 163.0 | 163.0 | 163.0 |
| Asset Management Plan Update | 100.0 | - | - | - | - |
| HQ Building Metering Switchboard Install. | 69.9 | - | - | - | - |
| Lateral Repl./Backflow Preventer Prog. | 102.0 | 102.0 | 102.0 | 102.0 | 102.0 |
| Pump Stations | | | | | |
| Avocado PS Upgrade Project | - | - | 452.3 | - | - |
| Batiquitos Generator Replacement | - | - | 700.0 | - | - |
| Diana PS Upgrade Project | - | - | 600.8 | - | - |
| Encinitas Estates PS Replacement | - | 1,195.0 | - | - | - |
| Leucadia PS Rehabilitation | 3,670.0 | - | - | - | - |
| Rancho Verde Improvements | - | - | - | 371.3 | - |
| Village Park No. 5 PS Replacement* | 814.6 | - | - | - | - |
| Village Park No. 7 PS Rehab Project | - | - | - | - | 625.0 |
| L07 Meter Relocation | - | 20.0 | - | - | - |
| Pump Station Condition Assessment | - | 30.0 | - | - | - |
| General Pump Station Improvements | - | 1,670.8 | - | 576.0 | 1,601.1 |
| Additional Pump Station Projects | | | | | |
| Avocado Emergency Overflow | - | - | 348.8 | - | - |
| Diana Emergency Generator | - | 350.0 | - | - | - |
| Diana Emergency Overflow | - | - | - | - | 900.0 |
| Force Mains | | | | | |
| Leucadia (L1) West Section Replacement* | 100.0 | - | - | - | - |
| Force Main Corrosion Control | 35.0 | - | - | - | - |
| L1 Final Replacement | - | - | - | 2,880.0 | - |
| B3 Rehab/Replace Project - Phase 1 | - | 115.0 | 1,378.0 | - | - |
| Jointly-Owned Gravity Sewers | | | | | |
| Poinsettia Station Gravity Pipeline Project (Lanikai) | 714.4 | - | - | - | - |
| General Lanikai Replacement (District Share) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| General Occidental Replacement (District Share) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 |
| *Subtotal Wastewater Program* | *7,180.8* | *3,884.5* | *4,463.8* | *4,811.3* | *4,110.1* |
| District Share of Encina CIP | 1,875.1 | 2,725.6 | 2,779.4 | 1,970.4 | 1,802.6 |
| ***Total Wastewater Program*** | ***9,055.9*** | ***6,610.1*** | ***7,243.2*** | ***6,781.6*** | ***5,912.7*** |
| **Recycled Water Program** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** |
| Encina Secondary Effluent PS Rehab Project | - | - | 370.0 | - | - |
| General Encina Secondary Improvements (less FM) | - | - | 98.3 | 34.0 | 34.0 |
| B1 Force Main - North Section Replacement. | - | 440.0 | - | - | - |
| Gafner AWT Improv. | 758.2 | - | - | - | - |
| North SD Water Reuse Coalition Project | 109.1 | - | - | - | - |
| B1 Force Main Final Replacement | - | - | - | - | 2,198.6 |
| No. SD County Regional RW Project | - | 392.0 | - | - | - |
| ***Total Recycled Water Program*** | ***867.3*** | ***832.0*** | ***468.3*** | ***34.0*** | ***2,232.6*** |
| **District Total CIP Expenses** | **9,923.2** | **7,442.1** | **7,711.5** | **6,815.6** | **8,145.3** |
| **Optional Projects** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** |
| Drainage Basin #11 VCP Line/Replace | - | - | - | - | - |
| Island Area Implementation - Eolus North | - | - | - | 1577.3 | - |
| Island Area Implementation - Eolus/Glaucus | - | - | - | - | 1163.3 |
| Island Area Implementation - Naiad | - | - | - | - | - |
| ***Total Optional Projects*** | ***0.0*** | ***0.0*** | ***0.0*** | ***1,577.3*** | ***1,163.3*** |

[1] All numbers are in thousands of dollars

* Completed project, actual cost

**TABLE 11-3**
**20-YEAR SUMMARY OF**
**WASTEWATER CIP EXPENDITURES**

| Asset Category | Expenditures over 20 Years |
|---|---|
| Gravity Sewer Pipelines and Manholes | $ 21,790,421 |
| Pump Stations and Force Mains | $ 47,958,087 |
| Joints-Owned Gravity Sewers | $ 1,594,400 |
| Encina Wastewater Authority Projects | $ 40,051,686 |
| **TOTAL** | **$ 111,394,594** |

**TABLE 11-4**
**20-YEAR SUMMARY OF**
**RECYCLED WATER CIP EXPENDITURES**

| Asset Category | Expenditures over 20 Years |
|---|---|
| Recycled Water Pump Station and Force Main | $ 1,941,333 |
| Gafner Water Reclamation Plant | $ 4,327,300 |
| North County Regional Recycled Water Project | $ 8,849,235 |
| **TOTAL** | **$ 15,117,868** |

**TABLE 11-5**
**LEUCADIA WASTEWATER DISTRICT CAPITAL IMPROVEMENT PROGRAM - FINANCIAL ANALYSIS**

| Location Code | Project Name | Project Cost | FY2018 | FY2019 | FY2020 | FY2021 | FY2022 | FY2023 | FY2024 | FY2025 | FY2026 | FY2027 | FY2028 | FY2029 | FY2030 | FY2031 | FY2032 | FY2033 | FY2034 | FY2035 | FY2036 | FY2037 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WASTEWATER PROGRAMS** | | | | | | | | | | | | | | | | | | | | | | |
| **Gravity Pipelines and Manholes** | | | | | | | | | | | | | | | | | | | | | | |
| *Specific Pipeline and Manhole Replacement/Rehabilitation Projects* | | | | | | | | | | | | | | | | | | | | | | |
| 0353 | FY 2016 Gravity Pipeline Rehab.* | $493,395 | $92,903 | | | | | | | | | | | | | | | | | | | |
| 0365 | Orchard Wood Rd. Sewer Rehab. | $194,700 | | $194,700 | | | | | | | | | | | | | | | | | | |
| | FY17/FY18 CIPP Project | $800,000 | $800,000 | | | | | | | | | | | | | | | | | | | |
| | La Costa Alteration and Quebrada | $475,000 | $475,000 | | | | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - CIPP | $675,000 | | | $675,000 | | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - Open Trench | $675,000 | | | | $675,000 | | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - CIPP | $675,000 | | | | | $675,000 | | | | | | | | | | | | | | | |
| | Pipeline Repair Priority List - Open Trench | $675,000 | | | | | | $675,000 | | | | | | | | | | | | | | |
| | Drainage Basin #1 VCP Line/Replace | $6,100,000 | | | | | | | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | $762,500 | | | | | | |
| 0077 | Misc. Pipeline/Manhole Rehab. | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 | $163,000 |
| | Buildout-Capacity Based Projects | | | | | | | | | | | | | | | | | | | | | |
| *Subtotal Specific Pipeline and Manhole Replacement/Re* | | *$10,926,095* | *$1,530,903* | *$357,700* | *$838,000* | *$838,000* | *$838,000* | *$838,000* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$925,500* | *$163,000* | *$163,000* | *$163,000* | *$163,000* | *$163,000* | *$163,000* |
| *General Pipeline and Manhole Replacement Projects* | | $713,790 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $550,790 | $550,790 | $550,790 | $550,790 | $550,790 | $550,790 |
| *Additional Pipeline and Manhole Projects* | | | | | | | | | | | | | | | | | | | | | | |
| 0368 | Asset Management Plan Update | $550,000 | $100,000 | | | | | $125,000 | | | | | $150,000 | | | | | $175,000 | | | | |
| 0369 | HQ Building Metering Switchboard Install. | $69,918 | $69,918 | | | | | | | | | | | | | | | | | | | |
| 0323 | Lateral Repl./Backflow Preventer Prog. | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 | $102,000 |
| **Total Gravity Pipelines and Manholes** | | **$19,587,261** | **$1,802,821** | **$459,700** | **$940,000** | **$940,000** | **$940,000** | **$1,065,000** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$1,177,500** | **$1,027,500** | **$1,027,500** | **$1,027,500** | **$815,790** | **$990,790** | **$815,790** | **$815,790** | **$815,790** | **$815,790** |
| **Pump Stations and Force Mains** | | | | | | | | | | | | | | | | | | | | | | |
| *Specific Pump Station Improvement Projects* | | | | | | | | | | | | | | | | | | | | | | |
| | Avocado PS Upgrade Project | $452,250 | | | $452,250 | | | | | | | | | | | | | | | | | |
| | Batiquitos Generator Replacement | $700,000 | | | $700,000 | | | | | | | | | | | | | | | | | |
| | Batiquitos Pump Station Rehabilitation | $4,000,000 | | | | | | $4,000,000 | | | | | | | | | | | | | | |
| | Diana PS Upgrade Project | $600,750 | | | $600,750 | | | | | | | | | | | | | | | | | |
| 0364 | Encinitas Estates PS Replacement | $1,195,000 | | $1,195,000 | | | | | | | | | | | | | | | | | | |
| | La Costa Pump Station Replacement | $2,835,000 | | | | | | | | | | | | | | | | | | $2,835,000 | | |
| 0358 | Leucadia PS Rehabilitation | $3,670,000 | $3,670,000 | | | | | | | | | | | | | | | | | | | |
| | Rancho Verde Improvements | $371,250 | | | | $371,250 | | | | | | | | | | | | | | | | |
| 0354 | Village Park No. 5 PS Replacement* | $814,587 | $814,587 | | | | | | | | | | | | | | | | | | | |
| | Village Park No. 7 PS Rehab Project | $625,000 | | | | | $625,000 | | | | | | | | | | | | | | | |
| | L07 Meter Relocation | $20,000 | | $20,000 | | | | | | | | | | | | | | | | | | |
| | Pump Station Condition Assessment | $30,000 | | $30,000 | | | | | | | | | | | | | | | | | | |
| *Subtotal Specific Pump Station Projects* | | *$15,313,837* | *$4,484,587* | *$1,245,000* | *$1,753,000* | *$371,250* | *$625,000* | *$4,000,000* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$2,835,000* | *$0* | *$0* |
| **Force Mains** | | | | | | | | | | | | | | | | | | | | | | |
| 0345 | Leucadia (L1) West Section Replacement* | $100,000 | $100,000 | | | | | | | | | | | | | | | | | | | |
| 0366 | Force Main Corrosion Control | $35,000 | $35,000 | | | | | | | | | | | | | | | | | | | |
| | L1 Final Replacement | $2,880,000 | | | | $2,880,000 | | | | | | | | | | | | | | | | |
| | B2 Metallic Section Evaluation | $100,000 | | | | | | | | | $100,000 | | | | | | | | | | | |
| | B3 Metallic Section Evaluation | $100,000 | | | | | | | | | $100,000 | | | | | | | | | | | |
| | B3 Rehab/Replace Project - Phase 1 | $1,493,000 | | $115,000 | $1,378,000 | | | | | | | | | | | | | | | | | |
| | B3 Rehab/Replace Project - Phase 2 | $1,992,000 | | | | | | | $1,992,000 | | | | | | | | | | | | | |
| *Subtotal Specific Force Mains Projects* | | *$6,700,000* | *$135,000* | *$115,000* | *$1,378,000* | *$2,880,000* | *$0* | *$0* | *$1,992,000* | *$0* | *$200,000* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* | *$0* |
| **Subotal of Specific Pump Station Replacement Projects** | | | **$4,619,587** | **$1,360,000** | **$3,131,000** | **$3,251,250** | **$625,000** | **$4,000,000** | **$1,992,000** | **$0** | **$200,000** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$0** | **$2,835,000** | **$0** | **$0** |
| *General Pump Station Projects* | | | *$0* | *$1,670,750* | *$0* | *$576,000* | *$1,601,125* | *$0* | *$917,625* | *$1,913,625* | *$403,450* | *$603,450* | *$603,450* | *$603,450* | *$2,204,575* | *$2,958,825* | *$2,197,950* | *$2,041,200* | *$3,954,825* | *$0* | *$1,047,600* | *$1,047,600* |
| *Additional Pump Station Projects* | | | | | | | | | | | | | | | | | | | | | | |
| | Avocado Emergency Overflow | $348,750 | | | $348,750 | | | | | | | | | | | | | | | | | |
| | Diana Emergency Generator | $350,000 | | $350,000 | | | | | | | | | | | | | | | | | | |
| | Diana Emergency Overflow | $900,000 | | | | | $900,000 | | | | | | | | | | | | | | | |
| **Total Pump Stations and Force Mains** | | **$47,958,087** | **$4,619,587** | **$3,380,750** | **$3,479,750** | **$3,827,250** | **$3,126,125** | **$4,000,000** | **$2,909,625** | **$1,913,625** | **$603,450** | **$603,450** | **$603,450** | **$603,450** | **$2,204,575** | **$2,958,825** | **$2,197,950** | **$2,041,200** | **$3,954,825** | **$2,835,000** | **$1,047,600** | **$1,047,600** |
| Jointly-Owned Gravity Sewers | | | | | | | | | | | | | | | | | | | | | | |
| 0361 | Poinsettia Station Gravity Pipeline Project (La | $714,400 | $714,400 | | | | | | | | | | | | | | | | | | | |
| | General Lanikai Replacement (District Share) | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 | $10,000 |
| | General Occidental Replacement (District Sh | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 |
| **Subtotal Jointly-Owned Gravity Sewers** | | **$1,594,400** | **$758,400** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** | **$44,000** |
| | | | | | | | | | | | | | | | | | | | | | | |
| **Subtotal Wastewater Program** | | **$69,139,748** | **$7,180,808** | **$3,884,450** | **$4,463,750** | **$4,811,250** | **$4,110,125** | **$5,109,000** | **$3,981,125** | **$2,985,125** | **$1,674,950** | **$1,674,950** | **$1,824,950** | **$1,674,950** | **$3,276,075** | **$4,030,325** | **$3,057,740** | **$3,075,990** | **$4,814,615** | **$3,694,790** | **$1,907,390** | **$1,907,390** |
| | District Share of Encina CIP | $39,324,876 | $1,875,134 | $2,725,632 | $2,779,434 | $1,970,388 | $1,802,556 | $3,492,216 | $2,857,554 | $2,095,758 | $2,137,716 | $2,180,430 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 | $1,540,806 |
| ***Total Wastewater Program*** | | ***$108,464,624*** | ***$9,055,942*** | ***$6,610,082*** | ***$7,243,184*** | ***$6,781,638*** | ***$5,912,681*** | ***$8,601,216*** | ***$6,838,679*** | ***$5,080,883*** | ***$3,812,666*** | ***$3,855,380*** | ***$3,365,756*** | ***$3,215,756*** | ***$4,816,881*** | ***$5,571,131*** | ***$4,598,546*** | ***$4,616,796*** | ***$6,355,421*** | ***$5,235,596*** | ***$3,448,196*** | ***$3,448,196*** |
| | | | | | | | | | | | | | | | | | | | | | | |
| **RECYCLED WATER PROGRAM** | | | | | | | $33,215,097 | | | $61,165,871 | | | | $25,958,774 | | | | | | | | |
| | Encina Secondary Effluent PS Rehab Project | $370,000 | | | $370,000 | | | | | | | | | | | | | | | | | |
| | General Encina Secondary Improvements (Ie | $1,131,333 | $0 | $0 | $98,333 | $34,000 | $34,000 | $34,000 | $34,000 | $34,000 | $54,000 | $54,000 | $54,000 | $54,000 | $54,000 | $79,000 | $79,000 | $79,000 | $79,000 | $79,000 | $99,000 | $99,000 |
| 0367 | B1 Force Main - North Section Repla. | $440,000 | | $440,000 | | | | | | | | | | | | | | | | | | |
| 0360 | Gafner AWT Improv. | $758,200 | $758,200 | | | | | | | | | | | | | | | | | | | |
| | Gafner AWT Improvements (Phase 2) | $1,221,100 | | | | | | $1,221,100 | | | | | | | | | | | | | | |
| | General Gafner Improvements | $2,348,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $54,000 | $54,000 | $54,000 | $54,000 | $54,000 | $322,000 | $322,000 | $322,000 | $322,000 | $322,000 | $234,000 | $234,000 |
| 0328 | North SD Water Reuse Coalition Project | $109,100 | $109,100 | | | | | | | | | | | | | | | | | | | |
| | B1 Force Main Final Replacement | $2,164,573 | | | | | $2,164,573 | | | | $100,000 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| ***Total Recycled Water Program*** | | ***$8,542,306*** | ***$867,300*** | ***$440,000*** | ***$468,333*** | ***$34,000*** | ***$2,198,573*** | ***$1,255,100*** | ***$34,000*** | ***$34,000*** | ***$208,000*** | ***$108,000*** | ***$108,000*** | ***$108,000*** | ***$108,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$401,000*** | ***$333,000*** | ***$333,000*** |
| **DISTRICT TOTAL CIP EXPENSES** | | **$117,006,929** | **$9,923,242** | **$7,050,082** | **$7,711,517** | **$6,815,638** | **$8,111,254** | **$9,856,316** | **$6,872,679** | **$5,114,883** | **$4,020,666** | **$3,963,380** | **$3,473,756** | **$3,323,756** | **$4,924,881** | **$5,972,131** | **$4,999,546** | **$5,017,796** | **$6,756,421** | **$5,636,596** | **$3,781,196** | **$3,781,196** |

*Since the projects were complete as of the AMP completion, the FY18 costs are actual costs (versus planning costs) for the FY16 Gravity PL, VP5 PS, and L1 West FM projects.

OPTIONAL PROJECTS - Not included in "District Total CIP Expenses"

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Drainage Basin #11 VCP Line/Replace | | | | | | | | | | | | $0 | $0 | $0 | | | | | | | |
| | Island Area Implementation - Eolus North | $1,577,250 | | | | $1,577,250 | | | | | | | | | | | | | | | | |
| | Island Area Implementation - Eolus/Glaucus | $1,163,250 | | | | | $1,163,250 | | | | | | | | | | | | | | | |
| | Island Area Implementation - Naiad | $721,800 | | | | | | $721,800 | | | | | | | | | | | | | | |
| | No. SD County Regional RW Project | $4,410,990 | | $392,040 | | | | $1,944,000 | $2,074,950 | | | | | | | | | | | | | |