



CITY OF OCEANSIDE 2015 INTEGRATED MASTER PLANS

SEWER MASTER PLAN

October 2015

FINAL REPORT



**CITY OF OCEANSIDE
2014 INTEGRATED MASTER PLANS**

SEWER MASTER PLAN

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LIST OF ABBREVIATIONS

| Abbreviation | Description |
|---------------------|--|
| A | Agriculture |
| AACE | Association for the Advancement of Cost Engineering |
| AAF | Average Annual Flow |
| AC | Asbestos Cement |
| ac | Acre |
| ADWF | Average Dry Weather Flow |
| BAM | Below Ground Asset Manager |
| Carollo | Carollo Engineers, Inc. |
| CC | Community Commercial |
| CCF | 100 cubic feet |
| CCP | Concrete Cylindrical Pipe |
| CCTV | Closed-Circuit Television |
| CEQA | California Environmental Quality Act |
| cfs | Cubic Feet Per Second |
| CI | Civic Institutional |
| CI | Cast Iron |
| CIMIS | California Irrigation Management Information System |
| CIP | capital improvement plan |
| City | City of Oceanside |
| CMLC | Cement Mortar Lined and Coated Steel |
| d/D | Flow Depth To Pipe Diameter Ratio |
| DIP | Ductile Iron Pipe |
| DOF | Department of Finance |
| DU | Dwelling Unit |
| DWF | Dry Weather Flow |
| EA - R | Estate A Residential |
| EB - R | Estate B Residential |
| <i>ENR CCI</i> | <i>Engineering News-Record</i> Construction Cost Index |
| ERU | Equivalent Residential Unit |
| Eto | Evapotranspiration |
| F | Fahrenheit |
| ft/s | feet per second |
| ft ² | Square Feet |
| GALV | Galvanized Steel Pipe |
| GC | General Commercial |
| GI | General Industrial |
| GIS | Geographic Information System |
| gpd | Gallons Per Day |
| gpd/ac | Gallons Per Day Per Acre |
| gpm | Gallons Per Minute |

| | |
|----------------|---|
| GWI | Groundwater Infiltration |
| HD - R | High Density Residential |
| HDPE | High Density Polyethylene |
| HGL | Hydraulic Grade Line |
| I/I | Infiltration and Inflow |
| IEC | Infrastructure Engineering Corporation |
| IMP | Integrated Master Plan |
| in | inches |
| in/hr | Inches Per Hour |
| LET | Load Equalization Tank |
| LI | Light Industrial |
| La Salina WWTP | La Salina Wastewater Treatment Plant |
| MDA - R | Medium Density – A Residential |
| MDB - R | Medium Density – B Residential |
| MDC - R | Medium Density – C Residential |
| MDD | Maximum Daily Demand |
| mgd | Million Gallons Per Day |
| mi | Miles |
| msl | mean sea level |
| n | Manning Friction Coefficient |
| NC | Neighborhood Commercial |
| NOAA | National Oceanic and Atmospheric Association |
| NPDES | National Pollution Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| OOO | Oceanside Ocean Outfall |
| OS | Open Space |
| PACP | Pipeline Condition Assessment Protocol |
| PC | Professional Commercial |
| PFDS | Precipitation Frequency Data Server |
| PI | Private Institutional |
| PUD | Public Utility District |
| PVC | Polyvinylchloride |
| PWWF | Peak Wet Weather Flow |
| R&R | Remove and Replace |
| RCP | Reinforced Concrete Pipe |
| RDII | Rainfall Dependent Infiltration and Inflow |
| Rainbow MWD | Rainbow Municipal Water District |
| ROW | Right-of-Way |
| RP-I | Research Park Industrial |
| RTK | RDI/I simulation method using Rainfall, Time and a Constant (K) |
| RWMP | Recycled Water Master Plan |
| RWQCB | Regional Water Quality Control Board |

| | |
|-----------------------|--|
| SANDAG | San Diego Association of Governments |
| SC | Special Commercial |
| SCADA | Supervisory Control and Data Acquisition |
| SCP | Steel Cylinder Pipe |
| SCS | Soil Conservation Service |
| SFD - R | Single Family Detached Residential |
| San Luis Rey WWTP | San Luis Rey Wastewater Treatment Plant |
| SMP | Sewer Master Plan |
| SSO | Sanitary Sewer Overflow |
| SWMM | Stormwater Management Model |
| Traffic Analysis Zone | TAZ |
| UHD - R | Urban High Density Residential |
| UNK | Unknown Material |
| U.S. | United States |
| UWMP | Urban Water Management Plan |
| VCP | Vitrified Clay Pipe |
| VID | Vista Irrigation District |
| WMP | Water Master Plan |
| WRF | Water Reclamation Facility |
| WWF | Wet Weather Flow |
| WWTP | Wastewater Treatment Plant |

ES.1 INTRODUCTION

The purpose of this Sewer Master Plan (SMP) is to aid the City of Oceanside (City) in the planning, development, and financing of wastewater collection system facilities, to provide reliable and enhanced service for existing customers, and to serve anticipated land use changes and growth. This SMP considers existing flow conditions as well as future growth projected by a number of specific near-term development projects and the San Diego Association of Governments' (SANDAG's) long-term regional growth projections. The objective of this master plan is to serve as a strategic planning guide for upgrading, improving, and expanding the City's wastewater collection system.

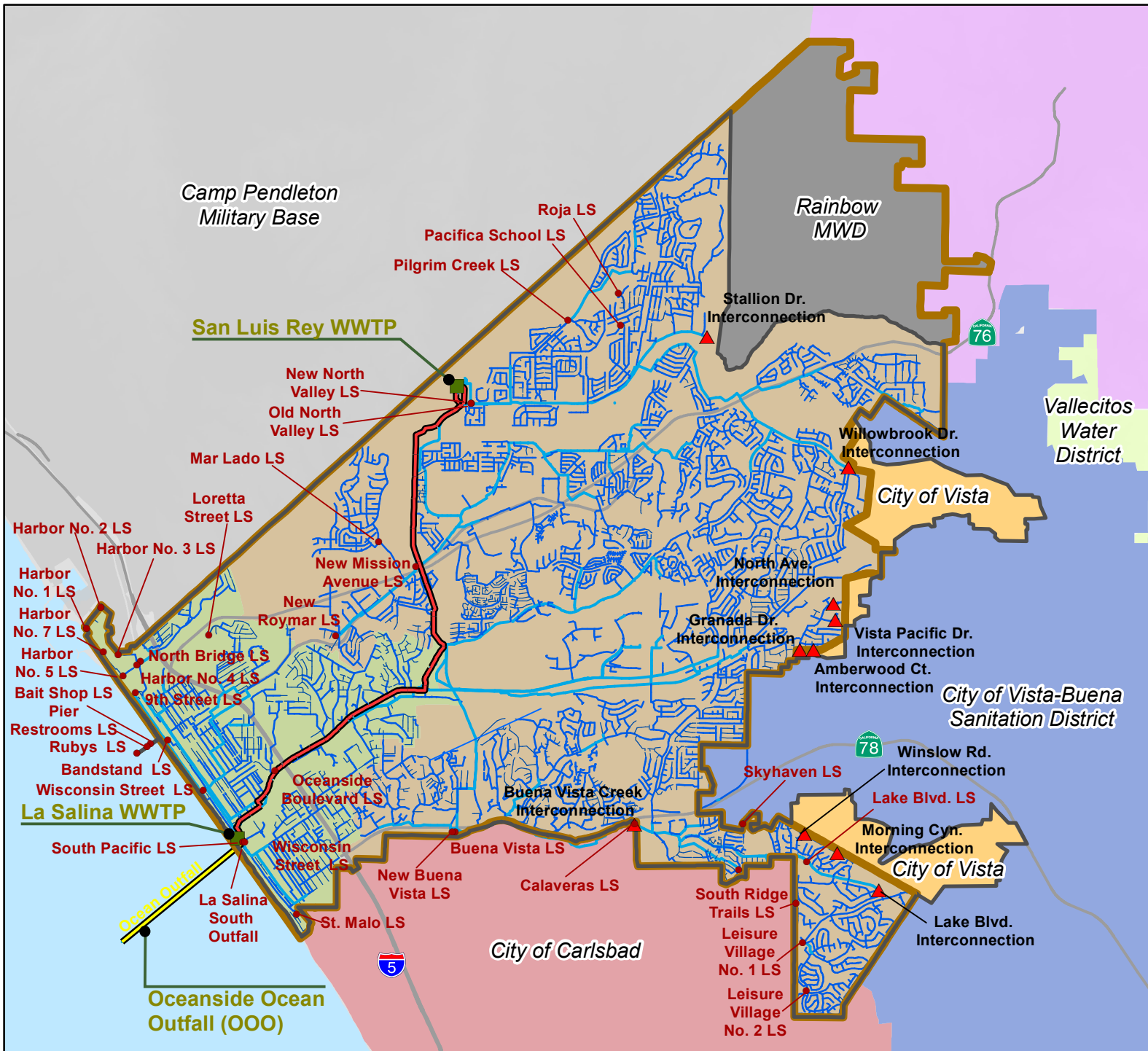
ES.2 STUDY AREA

The City currently occupies approximately 42 square miles in the northern part of San Diego County, California. The City's current population is approximately 175,000 and its location and sewer service area is depicted on Figure ES.1. As shown on this figure, the City treats wastewater from several areas outside the City boundary located within the City of Vista-Buena Sanitation District (Vista-BSD) and the Rainbow Municipal Water District (Rainbow MWD). The City is surrounded by the City of Carlsbad to the south, the City of Vista to the east, and Camp Pendleton Military Base to the north.

The study area for this SMP is the City's wastewater service area, which closely coincides with the City boundary as described above, with two major differences. First, the Morro Hills community in Northern part of the City doesn't have any sewer infrastructure installed. The sewage in the Morro Hills area is disposed of using septic systems, and therefore is excluded from the SMP. The second difference between the City's boundary and the sewer service boundary is that the sewer service boundary also includes some parts of the Vista-BSD and the Rainbow MWD. Wastewater from certain areas in the Vista-BSD and the Rainbow MWD service areas flow by gravity into Oceanside and thus these areas are included in the City's sewer study area.

ES.3 LAND USE

The City's General Plan was most recently updated in 2002, and was amended most recently in June 2012. The City's General Plan defines many elements of land use, including the distribution of land use types and both near-term and long-range development plans. (Oceanside, 2002).



Legend

- Lift Station
- ▲ Sewer Interconnections
- Wastewater Treatment Facility
- Sewer Service Area Boundary
- ▭ City Boundary
- Sewer Pipeline Diameter**
- 6" and Smaller
- 8" - 10"
- 12" and Larger
- Oceanside Ocean Outfall (OOO)
- Land Outfall
- Sewer Service Areas**
- La Salina WWTP Service Area
- San Luis Rey WWTP Service Area
- Morro Hills (Not Served)
- City of Vista-Buena Sanitation District
- Carlsbad Municipal Water District
- Pendleton Military Reservation
- Rainbow Municipal Water District
- Vallecitos Water District District
- Areas of Neighboring Agencies Served by City

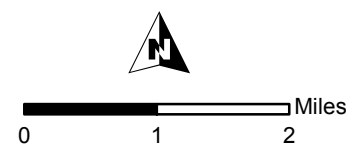


Figure ES.1
Service Area Map
 Sewer Master Plan
 City of Oceanside



A large portion of the City is zoned for agricultural use, the majority of which is located in the northeast area of the City. Over the last few decades, however, large portions of the agricultural areas have been converted to residential planned communities.

Current development plans call for some portions of the City to be redeveloped. This process will further contribute to growth and increased wastewater flows downstream of the redevelopment areas, but the overall composition of uses is not anticipated to change significantly.

Two major planned developments are the El Corazon Plan and Rancho Del Oro Plan, which entail the development of significant new industrial space within the City. Residential, commercial, and even some open space are included along the periphery of these developments. Significant amounts of redevelopment are also planned for the downtown area around City Hall and out to the beachfront within the Coastal Zone Boundary.

In addition to the developments described above, there is also discussion among land owners in the Morro Hills Area to sell their agricultural land and convert this area to estate or low-density residential area. This could potentially replace about 3,000 acres of agricultural land with 600 to 1,000 homes. Due to the uncertainty of this development, this SMP does not consider this land use conversion. The potential impact of this conversion on the required water and sewer system infrastructure improvement needs is evaluated in a separate study.

ES.4 POPULATION

The United States (U.S.) Census Bureau performs a census every 10 years, providing population estimates for municipalities throughout the country. The California Department of Finance (DOF) estimates population during non-census years using the previous census as a benchmark. Following the 2010 Census, the DOF revised their previous estimates for the City years between 2000 and 2010 to make historical estimates consummate with the 2010 Census.

Historical population estimates for 1997 through 2013 are depicted graphically on Figure ES.2. As shown on this figure, the population estimates made by the DOF based on 2000 Census data were substantially higher (16,000 people for 2010) than those based on actual counts made during the 2010 Census. After the 2010 Census data was received, the U.S. Census Bureau revised their population estimates for the years 2001-2010.

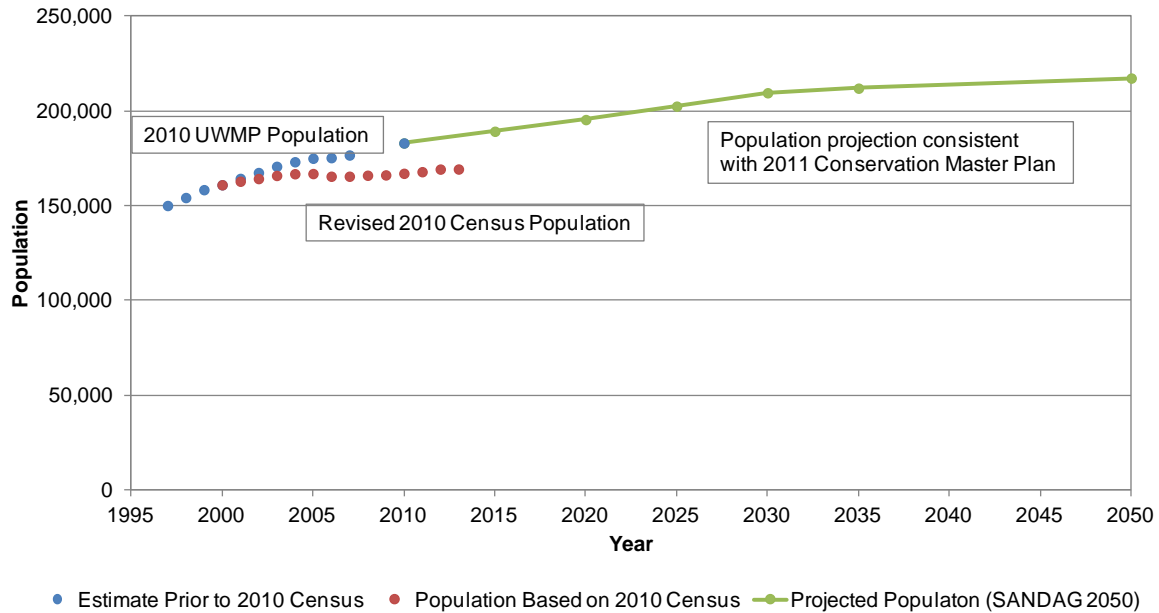


Figure ES.2 Historic and Projected Population

The initial population projection for 2010 was about 16,000 people (or 10 percent) higher than the 2010 Census population count. This difference represents a significant discrepancy in the data. Some potential reasons for this overestimation prior to the 2010 Census include the semi-transient nature of the nearby military population at Camp Pendleton and reduced economic activity due to the financial crisis late in the decade. The cause of this discrepancy could be important in anticipating the potential for recovery of the population in the future. It should be noted that the City faced a similar issue in the early 1990s, during the Desert Storm operation in 1990 and 1991. At that time, thousands of troops from nearby Camp Pendleton were deployed to the Middle East, with the local economy suffering, and sewer flows decreasing dramatically.

Population projections are based on the SANDAG 2050 Regional Growth Forecast. As discussed above, annual population estimates were revised substantially following the 2010 Census. The adjusted population estimates have not yet been incorporated into SANDAG's population estimates presented on Figure ES.2. However, for this master plan, the projected population was not reduced based on the population discrepancy. In part, this is because the reasons cited above for the discrepancy could potentially be only temporary influences. Especially if the population reduction occurred due to economic considerations, recovery to previous population levels could occur much faster than predicted by projected population growth rates. Thus, for conservative planning purposes and consistency with the City's 2011 Water Conservation Plan, it was decided to use the SANDAG 2050 population projections. This population projection is also graphically depicted on Figure ES.2.

The study area population is expected to continue to grow through year 2050. The majority of this growth is projected to occur in the next 15 to 20 years. The 2050 population is projected to be approximately 217,000 people.

ES.5 EXISTING AND FUTURE WASTEWATER FLOWS

The average dry weather flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season. The ADWF includes the BWF generated by the City's residential, commercial, and industrial users, plus the dry weather GWI component.

Peak wet weather flow (PWWF) is the highest observed flow that occurs following a design storm event. Wet weather I/I cause flows in the collection system to increase. PWWF is typically used for designing sewers and lift stations. Therefore, the PWWF and the "Design Flow" are synonymous and will be used interchangeably throughout this report.

Two future flow scenarios were developed to analyze system capacity: a near-term scenario (2020) and a long-term scenario (2050). The data sources and methods used for estimating these flows were coordinated closely with those used for estimating water demand for the Water Master Plan. The sewer flows resulting from this analysis are presented in the following sections.

The first scenario was a near-term flow projection through year 2020 that assumes that all planned and currently being constructed development projects have been built. Table 3.6 provides a list of the development projects that were assumed to have been built for the near-term scenario.

The second scenario was a long-term flow projection through year 2050 that assumes wastewater flow increases according to SANDAG's 2011-2050 population and employment projections by TAZ. Near-term wastewater flows associated with known developments were subtracted from each TAZ in order to calculate the incremental wastewater flow to be associated with the long-term scenario.

Table ES.1 summarizes the existing and future residential and non-residential ADWF estimates for the City of Oceanside. This table also presents the estimated flows from Rainbow MWD and the City of Vista. As shown in Table ES.1, the City's total dry weather flow is projected to increase from 12.5 mgd under existing conditions (year 2013) to 16.5 mgd by year 2050. This 4.0 mgd increase equates to 32 percent increase in the long term. In the near-term, total system flows are projected to increase by 5.6 percent to 13.2 mgd by 2020.

| Table ES.1 Summary of Average Dry Weather Flows Sewer Master Plan City of Oceanside | | | |
|--|--|---|---|
| Land Use Category/Area | Existing Sewer Flow (mgd) | Near-Term Sewer Flow (mgd) | Long-Term Sewer Flow (mgd) |
| Residential | 9.1 | 9.4 | 10.9 |
| Commercial | 1.9 | 2.3 | 3.5 |
| Industrial | 0.51 | 0.51 | 1.03 |
| Total ADWF within City | 11.5 | 12.2 | 15.4 |
| Rainbow MWD | 0.77 | 0.77 | 0.77 |
| City of Vista | 0.24 | 0.24 | 0.25 |
| Total ADWF From Outside Source | 1.01 | 1.01 | 1.02 |
| Total Dry Weather Flow | 12.5 | 13.2 | 16.5 |
| Notes: | | | |
| (1) Residential flows assume an 83% water-to-sewer return rate (using winter water consumption). | | | |
| (2) Commercial and industrial flows assume a 100% water-to-sewer return rate (using winter water consumption). | | | |
| (3) Flows from Rainbow area are based on 2012 flow monitoring data. | | | |
| (4) Flows from Vista are estimated based on house counts and commercial acreage from aerial imagery. | | | |

It is noted that recent government campaigns promoting water conservation and water-saving improvements to plumbing fixtures could potentially result in a reduction in sewer flow generation in the coming years. For this study, water conservation was not assumed to have an impact on sewer flow generation. Future flow surveys will be needed to verify how significant of an impact new plumbing codes have on indoor water use and sewer flows.

The distribution of the projected wastewater flows to the City's two treatment plants is provided in Table ES.2. The City is planning to decommissioning/demolish the La Salina WWTP, and will construct a new La Salina Pump Station to convey the influent to the existing La Salina WWTP to San Luis Rey. For this reason, Table ES.2 shows that future flows to the La Salina WWTP will be zero, and the will all flow to San Luis Rey WWTP.

| Table ES.2 Summary of Average Dry Weather Flows by Plant Sewer Master Plan City of Oceanside | | | | | |
|---|--|---|---|------------------------------|------------------|
| | Existing Sewer Flow (mgd) | Near-Term Sewer Flow (mgd) | Long-Term Sewer Flow (mgd) | ADWF Increase (%) | |
| | | | | Near-Term | Long-Term |
| San Luis Rey WWTP | 9.7 | 13.2 | 16.5 | 6.2 | 32.0 |
| La Salina WWTP | 2.8 | - | - | - | - |
| Total Dry Weather Flow | 12.5 | 13.2 | 16.5 | 6.2 | 32.0 |

The existing design flow is generated by routing the 10-year, 24-hour synthetic design storm through the hydraulic model, which was calibrated under both dry weather and wet weather conditions. The near-term and long-term PWWF was derived by routing the 10-year, 24-hour design storm through the hydraulic model, but with the near-term and long-term dry weather flow projections.

Table ES.3 presents a summary of the existing and build out ADWF and PWWF. Similar to Table ES.2, Table ES.3 shows a future flow of zero at the La Salina WWTP, with all existing flows and future flows routed to the San Luis Rey WWTP. The near term ADWF and PWWF at the San Luis Rey WWTP are projected to approach 13.2 mgd and 34.0 mgd, respectively, resulting in a PWWF/ADWF peaking factor of 2.58. In the long term, the ADWF and PWWF at the San Luis Rey WWTP are projected to approach 16.5 mgd and 38.9 mgd, respectively, which equates to a PWWF/ADWF peaking factor of 2.36.

| Table ES.3 Current and Projected Wastewater Flows Sewer Master Plan City of Oceanside | | | | | | | |
|--|-------------|---------------------------|---------------------------|-----------------------|---------------------------|---------------------------|-----------------------|
| Flow Condition | Year | San Luis Rey WWTP | | | La Salina WWTP | | |
| | | ADWF⁽¹⁾ | PWWF⁽²⁾ | Peaking Factor | ADWF⁽¹⁾ | PWWF⁽²⁾ | Peaking Factor |
| Existing | 2013 | 9.7 | 22.7 | 2.34 | 2.8 | 8.0 | 2.86 |
| Near-Term | 2020 | 13.2 | 34.0 | 2.58 | - | - | - |
| Long-Term | 2050 | 16.5 | 38.9 | 2.36 | - | - | - |
| Notes: | | | | | | | |
| (1) ADWF = Average Dry Weather Flow. | | | | | | | |
| (2) PWWF = Peak Wet Weather Flow. | | | | | | | |

ES.6 EXISTING WASTEWATER SYSTEM FACILITIES AND HYDRAULIC MODEL

Currently, the City manages a wastewater collection system that consists of approximately 460 miles of gravity sewer pipeline, 33 lift stations, two wastewater treatment plants, two land outfalls, and one ocean outfall. These facilities are shown on Figure ES.3. In addition to the collection system main and trunk sewers, there are approximately 200 miles of lateral pipelines that connect to the collection system, which are the responsibility of the property owner. These sewer laterals are not analyzed in this SMP.

As part of the SMP, the City's previous sewer models, one for the La Salina Wastewater Treatment Plant (WWTP) wastewater service area and one for the San Luis Rey WWTP, were consolidated, updated, and upgraded to InfoSWMM® software to improve model accuracy and ease of use. The total modeled network includes 140 miles (approximately 30 percent) of the City's sewer system. It has two land outfalls representing the La Salina and San Luis Rey WWTPs. The modeled network is shown on Figure ES.4.

The updated hydraulic model was then calibrated for dry and wet weather conditions using flow monitoring data collected as part of the project. The updated and calibrated model was utilized for the wastewater collection system analysis presented in this SMP.

ES.7 WASTEWATER COLLECTION SYSTEM EVALUATION

This section summarizes the evaluation of the City's wastewater collection system facilities and identifies current and future system deficiencies. This chapter also summarizes the results of the condition assessment of the City's collection system.

ES.7.1 Capacity Analysis

The City's hydraulic model was used to perform a capacity analysis of the existing wastewater collection system. This evaluation involves identifying areas in the collection system where flow restrictions are present or where pipe capacity is inadequate to convey design flows.

For the sewer collection system, the PWWF was routed through the hydraulic model under existing, Near-Term, and Long-Term flow conditions. In accordance with the established evaluation criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 1.0 were identified and improvement projects were identified to mitigate the capacity deficiencies.

The City's existing modeled lift stations were also evaluated to determine if they have sufficient capacity to convey existing PWWFs. Lift stations with an influent PWWF above the existing firm capacity were flagged as deficient.

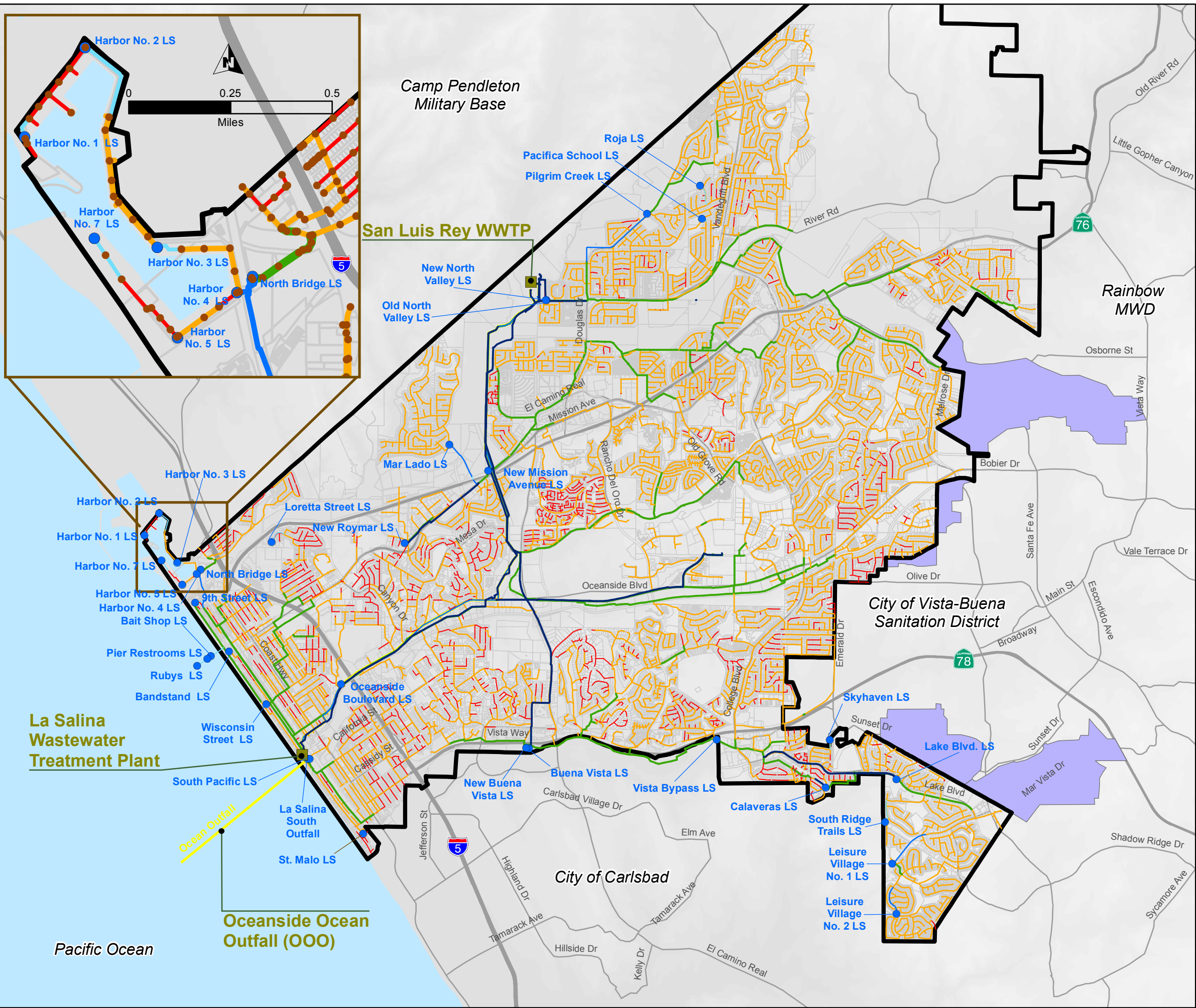
ES.7.2 Condition Assessment

A condition assessment and asset management strategy was performed to get a better understanding of the city's collection system infrastructure. An understanding of the existing condition of the collection system assets is critical to 1) providing the baseline projection of collection system renewal needs to be incorporated into this SMP; and 2) allowing for prioritization of capital renewal projects within the SMP.

ES.7.2.1 Gravity Collection System Condition Assessment

The approach used to conduct the age-based renewal analysis of the gravity collection system was based on current practices that are commonly applied within wastewater asset management programs. Pipeline diameter, material, linear feet, and age data was obtained from Oceanside's GIS database. Additionally, a dataset of CCTV condition scores based on the Pipeline Assessment and Certification Program (PACP) for approximately 71 pipe segments was incorporated into the analysis. These pipe segments were targeted as high priority pipelines for video inspection as part of this SMP. Of the 71 pipeline segments that were CCTV'd, 8 were targeted for rehabilitation and replacement as part of the condition assessment.

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Legend

- Wastewater Treatment Facility
- Manholes
- Lift Station
- City of Oceanside


Force Main Diameter

- 6" and Smaller
- 8" - 10"
- 12" and Larger

Gravity Main Diameter


- 6" and Smaller
- 8" - 10"
- 12" and Larger
- Ocean Outfall

- Parcels
- Areas of Neighboring Agencies Served by City

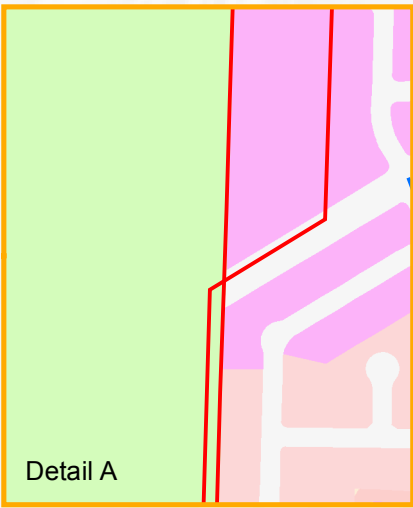
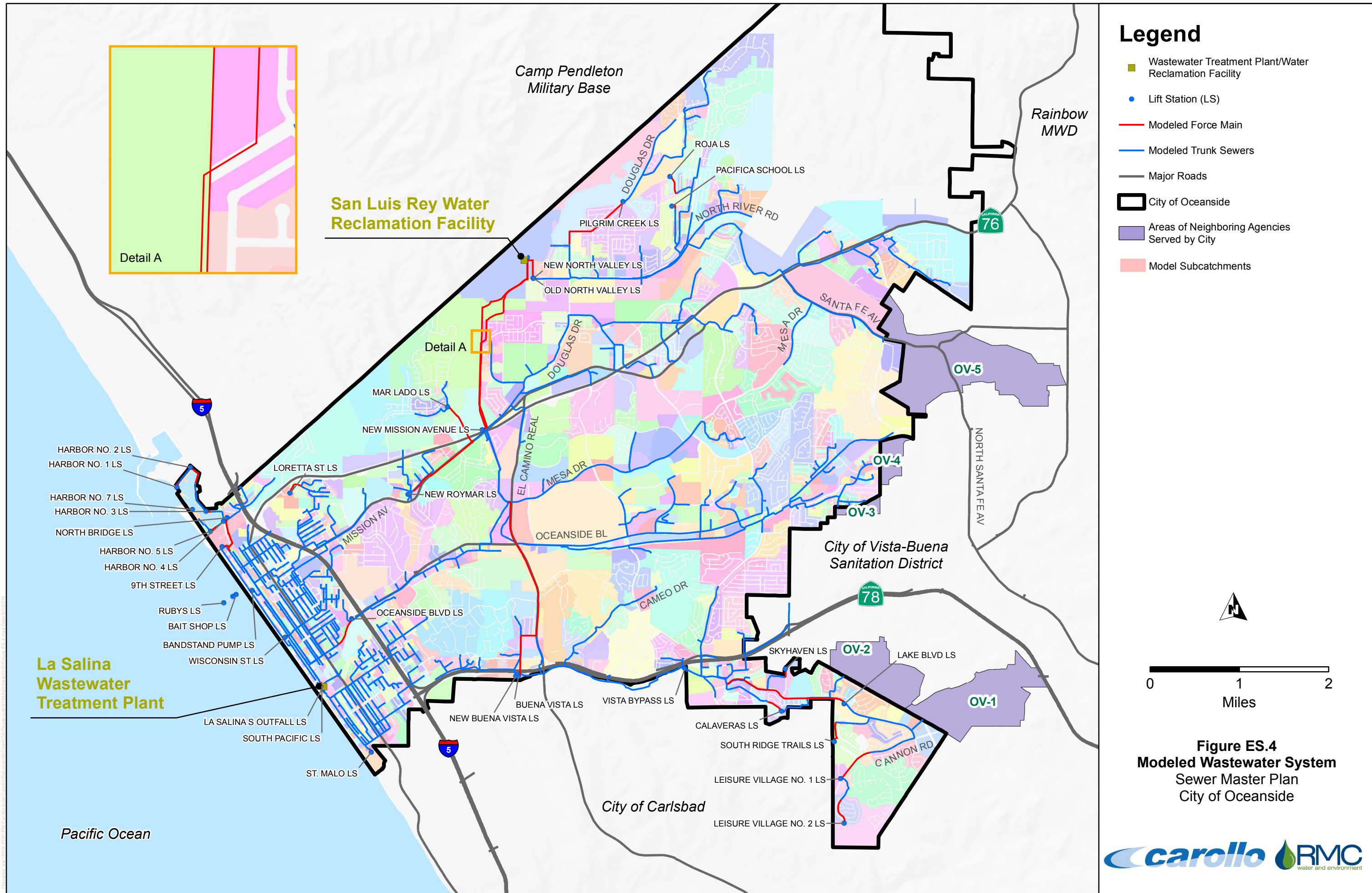


0 1 2
Miles

Figure ES.3
Lift Stations, Force Mains,
and Gravity Mains
Sewer Master Plan
City of Oceanside



carollo RMC
Engineers...Working Wonders With Water® water and environment



San Luis Rey Water Reclamation Facility

La Salina Wastewater Treatment Plant



Pacific Ocean

Camp Pendleton Military Base

Rainbow MWD

City of Vista-Buena Sanitation District

City of Carlsbad

HARBOR NO. 2 LS
 HARBOR NO. 1 LS
 HARBOR NO. 7 LS
 HARBOR NO. 3 LS
 NORTH BRIDGE LS
 HARBOR NO. 5 LS
 HARBOR NO. 4 LS
 9TH STREET LS
 RUBYS LS
 BAIT SHOP LS
 BANDSTAND PUMP LS
 WISCONSIN ST LS
 LA SALINA S OUTFALL LS
 SOUTH PACIFIC LS
 ST. MALO LS

LORETTA ST LS
 NEW MISSION AVENUE LS
 NEW ROYMAR LS
 OCEANSIDE BLVD LS
 NEW BUENA VISTA LS
 BUENA VISTA LS
 VISTA BYPASS LS

MAR LADO LS
 NEW NORTH VALLEY LS
 OLD NORTH VALLEY LS
 OCEANSIDE BL
 CALAVERAS LS
 SOUTH RIDGE TRAILS LS
 LEISURE VILLAGE NO. 1 LS
 LEISURE VILLAGE NO. 2 LS

DOUGLAS DR
 PILGRIM CREEK LS
 NEW NORTH VALLEY LS
 OLD NORTH VALLEY LS
 DOUGLAS DR
 EL CAMINO REAL
 MESA DR
 CAMEO DR
 SKYHAVEN LS
 LAKE BLVD LS
 CANNON RD

ROJALS
 PACIFICA SCHOOL LS
 NORTH RIVER RD
 MESA DR
 SANTA FE AV
 OCEANSIDE BL
 SKYHAVEN LS
 SOUTH RIDGE TRAILS LS
 LEISURE VILLAGE NO. 1 LS
 LEISURE VILLAGE NO. 2 LS

SANTA FE AV
 MESA DR
 OCEANSIDE BL
 CAMEO DR
 SKYHAVEN LS
 LAKE BLVD LS
 CANNON RD

OV-5
 OV-4
 OV-3
 OV-2
 OV-1



The GIS and CCTV data was entered into Carollo's Below Ground Asset Manager (BAM) Model. BAM includes a statistical analysis of decay and failure of pipes based on age, material, and diameter. The BAM model was used to prepare an age-based pipeline rehabilitation and replacement (R&R, or renewal) needs analysis for the City's wastewater collection system. The purpose of this renewal analysis is to provide a long-term financial plan to address aging collection system infrastructure.

It is recommended that approximately 54 miles of sewer pipeline be replaced or rehabilitated before year 2020, while another 63 miles of pipeline will need to be replaced in the period 2020-2050. This equates to approximately 10.7 miles per year on average in the next 5 years and 2.1 miles per year on average for the remaining 30 years.

ES.7.2.2 Lift Station Condition Assessment

A condition assessment of the City's wastewater lift stations was performed on July 9 and 10, 2013 by the Carollo assessment team for ten lift stations identified by the City as most critical. The remaining lift stations were inspected by Carollo's mechanical engineer and pump station expert between July 16 through 18, 2013. The condition assessments included a visual inspection of the site and input from City staff. The facility inspection did not include a full condition assessment from the multi-discipline team that performed the inspections.

The purpose of the lift station condition assessment was to provide a planning document that gives the City guidance and direction for facility improvements, project budgeting, and implementation schedules. This condition assessment evaluated and categorized projects identified by the City and personnel familiar with the lift stations.

ES.7.3 Collection System Improvements

In summary, the following major wastewater collection system improvement projects are recommended, and included in the City's Capital Improvement Plan (CIP):

- 11 capacity related gravity sewer improvement projects with a total length of approximately 15,700 linear feet (LF), ranging in diameter from 8-inches to 30-inches in diameter.
- A capacity upgrade to the South Pacific Lift Station and Force Main.
- Rehabilitation of eight of the City's existing lift stations (Harbor #5, New Buena, Pilgrim Creek, Harbor #3, Roja, North Bridge, Leisure Village #2, and Oceanside Boulevard), as well as an allowance for future lift station rehabilitation.
- A plan for rehabilitation and repair of the City's gravity collection system, based on the results of the BAM analysis.
- Implementation of the improvements recommended in the City's 2012 San Luis Rey Wastewater Treatment Plant (WWTP) Facility Needs Assessment.

- Decommission/Demolition of the existing La Salina WWTP, construction of a new La Salina Pump Station to pump raw wastewater from La Salina to the San Luis Rey WWTP, and associated infrastructure improvements.
- Other planned improvements included in the City's current CIP.

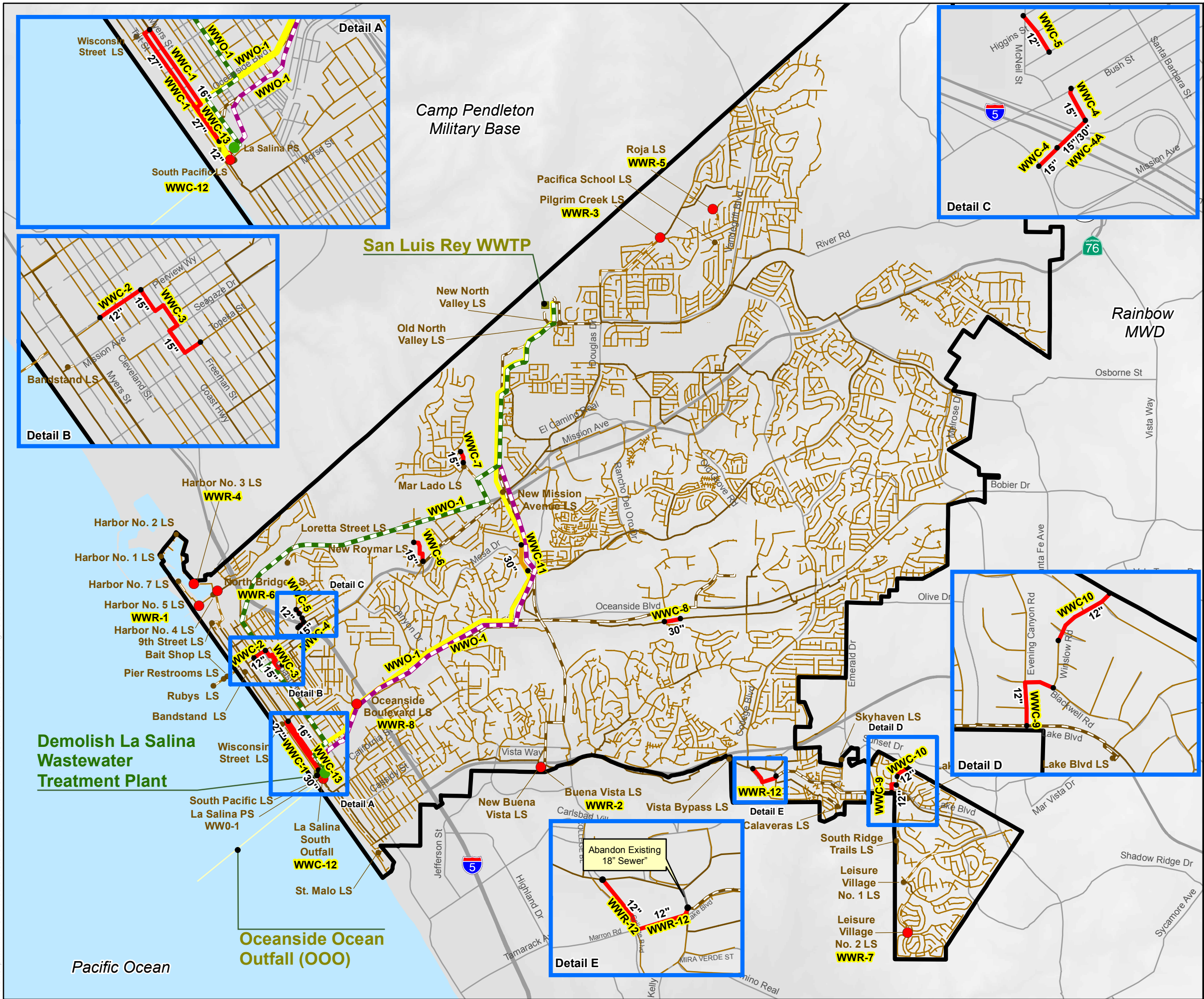
The proposed sewer system improvement projects are depicted on Figure ES.5.

ES.8 CAPITAL IMPROVEMENT PLAN

Project cost estimates were calculated based on elements, such as the project location, size, length, land acquisition needs, and other factors. Allowances for project contingencies consistent with an "Order of Magnitude" estimate are also included in the project costs prepared as part of this SMP.

The proposed capital improvements are prioritized based on their urgency to mitigate existing deficiencies and condition issues and for servicing future growth. The implementation phases are separated into two phases, Near-Term and Long-Term. As mentioned previously, the near-term phase extends from 2014 to 2020, and the long-term phase begins in 2021 and continues until 2050. A summary improvement costs by phase is provided in Table ES.4. As shown in Table ES.4, the total estimated cost for sewer collection system improvements through the year 2050 is nearly \$249 million. The vast majority of improvement projects (\$246 million) are associated with existing system improvements.

The distribution of project cost by project type are listed in Table ES.5 and depicted on Figure ES.6. As shown on Figure ES.6, the majority of the proposed improvements consist of rehabilitation projects. Pipeline rehabilitation accounts for approximately 66 percent of the total CIP costs. Lift station rehabilitation accounts for approximately 7 percent, and treatment plant rehabilitation accounts for an additional 13 percent of the CIP total. Capacity projects account for only 5 percent of the recommended improvement projects, while the remaining 9 percent of CIP costs are associated with other City planned CIP items.



Legend

- La Salina Pump Station
- Proposed Improvements**
- Near Term Lift Station Improvement
- Near Term Gravity Main Improvement With Start/End Manholes
- Near Term Force Main Improvement With Start/End Manholes
- Long Term Gravity Main Improvement With Start/End Manholes
- La Salina Pipeline Improvements**
- Repurpose FPU D Outfall to La Salina Force Main
- Convert Brine Line to Recycled Water Pipeline
- Relocate Existing Land Outfall
- Wastewater Treatment Facility
- Lift Station
- City of Oceanside
- Force Main Diameter**
- 10" and Smaller
- 12" and Larger
- Gravity Main Diameter**
- 10" and Smaller
- 12" and Larger
- Ocean Outfall

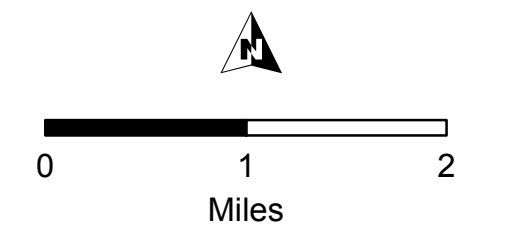


Figure ES.5
Future System Improvements
 Sewer Master Plan
 City of Oceanside

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| Table ES.4 Summary of Capital Improvement Costs Sewer Master Plan City of Oceanside | | | |
|--|---------------------------------|---------------------------------|-------------------------------|
| Reimbursement Category | Implementation Phase | | Total (\$ million) |
| | 2014-20 (\$ million) | 2020-50 (\$ million) | |
| Cost to Existing Users | 127.85 | 118.12 | 245.98 |
| Cost to Future Users | 2.18 | 0.85 | 3.02 |
| Total | 130.03 | 118.97 | 249.00 |
| Note: | | | |
| (1) Costs are based on ENR CCI 10,736 (Los Angeles, January 2014). | | | |

| Table ES.5 Existing Versus Future Cost by Classification Type Sewer Master Plan City of Oceanside | | | | |
|--|--|--|--|-------------------------------|
| Reimbursement Category | Capacity Related (\$ million) | Rehabilitation (\$ million) | Misc. Projects (\$ million) | Total (\$ million) |
| Existing Users | 4.89 | 188.16 | 52.93 | 245.98 |
| Future Users | 3.025 | - | - | 3.02 |
| Total | 7.91 | 188.16 | 52.93 | 249.00 |
| Note: | | | | |
| (1) Costs are based on ENR CCI 10,736 (Los Angeles, January 2014). | | | | |

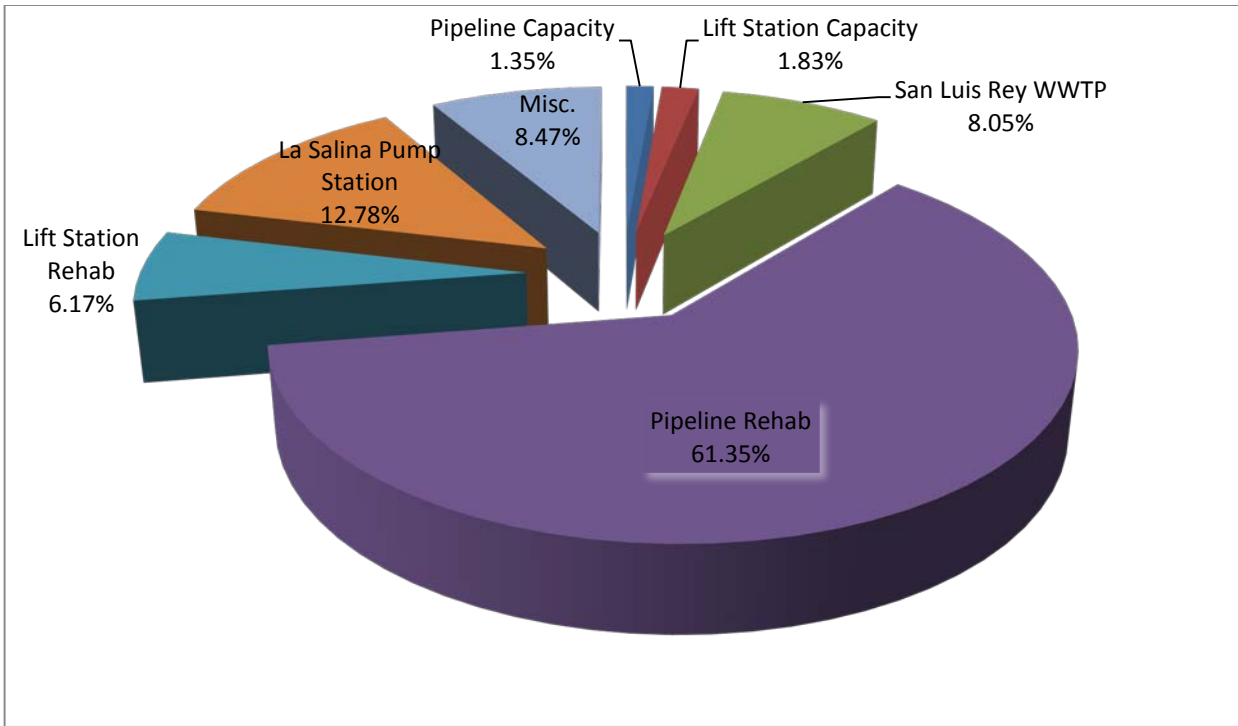


Figure ES.6 Existing and Future Cost by Project

INTRODUCTION

The City of Oceanside (City) has retained Carollo Engineers, Inc. (Carollo) to prepare this Sewer Master Plan (SMP). The SMP is part of a larger effort to produce an Integrated Master Plan (IMP) for the City. This chapter presents the purpose, objectives, and background of this SMP and the scope of work of this master plan. A list of references used to prepare this master plan is also provided in Appendix A.

1.1 BACKGROUND

The City's previous sewer master plan was completed in June 2006 by Carollo. The 2006 master plan identified numerous projects over three phases of capital improvement plan (CIP) with a total estimated capital cost of \$138 million (2006 dollars), \$55 million for the collection system and \$83 million for treatment plant and disposal upgrades.

As the previous master plan is more than seven years old, coupled with changes in wastewater flow since the master plan was completed, the City finds it prudent to update the 2006 sewer master plan and develop a new capital improvement program that prioritizes the necessary sewer infrastructure upgrade and expansion projects.

1.2 GOALS AND OBJECTIVES

The purpose of this SMP is to aid the City in the planning, development, and financing of wastewater collection system facilities, to provide reliable and enhanced service for existing customers, and to serve anticipated land use changes and growth. This SMP considers existing flow conditions as well as future growth projected by a number of specific near-term development projects and the San Diego Association of Governments' (SANDAG's) long-term regional growth projections. The objective of this master plan is to serve as a strategic planning guide for upgrading, improving, and expanding the City's wastewater collection system.

1.3 STUDY AREA

The City currently occupies approximately 42 square miles in the northern part of San Diego County, California. The City's current population is approximately 175,000 and its location and sewer service area is depicted on Figure 1.1. As shown on this figure, the City treats wastewater from several areas outside the City boundary located within the City of Vista-Buena Sanitation District (Vista-BSD) and the Rainbow Municipal Water District (Rainbow MWD). The City is surrounded by the City of Carlsbad to the south, the City of Vista to the east, and Camp Pendleton Military Base to the north.

The study area for this SMP is the City's wastewater service area, which closely coincides with the City boundary as described above, with two major differences. First, the Morro Hills community in Northern part of the City doesn't have any sewer infrastructure installed. The sewage in the Morro Hills area is disposed of using septic systems, and therefore is excluded from the SMP. The second difference between the City's boundary and the sewer service boundary is that the sewer service boundary also includes some parts of the Vista BSD and the Rainbow MWD. Wastewater from certain areas in the Vista-BSD and the Rainbow MWD service areas flow by gravity into Oceanside and thus these areas are included in the City's sewer study area.

The City can be characterized by varied topography and rolling hills that increase from sea level in the southwestern end to elevation of up to 930 feet above mean sea level (msl) approximately 10 miles inland.

1.4 PLANNING PERIOD

This SMP includes the existing City wastewater service area and development that could occur within the wastewater service area in the near-term (i.e., prior to 2020) and in the long-term (i.e., year 2050). Existing and projected populations and land uses within the study area are discussed in Chapter 2.

1.5 CLIMATE

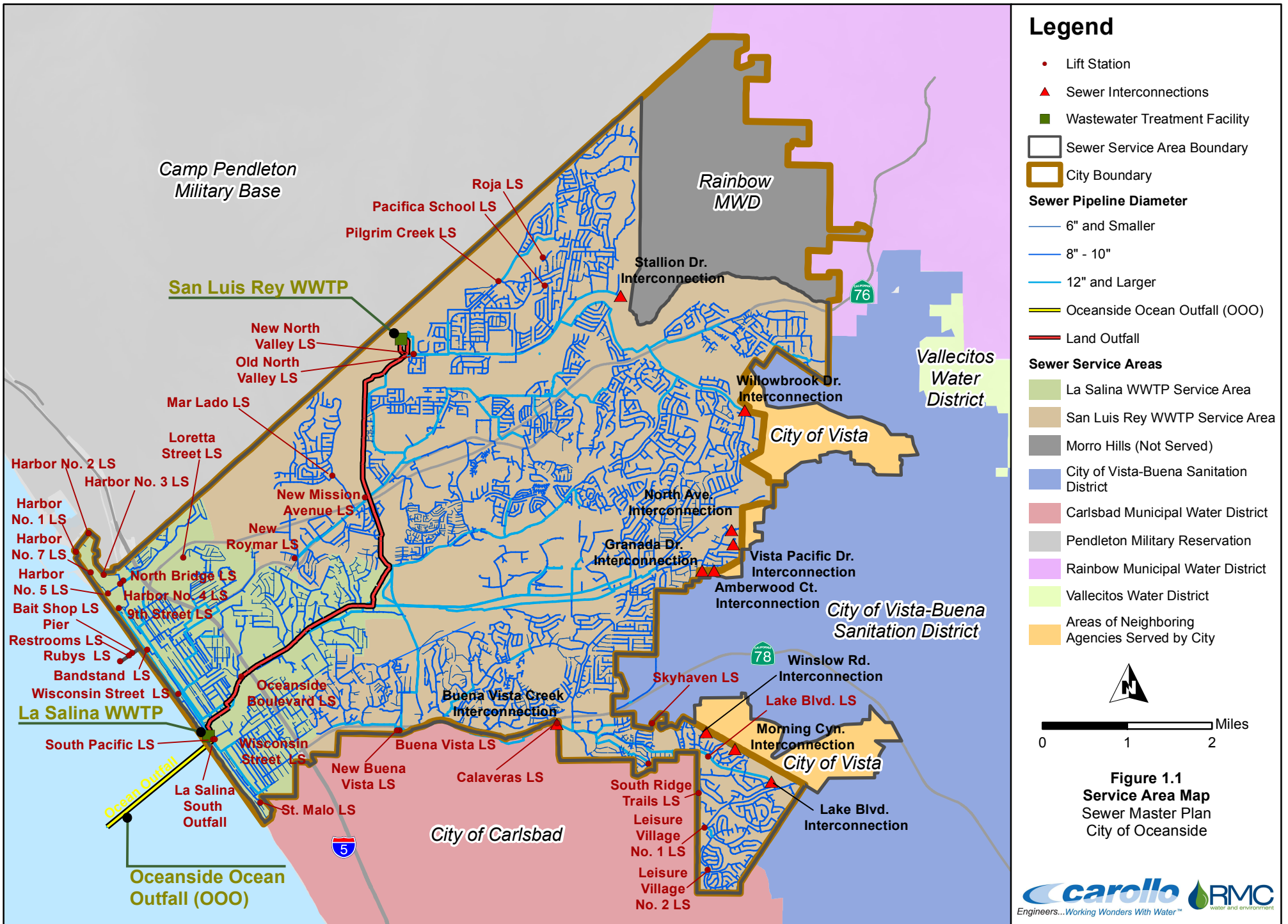
The City has a mild, coastal climate with limited variation in average temperatures over the course of the year. As shown in Table 1.1, the average annual temperature between 2003 and 2012 was 60.2 degrees Fahrenheit (F). The average annual rainfall for the City is 11.2 inches, as measured at the National Weather Service Oceanside Marina Weather Station 046377.

1.6 REPORT ORGANIZATION

The SMP has been structured to help City staff easily locate and identify information regarding the City's wastewater system. The report contains 10 chapters, followed by appendices that provide supporting documentation for the information presented in the report. The information provided in each chapters is briefly described below:

Chapter 1 – Introduction: This chapter presents the need for this SMP and the objectives of the master plan.

Chapter 2 – Land Use and Population: This chapter presents a discussion of this master plan's planning area, near-term land use, and population trends.



| Table 1.1 Historic Climate Data Sewer Master Plan City of Oceanside | | | |
|--|--|---|---|
| Month | Average Temperature⁽¹⁾ (F) | Monthly Average ETo⁽²⁾ (inches) | Average Total Precipitation⁽¹⁾ (inches) |
| January | 55.1 | 2.08 | 2.1 |
| February | 54.3 | 2.40 | 2.9 |
| March | 55.8 | 3.70 | 0.7 |
| April | 57.6 | 4.79 | 0.9 |
| May | 60.5 | 5.35 | 0.2 |
| June | 62.9 | 5.72 | 0.1 |
| July | 66.9 | 6.06 | 0.0 |
| August | 67.3 | 5.98 | 0.0 |
| September | 66.4 | 4.60 | 0.1 |
| October | 63.1 | 3.61 | 1.4 |
| November | 58.0 | 2.44 | 0.7 |
| December | 53.9 | 1.99 | 2.1 |
| Annual Average or Total | 60.2 | 48.72 | 11.2 |
| <u>Notes:</u> | | | |
| (1) Source: National Weather Service Oceanside Marina Weather Station 046377. Annual Climatologically Summary for December 2002 through November 2012 [http://www.ncdc.noaa.gov/]. | | | |
| (2) Source: California Irrigation Management Information System (CIMIS) Station 49 located in Oceanside. Monthly Average ETo is based on data from March 1986 through April 2002 [http://wwwcimis.water.ca.gov]. | | | |

Chapter 3 – Sewer Flows: This chapter presents historical sewer flow trends, a description of wastewater characteristics, estimates of wet weather flow, and presents sewer flow projections.

Chapter 4 – Wastewater System Facilities: This chapter presents an overview of the City’s existing collection system and wastewater facilities, such as lift stations, treatment plants, and wastewater treatment plant.

Chapter 5 – Sewer Model Development: This chapter describes the development and calibration of the City’s collection system hydraulic model.

Chapter 6 – Planning and Evaluation Criteria: This chapter presents the planning criteria and methodologies for analysis used to evaluate the existing collection system and its facilities, and to address the existing system deficiencies and future improvements.

Chapter 7 – Existing System Evaluation: This chapter presents the results of the capacity evaluation of the existing wastewater collection system and the proposed improvements that can mitigate the identified deficiencies.

Chapter 8 – Future System Evaluation: This chapter presents the results of the capacity evaluation of the wastewater collection system to meet the projected sewer flows described in Chapter 3. This chapter also identifies the proposed improvements that are required to meet the planning and evaluation criteria under future loading conditions.

Chapter 9 – Capital Improvement Plan: This chapter presents a CIP for the City's sewer system. This program incorporates all recommended projects identified in the existing system analysis (Chapter 7), the future system analysis (Chapter 8), and the condition assessment. This CIP includes planning level cost estimates and the proposed project phasing through year 2050 and build-out.

1.7 ACKNOWLEDGEMENTS

We would like to thank the following City of Oceanside staff for their assistance and oversight of this project:

- Cari Dale, P.E., Former Water Utilities Director
- Jason Dafforn, P.E., Water Utilities Director
- Amy Czajkowski, P.E., Water Utilities Project Manager

The following Carollo and RMC staff members were principally involved in this project:

- Inge Wiersema, P.E., Project Manager
- Richard Humpherys, P.E., Technical Review
- Tim Loper, P.E., Project Engineer
- Ryan Orgill, P.E., Hydraulic Modeling and System Analysis
- Alison Hill, P.E., Hydraulic Model Development and Calibration
- John Meyerhofer, GIS/Graphics
- Debra Dunn, GIS/Graphics

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LAND USE AND POPULATION

This chapter presents a discussion of the land use classifications, historical population trends, and projected populations for the planning period of this master plan. Planned developments and information obtained on build out land use will be discussed. Details presented in this chapter on near-term developments and projected population will form the basis of the wastewater flow projections developed and presented in Chapter 3.

2.1 EXISTING LAND USES

The City's General Plan was most recently updated in 2002, and was amended most recently in June 2012. The City's General Plan defines many elements of land use, including the distribution of land use types and both near-term and long-range development plans. (Oceanside, 2002).

A large portion of the City is zoned for agricultural use, the majority of which is located in the northeast area of the City. Over the last few decades, however, large portions of the agricultural areas have been converted to residential planned communities.

Land use categories and their corresponding water use classification are listed in Table 2.1. Current development plans call for some portions of the City to be redeveloped. This process will further contribute to growth and increased wastewater flows downstream of the redevelopment areas, but the overall composition of uses is not anticipated to change significantly.

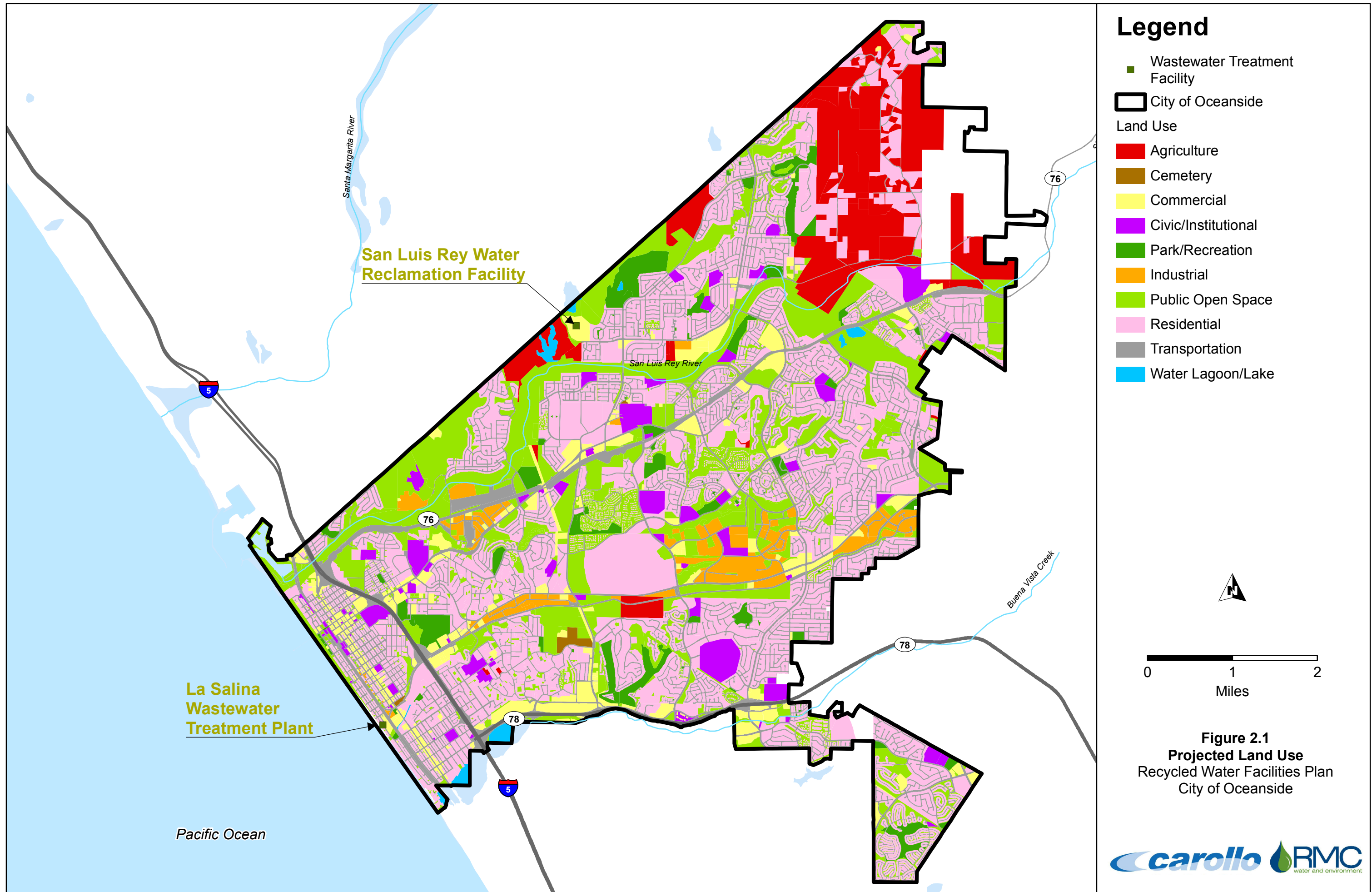
2.2 PROJECTED LAND USE

The City provided a map showing planned General Plan land uses for build-out of the City's service area. Due to the format of projected land use data, acreages cannot be precisely quantified. However, the City's land use map illustrates that many developments and redevelopments are slated for the service area. The map showing projected land use for the 2002 General Plan is shown on Figure 2.1.

As shown on Figure 2.1, two major developments are the El Corazon Plan and Rancho Del Oro Plan, which entail the development of significant new industrial space within the City. Residential, commercial, and even some open space are included along the periphery of these developments. Significant amounts of redevelopment are also planned for the downtown area around City Hall and out to the beachfront within the Coastal Zone Boundary.

| Table 2.1 Land Use Designations Sewer Master Plan City of Oceanside | | |
|--|------------------------------------|----------------------|
| Use Classification | Land Use Category | Land Use Code |
| Low Density Residential | Estate A Residential | EA - R |
| Low Density Residential | Estate B Residential | EB - R |
| Low Density Residential | Single Family Detached Residential | SFD - R |
| Medium Density Residential | Medium Density – A Residential | MDA - R |
| Medium Density Residential | Medium Density – B Residential | MDB - R |
| Medium Density Residential | Medium Density – C Residential | MDC - R |
| High Density Residential | High Density Residential | HD - R |
| High Density Residential | Urban High Density Residential | UHD - R |
| Commercial | Community Commercial | CC |
| Commercial | Neighborhood Commercial | NC |
| Commercial | General Commercial | GC |
| Commercial | Special Commercial | SC |
| Commercial | Professional Commercial | PC |
| Commercial | Civic Institutional | CI |
| Commercial | Private Institutional | PI |
| Industrial | General Industrial | GI |
| Industrial | Light Industrial | LI |
| Industrial | Research Park Industrial | RP-I |
| Other | Agriculture | A |
| Other | Open Space | OS |

In addition to the developments described above, there is also discussion among land owners in the Morro Hills Area (east of the Morro Hills Development described in Chapter 1) to sell their agricultural land and convert this area to estate or low-density residential area. This could potentially replace about 3,000 acres of agricultural land with 600 to 1,000 homes. Due to the uncertainty of this development, this SMP does not consider this land use conversion.



Legend

- Wastewater Treatment Facility
- City of Oceanside
- Land Use**
- Agriculture
- Cemetery
- Commercial
- Civic/Institutional
- Park/Recreation
- Industrial
- Public Open Space
- Residential
- Transportation
- Water Lagoon/Lake

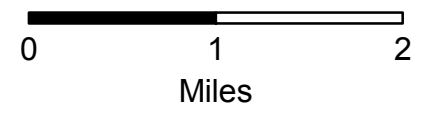


Figure 2.1
Projected Land Use
 Recycled Water Facilities Plan
 City of Oceanside

2.3 NEAR-TERM DEVELOPMENTS

Several developments are currently under construction or planned for the next few years, as specified by the City's planning department. Major developments from this list were used as the basis for near-term wastewater flow projections. Developments less than an acre in size or consisting of less than 100 residential units or hotel rooms were excluded and considered infill development for planning purposes. The locations of these major developments are shown on Figure 2.2, while the number of units or size of the developments are summarized in Table 2.2.

As shown in Table 2.2, 23 separate major developments are currently planned for the near term. These developments consist of residential, hotel, retail, industrial, and office developments ranging in size from single buildings to hundreds of acres. Figure 2.2 provides the location of each near term development listed in Table 2.2.

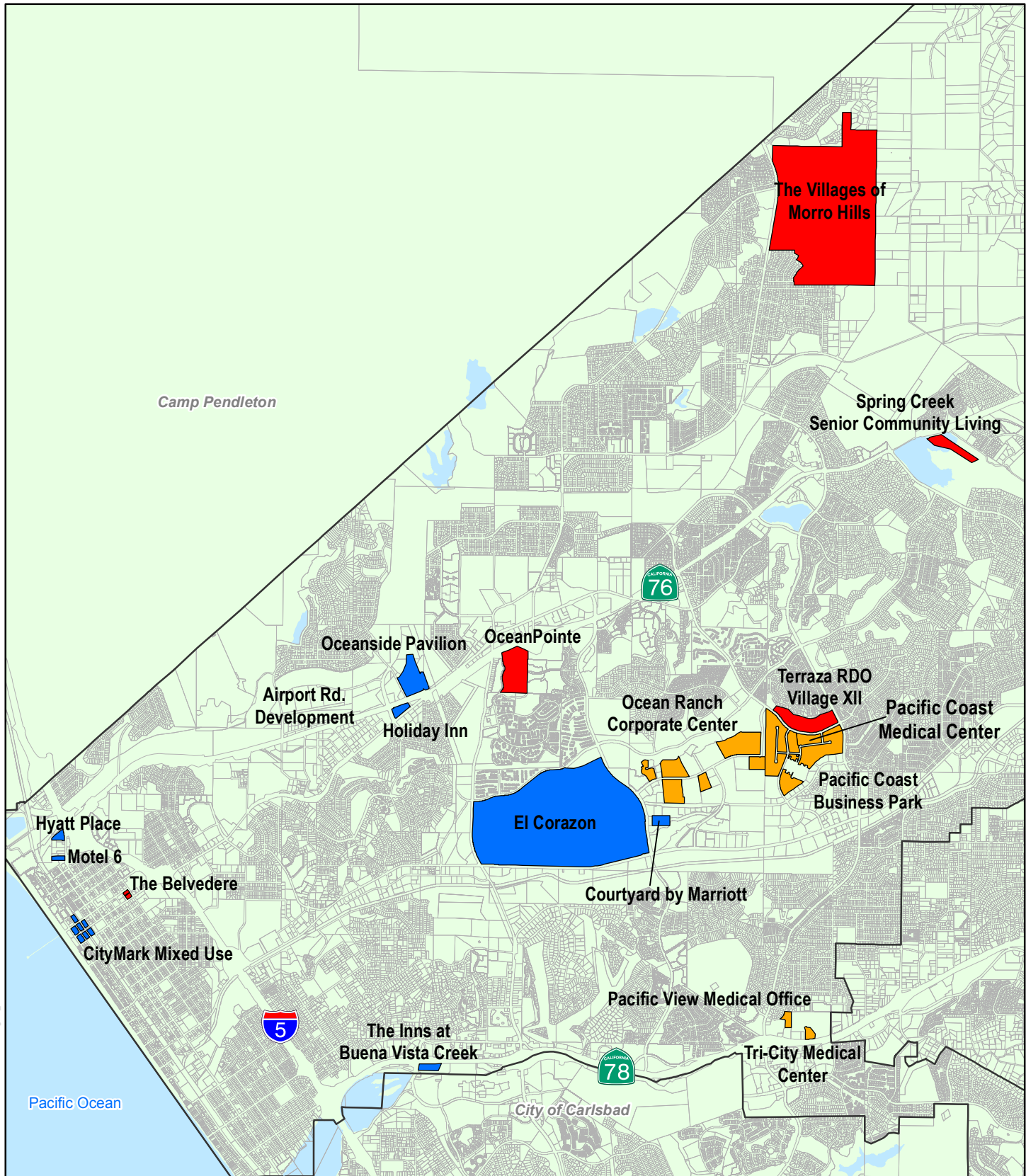
2.4 EXISTING AND HISTORICAL POPULATION

The United States (U.S.) Census Bureau performs a census every 10 years, providing population estimates for municipalities throughout the country. The California Department of Finance (DOF) estimates population during non-census years using the previous census as a benchmark. Following the 2010 Census, the DOF revised their previous estimates for the City years between 2000 and 2010 to make historical estimates consummate with the 2010 Census. The details of how these adjustments were made and their impacts on the projections used for this report are described below.

Historical population estimates for 1997 through 2013 are presented in Table 2.3 and depicted graphically on Figure 2.3. The table compares two sets of population estimates, the first using 2000 Census data as its basis and the second using 2010 Census data as its basis. As shown in Table 2.3, the population estimates made by the DOF based on 2000 Census data were substantially higher (16,000 people for 2010) than those based on actual counts made during the 2010 Census. After the 2010 Census data was received, the U.S. Census Bureau revised their population estimates for the years 2001-2010.

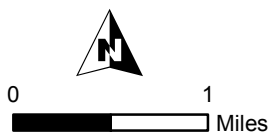
As shown on Figure 2.3, the initial population projection for 2010 was about 16,000 people (or 10 percent) higher than the 2010 Census population count. This difference represents a significant discrepancy in the data. Some potential reasons for this overestimation prior to the 2010 Census include the semi-transient nature of the nearby military population at Camp Pendleton and reduced economic activity due to the financial crisis late in the decade. The cause of this discrepancy could be important in anticipating the potential for recovery of the population in the future.

| Table 2.2 Near-Term Development Details Sewer Master Plan City of Oceanside | | |
|---|----------------------------|---|
| Development Name | Approximate Address | Quantity/Size |
| Residential | | |
| The Belvedere | 901 Mission Avenue | 90 live/work lofts |
| Mission Cove Affordable Housing | 3200 Mission Avenue | 150 family, 138 senior units |
| OceanPointe, | 300 Stage Coach Road | 198 condominium units |
| Terraza RDO Village XII | Old Grove Road | 338 units |
| Spring Creek Senior Community Living | Old Ranch Road | 131 units |
| The Villages of Morro Hills ⁽¹⁾ | Vandergrift Boulevard | 1,007 units |
| Melrose Heights ⁽²⁾ | Oceanside Boulevard | 931 units |
| Hotel/Retail | | |
| Hyatt Place, | 1103 N Coast HWY | 127 rooms, 3,000-square-foot retail, 24 condominium units |
| Springhill Suites Marriot, | 211 Mission Avenue | 149 hotel rooms, 6,400-square-foot restaurant |
| S.D. Malkin Resort Hotel, | Mission Avenue | 289 hotel rooms, 47 boutiques, 48 timeshares |
| The Inns at Buena Vista Creek | Jefferson Street | 426 hotel rooms, 10,000-square-foot meeting facility |
| El Corazon | Oceanside Boulevard | 55 acres |
| Courtyard by Marriott | 3501 Seagate Way | 140 hotel rooms |
| Oceanside Pavilion | Mission Avenue | 950,000 square feet |
| Holiday Inn | 3350 Mission Avenue | 93 hotel rooms |
| Motel 6 | 909 N Coast HWY | 123 hotel rooms |
| CityMark Mixed Use | Myers Street | 231 units, 150 hotel rooms, 38,000-square-foot commercial |
| Industrial/Office | | |
| Pacific View Medical Office | 3300 Waring Road | 39,835 square feet |
| Tri-City Medical Center | 4200 Vista Way | 57,476 square feet |
| Ocean Ranch Corporate Center | 3728 Maritime Way | 75 acres |
| Pacific Coast Business Park | 1301 Rocky Point Drive | 90 acres |
| Pacific Coast Medical Center | Rocky Point Drive | 80,284 square feet |
| Notes: | | |
| Source: City of Oceanside, Pending Developments, May 2013. | | |
| (1) Near-term development refers to developments anticipated to be completed by 2020. | | |
| (2) Based on water billing data, approximately 75 percent of the anticipated units are in place and consuming water. Thus, 25 percent of the anticipated units (252 units) will be included in the near-term demand projection. | | |



Legend

- Near Term Developments
 - Industrial/Office
 - Hotel/Retail
 - Residential
 - Parcels
 - Bodies of Water
 - City Boundary



**Figure 2.&
Near Term Developments**
Sewer Master Plan
City of Oceanside



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| Table 2.3 Historical Population Sewer Master Plan City of Oceanside | | | |
|--|---|---|-------------------|
| Year | Annual Population Estimates Based on 2000 Census⁽¹⁾ | Revised Annual Population Estimates Based on 2010 Census⁽²⁾ | Difference |
| 1997 | 150,090 | N/A | - |
| 1998 | 154,300 | N/A | - |
| 1999 | 158,451 | N/A | - |
| 2000 | 161,039 | 161,039 | 0 |
| 2001 | 164,398 | 162,907 | 1,491 |
| 2002 | 167,494 | 164,312 | 3,182 |
| 2003 | 170,769 | 165,962 | 4,807 |
| 2004 | 173,183 | 166,859 | 6,324 |
| 2005 | 175,038 | 166,958 | 8,080 |
| 2006 | 175,357 | 165,539 | 9,818 |
| 2007 | 176,743 | 165,545 | 11,198 |
| 2008 | N/A ⁽³⁾ | 166,064 | - |
| 2009 | N/A ⁽³⁾ | 166,242 | - |
| 2010 | 183,095 | 167,086 | 16,009 |
| 2011 | N/A ⁽³⁾ | 167,943 | - |
| 2012 | N/A ⁽³⁾ | 168,505 | - |
| 2013 | N/A ⁽³⁾ | 169,350 | - |

Notes:

(1) Annual Population Estimates Prior to 2010 Census based on 2000 Census data estimated by the DOF, obtained from the City's 2010 Urban Water Management Plan (UWMP) (Oceanside, 2011a).

(2) Census-based data taken from the DOF "E-4 Population Estimates for Cities, Counties and State, 2001-2010," November 2012, and "E-4 Population Estimates for Cities, Counties and State, 2011-2013," May 2013. Data from 2010 is directly from the US Census, while other years use the Census as a benchmark.

(3) Data Not Available.

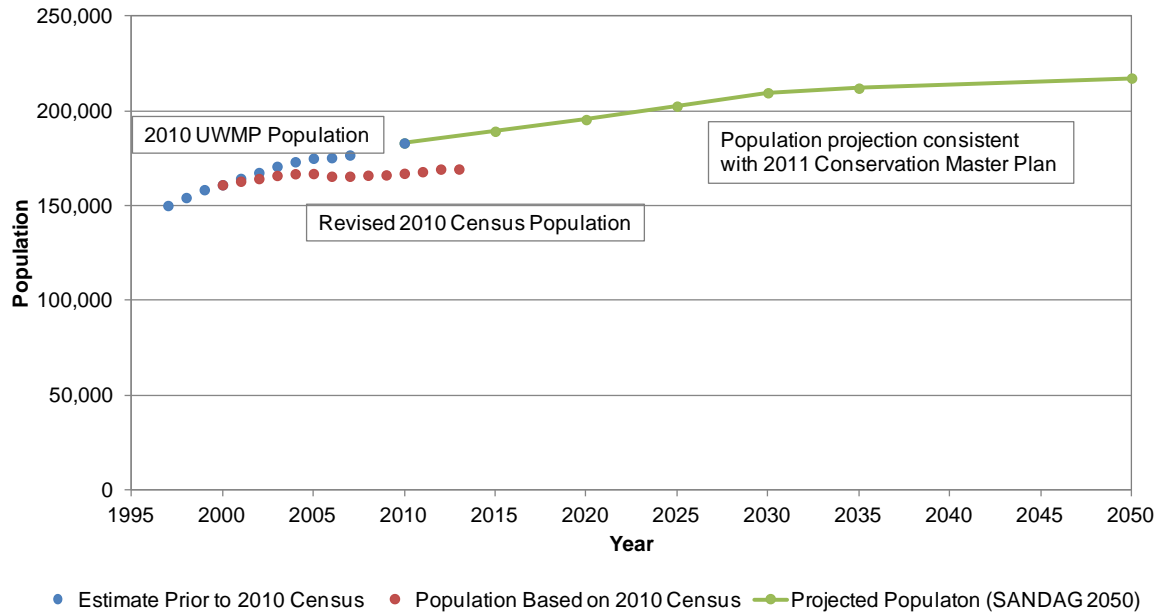


Figure 2.3 Historic and Projected Population

It should be noted that the City faced a similar issue in the early 1990s, during the Desert Storm operation in 1990 and 1991. At that time, thousands of troops from nearby Camp Pendleton were deployed to the Middle East, with the local economy suffering, and sewer flows decreasing dramatically.

2.5 PROJECTED POPULATION

Projected population for the City’s service area is presented in Table 2.4. Population projections are based on the SANDAG 2050 Regional Growth Forecast.

As discussed in Section 2.1, annual population estimates were revised substantially following the 2010 Census. The adjusted population estimates have not yet been incorporated into SANDAG’s population estimates presented on Figure 2.3. However, for this master plan, the projected population will not be reduced based on the population discrepancy. In part, this is because the reasons cited in Section 2.1 for the discrepancy could potentially be only temporary influences. Especially if the population reduction occurred due to economic considerations, recovery to previous population levels could occur much faster than predicted by projected population growth rates. Thus, for conservative planning purposes and consistency with the City’s 2011 Water Conservation Plan, it was decided to use the SANDAG 2050 population projections.

| Table 2.4 Population Projections Sewer Master Plan City of Oceanside | |
|---|---|
| Year | Projected Population⁽¹⁾ |
| 2010 | 183,095 |
| 2015 | 189,275 |
| 2020 | 195,455 |
| 2025 | 202,529 |
| 2030 | 209,602 |
| 2035 | 212,024 |
| 2050 | 217,364 |

Note:
(1) SANDAG 2050 Regional Growth Forecast (for years which were not projected in the Regional Growth Forecast, interpolation of the Oceanside 2011 Water Conservation Plan was used).

The study area population is expected to continue to grow through year 2050. The majority of this growth is projected to occur in the next 15 to 20 years. The 2050 population is projected to be approximately 217,000 people. This population projection is also graphically depicted on Figure 2.3.

The historic population listed in the 2010 Urban Water Management Plan (UWMP) leads into the population projections for the future. While the population data from the DOF lists lower numbers in the most recent years, it also demonstrates an upward trend moving forward. For this reason, the population projections provide a conservative planning basis.

EXISTING AND FUTURE WASTEWATER FLOWS

This chapter presents the methodology used to determine existing and future dry and wet weather wastewater flows for the SMP. Data sources are documented, followed by a step-by-step description of the procedure used to estimate dry weather flows for the existing (2008), near-term (2020), and long-term (2050) planning scenarios. The resulting total City flows are presented for each of the scenarios.

3.1 DATA SOURCES

A number of data sources were used in the process of estimating dry weather wastewater flows, most notable of which were water billing records provided by the City and Traffic Analysis Zone (TAZ) level population projections prepared by the SANDAG. A description of data sources is provided below:

- **Water Consumption Data:**
Water consumption data was the primary data source used to estimate existing wastewater flows for each customer within the City limits. The data were also used to identify and request more information on large industrial users. The City provided monthly data in units of 100 cubic feet (CCF) per month (which were converted to gallons per day (gpd)) for the winter of 2012 through 2013.
- **San Diego County Parcels and Land Use Codes:**
Parcels were used to refine subcatchment boundaries and link water consumption data to a land use type. The County's parcel database was in a spatial format that was easier to process than the City's zoning maps.
- **City of Oceanside List of Industrial Users:**
A list of the City's industrial customers from September 2012 was used to estimate existing and future flows from large dischargers.
- **City of Oceanside Pending Development:**
The City's latest update on pending residential and non-residential development from November 2012 was used to calculate and spatially distribute near-term flows to the hydraulic model.
- **TAZ Population Projections:**
Population projections from SANDAG were used for long-term flow forecasting.
- **Sewer Flow Monitoring Data:**
Temporary flow monitoring data obtained during the early months of 2013 were used to establish water-to-sewer return rates.

3.2 WASTEWATER FLOW COMPONENTS

This section describes and provides definitions of commonly used terminology in the wastewater collection system analysis and evaluations conducted as part of this project. Wastewater flows vary according to the season. Dry weather flow (DWF) or base flow is flow generated by routine water usage in the residential, commercial, business and industrial sectors of the collection system.

The other component of DWF is the contribution of dry weather groundwater infiltration (GWI) into the collection system. Dry weather GWI will enter the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and when the susceptibility of the sanitary sewer pipe allows infiltration through defects such as cracks, misaligned joints, and broken pipelines.

Wet weather flow (WWF) includes storm water inflow, trench infiltration, and GWI. The storm water inflow and trench infiltration comprise the WWF component termed infiltration/inflow (I/I). The response in the sewer system to rainfall is seen immediately (as with inflow) or within hours after the storm (as with infiltration).

3.2.1 Base Wastewater Flow

The base wastewater flow (BWF) is the flow generated by the City's customers independent of wet weather influences. BWF is estimated by measuring flows during dry weather conditions. The flow has a diurnal pattern that varies depending on the type of use. Commercial and industrial patterns, though they vary depending on the type of use, typically have more consistent higher flows during business hours and lower flows at night. Furthermore, the diurnal flow pattern experienced during a weekend may vary from the diurnal flow experienced during a weekday.

3.2.2 Average Annual Flow

The average annual flow (AAF) is the average flow that occurs on a daily basis throughout the year, including both periods of dry and wet weather conditions.

3.2.3 Average Dry Weather Flow

The average dry weather flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season. The ADWF includes the BWF generated by the City's residential, commercial, and industrial users, plus the dry weather GWI component.

3.2.4 Peak Dry Weather Flow

Peak dry weather flow (PDWF) is the highest observed hourly flow that occurs during the dry weather season. The peak dry weather flow is the average dry weather flow times a peaking factor.

3.2.5 Peak Month Flow

The peak month flow is the highest 30-day average flow that occurs in a one year period and includes periods of dry and wet weather conditions.

3.2.6 Peak Wet Weather Flow

Peak wet weather flow (PWWF) is the highest observed flow that occurs following a design storm event. Wet weather I/I cause flows in the collection system to increase. PWWF is typically used for designing sewers and lift stations. Therefore, the PWWF and the “Design Flow” are synonymous and will be used interchangeably throughout this report.

3.2.7 Groundwater Infiltration

GWI is the result of extraneous water entering the sewer system through defects in pipes and manholes. GWI is related to the condition of the sewer pipes, manholes, and groundwater levels. GWI may occur throughout the year, although rates are typically higher in the late winter and early spring. Dry weather GWI (or base infiltration) cannot easily be separated from BWF by flow measurement techniques. Therefore, dry weather GWI is typically grouped with BWF.

3.2.8 Infiltration and Inflow

Infiltration is defined as storm water flows that enter the sewer system by percolating through the soil and then through defects in pipelines, manholes, and joints. Examples of infiltration entry points are cracks in pipelines, misaligned joints, and root penetration. Inflow is defined as storm water that enters the sewer system via a storm drain cross connections, leaky manhole covers, or cleanouts. Examples of inflow entry points are roof drain and downspout connections, leaky manhole covers, and illegal storm drain connections.

3.3 HISTORICAL FLOWS

Before discussing existing and future flows that were developed for this SMP, it is important to first take a look at historical flows and trends over the last several years. Due to the unavailability of consistent flow measurements into the wastewater treatment plants, influent flows to the San Luis Rey Wastewater Treatment Plant (WWTP) and La Salina WWTP were estimated using plant effluent data and an assumed loss rate of 10 percent in the treatment process.

The monthly influent flows to the San Luis Ray WWTP are shown on Figure 3.1 and Table 3.1. Between 2010 and 2013, the flows have essentially remained unchanged on an annual basis. In the winter months, flows have increased by up to 11 percent over the annual average flow due to the system’s response to wet weather events. The 2013 average annual flow of 9.8 mgd was approximately 3.7 mgd below the average annual rated capacity of 13.5 mgd at the San Luis Rey WWTP.

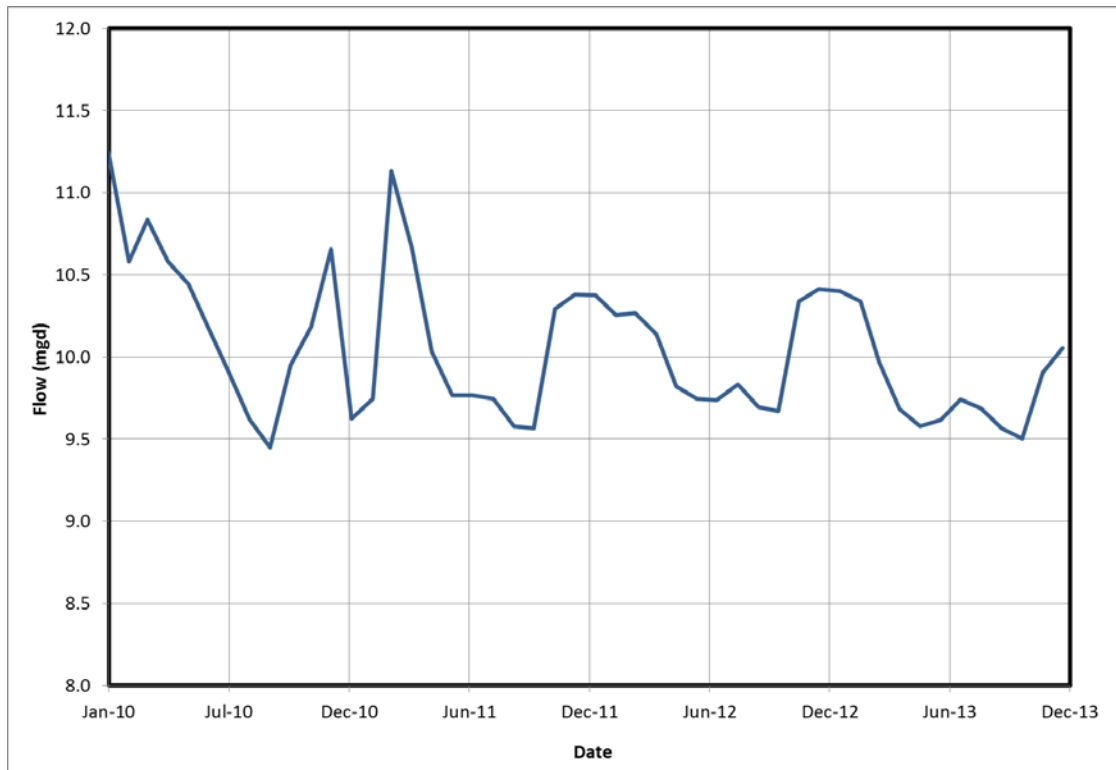


Figure 3.1 Historical Flows at San Luis Rey Water Reclamation Plant

The influent flows to the La Salina WWTP are shown on Figure 3.2 and Table 3.1. Between 2010 and 2013, the flows have essentially remained unchanged on an annual basis. The La Salina WWTP primarily serves the downtown and coastal areas of the City, meaning that peak month flows occur in the summer months when the influx from tourism is highest. In the summer months, flows have increased by up to 9 percent over the average annual flow. The 2013 average annual flow of 2.9 mgd was approximately 2.6 mgd below the average annual rated capacity of 5.5 mgd at the La Salina WWTP. As shown on Figure 3.2, there is a gap in the La Salina WWTP data in August 2010 and the month of May 2012 wastewater flow rate is suspect.

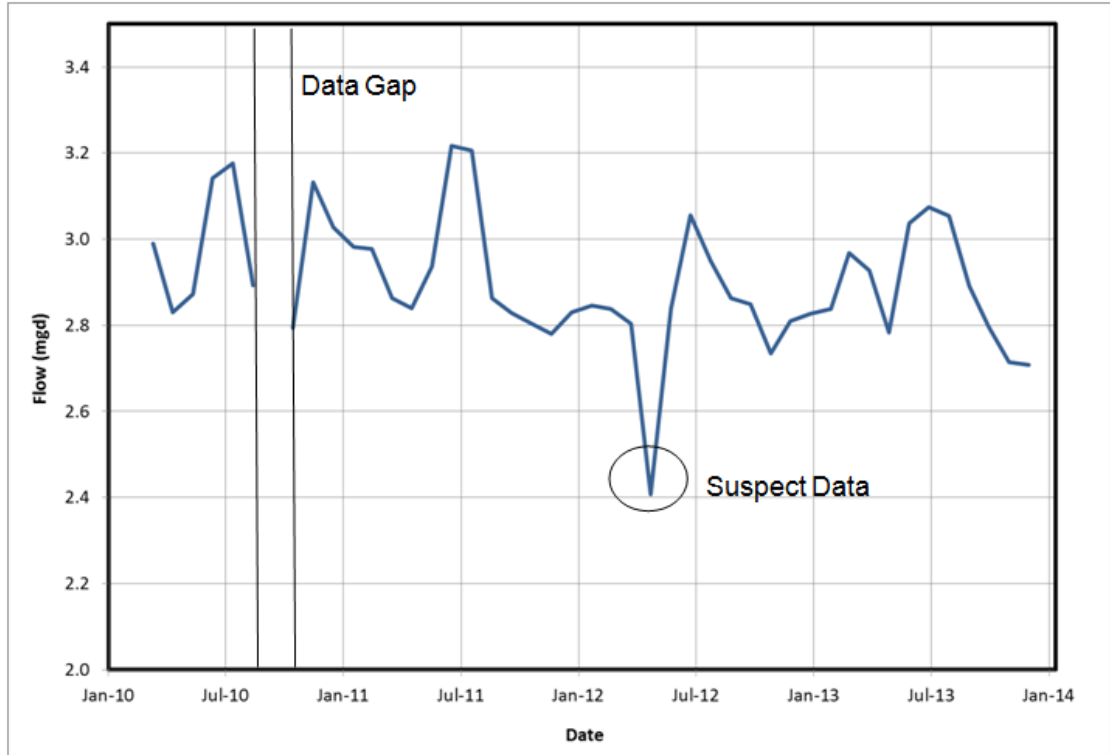


Figure 3.2 Historical Flows at La Salina WWTP

| | Year | | | |
|---|-------------|-------------|-------------|-------------|
| | 2010 | 2011 | 2012 | 2013 |
| San Luis Rey WWTP | | | | |
| Average Annual Flow (mgd) | 10.3 | 10.0 | 10.0 | 9.8 |
| Peak Month Flow (mgd) | 11.3 | 11.1 | 10.4 | 10.4 |
| Ratio of Peak Month to Average Annual Flow | 1.09 | 1.11 | 1.04 | 1.06 |
| La Salina WWTP | | | | |
| Average Annual Flow (mgd) | 3.0 | 2.9 | 2.8 | 2.9 |
| Peak Month Flow (mgd) | 3.2 | 3.2 | 3.1 | 3.1 |
| Ratio of Peak Month to Average Annual Flow | 1.07 | 1.09 | 1.08 | 1.07 |
| Total System-Wide Average Annual Flow (mgd) | 13.3 | 12.9 | 12.8 | 12.7 |
| <u>Note:</u> | | | | |
| (1) Peak month and average annual flows based on daily effluent flow data and an assumed process loss rate of 10 percent. | | | | |

3.4 EXISTING DRY WEATHER FLOW

3.4.1 Existing Flows within City Limits

Existing residential and non-residential wastewater flows described in this chapter are based on 2013 data. The existing flow was estimated based on water consumption data provided by the City. Metered water use during the winter months most closely approximates wastewater generation because outdoor water use (which does not return to the sewers) is at a minimum. Therefore, meter readings taken December 2012 and January 2013 were used as the basis for estimating residential and non-residential flow. However, in winter there is some water that is used for irrigation or other purposes that does not return to the sewer. In these cases, a water-to-sewer return rate was applied to calculate wastewater flow from the water consumption data as described below.

Each water billing record in the City's database has been assigned a rate type which characterizes the land use type or how the water is used. Accounts coded with a rate type associated with irrigation uses do not contribute wastewater to the sewers and were therefore not included in the analysis. The remaining accounts were assumed to contribute to sewer flow and were geocoded to their associated parcels. It was verified that there are no septic users in the City that should be excluded from the study.

Water-to-sewer return rates for each land use type were determined through model iterations by comparing the total water consumption upstream of a temporary flow meter to the observed sewer flows at the meter site. As described in Chapter 5, groundwater infiltration was subtracted from sewer flows before making this comparison. Although it was not possible to isolate land use types entirely with the flow meters due to the highly mixed nature of land use within the City, there was enough data from the thirty temporary flow meters installed throughout the City to support the finding that non-residential properties were returning nearly all of their flow to the sewer while residential properties returned between 70 percent and 100 percent of their flows to the sewer. As expected, there was some variability in the residential return rate from one meter basin to another, even for the same specific land use type (e.g., low-density residential). On average, the return rate from residential properties was 83 percent. More detail on return rate assumptions is given in Chapter 5.

3.4.2 Development of Unit Flow Factors from Existing City Flows

Once the existing flows were finalized for the entire system, unit flow factors that were based on the City's actual winter water use data (adjusted by the return rate) could be established. These unit flow factors can be used for modeling future flows and sizing new sewers.

Current unit flow rates were assessed for several residential and non-residential land use categories. For single family residential land use, each water billing meter was assumed to correlate to one dwelling unit or equivalent dwelling unit (EDU). The unit flow factor was

calculated using the total wastewater flow for single-family residential parcels divided by the total number of single-family residential billing meters in the City. Multi-family residential land use required a different approach because one billing meter may be associated with multiple housing units. The number of multi-family residential dwelling units was calculated using house counts provided in SanGIS's parcel layer and verified through inspection of aerial imagery. The unit flow factor was then calculated by dividing the total wastewater flow for meters divided by the number of multi-family residential dwelling units. It is noted that the multi-family residential analysis only considered a portion of the multi-family residential flow because the SanGIS parcel layer did not always report the number of dwelling units for each development.

For each non-residential land use category, a number of small "sample" areas were hand-selected that varied in size from about 20 to 500 acres and contained only that land use type. In delineating those areas, care was taken to confirm that all parcels were accurately linked to water consumption records, were of the appropriate land use, and were in areas in which wastewater flow metering data was available to confirm the return rates. Vacant parcels (those that had no water consumption) were excluded from the analysis. For each sample area, the weekly average winter water consumption data for all customers were summed and divided by the total parcel acreage to calculate the unit flow rate by acre.

The average and range of unit flow factors calculated for each land use category is presented in Table 3.2, while Table 3.3 lists the recommended unit flow factors per land use type. For commercial and industrial land use types, the recommended values were rounded up from the values in the sample area analysis to apply some level of conservatism that accounts for the large variation in flow generation amongst commercial and industrial users. Residential flow factors tend to be consistent and were not rounded for that reason.

It is noted that these flow factors are significantly less than those listed in the *City of Oceanside's Engineer's Design and Processing Manual* (Oceanside 1992). Flow factors throughout the State of California have decreased substantially over recent years, either due to conservation or economics. Even by 2005, when the last sewer master plan was produced, unit flow factors for single family residential use were reported to be approximately 200 gpd/EDU (compared to 280 gpd/EDU in the design manual). In regards to non-residential flows, the most current evaluation of water demands presented in the Water Master Plan (WMP) indicates that the daily demand factors for water use are actually lower than the design manual guidelines for commercial and industrial sewage generation; typically, maximum daily demand (MDD) factors are at least 50 percent higher than sewage generation rates. For these reasons, the flow factors presented in this section are recommended for use in flow estimation for this SMP to avoid developing overly conservative flow estimates and unnecessary capacity improvements.

| Table 3.2 Unit Flow Factors for Small Sample Areas Sewer Master Plan City of Oceanside | | | |
|---|---------------------------|--------------------------------------|-------------------------------------|
| Residential Land Use | Average Flow (gpd) | Dwelling Units (DU, or Acres) | Unit Flow (gpd/DU or gpd/ac) |
| Residential | | | |
| Low Density Residential | 5,603,684 | 32,840 DU | 170 gpd/DU |
| Medium/High Density Residential | 2,803,206 | 19,874 DU | 140 gpd/DU |
| Industrial | | | |
| IND1 | 74,947 | 73 ac | 1,030 gpd/ac |
| IND2 | 63,546 | 116 ac | 550 gpd/ac |
| IND3 | 102,478 | 84 ac | 1,220 gpd/ac |
| IND4 | 118,564 | 277 ac | 430 gpd/ac |
| Total Industrial | 360,000 | 500 ac | 720 gpd/ac |
| Commercial | | | |
| COMM1 | 42,670 | 35 ac | 1,220 gpd/ac |
| COMM2 | 66,542 | 85 ac | 780 gpd/ac |
| COMM3 | 100,407 | 126 ac | 800 gpd/ac |
| COMM4 | 61,277 | 65 ac | 940 gpd/ac |
| COMM5 | 53,074 | 65 ac | 820 gpd/ac |
| COMM6 | 29,750 | 21 ac | 1,420 gpd/ac |
| COMM7 | 96,444 | 75 ac | 1,290 gpd/ac |
| Total Commercial | 450,000 | 500 ac | 900 gpd/ac |
| Hotel | | | 100 gpd/room |
| <u>Notes:</u> | | | |
| (1) Residential Unit Flow Factors developed using overall water billing data | | | |
| (2) Non-residential Unit Flow Factors are developed using individual areas identified through aerial image. | | | |

| Table 3.3 Recommended Flow Factors for Future Flow Estimation Sewer Master Plan City of Oceanside | | | |
|--|--|--------------------------------|--------------|
| Land Use | City Land Use Category | Recommended Flow Factor | Units |
| Low Density Residential | EA - R, EB - R, SFD - R | 170 | gpd/EDU |
| Mid Density Residential | MDA - R, MDB - R, MDC - R, HD - R, UHD - R | 140 | gpd/EDU |
| Commercial | CC, NC, GC, SC, PC, GI, RP - I, CI, PI | 1,000 | gpd/acre |
| Industrial | LI | 1,000 | gpd/acre |
| Hotels | | 100 | gpd/room |

3.4.3 Existing Flows from Agency Interconnections

In cases where water records could not be obtained for the agency interconnection areas located in Rainbow Municipal Water District (Rainbow MWD) and the City of Vista, a different approach was required to estimate sewer flows.

Rainbow MWD's Ordinance 01-02 permits the District to convey a "total flow of 1.5 mgd or 6,000 EDU's, whichever comes first" to the City's system. All flow entering the City's system from Rainbow MWD is measured using a permanent billing meter located at Stallion Drive. Flow data from September and October 2012 indicated that the average dry weather flow from Rainbow MWD was 0.77 mgd.

The City of Vista is permitted to transfer up to 2.15 mgd of flow from its interconnection areas. For connections OV-1, OV-2, OV-3, OV-4 and OV-5, which make up the total flow from the City of Vista, existing flows were calculated using the unit flow factors presented in Table 3.3. Flow factors in Table 3.3 are based on average values, actual flows from the City of Vista may vary. House counts and commercial acreage were estimated using connection area boundaries overlaid on aerial imagery in ArcGIS.

The existing flows for the agency interconnection areas are given in Table 3.4.

| Table 3.4 Flows from Agency Interconnections Sewer Master Plan City of Oceanside | |
|---|---|
| Outside Area | Estimated Average Dry Weather Flow (mgd) |
| Rainbow MWD | 0.77 |
| OV-1 (Vista) | 0.053 |
| OV-2 (Vista) | 0.043 |
| ON-3 (Vista) | 0.010 |
| OV-4 (Vista) | 0.013 |
| OV-5 (Vista) | 0.12 |
| Total Inflow From Outside The City | 1.01 |
| Notes: | |
| (1) Flows from Rainbow MWD are based on 2012 flow monitoring data | |
| (2) Flows from City of Vista are estimated from house counts/commercial acreage and recommended flow factors by land use type | |

3.4.4 Existing Industrial User Flows

Industrial dischargers that contribute a significant amount of flow, or dischargers that are otherwise regulated by the City, were identified based on water billing records and permit information from the City's Source Control Division. The goal was to get a more accurate estimate of actual wastewater flow and hours of discharge for each individual large discharger rather than using a generalized wastewater return rate as was done for other customers. Table 3.5 lists the industrial dischargers along with information on their existing water usage and maximum allowable wastewater flow to the City's system. The only user that was given a different return rate was Arctic Glacier USA, which runs an ice manufacturing facility. It was assumed that most of their water usage is associated with its product and that only 10 percent of the water is returned to the sewer. For users such as metal finishing companies that are regulated for water quality and are therefore not allowed to discharge to the sewer, none of the water usage was assumed to enter the sewers.

| Industrial User Address | Address | Winter Water Use, 2012-2013 (gpd) | Permitted Sewer Flow (gpd) |
|--|----------------------------|--|-----------------------------------|
| Deutsch | 250 Eddie Jones Way | 32,442 | 50,000 |
| Hydranautics, Inc | 401 Jones Road | 283,186 | 450,000 |
| West Coast Plating ⁽²⁾ | 2613 Temple Heights Dr | 415 | 0 |
| SEPRO, Inc | 4115 Avenida de la Plata | 11,032 | 40,000 |
| Gilead Sciences, Inc | 4049 Avenida de la Plata | 7,797 | 125,000 |
| Genentech, NIMO/OCN | One Antibody Way | 172,141 | 343,000 |
| Elite Metal Finishing | 2525 Jason Court | 48 | 2,000 |
| Nitto Denko Technical Corp. | 501 Via Del Monte | 310 | 100 |
| Sabra Dipping Co | 649 Benet Road | 15,360 | 50,000 |
| Oceanside Ale Works | 1800 Ord Way | 25 | 100 |
| Legacy Brewing Co | 363 Airport Road | 82 | 100 |
| Arctic Glacier USA ⁽¹⁾ | 2843 Benet Road | 32,500 | 40,000 |
| Veridiam, Inc ⁽²⁾ | 4665 North Avenue | 668 | 0 |
| Star Metal Plating, Inc ⁽²⁾ | 3801 Ocean Ranch Ste 105-6 | 170 | 0 |
| Superior Glass Frosting, Inc | 2675 Vista Pacific Drive | 288 | 100 |
| Tri City Medical Center | 4002 Thunder Dr | 88,412 | 130,000 |
| Core Supplement Technology | 4645 North Avenue | 277 | 100 |
| Nature's Supplements | 1342 Rocky Point Drive | 63 | 100 |

| Table 3.5 Industrial Users in Service Area Sewer Master Plan City of Oceanside | | | |
|---|-------------------------|--|-----------------------------------|
| Industrial User Address | Address | Winter Water Use, 2012-2013 (gpd) | Permitted Sewer Flow (gpd) |
| Mission Linen Service | 2727 Industry St | 71,000 | 185,000 |
| Metro Roof Products | 3093 "A" Industry St | 2,005 | 6,000 |
| Breakwater Brewery Co | 101 N. Coast Hwy, C-140 | 1,179 | 100 |
| Notes: | | | |
| (1) 10% return-to-sewer rate assumed for Arctic Glacier USA (325 gpd sewer flow). | | | |
| (2) 0% return-to-sewer rate assumed for users with zero permitted discharge. | | | |

3.5 FUTURE DRY WEATHER FLOW PROJECTIONS

Two future flow scenarios were developed to analyze system capacity: a near-term scenario (2020) and a long-term scenario (2050). The data sources and methods used for estimating these flows were coordinated closely with those used for estimating water demand for the Water Master Plan. The sewer flows resulting from this analysis are presented in the following sections.

3.5.1 Near-Term Residential and Commercial Flows within City Limits

The first scenario was a near-term flow projection through year 2020 that assumes that all planned and currently being constructed development projects have been built. Table 3.6 provides a list of the development projects that were assumed to have been built for the near-term scenario. Wastewater generation for each project was calculated using the recommended unit flow factors presented in Table 3.3, and then applied to the specific parcels and subcatchments where the development is planned to occur. The table shows that these developments are estimated to increase flow by 0.745 mgd by year 2020.

| Table 3.6 Near-Term Flow Projections Sewer Master Plan City of Oceanside | | | | | | |
|---|---|-------------------------------------|------------------------------|------------------------------------|-------------------------------|---------------------------------|
| Development Name | Unit | Equivalent Residential Units | Flow Factor (gpd/EDU) | Gross Acreage⁽²⁾ | Flow Factor (gpd/acre) | Average Sewer Flow (mgd) |
| Residential | | | | | | |
| The Belvedere | 90 live/work lofts | 90 | 140 | N/A | N/A | 0.013 |
| Mission Cove Affordable Housing | 150 family, 138 senior | 288 | 140 | N/A | N/A | 0.040 |
| OceanPointe | 198 condominiums | 198 | 140 | N/A | N/A | 0.028 |
| Terraza RDO Village XII | 338 | 338 | 140 | N/A | N/A | 0.047 |
| Spring Creek Senior Community Living | 131 | 131 | 140 | N/A | N/A | 0.018 |
| The Villages of Morro Hills | 250 | 250 | 140 | N/A | N/A | 0.035 |
| Melrose Heights | 931 | 931 | 140 | N/A | N/A | 0.13 |
| CityMark Mixed Use ⁽³⁾ | 231 | 231 | 140 | N/A | N/A | 0.032 |
| Hotel/Retail | | | | | | |
| Hyatt Place | 127 rooms, 3,000 sq. ft. retail, 24 condos | 151 | 100 | 0.07 | N/A | 0.015 |
| Springhill Suites Marriot | 149 hotel rooms, 6,400 sq. ft. restaurant | 149 | 100 | 0.15 | N/A | 0.015 |
| S.D. Malkin Resort Hotel | 289 rooms, 47 boutiques, 48 timeshares | 337 | 100 | N/A | N/A | 0.034 |
| The Inns at Buena Vista Creek | 426 rooms, 10,000 sq. ft. meeting facility | 426 | 100 | 0.23 | N/A | 0.043 |
| El Corazon | 25 ac. commercial (Ocean blvd), 19 ac. commercial (Village), 11 ac. hotel | N/A | N/A | 55 | 1,000 | 0.055 |

| Table 3.6 Near-Term Flow Projections Sewer Master Plan City of Oceanside | | | | | | |
|---|-----------------|-------------------------------------|------------------------------|------------------------------------|-------------------------------|---------------------------------|
| Development Name | Unit | Equivalent Residential Units | Flow Factor (gpd/EDU) | Gross Acreage⁽²⁾ | Flow Factor (gpd/acre) | Average Sewer Flow (mgd) |
| Courtyard by Marriott ⁽³⁾ | 140 hotel rooms | 140 | 100 | N/A | n/a | 0.014 |
| Oceanside Pavilion ⁽¹⁾ | 950,000 sq. ft. | N/A | N/A | 24 | 1,000 | 0.024 |
| Holiday Inn | 93 rooms | 93 | 100 | N/A | N/A | 0.009 |
| Motel 6 | 123 rooms | 123 | 100 | N/A | N/A | 0.012 |
| Industrial/Office | | | | | | |
| Pacific View Medical Office | 39,835 sq. ft. | N/A | N/A | 4 | 1,000 | 0.004 |
| Tri-City Medical Center | 57,476 sq. ft. | N/A | N/A | 3 | 1,000 | 0.003 |
| Ocean Ranch Corp. Center | 75 ac. | N/A | N/A | 75 | 1,000 | 0.075 |
| Pacific Coast Business Park | 90 ac. | N/A | N/A | 90 | 1,000 | 0.090 |
| Pacific Coast Medical Center | 80,284 sq. ft. | N/A | N/A | 8 | 1,000 | 0.008 |
| Total | | | | | | 0.745 |
| <u>Notes:</u> | | | | | | |
| (1) Gross acreage is based on digitized parcel area of lot. | | | | | | |
| (2) Gross acreage includes total lot size and is larger than unit sq.ft. | | | | | | |

3.5.2 Long-Term Residential and Commercial Flows within City Limits

The second scenario was a long-term flow projection through year 2050 that assumes water demand increases according to SANDAG's 2011-2050 population and employment projections by TAZ. Near-term water demands associated with known developments were subtracted from each TAZ in order to calculate the incremental water demand to be associated with the long-term scenario. Sewer flows were then calculated using the ratio of the water demand to sewer generation flow factors that were developed for the near-term scenario.

Sewer flows were distributed spatially from TAZ to subcatchment proportionally to the amount of developable area within each subcatchment. Developable area excludes parks, reservoirs, golf courses, and other large open spaces, which are assumed not be redeveloped for residential or commercial use by year 2050. The assumption, therefore, is that infill beyond the near-term will otherwise be uniform throughout the TAZ.

3.5.3 Near-Term and Long-Term Flows from Industrial Users

To confirm that adequate capacity remains available, average near-term and long-term flows from industrial users were assumed to equal the maximum permitted sewer flow listed in Table 3.5.

3.5.4 Near-Term and Long-Term Flows from Outside the City Boundary

According to Rainbow MWD's 2006 Sewer Master Plan, the District's maximum allowance of 6,000 sewer connections to the City's sewer system has already been reached. Although there are some options being discussed to increase flows from the District, it was assumed that the District's flows will remain the same in the future as they are today.

For the City of Vista, near-term and long-term flows were increased in each connection area by the same percentage increase in population shown in the overlying Transportation Analysis Zone provided by SANDAG for years 2020 and 2050.

3.6 DRY WEATHER FLOW SUMMARY

Table 3.7 summarizes the existing and future residential and non-residential average dry weather flow (ADWF) estimates for the City of Oceanside. This table also presents the estimated flows from Rainbow MWD and the City of Vista. As shown in Table 3.7, the City's total dry weather flow is projected to increase from 12.5 mgd under existing conditions (year 2013) to 16.5 mgd by year 2050. This 4.0 mgd increase equates to 32 percent increase in the long term. In the near-term, total system flows are projected to increase by 5.6 percent to 13.2 mgd by 2020. Table 3.7 also shows that the majority of flow (15.4 mgd or 93.3 percent) is estimated to be generated inside the City, while 1.1 mgd (6.7 percent) is estimated to come from outside the City. As shown in Table 3.7, the total ADWF for existing (12.5 mgd) is slightly less than the average annual flow in Table 3.1 (12.7 mgd). This indicates that there is a minor impact to wastewater flows due to I/I during the wet season, which is why the annual average flow is slightly greater than the ADWF.

It is noted that recent government campaigns promoting water conservation and water-saving improvements to plumbing fixtures could potentially result in a reduction in sewer flow generation in the coming years. For this study, water conservation was not assumed to have an impact on sewer flow generation. Future flow surveys will be needed to verify how significant of an impact new plumbing codes have on indoor water use and sewer flows.

| Table 3.7 Summary of Average Dry Weather Flows Sewer Master Plan City of Oceanside | | | |
|--|--|---|---|
| Land Use Category/Area | Existing Sewer Flow (mgd) | Near-Term Sewer Flow (mgd) | Long-Term Sewer Flow (mgd) |
| Residential | 9.1 | 9.4 | 10.9 |
| Commercial | 1.9 | 2.3 | 3.5 |
| Industrial | 0.51 | 0.51 | 1.03 |
| Total ADWF within City | 11.5 | 12.2 | 15.4 |
| Rainbow MWD | 0.77 | 0.77 | 0.77 |
| City of Vista | 0.24 | 0.24 | 0.25 |
| Total ADWF From Outside Source | 1.01 | 1.01 | 1.02 |
| Total Dry Weather Flow | 12.5 | 13.2 | 16.5 |
| Notes: | | | |
| (1) Residential flows assume an 83% water-to-sewer return rate (using winter water consumption). | | | |
| (2) Commercial and industrial flows assume a 100% water-to-sewer return rate (using winter water consumption). | | | |
| (3) Flows from Rainbow area are based on 2012 flow monitoring data. | | | |
| (4) Flows from Vista are estimated based on house counts and commercial acreage from aerial imagery. | | | |

The distribution of the projected wastewater flows to the City's two treatment plants is provided in Table 3.8. The City is planning to decommissioning/demolish the La Salina WWTP, and will construct a new La Salina Pump Station to convey the influent of the existing La Salina WWTP to San Luis Rey. For this reason, Table 3.8 shows that future flows to the La Salina WWTP will be zero, and the will all flow to San Luis Rey WWTP. Details about the future La Salinas Pump station are provided in Chapter 7. In the near-term, wastewater flows are projected to increase 0.7 mgd (6.2 percent). In the long-term, it is projected that the wastewater flows will increase by 32 percent above existing wastewater flows.

| Table 3.8 Summary of Average Dry Weather Flows by Plant Sewer Master Plan City of Oceanside | | | | | |
|--|--|---|---|------------------------------|-----------------------|
| | Existing Sewer Flow (mgd) | Near-Term Sewer Flow (mgd) | Long-Term Sewer Flow (mgd) | ADWF Increase (%) | |
| | | | | Near- Term | Long- Term |
| San Luis Rey WWTP | 9.7 | 13.2 | 16.5 | 6.2 | 32.0 |
| La Salina WWTP | 2.8 | - | - | - | - |
| Total Dry Weather Flow | 12.5 | 13.2 | 16.5 | 6.2 | 32.0 |

3.7 DESIGN STORM

Design storms are rainfall events used to analyze the performance of a collection system under significant wet weather events. The first step in the development of the design storm is to determine its recurrence interval and rainfall duration. The recurrence interval is based on the probability that a given rainfall event will occur or be exceeded in any given year. For example, a “10-year storm” means there is a 1 in 10 chance that a storm as large as or larger than this event will occur at a specific location in any year. Duration is the length of time that in which the rainfall occurs. It is common practice throughout California to define design storm as the 10-year, 24-hour rainfall event for collection system planning purposes.

The National Oceanic and Atmospheric Association (NOAA) Atlas 14 Volume 6 Isopleth rainfall maps serve as the industry standard for determining total rainfall depth at specified frequencies and durations in California (effective April 8, 2011, NOAA Atlas 14 Volume 6 superseded NOAA Atlas 2, which served as the previous California industry standard). Precipitation measurements used in the development of the Atlas were obtained for approximately 8,300 stations from a number of federal, state, and county agencies, as well as from private citizens. The Atlas results are published through the NOAA Precipitation Frequency Data Server (PFDS), which is available online (<http://hdsc.nws.noaa.gov/hdsc/pfds>). Based on the information presented in the PFDS, a 10-year, 24-hour storm for the City is 3.03 inches of rainfall.

Once the design storm recurrence interval and duration have been established, the next step is to develop the rainfall distribution for the design storm (i.e., how the total rainfall volume is distributed throughout the duration of the storm). An approach that is commonly used in collection system planning is to develop a synthetic design storm rainfall distribution. The Natural Resources Conservation Service (NRCS), formally known as the Soil Conservation Service (SCS), has developed normalized rainfall hyetograph distribution curves based on geographical location. The distribution curves are applied to total storm event volumes in order to develop hourly storm event hyetographs. There are four types of rainfall distributions used to represent various regions throughout the United States (Type I, IA, II, and III). Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24-hour rainfall amounts. Type II represents the rest of the country. The City lies geographically within the Type I boundary. Therefore, the Type I distribution was used. The design storm developed using the NRCS method is shown on Figure 3.3. As shown on Figure 3.3, the design storm results in a peak hourly rainfall rate of 0.79 inches per hour, with a total rainfall depth of 3.03 inches over the 24-hour period.

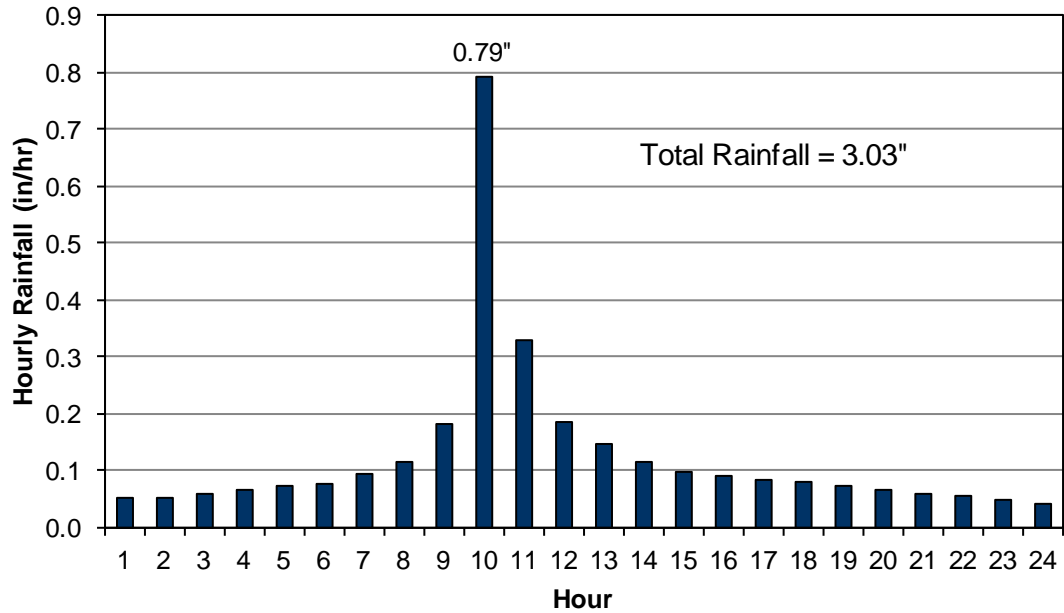


Figure 3.3 10-Year, 24-Hour Design Storm

3.8 PEAK WET WEATHER FLOW

The peak wet weather flow (PWWF) is the maximum hourly flow rate under selected design storm and growth conditions. Also referred to as the design flow, the PWWF includes the ADWF plus the peak flow response from infiltration and inflow (I/I). Typically, a design storm is routed through a hydraulic model to simulate the PWWF in a sewer system to evaluate the systems flows relative to the system's capacity. This SMP utilizes the 10-year, 24-hour design storm rainfall pattern for generating the design flow in the sewer system. For conservative planning purposes, the design storm distribution is timed to roughly match the daily ADWF peak, or the peak dry weather flow (PDWF).

The existing design flow is generated by routing the 10-year, 24-hour synthetic design storm through the hydraulic model, which was calibrated under both dry weather and wet weather conditions. Detailed information regarding the calibration of the City's hydraulic model is provided in Chapter 5.

The near-term and long-term PWWF was derived by routing the 10-year, 24-hour design storm through the hydraulic model, but with the near-term and long-term dry weather flow projections. Peak I/I rates for future growth areas were developed based on a peak I/I rate of 500 gpd/ac. This assumption was developed based on a review of the *City of Oceanside Sanitary Sewer Flow Monitoring Study (V&A, 2013)*, and is considered representative of lower I/I response rate areas within the City, as would be expected for new growth.

Table 3.9 presents a summary of the existing and build out ADWF and PWWF. Similar to Table 3.8, Table 3.9 shows a future flow of zero at the La Salina WWTP, with all existing flows and future flows routed to the San Luis Rey WWTP. The near term ADWF and

PWWF at the San Luis Rey WWTP are projected to approach 13.2 mgd and 34.0 mgd, respectively, resulting in a PWWF/ADWF peaking factor of 2.58. In the long term, the ADWF and PWWF at the San Luis Rey WWTP are projected to approach 16.5 mgd and 38.9 mgd, respectively, which equates to a PWWF/ADWF peaking factor of 2.36.

| Table 3.9 Current and Projected Wastewater Flows Sewer Master Plan City of Oceanside | | | | | | | |
|---|-------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Flow Condition | Year | San Luis Rey WWTP | | | La Salina WWTP | | |
| | | ADWF⁽¹⁾ | PWWF⁽²⁾ | Peaking Factor | ADWF⁽¹⁾ | PWWF⁽²⁾ | Peaking Factor |
| Existing | 2013 | 9.7 | 22.7 | 2.34 | 2.8 | 8.0 | 2.86 |
| Near-Term | 2020 | 13.2 | 34.0 | 2.58 | - | - | - |
| Long-Term | 2050 | 16.5 | 38.9 | 2.36 | - | - | - |
| Notes: | | | | | | | |
| (1) ADWF = Average Dry Weather Flow. | | | | | | | |
| (2) PWWF = Peak Wet Weather Flow. | | | | | | | |

Newer sewers tend to have less I/I response than older areas of the system, primarily due to better construction methods. This was accounted for by the use of a peak I/I rate of 500 gpd/acre, as documented in the previous paragraph. It should be noted however that the PWWF factor from existing to near term conditions is expected to increase slightly. The reason for this increase is that the near term PWWF presented in Table 3.9 is the PWWF that would reach the treatment plant after the near term capacity bottlenecks have been addressed (i.e., with “improvements”), thus allowing higher flow peaks to reach the plant that would be held back in the collection system if the improvements were not implemented. The reason that the long-term PWWF peaking factor decreases with respect to the near-term PWWF is that the impact of long term growth, which as previously discussed will exhibit a lower peaking factor than the existing system, masks the impact of the removal of capacity bottlenecks in the system. For the near term scenario, the impact of the removal of the capacity bottlenecks is more pronounced because the near term flow increase is relatively small in comparison to the long term scenario.

WASTEWATER SYSTEM FACILITIES

This chapter presents an overview of the City's existing wastewater collection system and treatment facilities as well as the City's land and ocean outfalls. Currently, the City manages a wastewater collection system that consists of approximately 460 miles of gravity sewer pipeline, 33 lift stations, two wastewater treatment plants, two land outfalls, and one ocean outfall. An overview of the City's collection system and facilities are shown on Figure 4.1. An assessment of the conditions of City's existing collection system is presented in Chapter 7.

4.1 TREATMENT TRIBUTARY AREAS

The City's service area is divided into two tributary areas, one for each of the two treatment plants. The area that is served by the La Salina WWTP is entirely within the City limits. The area that is served by the San Luis Rey WWTP includes areas within the cities of Oceanside and Vista and the Rainbow MWD. Figure 4.1 shows the tributary areas to each plant.

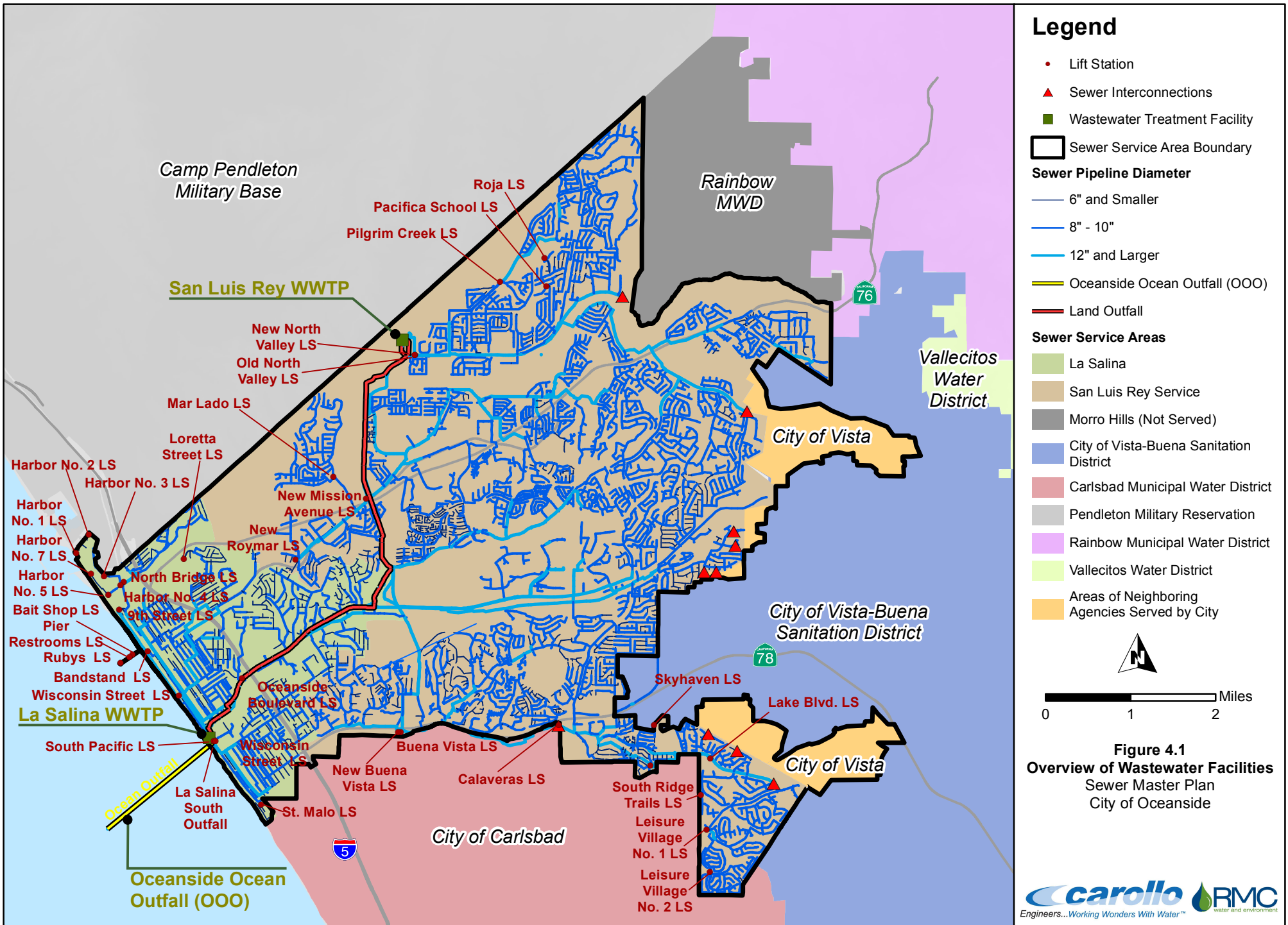
The effluent from both plants is discharged to the Pacific Ocean through the Oceanside Ocean Outfall (OOO). The Morro Hills area (shown in Figure 2.1) in the northern part of the city, uses septic systems to handle its wastewater. Although the Morro Hills area is in the City's water service area, it does not currently connect to any of the City's wastewater facilities.

4.2 TREATMENT PLANTS

4.2.1 San Luis Rey WWTP

The San Luis Rey WWTP treats wastewater from the eastern and central portions of the City, the Rainbow MWD, and a portion of the City of Vista. The Plant was originally constructed in 1972 and treats wastewater to secondary level by conventional biological treatment followed by clarification. The discharge flows to the Pacific Ocean via the Land Outfall and the OOO.

The San Luis Rey WWTP is a conventional activated sludge plant that provides secondary treatment for most of the City's service area. The San Luis Rey WWTP has a peak-month capacity of 15.4 mgd. The facility has been master planned with the ability for an ultimate expansion to 19.9 mgd. The facility consists of two liquid treatment trains, typically denoted as Plant 1 and Plant 2, downstream of the common Headworks and load equalization tanks (LET).



Plant 1 has a rated capacity of 10.7 mgd. It was constructed in two major phases in 1976 and 1985. The plant consists of rectangular primary clarifiers, activated sludge basins, and rectangular secondary clarifiers. The Load Equalization Tanks (LETs) and Headworks were originally constructed as part of Plant 1.

Plant 2 was constructed in year 2000 and has a rated capacity of 4.7 mgd. The facility includes rectangular primary clarifiers and activated sludge basins, and circular secondary clarifiers. The headworks was modified and expanded as part of the Plant 2 construction, including new bar screens, a washer compactor and a new grit chamber.

Waste activated sludge from both plants is thickened by gravity belt thickeners before being sent to one of four operating digesters. Primary sludge is sent directly from the clarifiers to the digesters. The digesters range in age with Digester 4 being constructed in 2000, and Digesters 1 and 2 dating back to 1976. Digester 3 was constructed in the late 1980s.

The majority of secondary effluent is sent to the OOO at the La Salina WWTP. A portion of the San Luis Rey WWTP effluent is treated to a higher level for recycled water use. The recycled water is currently used to irrigate the Oceanside Municipal Golf Course and to replenish Whelan Lake. Expansion of recycled water use for the San Luis Rey WWTP is evaluated in detail in the 2014 Recycled Water Master Plan (RWMP) Update (Carollo, 2014).

Processes included in each component of treatment at San Luis Rey WWTP are summarized in Table 4.1.

| Table 4.1 San Luis Rey WWTP Process Summary Sewer Master Plan City of Oceanside | | | |
|--|-----------------------------------|-----------------------------|-------------------------|
| Preliminary Treatment | Primary Treatment | Secondary Treatment | Solids Handling |
| Mechanical Bar Screens | Primary Clarifiers (East) | Aeration Basins (East) | Gravity Belt Thickeners |
| Aerated Grit Removal Basins | Primary Clarifiers (West) | Aeration Basins (West) | Anaerobic Digesters |
| Grit Pumps | Scum Collection (East and West) | Secondary Clarifiers (East) | Centrifuges |
| Load Equalization Tank No. 1 (LET 1) | Sludge Collection (East and West) | Secondary Clarifiers (West) | Solids Handling |
| Load Equalization Tank No. 2 (LET 2) | | Scum Collection (East) | |
| | | Scum Collection (West) | |
| | | Sludge Collection (East) | |
| | | Sludge Collection (West) | |
| | | Aeration Blowers | |

Table 4.2 provides design capacities for Plant 1, and Plant 2. These flows represent the total flow treated to the secondary level. As shown in Table 4.2, the SLWRF has a total peak month design flow of 15.4 mgd, while the LETs can provide buffer capacity to accommodate a peak hour flow of up to 39.2 mgd.

| Table 4.2 San Luis Rey WWTP Design Flow Rates Sewer Master Plan City of Oceanside | | | |
|--|----------------------|----------------------|-------------------------|
| Condition | Plant 1 (mgd) | Plant 2 (mgd) | Total Flow (mgd) |
| Average Annual | 9.4 | 4.1 | 13.5 |
| Peak Month | 10.7 | 4.7 | 15.4 |
| Peak Hour | 16.0 | 23.2 | 39.2 |

The San Luis Rey WWTP has treatment capacity to provide 0.7 mgd water treated to the tertiary level to meet Title 22 regulations for recycled water. However, the filter design limits the practical production rate to 0.5 mgd. Recycled water production and use at the San Luis Rey WWTP is discussed in the 2014 RWMP Update.

4.2.2 La Salina WWTP

The La Salina WWTP was originally constructed in 1949 and treats wastewater entirely from the City's coastal zone. It treats wastewater to the secondary level by conventional biological treatment followed by clarification. The discharge flows to the Pacific Ocean via the La Salina Outfall and the OOO. It has undergone several expansion projects, which have increased the treatment capacity to 5.5 mgd.

As discussed in Chapter 3 and Chapter 7, the City is planning to decommission and demolish the La Salina WWTP, and pump the influent flows into the plant up to San Luis Rey WWTP. Processes for each component of treatment at La Salina WWTP are shown in Table 4.3 for reference, although in the future the plant will be demolished.

| Table 4.3 La Salina WWTP Process Summary Sewer Master Plan City of Oceanside | | | |
|---|-----------------------------|--------------------------------------|------------------------------|
| Preliminary Treatment | Primary Treatment | Secondary Treatment | Solids Handling |
| Influent Pumps | Circular Primary Clarifiers | Circular Aeration Tank (North) | Dissolved Air Flotation Tank |
| Mechanical Bar Screen | Scum Collection | Circular Aeration Tank (South) | North Anaerobic Digester |
| Manual Bar Screen | Sludge Collection | Circular Secondary Clarifier (North) | South Anaerobic Digester |
| Aerated Grit Removal Basins | | Circular Secondary Clarifier (South) | Belt Filter Presses |
| Load Equalization Tank (LET) | | Scum Collection | |
| LET Aeration Blowers | | Sludge Collection | |
| | | Aeration Blowers | |

Table 4.4 provides the capacity of the La Salina WWTP for flows treated to the secondary level. As shown in Table 4.4, the La Salina WWTP can treat up to 5.5 mgd on a peak monthly basis, and up to 13.3 mgd on an hourly basis.

| Table 4.4 La Salina WWTP Design Flow Rates Sewer Master Plan City of Oceanside | |
|---|-------------------------|
| Condition | Total Flow (mgd) |
| Average Annual | 2.8 |
| Peak Month | 5.5 |
| Peak Hour | 13.3 |

4.3 COLLECTION SYSTEM

The following section provides a description of the sewer pipelines, sewer force mains, and lift station facilities that comprise the City's wastewater collection system. These facilities are shown on Figure 4.2. In addition to the collection system main and trunk sewers, there are approximately 200 miles of lateral pipelines that connect to the collection system, which are the responsibility of the property owner. These sewer laterals are not analyzed in this SMP.

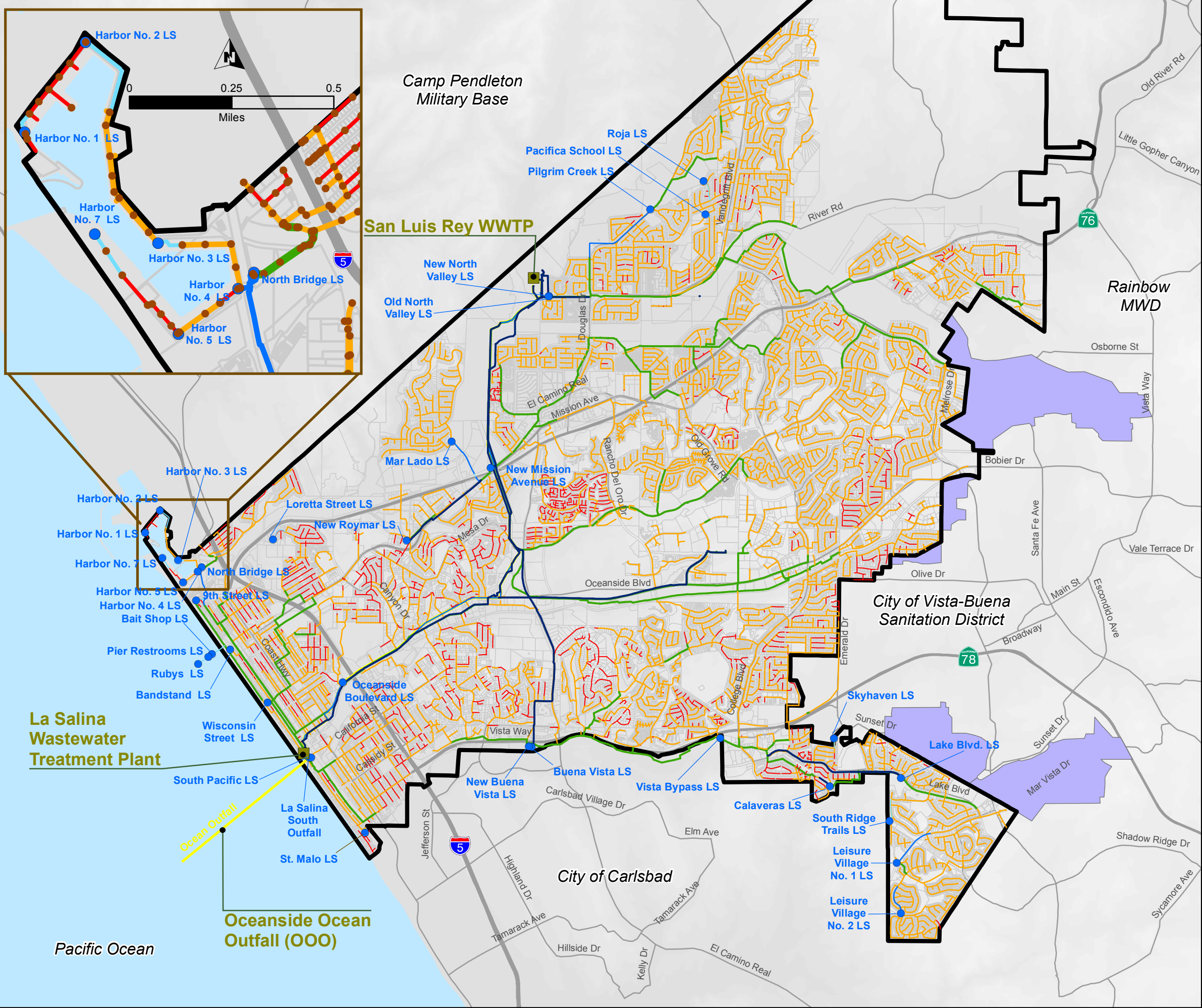
4.3.1 Gravity Sewers

The City's sewer collection system includes approximately 460 miles of gravity pipeline ranging in diameter from 4 inches to 42 inches. Table 4.5 and Table 4.6 and Figure 4.3 through Figure 4.6 provide a summary of the length of the collection system pipeline based on diameter, material, and age.

| Table 4.5 Sewer Pipeline Overview Sewer Master Plan City of Oceanside | | | |
|--|--------------------|----------------|-------------------------|
| Diameter | Pipe Length | | Percent of Total |
| | (ft) | (miles) | |
| 4 | 700 | 0.1 | < 0.1% |
| 6 | 356,350 | 67.5 | 14.7% |
| 8 | 1,597,450 | 302.5 | 65.9% |
| 10 | 113,550 | 21.5 | 4.7% |
| 12 | 89,000 | 16.9 | 3.7% |
| 14 | 1,200 | 0.2 | < 0.1% |
| 15 | 48,400 | 9.2 | 2.0% |
| 16 | 4,300 | 0.8 | 0.2% |
| 18 | 47,950 | 9.1 | 2.0% |
| 20 | 150 | < 0.1 | < 0.1% |
| 21 | 14,700 | 2.8 | 0.6% |
| 24 | 132,850 | 25.2 | 5.5% |
| 27 | 10,100 | 1.9 | 0.4% |
| 30 | 6,250 | 1.2 | 0.3% |
| 33 | 350 | 0.1 | < 0.1% |
| 42 | 1,350 | 0.3 | 0.1% |
| Unknown | 200 | < 0.1 | < 0.1% |
| Total | 2,424,850 | 459.3 | 100.0% |

As shown in Figure 4.3, the majority of the pipelines in the City's wastewater collection system are 8-inches in diameter. Pipelines with diameters less than or equal to 6 inches make up 15 percent. The 10-inch and 12-inch diameters compose 5 percent and 4 percent, respectively. Pipelines with diameters between 14 and 21 inches make up 5 percent of the system. Finally, pipelines 24-inches or greater in diameter represent 6 percent of the City's wastewater collection system.

Filename: p:\PHX-POP-PW-Carollo\local\Carollo\Documents\Client\CA\Oceanside\9198A\00\Drawings\GIS\SMP-Figure_4.2_Lift_Stations_Force_Mains_Gravity_Mains.mxd Date: 4/7/2015



Legend

- Wastewater Treatment Facility
- Manholes
- Lift Station
- City of Oceanside

Force Main Diameter

- 6" and Smaller
- 8" - 10"
- 12" and Larger

Gravity Main Diameter


- 6" and Smaller
- 8" - 10"
- 12" and Larger
- Ocean Outfall

- Parcels
- Areas of Neighboring Agencies Served by City

Scale: 0 1 2 Miles

North Arrow

**Figure 4.2
Lift Stations, Force Mains,
and Gravity Mains
Sewer Master Plan
City of Oceanside**



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The distribution of pipeline by material is summarized in Table 4.6 and is graphically presented in Figure 4.4. The material categories are asbestos cement (AC), cast iron, concrete cylindrical pipe (CCP), cement mortar lined and coated steel (CMLC), ductile iron pipe (DIP), high density poly ethylene (HDPE), polyvinylchloride (PVC), steel, vitrified clay pipe (VCP), and unknown. The majority of the pipelines (265 miles, or 57 percent) are made of VCP.

The distribution of materials is shown again in Figure 4.5 but an additional breakdown by decade of installation is included. This data shows the changes in materials used for construction, and the age of specific materials throughout the City's history. The same distribution of age is also shown in Figure 4.6, but for diameter instead of material.

As shown in Figure 4.5, the majority, over 50 percent, of City's collection system was constructed between 1970 and 1989. Prior to the 1980s, the most commonly used construction material was VCP, with about 460,000 linear feet installed in the 1970s. In the 1980s the installation of VCP declined to 320,000 linear feet and was replaced by PVC as the City's prevalent construction material. Between 1980 and 1989 PVC, as a sewer pipeline material, increased dramatically, going from a little more than 20,000 feet to approximately 400,000 feet. In Oceanside, from the 1980s to the present decade, PVC continued to be the dominate construction material while the use of VCP in the sewer collection system continued to decline until it diminished all together.

Lastly, in Figure 4.6 the diameters of the City's sewer pipelines are compared with the decades they were installed. The majority of the collection pipeline, 66 percent, consists of 8-inch diameter pipe. This has been this case every decade, except the 1910s and 1940s, when 6-inch diameter pipeline was the City's size of choice. 6-inch diameter pipes make up almost 15 percent of the City's collection system.

4.3.2 Lift Stations

The City owns and operates 33 lift stations used to collect and transport wastewater to the San Luis Rey WWTP and the La Salina WWTP. The lift stations are critical facilities in maintaining the sewer collection and transport system. The lift station characteristics are summarized in Table 4.7, while its locations are shown on Figure 4.7.

**Table 4.6 Sewer Pipeline Diameter by Material
Sewer Master Plan
City of Oceanside**

| Diameter | CI | DIP | PVC | Steel | VCP | Unknown | Total (ft) | Total (mi) | Percent |
|----------------------|--------------|---------------|----------------|------------------|------------------|---------------|------------------|--------------|-------------|
| 4 | 150 | 0 | 200 | 0 | 350 | 0 | 700 | 0.1 | < 0.1% |
| 6 | 800 | 0 | 13,250 | 0 | 342,300 | 0 | 356,350 | 67.5 | 14.7% |
| 8 | 3,900 | 150 | 806,500 | 0 | 786,900 | 0 | 1,597,450 | 302.5 | 65.9% |
| 10 | 550 | 0 | 28,250 | 0 | 84,750 | 0 | 113,550 | 21.5 | 4.7% |
| 12 | 0 | 0 | 36,250 | 550 | 52,200 | 0 | 89,000 | 16.9 | 3.7% |
| 14 | 0 | 50 | 0 | 0 | 1,150 | 0 | 1,200 | 0.2 | < 0.1% |
| 15 | 0 | 0 | 12,400 | 0 | 36,000 | 0 | 48,400 | 9.2 | 2.0% |
| 16 | 0 | 0 | 2,200 | 0 | 2,100 | 0 | 4,300 | 0.8 | 0.2% |
| 18 | 0 | 800 | 7,300 | 0 | 39,850 | 0 | 47,950 | 9.1 | 2.0% |
| 20 | 0 | 150 | 0 | 0 | 0 | 0 | 150 | 0.0 | < 0.1% |
| 21 | 0 | 0 | 1900 | 0 | 12,800 | 0 | 14,700 | 2.8 | 0.6% |
| 24 | 0 | 98,550 | 3,850 | 0 | 20,100 | 10,350 | 132,850 | 25.2 | 5.5% |
| 27 | 0 | 0 | 0 | 0 | 10,100 | 0 | 10,100 | 1.9 | 0.4% |
| 30 | 0 | 0 | 100 | 0 | 6,150 | 0 | 6,250 | 1.2 | 0.3% |
| 33 | 0 | 0 | 0 | 0 | 350 | 0 | 350 | 0.1 | < 0.1% |
| 42 | 0 | 0 | 0 | 0 | 1,350 | 0 | 1,350 | 0.3 | 0.1% |
| Unknown | 0 | 0 | 150 | 0 | 0 | 50 | 200 | < 0.1 | < 0.1% |
| Total (ft) | 5,400 | 99,700 | 912,350 | 550 | 1,396,450 | 10,400 | 2,424,850 | | 100% |
| Total (miles) | 1.0 | 18.9 | 172.8 | 0.1 | 264.5 | 2.0 | - | 459.3 | 100% |
| Total (%) | 0.2% | 4.1% | 37.6% | < 0.1% | 57.6% | 0.4% | 100.0% | 100% | 100% |

| Table 4.7 Lift Station Characteristics Sewer Master Plan City of Oceanside | | | | | | |
|---|--------------------------|-------------------------|-------------------------------|----------------------------|--------------------|----------------------------------|
| Lift Station | Address | Year Constructed | Station Capacity (gpm) | Flow per Pump (gpm) | # of Pumps | Force Main Diameter (in.) |
| Bandstand | 250 North Strand | 1999 | 300 | 300 | 2 | 6 |
| Buena Vista | 2501 Haymar Drive | 1976 | 2,550 | N/A ⁽¹⁾ | 3 | 18 |
| New Buena Vista | 2501 Haymar Drive | N/A ⁽¹⁾ | 1,900 | N/A ⁽¹⁾ | 3 | N/A ⁽¹⁾ |
| Vista Bypass ⁽²⁾ | 3800 Vista Way | 1961 | N/A ⁽¹⁾ | N/A ⁽¹⁾ | N/A ⁽¹⁾ | N/A ⁽¹⁾ |
| Calaveras | 3636 Sky Haven Lane | N/A ⁽¹⁾ | 1,500 | 850 | 3 | 12 |
| Harbor #1 | 200 North Harbor Drive | 1961 | 150 | 150 | 2 | 6 |
| Harbor #2 | 1830 North Harbor Drive | 1961 | 175 | 175 | 2 | 6 |
| Harbor #3 | 1325 North Harbor Drive | 1961 | 250 | 250 | 2 | 6 |
| Harbor #4 | 284 North Harbor Drive | 1961 | 500 | 500 | 2 | 8 |
| Harbor #5 | North Pacific Street | 1961 | 150 | 150 | 2 | 6 |
| Harbor #7 | 1384 North Harbor Drive | 1986 | 50 | 50 | 2 | 4 |
| Lake Blvd | 4700 1/2 Lake Boulevard | 1993 | 1,000 | 1,000 | 4 | 16 |
| Leisure Village #1 | 4706 Cannon Road | 1984 | 800 | 800 | 3 | 8 |
| Leisure Village #2 | 4300 Leisure Village Way | 1986 | 500 | 600 | 2 | 8 |
| Loretta | 1261 Loretta Street | 1953 | 400 | 400 | 2 | 6 |
| Mar Lado | 401 North Foussat Road | 1986 | 800 | 600 | 3 | 8 |
| Mission Avenue | 3476 Mission Avenue | 2002 | 4,000 | 2,900 | 4 | 24 |
| North Bridge | 304 South Harbor Drive | 1988 | 1,200 | 1,200 | 2 | 10 |
| Ninth Street | 997 North Pacific Road | 1975 | 500 | 500 | 2 | 16 |
| North Valley | 3930 North River Road | 2001 | 2,960 | 2,960 | 3 | 20 |
| Oceanside Blvd | 1664 Oceanside Boulevard | 1975 | 3,000 | 1,700 | 3 | 10 |
| Pacifica School | 4991 Marcario Road | 1971 | 400 | 400 | 2 | 6 |

**Table 4.7 Lift Station Characteristics
Sewer Master Plan
City of Oceanside**

| Lift Station | Address | Year Constructed | Station Capacity (gpm) | Flow per Pump (gpm) | # of Pumps | Force Main Diameter (in.) |
|--------------------|-------------------------------|--------------------|------------------------|---------------------|------------|---------------------------|
| Pilgrim Creek | 855 Douglas Drive | 1976 | 2,000 | 2,000 | 2 | 10 |
| Roja | 703 Roja Street | 1975 | 250 | 250 | 2 | 6 |
| Roymar | 110 Jones Road | 1992 | 1,600 | 1,600 | 4 | 12 |
| St. Malo | 52 St. Malo Beach | N/A ⁽¹⁾ | 200 | 200 | 2 | 4 |
| Sky Haven | 3521A Sky Haven Lane | 1973 | 150 | 150 | 2 | 4 |
| South Pacific | 1330 South Tait Street | 1955 | 700 | 700 | 2 | 6 |
| South Ridge Trails | 4900 Cannon Road | N/A ⁽¹⁾ | 600 | 600 | 2 | 8 |
| Wisconsin | Wisconsin and Pacific Streets | N/A ⁽¹⁾ | 300 | 300 | 2 | 6 |
| Restrooms | On the Pier | N/A ⁽¹⁾ | 200 | 200 | 2 | 6 |
| Bait Shop | On the Pier | 1973 | 50 | 50 | 2 | 6 |
| Ruby's | On the Pier | N/A ⁽¹⁾ | 200 | 200 | 2 | 6 |

Notes:

Source: Lift Station Condition Assessment, Appendix G.

(1) Information not available.

(2) Pump station allows the City to pump flow to Vista for emergency situations.

4.3.3 Force Mains

This section provides an overview of the City's force mains. The previous pipeline section, Section 4.3.1, described the City's gravity mains. The differences between these two types of pipelines are the methods of conveyance used to transport wastewater from sewer system to the treatment facilities. Gravity pipelines use the force of gravity to deliver wastewater from higher elevations to lower elevations, and are typically not pressurized. Force mains are pipelines that flow from lower to higher elevations. In a force main, wastewater is pumped (via a lift station) up gradient and is discharged into a gravity main or treatment facility.

The City maintains 135 miles of force mains ranging in diameter from 3 inches to 42 inches. The following charts and figures provide a summary of the length of the collection system force mains based on diameter, material, and age.

See Table 4.8 for an overview of the City's force mains based on diameter. Figure 4.7 shows the locations of these force mains. Figure 4.8 provides a graphical representation of the pipeline distribution by diameter.

| Table 4.8 Force Main Overview Sewer Master Plan City of Oceanside | | | |
|--|------------------------------|------------------------------|------------------------------------|
| Diameter | Total Length (ft) | Total Length (mi) | Percent of Total Length |
| 3 | 800 | 0.2 | 0.1% |
| 4 | 2,450 | 0.5 | 0.3% |
| 6 | 8,350 | 1.6 | 1.2% |
| 8 | 7,000 | 1.3 | 1.0% |
| 10 | 238,050 | 45.1 | 33.2% |
| 12 | 14,000 | 2.7 | 2.0% |
| 14 | 102,250 | 19.4 | 14.2% |
| 16 | 67,050 | 12.7 | 9.3% |
| 18 | 200 | 0.0 | < 0.1% |
| 20 | 5,100 | 1.0 | 0.7% |
| 24 | 174,000 | 33.0 | 24.2% |
| 27 | 38,650 | 7.3 | 5.4% |
| 28 | 2,350 | 0.4 | 0.3% |
| 30 | 6,250 | 1.2 | 0.9% |
| 32 | 5,300 | 1.0 | 0.7% |
| 36 | 1,500 | 0.3 | 0.2% |
| 42 | 44,200 | 8.4 | 6.2% |
| Unknown | 50 | 0.0 | < 0.1% |
| Total | 717,550 | 135.9 | 100.0% |

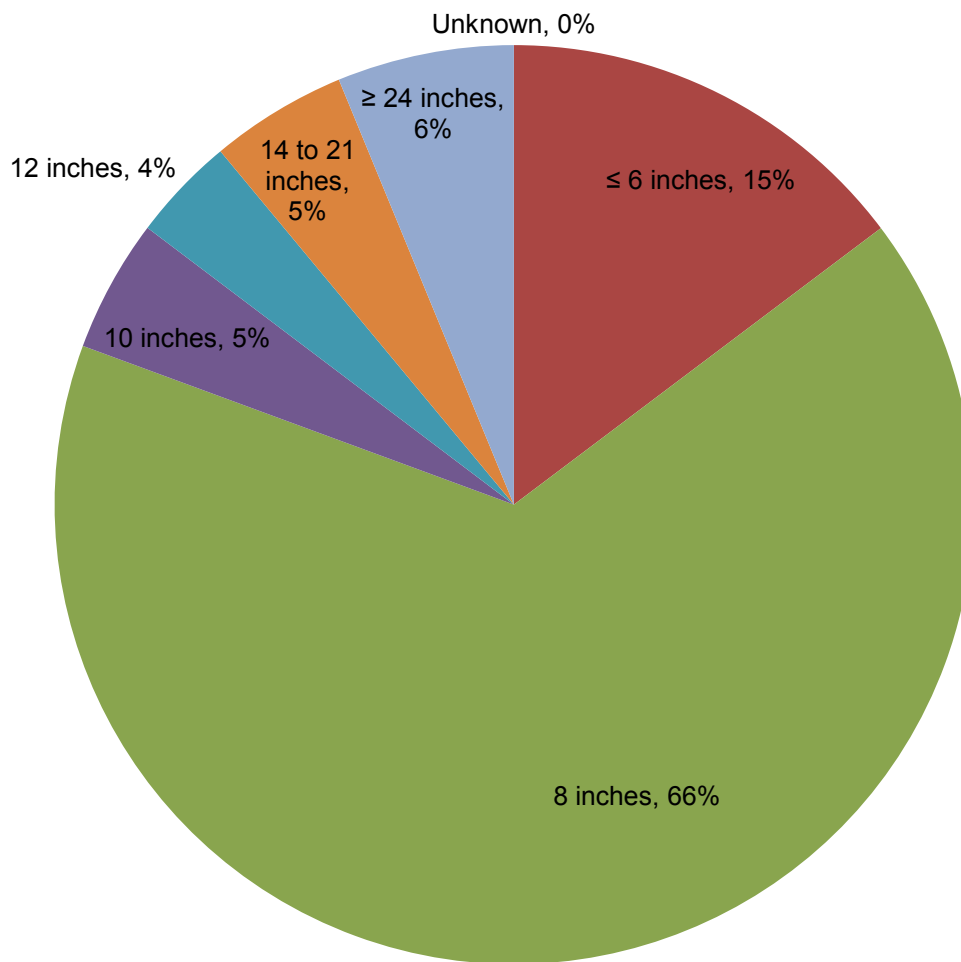


Figure 4.3
Sewer Pipe Distribution by Diameter
Sewer Master Plan
City of Oceanside

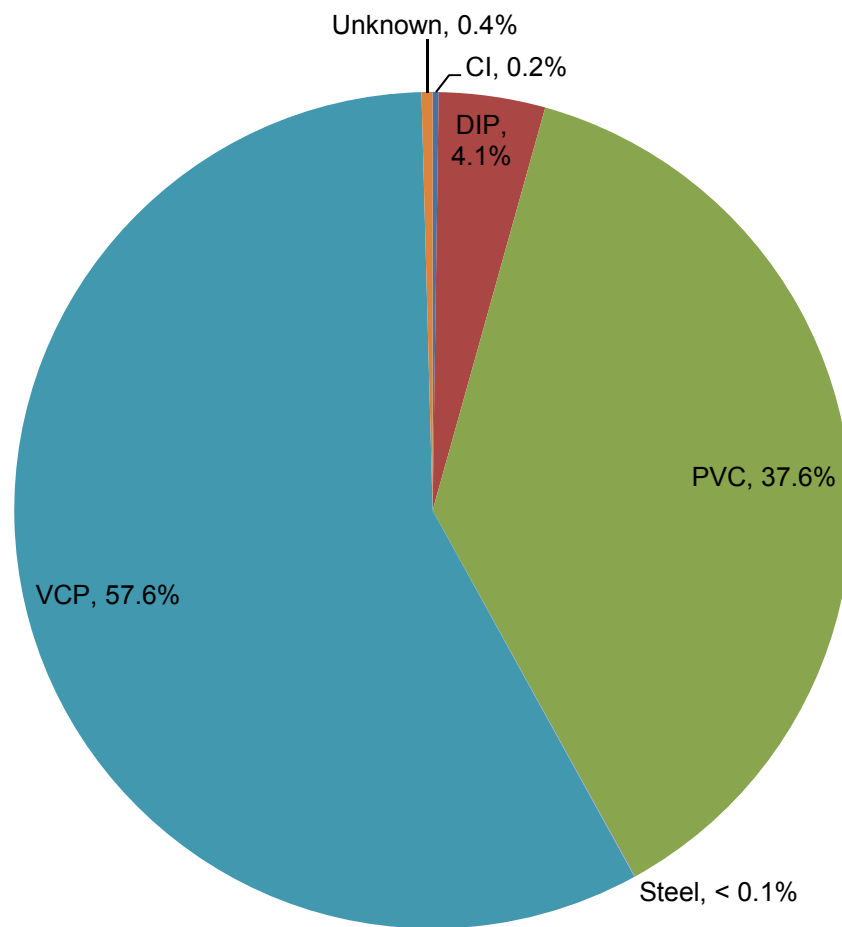


Figure 4.4
Sewer Pipeline Distribution by Material
Sewer Master Plan
City of Oceanside

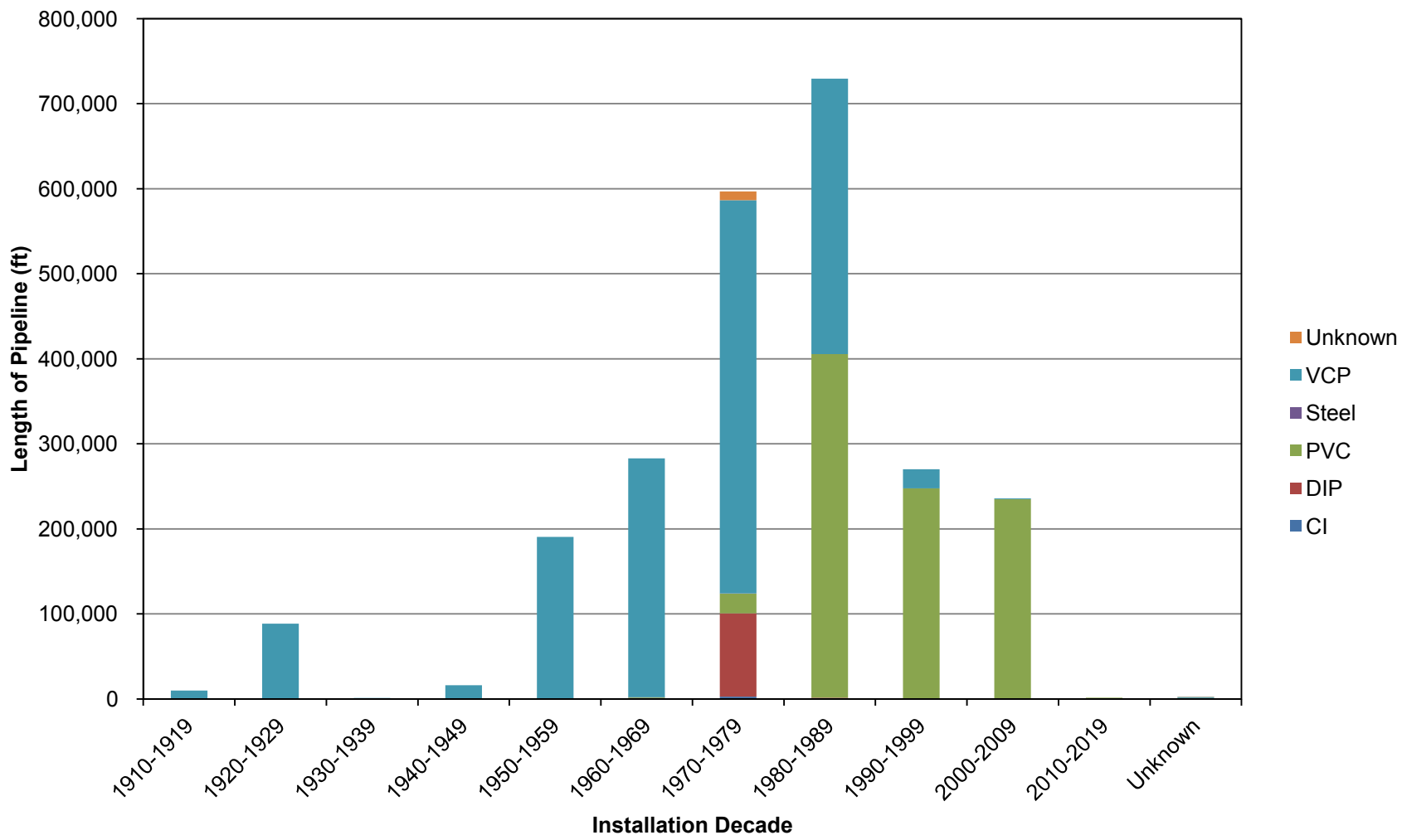


Figure 4.5
Sewer Pipe Material by Decade
 Sewer Master Plan
 City of Oceanside

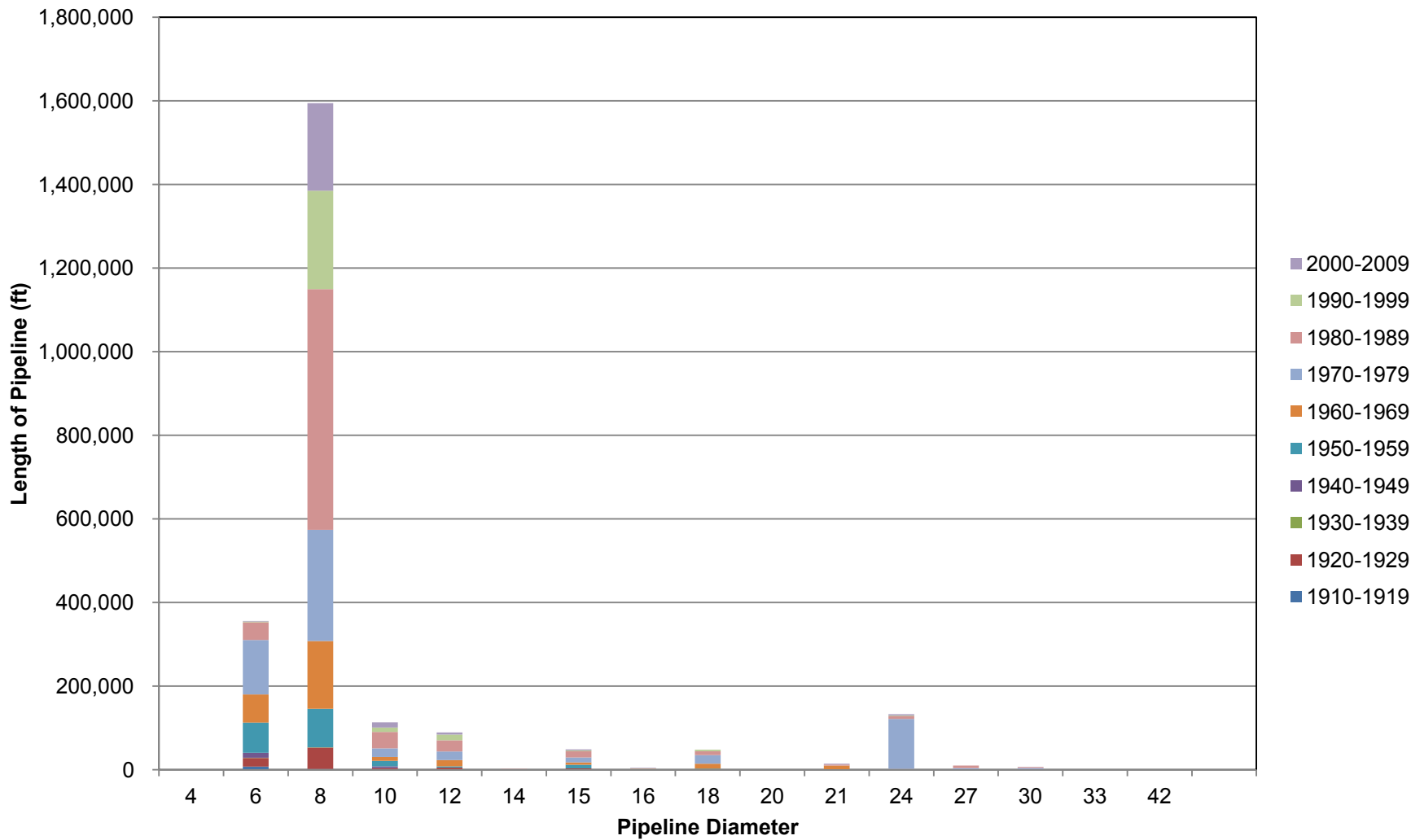
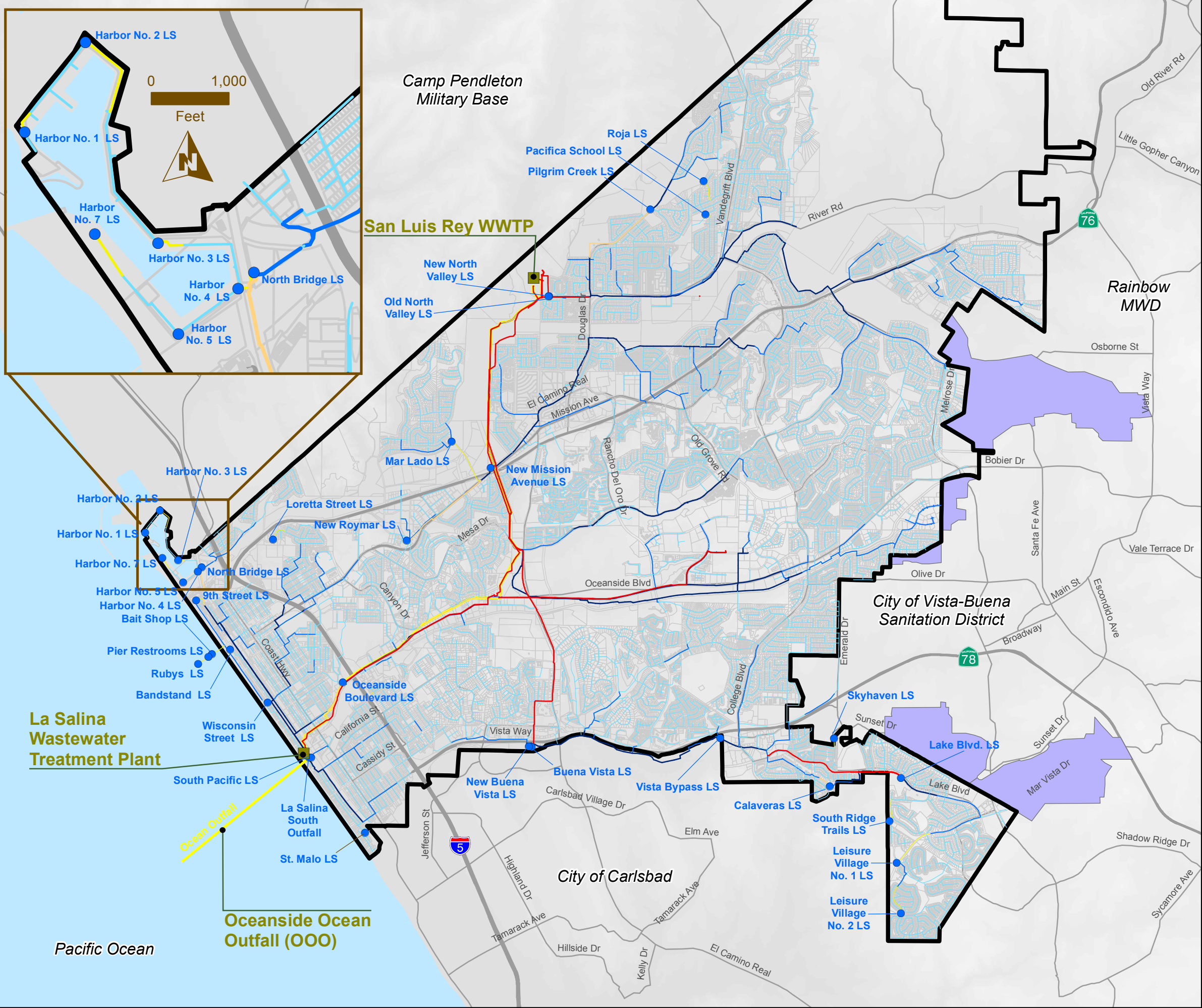


Figure 4.6
Sewer Pipe Diameter Distribution
 Sewer Master Plan
 City of Oceanside



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Filename: p:\PHX-POP-PW_Carollo.local\Carollo\Documents\Client\CA\Oceanside\9198A\00\Drawings\GIS\SMP-Figure_4.7_Lift_Station_and_Force_Main_Locations_Ver.B.mxd Date: 4/7/2015



Legend

- Wastewater Treatment Facility
- Lift Station
- City of Oceanside
- Force Main Diameter**
- 8" and Smaller
- 10" - 12"
- 14" and Larger
- Gravity Main Diameter**
- 8" and Smaller
- 10" - 12"
- 14" and Larger
- Ocean Outfall
- Parcels
- Areas of Neighboring Agencies Served by City

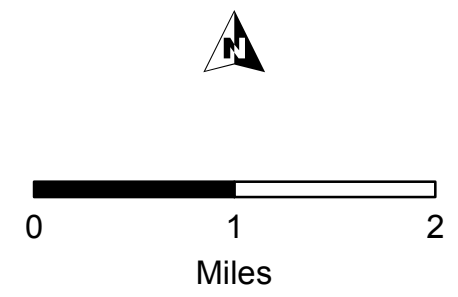


Figure 4.7
Lift Station and
Force Main Locations
Sewer Master Plan
City of Oceanside

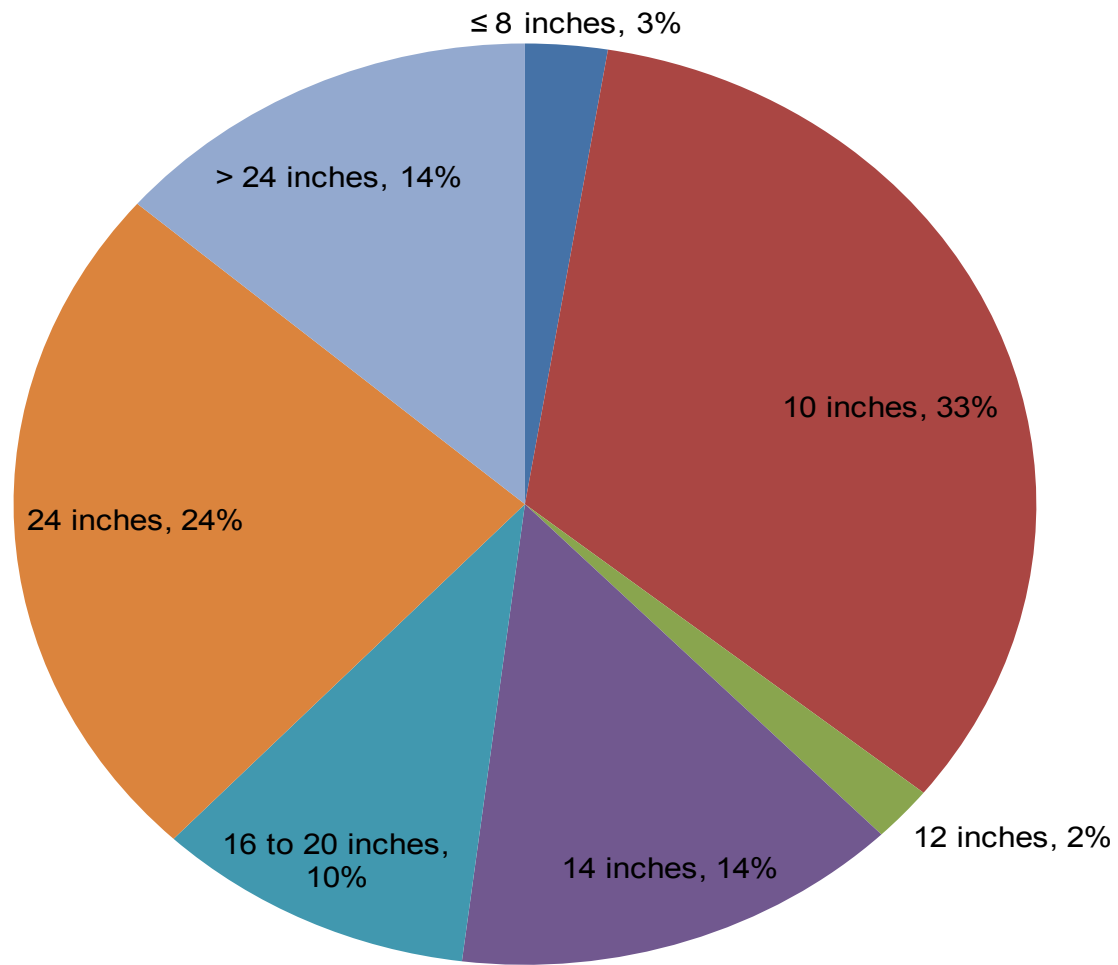


Figure 4.8
Force Main Distribution by Diameter
Sewer Master Plan
City of Oceanside

As shown in Figure 4.8 the majority of the force mains in the City, 33 percent, are 10-inches in diameter. The 3-inch and 4-inch diameter force mains compose less than one percent of the City's force mains. These pipe diameters are not common sizes and are used for small-scale applications. In the City's case, they are used to pump sewage from the pier and harbor to nearby gravity mains. 6-inch and 8-inch diameter mains each make up about one percent of the City's force mains. Force mains with diameters between 16-inches and 20 inches make up 10 percent of the system. 14-inch and 24-inch diameter force mains make up 14 percent and 24 percent of the total system, respectively. Lastly, diameters 24-inches and larger represent 14 percent of the City's force mains.

The distribution of pipeline by material is summarized in Table 4.10 and is graphically presented in Figure 4.9. The material categories are AC, cast iron (CI), CCP, CMLC, DIP, HDPE, PVC, steel, VCP, and unknown.

As shown in Figure 4.9 the majority of the force mains consist of PVC (39 percent). AC, DIP, and Steel make up 31 percent, 14 percent, and 14 percent of the City's force mains, respectively. HDPE, alone, makes up 1 percent of the force mains while CI, CCP, VCP, and unknown materials make up approximately 1 percent.

The distribution of materials is shown again in Figure 4.10, but an additional breakdown by decade of installation is included. This data shows the changes in materials used for construction, and the age of specific materials throughout the City's history. The same distribution of age is also shown in Figure 4.11, but for diameter instead of material.

As shown in Figure 4.10 and Figure 4.11 most of the City's force mains were constructed in the 1970s and 2000s, with 38 percent and 29 percent installed, respectively. In the 1970s 10-inch diameter DI pipe was the force main material of choice, but was replaced by PVC as the material of choice the following decade. In the 1970s, 41 miles of the 52 miles installed were 10-inch diameter DI pipe, while in the 2000s no DI pipe was installed. On the other hand, from 2000 to 2009, 37 miles of the 39 total miles installed that decade were PVC, and only one mile of PVC was installed in the 1970s.

During the 1950s, 14 percent of the City's force mains were installed. There were almost 20 miles of 24-inch diameter steel force mains installed. This was practically the only material and diameter used in the 1950s and is currently the City's only steel force main. The other material used in 1950s was 1,000 feet of 8-inch diameter CI. The other time steel was used was for 250 feet pipeline in the 1980s. The 1990s represented 11 percent of the force mains installed with PVC, and 16-inch diameter pipes making up the majority of that percentage. In the 1980s, 6 percent of the City's force mains were installed. That 6 percent consisted of various pipeline materials and diameters, with DIP and 42-inch diameters being the main categories.

4.4 INTERCONNECTIONS WITH NEIGHBORING AGENCIES

This chapter discusses the interagency agreements the City has with the City of Vista, the City of Carlsbad, Rainbow MWD, Fallbrook PUD, and Camp Pendleton. The capacity details of these agreements are summarized in Table 4.9.

| Agency | Interconnection | Capacity (mgd) | | Oceanside Facility Utilized |
|------------------|---|----------------|----------------|-----------------------------|
| | | To Oceanside | From Oceanside | |
| City of Vista | Willowbrook Dr North Ave. Vista Pacific Dr. Amberwood Ct. Granada Dr. Winslow Rd. Morining Cyn. Lake Blvd. | 2.15 | 2.15 | San Luis Rey WWTP |
| Rainbow MWD | Stallion | 1.5 | | San Luis Rey WWTP |
| Fallbrook PUD | Ocean Outfall | 2.4 | | OOO |
| City of Carlsbad | Buena Vista Cr. | No Agreement | No Agreement | San Luis Rey WWTP |
| Camp Pendleton | Ocean Outfall | 3.6 | | OOO |

The City currently accepts wastewater flows from the City of Vista and the Rainbow MWD through contractual relationships. It also has contracted with the Fallbrook Public Utility District (Fallbrook PUD) to allow Fallbrook PUD to discharge up to 2.4 mgd of treated wastewater through the Oceanside Ocean Outfall (OOO). The treated wastewater is conveyed from the Fallbrook PUD Plant Number 2 through a 16-inch diameter land outfall. The Fallbrook PUD land outfall joins the OOO at the La Salina WWTP. A portion of the treated effluent is diverted from the land outfall for irrigation at the Morro Hills Country Club and Caltrans right-of-way. This is discussed in further detail in the Recycled Water Master Plan.

The City can exchange flow to Vista on an emergency basis through the Vista Bypass Pump Station. The City of Carlsbad has one connection to the City in the southwest portion of the City. There is no agreement for this connection. This connection serves several City of Carlsbad buildings at a reservoir site. The City's agreement with the Rainbow MWD allows them to discharge up to 1.5 mgd to the San Luis Rey WWTP. Camp Pendleton can discharge up to 3.6 mgd to the OOO. The location of each of the interconnections is shown in Figure 4.12. Camp Pendleton and FPUD utilize an outfall system which is illustrated on Figure 4.13.

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| Table 4.10 Force Main Diameter by Material Sewer Master Plan City of Oceanside | | | | | | | | | | | | | |
|---|----------------|--------------|-------------|-------------|----------------|--------------|----------------|----------------|--------------|----------------|--------------------------|--------------------------|--------------------------|
| Diameter | AC | CI | CCP | CMLC | DIP | HDPE | PVC | Steel | VCP | Unknown | Total Length (ft) | Total Length (mi) | % of Total Length |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 800 | 0 | 0 | 0 | 800 | 0.2 | 0% |
| 4 | 1,400 | 400 | 0 | 0 | 0 | 0 | 650 | 0 | 0 | 0 | 2,450 | 0.5 | 0% |
| 6 | 1,550 | 2,300 | 0 | 0 | 0 | 0 | 3,900 | 250 | 350 | 0 | 8,350 | 1.6 | 1% |
| 8 | 0 | 2,850 | 0 | 0 | 0 | 0 | 4,150 | 0 | 0 | 0 | 7,000 | 1.3 | 1% |
| 10 | 217,350 | 0 | 0 | 0 | 16,000 | 0 | 4,700 | 0 | 0 | 0 | 238,050 | 45.1 | 33% |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 14,000 | 0 | 0 | 0 | 14,000 | 2.7 | 2% |
| 14 | 0 | 0 | 0 | 0 | 50 | 0 | 102,100 | 0 | 100 | 0 | 102,250 | 19.4 | 14% |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 66,450 | 0 | 0 | 600 | 67,050 | 12.7 | 9% |
| 18 | 0 | 0 | 0 | 0 | 50 | 0 | 150 | 0 | 0 | 0 | 200 | 0.0 | 0% |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 5,100 | 0 | 0 | 0 | 5,100 | 1.0 | 1% |
| 24 | 0 | 0 | 100 | 0 | 900 | 0 | 71,650 | 100,700 | 0 | 650 | 174,000 | 33.0 | 24% |
| 27 | 0 | 0 | 0 | 0 | 37,600 | 0 | 0 | 0 | 1,050 | 0 | 38,650 | 7.3 | 5% |
| 28 | 0 | 0 | 0 | 0 | 0 | 2,350 | 0 | 0 | 0 | 0 | 2,350 | 0.4 | 0% |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 6,250 | 0 | 0 | 0 | 6,250 | 1.2 | 1% |
| 32 | 0 | 0 | 0 | 0 | 0 | 5,300 | 0 | 0 | 0 | 0 | 5,300 | 1.0 | 1% |
| 36 | 0 | 0 | 0 | 0 | 1,500 | 0 | 0 | 0 | 0 | 0 | 1,500 | 0.3 | 0% |
| 42 | 0 | 0 | 0 | 0 | 44,200 | 0 | 0 | 0 | 0 | 0 | 44,200 | 8.4 | 6% |
| Unknown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 50 | 0.0 | 0% |
| Total Length (ft) | 220,300 | 5,550 | 100 | 0 | 100,300 | 7,650 | 279,900 | 100,950 | 1,500 | 1,300 | 717,550 | 135.9 | 100% |
| Total Length (miles) | 41.7 | 1.1 | 0.0 | 0.0 | 19.0 | 1.4 | 53.0 | 19.1 | 0.3 | 0.2 | 135.9 | | |
| % of Total Length | 30.7% | 0.8% | 0.0% | 0.0% | 14.0% | 1.1% | 39.0% | 14.1% | 0.2% | 0.2% | 100.0% | | |

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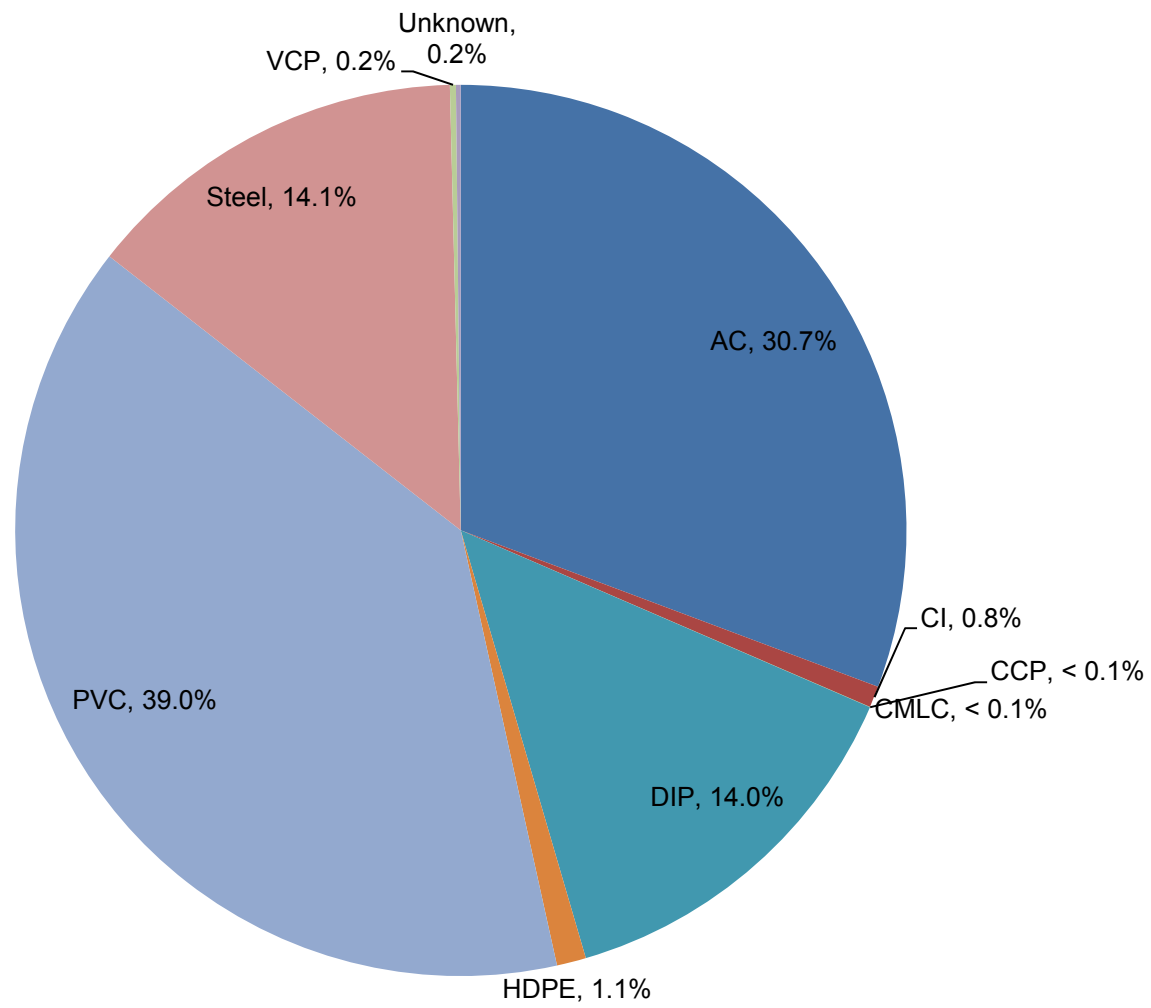


Figure 4.9
Force Main Distribution by Material
Sewer Master Plan
City of Oceanside

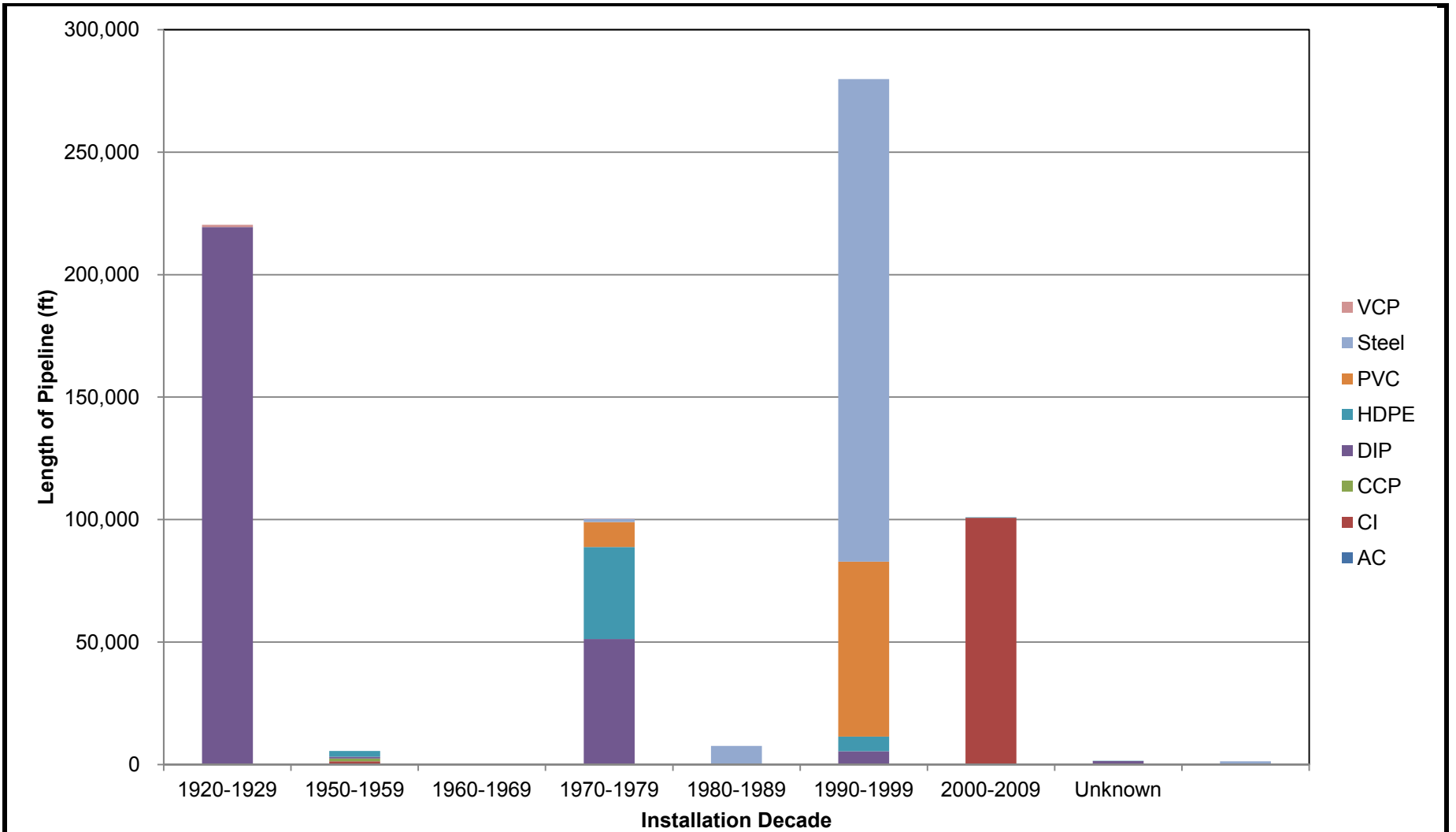


Figure 4.10
Force Main Installation Decade by Material
 Sewer Master Plan
 City of Oceanside

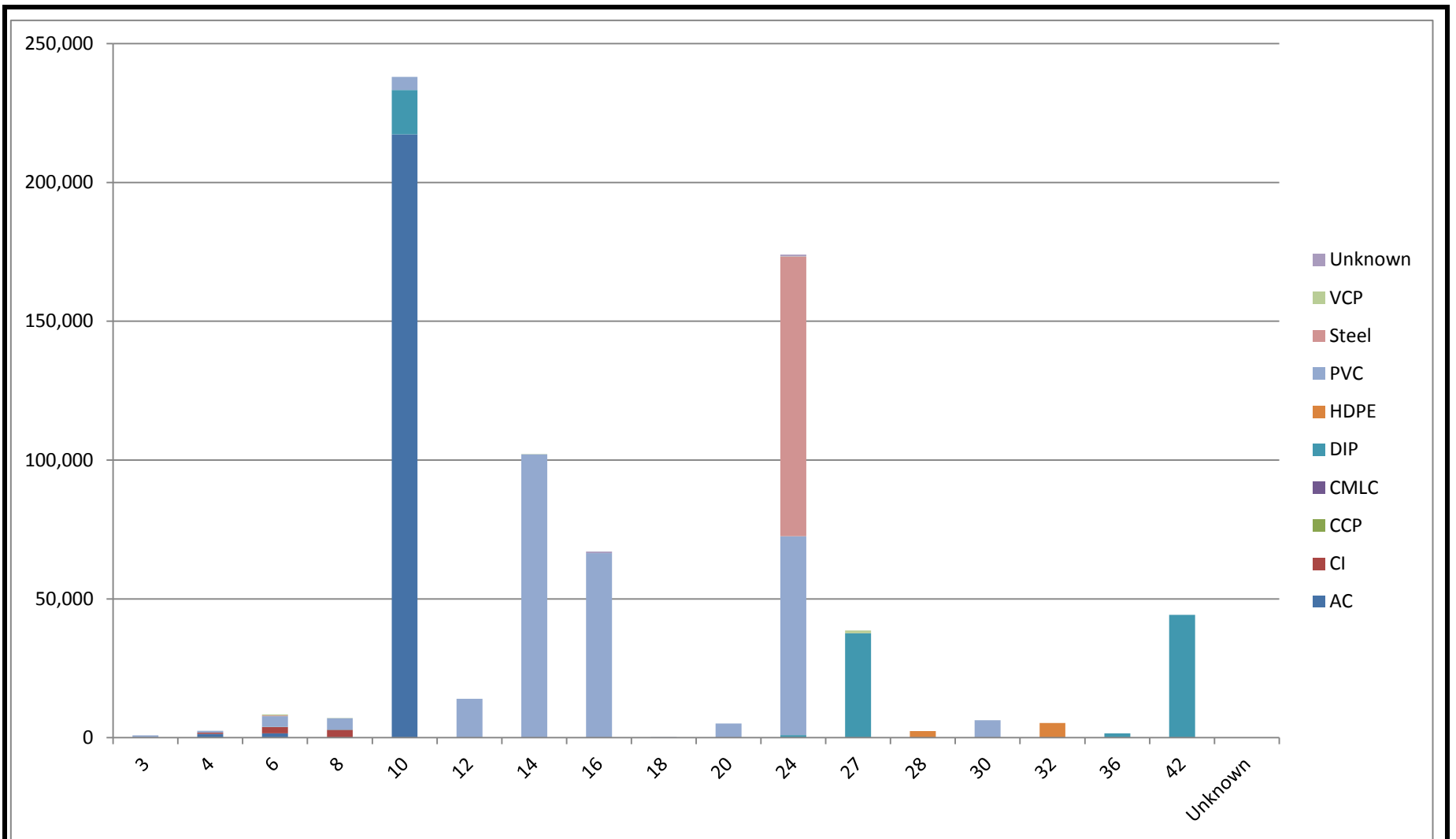
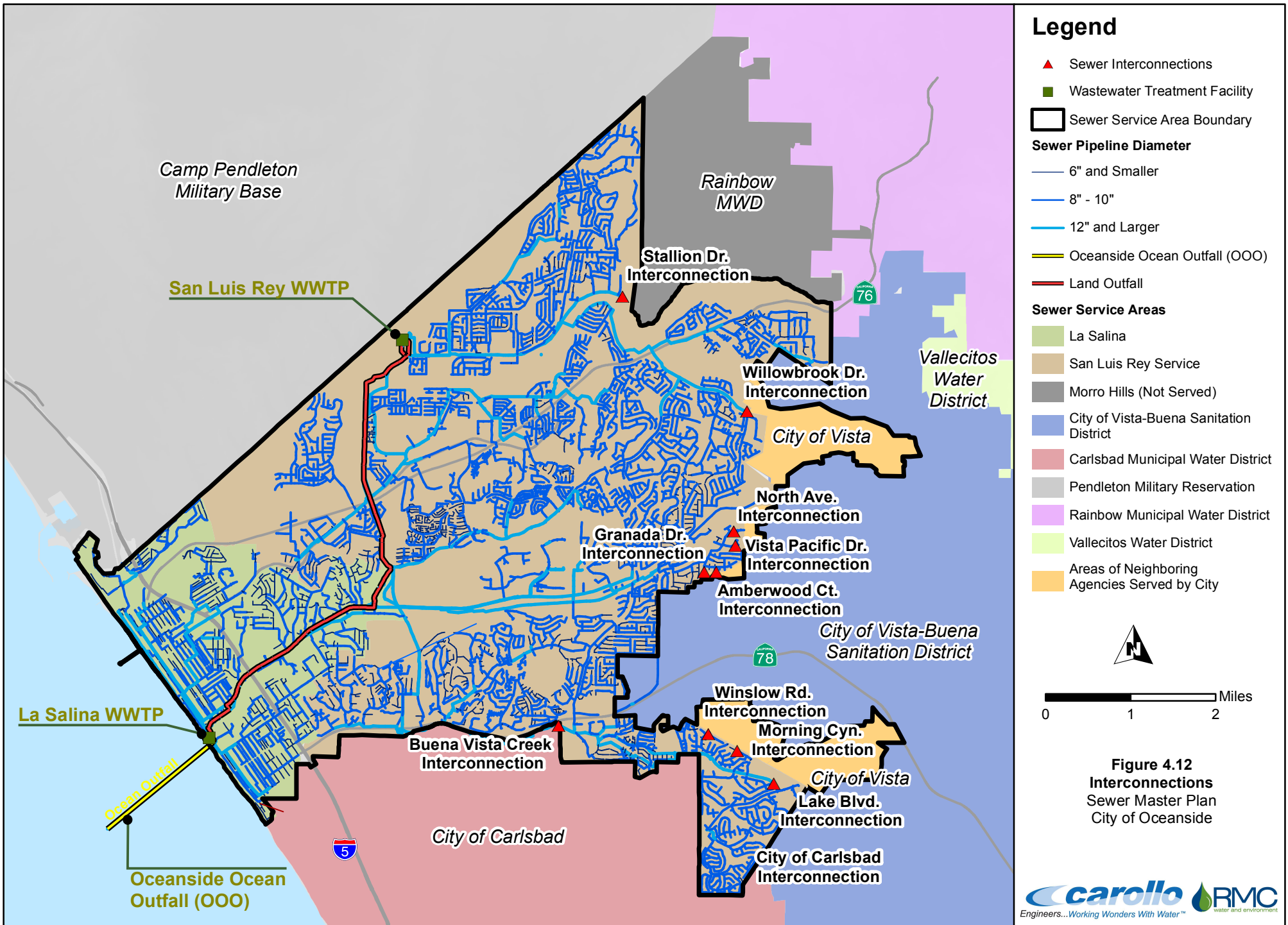


Figure 4.11
Force Main Installation Diameter Distribution
 Sewer Master Plan
 City of Oceanside



Legend

- ▲ Sewer Interconnections
- Wastewater Treatment Facility
- Sewer Service Area Boundary
- Sewer Pipeline Diameter**
- 6" and Smaller
- 8" - 10"
- 12" and Larger
- Oceanside Ocean Outfall (OOO)
- Land Outfall
- Sewer Service Areas**
- La Salina
- San Luis Rey Service
- Morro Hills (Not Served)
- City of Vista-Buena Sanitation District
- Carlsbad Municipal Water District
- Pendleton Military Reservation
- Rainbow Municipal Water District
- Vallecitos Water District
- Areas of Neighboring Agencies Served by City

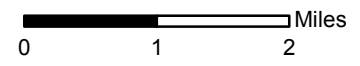


Figure 4.12
Interconnections
 Sewer Master Plan
 City of Oceanside



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4.5 OUTFALLS

The La Salina WWTP Land Outfall connects the La Salina WWTP to the OOO. Treated wastewater is discharged through the OOO at the La Salina WWTP into the Pacific Ocean. The San Luis Rey WWTP Land Outfall connects the San Luis Rey WWTP to the OOO at a connection at the La Salina WWTP. The La Salina WWTP Land Outfall conveys connect the La Salina WWTP to the OOO. Figure 4.13 shows the locations of the two land outfalls and one ocean outfall.

4.5.1 Oceanside Ocean Outfall

The OOO is a 36-inch nominal-diameter steel pipe that extends 8,850 feet into the Pacific Ocean. The pipe is lined with 1-inch of mortar and coated with 2-3/4 inches of mortar. The actual internal diameter is 35 3/4- inches. The entire pipe is mastic coated and protected by an impressed current cathodic-protection system. Effluent is discharged through 24 diffuser ports located along the last 230 feet of the outfall. The end of the outfall is approximately 100 feet below Mean Sea Level (msl).

The Ocean Outfall Capacity Evaluation Report (Carollo, 2010) concluded that the peak hydraulic capacity of the Ocean Outfall is 22.6 mgd. This limitation was arrived at by an analysis of the Ocean Outfall roughness coefficient and its effect on the San Luis Rey WWTP Effluent Pump Station Pumps and the pressure rating of the Land Outfall. The analysis included the effects of the debris accumulation along the pipe walls and at the diffuser section. Further, the report estimated that the Ocean Outfall capacity could be met as soon as 2016 assuming estimated flow projections are realized. Cleaning of the Outfall can increase capacity to 23.5 mgd, meeting estimated flow projections through the year 2025. Replacement of the restrictive meter section piping at the La Salina WWTP provides additional capacity to year 2030.

The California Regional Water Quality Control Board, San Diego Region (RWQCB) regulates the discharge through issuance of a federal National Pollution Discharge Elimination System (NPDES) permit. RWQCB Tentative Order No. R9-2014-0108 (NPDES CA0107433). This permit limits the Ocean Outfall average monthly flow to 22.6 mgd. A copy of the permit is included in Appendix B for reference.

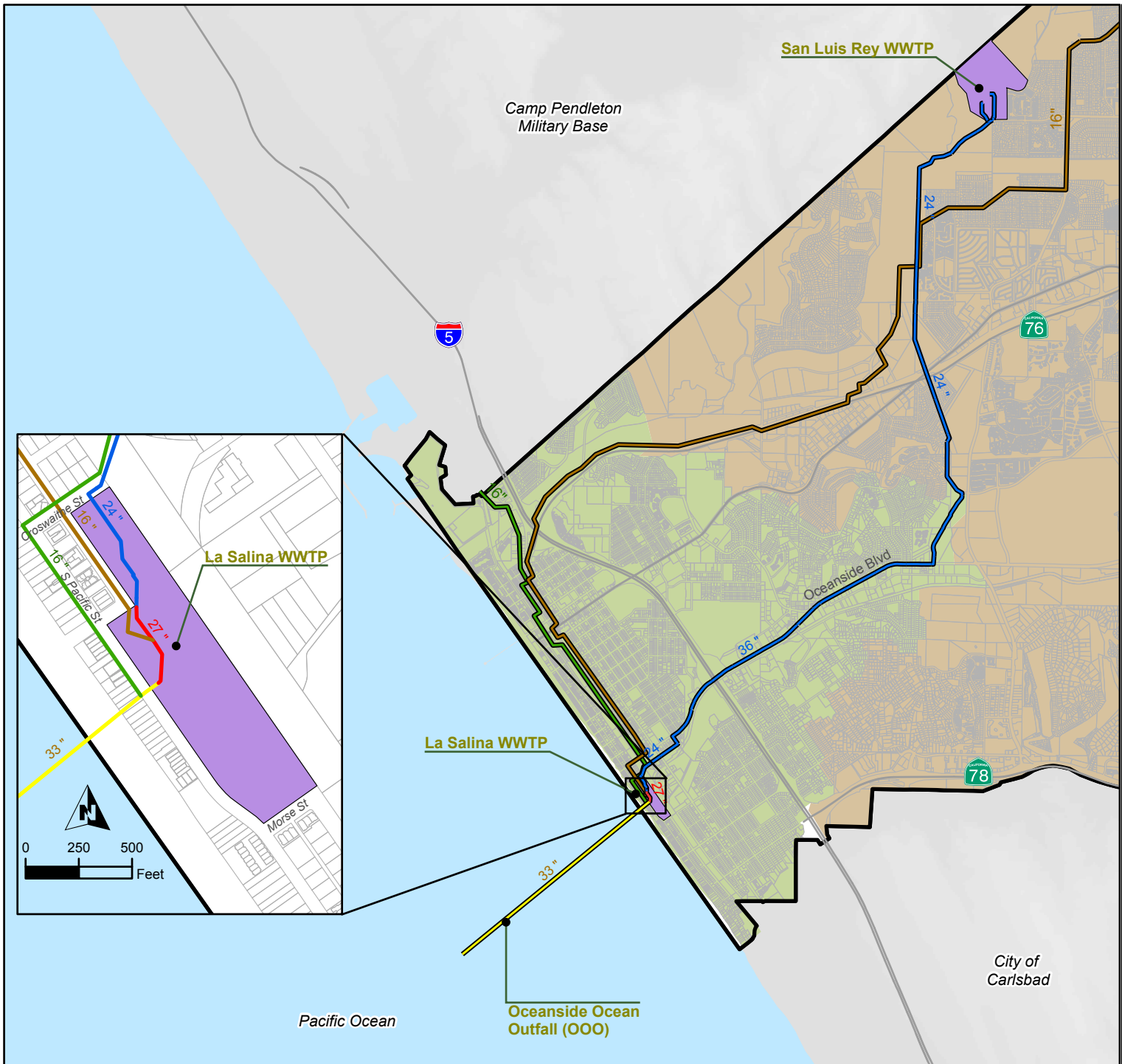
Two other agencies, the Fallbrook PUD and Camp Pendleton, also discharge to the Ocean Outfall through contracts with the City. Additionally, there is a brine line connected to the Ocean Outfall. It carries brine discharge from the Mission Basin Groundwater Purification Facility and from Genentech, an industrial discharger.

4.5.2 San Luis Rey Land Outfall System

The Land Outfall connects the San Luis Rey WWTP to the OOO. The existing Land Outfall is a 24-inch diameter ductile iron pipe that was constructed in 1972. The alignment of the outfall is shown on Figure 4.13. It originally started at the effluent pump station located at the end of San Luis Rey WWTP Plant 1's secondary clarifiers. It runs south crossing the San Luis Rey River. The alignment then follows a San Diego Gas and Electric Company transmission right of way south across the river valley. The outfall then enters a tunnel and continues south to Oceanside Boulevard. It then follows Oceanside Boulevard to the La Salina WWTP. The capacity of the outfall is 13.5 mgd.

4.5.3 La Salina Land Outfall System

The La Salina Land Outfall System consists of a 400-foot reach of 27-inch diameter pipe connecting the La Salina WWTP to the OOO. The existing La Salina WWTP effluent pump station cannot pump peak storm water events into OOO in unison with the San Luis Rey WWTP Land Outfall flowing at peak flows. During the wet weather periods, flows from the San Luis Rey WWTP are stored at the San Luis Rey WWTP and Camp Pendleton to allow the La Salina WWTP flows to be pumped into the OOO.



Legend

Outfall Type

- Oceanside Ocean Outfall (OOO)
- SLRWRF Land Outfall
- LSWWTP Land Outfall
- Fallbrook Outfall
- Camp Pendleton Outfall

Wastewater Treatment Facility


- Wastewater Treatment Facility

City of Oceanside

- City of Oceanside

Sewer Service Areas



- La Salina Service Area
- San Luis Rey Service Area



Miles

0 0.5 1

Figure 4.13
Outfalls
 Sewer Master Plan
 City of Oceanside

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HYDRAULIC MODEL DEVELOPMENT

This chapter documents the procedures used to build and calibrate the InfoSWMM[®] hydraulic model used for the SMP. The objective of this documentation is to provide an overview of the model development process, including steps taken to calibrate the model to dry and wet weather conditions.

The City, in conjunction with RMC and Carollo, selected InfoSWMM[®] (Innovyze, Inc.) to be used for the hydraulic capacity analysis of the City's sewer collection system. InfoSWMM[®] uses the EPA's SWMM hydraulic engine, which provides a fully-dynamic solution for modeling sanitary sewer systems. The program has an ArcGIS-based model interface.

5.1 DATA SOURCES

A description of data sources used in the model building and model calibration process is provided below:

- **2005 H₂OMAP Sewer Models.** Two sewer models, one for the La Salina Wastewater Treatment Plant (WWTP) wastewater service area and one for the San Luis Rey WWTP, were constructed in 2005 for the previous City SMP. These models were consolidated, updated, and upgraded to InfoSWMM[®] software to improve model accuracy and ease of use.
- **City As-Built Drawings.** RMC performed as-built drawing research to fill in data gaps found in the geographic information system (GIS) layers and the existing H₂OMAP Sewer models.
- **Sewer GIS Layers.** GIS layers of sewer manholes and sewer mains were provided by the City. The layers provide the location, unique ID, pipe length, and pipe diameter for all sewer structures within the City's jurisdiction.
- **Water Consumption Data.** Water billing records, measured during a 2-month period in the winter of 2012-2013, were the primary source of sanitary flow data for the model.
- **San Diego County Parcels and Land Use Codes.** Parcels were used to refine sub-service area boundaries and link water consumption data to a land use type. San Diego County's parcel database was in a spatial format that was easier to process than the City's zoning maps.
- **Sewer Flow Monitoring Data.** Temporary flow monitoring data obtained during the early months of 2013 were used to establish water-to-sewer return rates and wet weather response parameters, and to calibrate the InfoSWMM[®] hydraulic model. Data from a 2009 flow monitoring study was also used for the downtown area.

5.2 MODEL NETWORK UPDATES

Before the model calibration could begin, a number of model updates were required to confirm that the modeled network was accurately representing the sewer system. First and foremost, the City's model software was upgraded from H₂OMAP Sewer to InfoSWMM[®]. Although both programs are supported by Innovyze, Inc., H₂OMAP Sewer is not a fully dynamic model and is therefore subject to limitations such as the inability to model flow backup and surcharging from capacity bottlenecks. InfoSWMM[®], on the other hand, offers a fully dynamic solution that more accurately represents flow conditions in a sewer system. Automated tools within InfoSWMM[®], which perform functions such as calculating manhole invert elevations and pipe offsets from pipe invert elevations, were used to aid in the conversion process.

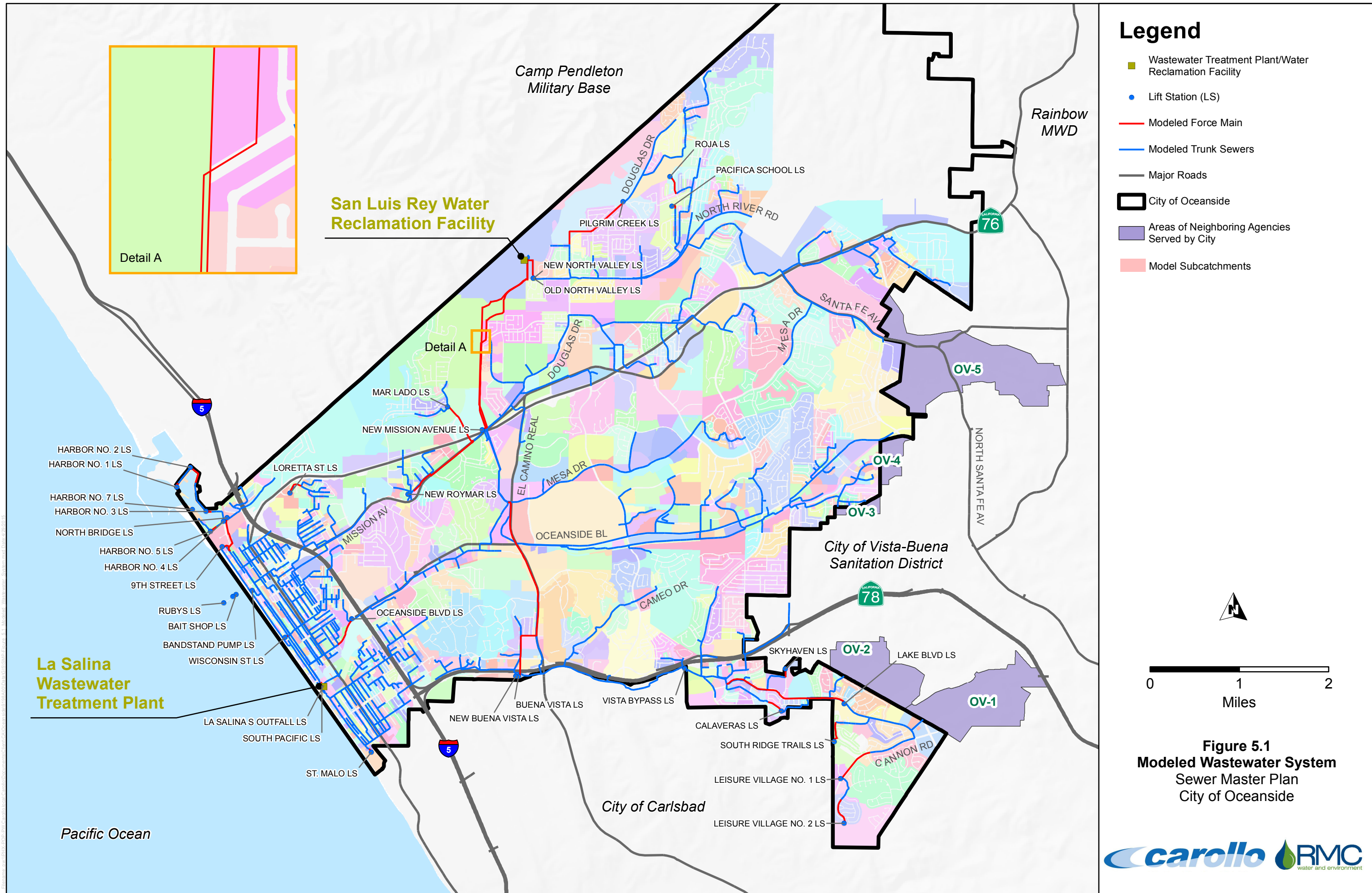
In 2005, the City's sewer system was divided into two separate models, one for the La Salina WWTP service area and one for the San Luis Rey WWTP wastewater service area. For this project, the models were consolidated into one model to streamline the calibration process. The consolidated model is well within the 4,000-node limitation of the model software program to be purchased by the City.

In the San Luis Rey wastewater service area, the previous model network had been simplified to include only one out of every two or three manholes, and the manholes were given randomly generated manhole IDs. The model was updated to include every manhole and pipe within the model extents based on the City's GIS layer. Manhole IDs were changed to match the actual manhole IDs given in the City's GIS.

The model network was extended to include all 10-inch-diameter sewers in the City for the San Luis Rey wastewater service area. In addition, some 8-inch-diameter sewers were included in the model where redevelopment was likely to occur. Digitizing sewer pipelines within these areas increases the ability to evaluate capacity impacts when requested by developers. Manhole and pipe attributes were populated in the model using as-built drawings provided by the City. In cases where as-built drawings were unavailable, invert elevation data was inferred using slope information from neighboring manholes and pipes. Diameters were assumed to be 8 inches, and the depth from ground to pipe inverts was assumed to be 9.99 feet. Manholes and pipes for which data were inferred are flagged as such in the model's asset information field.

In the La Salina wastewater service area, City staff had previously added every manhole and pipe to the model using as-built drawings. All of these assets were included in the consolidated model.

The total modeled network includes 140 miles (approximately 30 percent) of the City's sewer system. It has two land outfalls representing the La Salina and San Luis Rey WWTPs. The modeled network is shown on Figure 5.1.



In general, the network connectivity, diameters, invert elevations, and ground elevation data appeared to be accurate based on the as-built drawings that were reviewed. This was particularly true in the La Salina wastewater service area, where extensive as-built drawing research and model updates had been conducted by City staff over recent years.

For the purpose of estimating and loading flows to the model network, the City's total area was divided into 1,540 sub-service areas with an average of 13 acres. Many of these areas had to be very small in order to model every manhole and pipe in the La Salina wastewater service area. Wastewater service areas for the agency interconnections from Rainbow MWD and the City of Vista were also included.

5.3 FLOW MONITORING DATA

The main objective of flow monitoring is to characterize dry weather flow and wet weather flow response to rainfall in different parts of the sewer system. As part of the model calibration process, various model parameters were compared to observed (monitored) flows and adjusted until the model was determined to be simulating flows in the sewer system with reasonable accuracy.

The following sets of flow monitoring data were evaluated for the dry and wet weather calibration:

- **Flow Monitoring Set 1:** Thirty (30) meters and five (5) rain gauges installed for the City as part of this study by V&A Consulting Engineers, Inc. (V&A), February 14 to March 21, 2013.
- **Flow Monitoring Set 2:** Two (2) meters installed by Infrastructure Engineering Corporation (IEC) as part of a temporary dry weather monitoring study, August 5 to August 12, 2009.
- **Flow Monitoring Set 3:** One (1) meter on Stallion Drive maintained by City of Oceanside to measure influent sewer flows from Rainbow MWD.

33 meters (sets one, two, and three) were considered for the dry weather calibration and 31 meters (sets one and three only) were used for the wet weather calibration. The two meters from set 2 were not used for the wet weather calibration due to the time of monitoring in summer. The locations of flowmeters used in the calibration, along with their associated basin areas, are shown on Figure 5.2 (basin areas shown are incremental areas for meters that have upstream meters). A flowmeter schematic illustrating how flowmeters are located relative to each other is shown on Figure 5.3.

Detailed site reports and maps for each meter that was installed as part of this study are included in V&A's *Sanitary Sewer Flow Monitoring Study* (December 2013) which is included in Appendix C.

5.4 DRY WEATHER FLOW CALIBRATION

In domestic wastewater systems, dry weather flow varies throughout the day, peaking early in the morning in upstream sewers, and later and less sharply in larger downstream sewers due to flow travel time and attenuation. Dry weather flow patterns in commercial and industrial areas depend on specific land use types but are typically characterized by a more uniform flow that lasts throughout working hours. For both residential and non-residential areas, there are also differences between weekday and weekend diurnal flow patterns.

When a dynamic analysis of the sewer system is conducted, the peak flows are determined by routing the individual diurnal dry weather flow hydrographs for all of the sub-service areas through the sewer system using the hydraulic model. The model attenuates flow based on hydraulic storage and routing computations, which results in lower peaking factors as flow proceeds downstream.

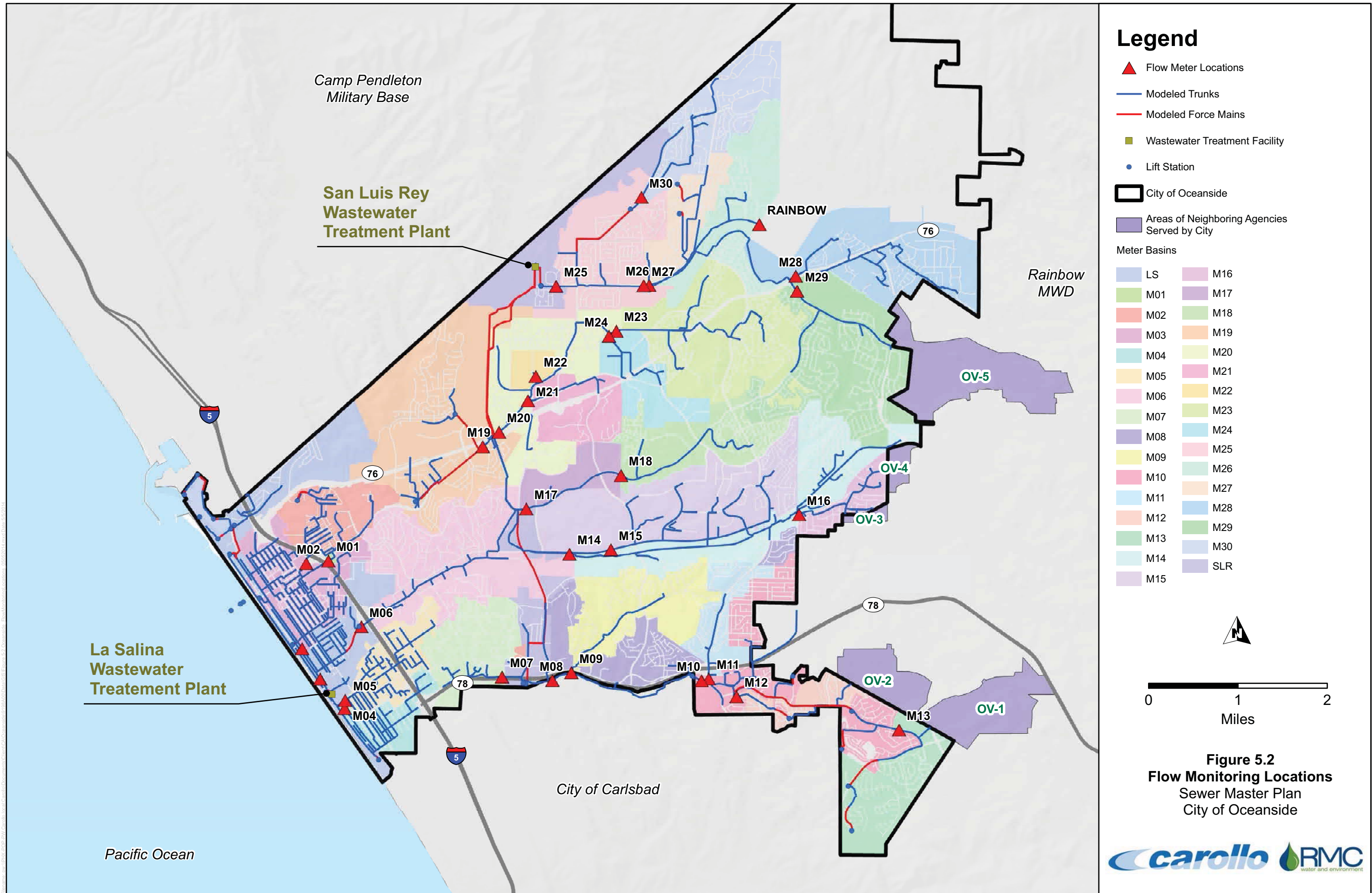
The 7-day dry period from February 23 to March 2, 2013 was used as the dry weather calibration period for comparing flow data to the model results. This period consisted of a Saturday, Sunday, and five weekdays during which all the meters showed consistent readings.

5.4.1 Average Dry Weather Flow

As described in Chapter 3, existing residential and non-residential wastewater flow was estimated based on water consumption data from non-irrigation rate types provided by the City. The amount of water usage returning to the sewer system, or the water-to-sewer return rate, was determined for each land use type through model iterations that compared the total water consumption upstream of a temporary flowmeter to the observed sewer flows at the meter site. Although it was not possible to isolate land use types entirely with the flowmeters due to the highly mixed nature of land use within the City, there was enough data from the 30 meters located throughout the City to support the finding that non-residential properties were returning nearly all of their flow to the sewer, while residential properties returned between 70 percent and 100 percent of their flows to the sewer. As expected, there was some variability in the residential return rate from one meter basin to another, even for the same specific land use type (e.g., low-density residential). On average, the return rate from residential properties was 83 percent. The return rates for each land use type are presented in Table 5.1.

| Land Use Type | Return Rate (%) |
|--|------------------------|
| Residential | 83% |
| Commercial (includes institutional facilities) | 90% |
| Industrial | 100% |

Notes:
(1) Residential return rate is an average value.
(2) Exception: Industrial sewer flows from Arctic Glacier USA assumed to be 10% of total water usage.



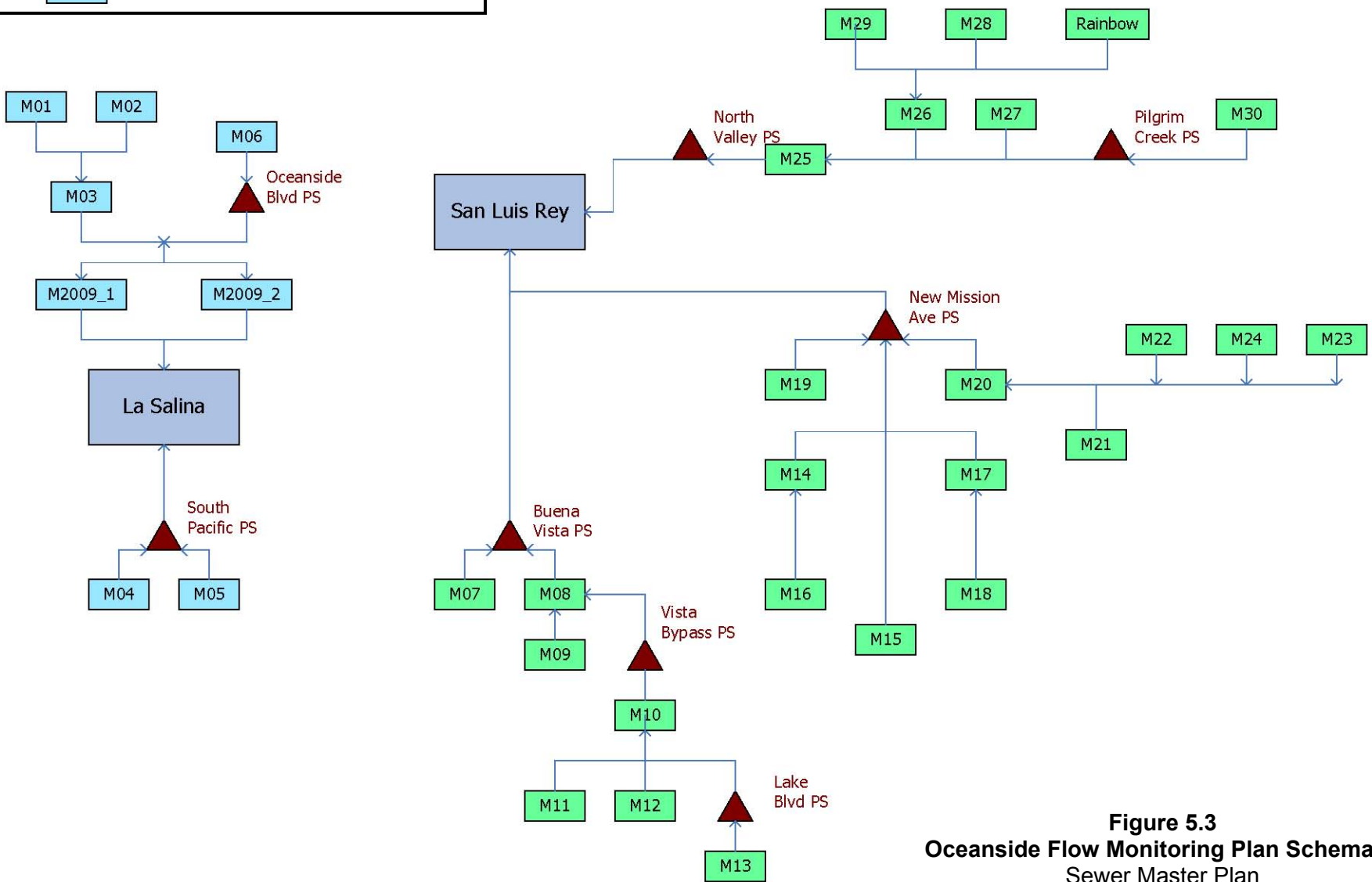
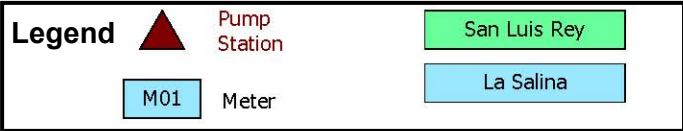


Figure 5.3
Oceanside Flow Monitoring Plan Schematic
 Sewer Master Plan
 City of Oceanside

5.4.2 Diurnal Variations in Dry Weather Flow

Hourly diurnal patterns corresponding to major land use categories were developed using data from V&A meters that isolated specific land use types. Figure 5.4, Figure 5.5, and Figure 5.6 illustrate the complete set of diurnal profiles that were used for modeling existing flows.

The residential profile indicates that a typical morning peak occurs at 7:00 am followed by a slightly lower evening peak at 8:00 pm. On the weekends, the morning peak occurs later at 10:00 am. Commercial areas had a typically flat curve lasting from 9:00 am to 4:00 pm. Schools and other institutional facilities were assumed to have diurnal profiles similar to the commercial profile.

As shown on Figure 5.5, industrial flow from smaller users was generally assumed to be generated at a constant rate, 24 hours per day (see green line on Figure 5.5). For the larger users, namely Genentech and Hydranautics, a more unique profile was used. Inspection of flow data from Meters M15 and M19, which are downstream of these users, showed daily spikes occurring at irregular intervals throughout the day. These spikes are assumed to coincide with batch dumps from manufacturing processes, and are important to capture because they can have a significant impact on sewer capacity. For these users (such as Genentech and Hydranautics), a special batch dump profile was used for large users to match peak flows at Meters M15 and M19 (see purple line on Figure 5.5).

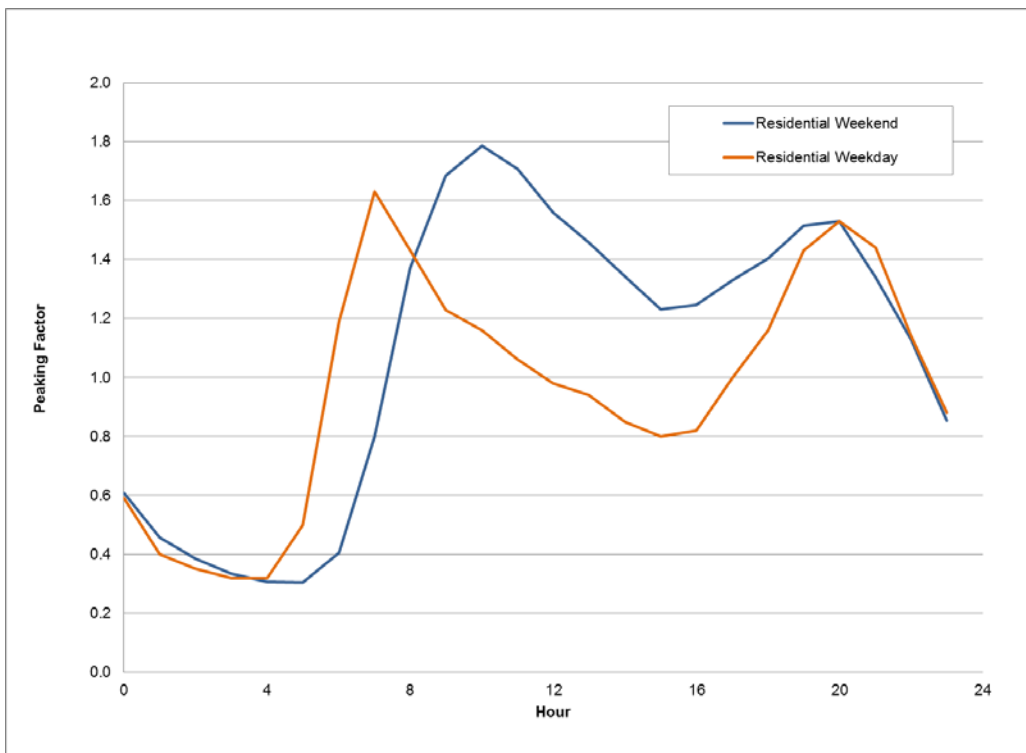


Figure 5.4 Diurnal Profiles for Residential Land Use

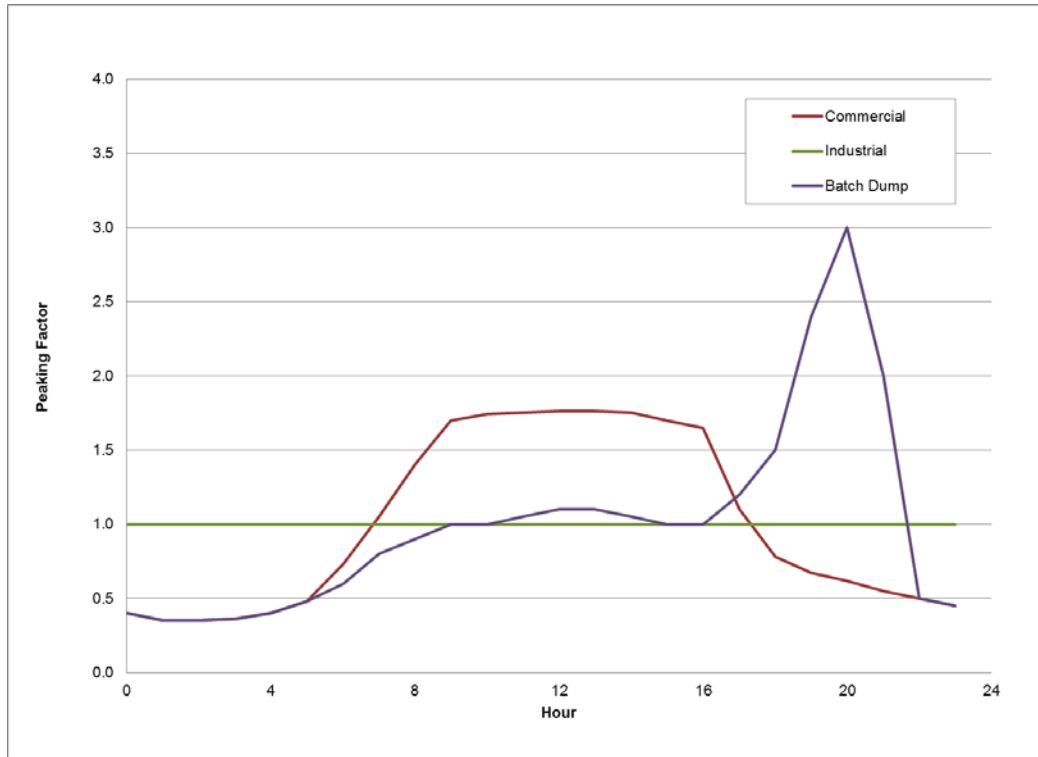


Figure 5.5 Diurnal Profiles for Non-Residential Land Use

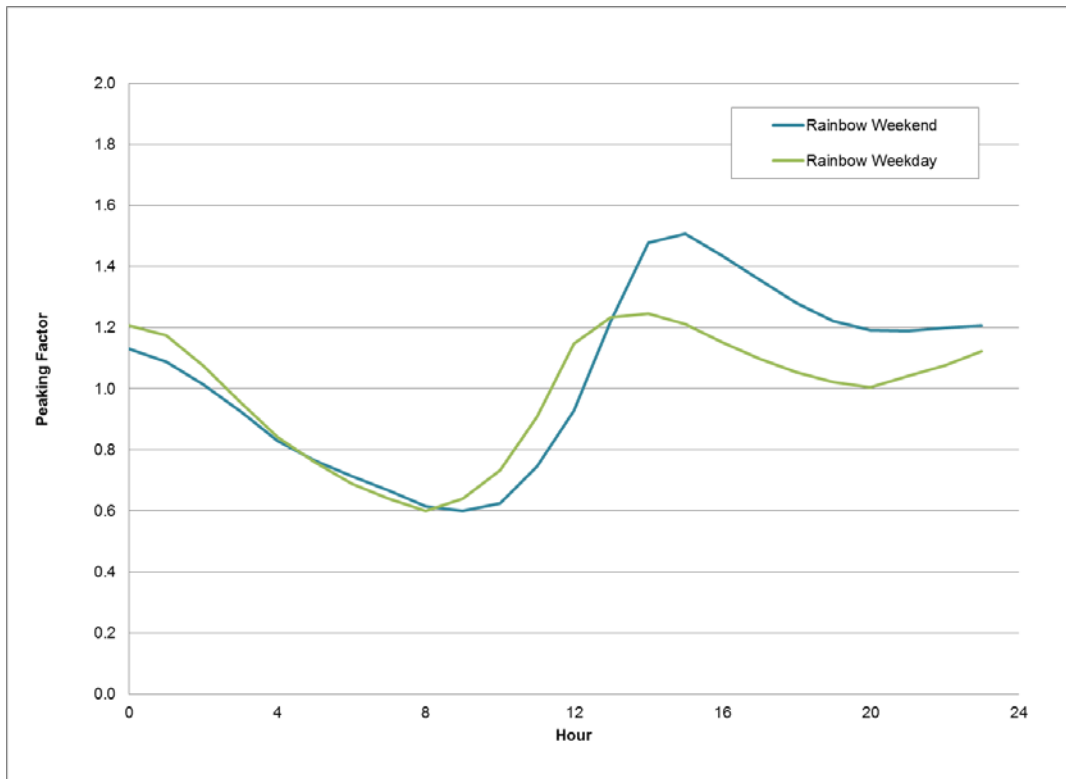


Figure 5.6 Diurnal Profiles for Rainbow Municipal Water District

Weekday and weekend diurnal profiles were developed for flows coming from Rainbow MWD using the wastewater billing meter located on Stallion Drive. It is interesting to note that, because of the long travel time of this flow to its connection point in the City's system, the peak flow does not reach the City until approximately 2:00 pm and is heavily attenuated with a peaking factor of only 1.25 during the week and 1.5 during the weekend.

5.4.3 Groundwater Infiltration

Groundwater infiltration (GWI) is flow that enters the sewers through defects in pipes and manholes in periods not associated with a rainfall event. GWI is typically seasonal in nature and remains relatively constant throughout the day. The amount of GWI in the City's wastewater service area was determined during the model calibration by comparing the DWF estimated from water consumption to actual flow observed at flowmeters during a period in the winter season when there was no rain. If the observed (metered) dry weather hydrographs were greater than the model-simulated hydrographs by a relatively constant value throughout the day, GWI was added to the meter basin on an area-weighted basis. Table 5.2 lists the GWI that was identified in five of the meter basins with rates ranging from about 50 to 280 gallons per day per acre (gpd/ac). Refer to Figure 5.2 for the locations of these meter basins. GWI was not added to the remaining 27 meter basins.

| Table 5.2 Modeled GWI Sewer Master Plan City of Oceanside | | |
|--|------------------|-----------------------|
| Meter Basin | GWI (mgd) | GWI (gpd/acre) |
| M06 | 0.10 | 90 |
| M14 | 0.03 | 100 |
| M15 | 0.25 | 200 |
| M18 | 0.16 | 280 |
| M28 | 0.05 | 50 |
| Total GWI | 0.59 | - |

5.4.4 Dry Weather Flow Calibration Results

The model calibration resulted in an excellent match between modeled and metered average flow. On average measured and modeled flows were within 11 percent for 30 of the 32 meters. A comparable match for peak dry weather flow was also achieved, within 20 percent for 27 of the meters. From a system-wide perspective, the total modeled flow to the La Salina and San Luis Rey WWTPs was within 2 percent of the total combined influent flow calculated using the plants' effluent flows and an assumed water loss rate of 10 percent.

Table 5.3 provides a comparison of the model flows, V&A metered flows, and the City's estimated plant influent flows. As shown in Table 5.3, on a citywide basis, there was a

1.6 percent difference between the modeled dry weather flow and the plant measured dry weather flow, and an 0.8 percent difference between the metered (V&A) dry weather flow and the modeled dry weather flow. Table 5.4 compares model flows to meter flows at V&A's flow monitoring locations. Meters that were found to be outside expected accuracy for either average or peak flow, respectively, are explained as follows:

- M01 (peak flows): There was an atypical spike in the flow data on February 25.
- M12 (average/peak flows): Water usage was less than observed sewer flow at this location. Sewer meter accuracy is likely the issue.
- M22 (peak flows): This meter measured flow from a much smaller area than expected, only a handful of trailer homes. The diurnal profile defined for the model was not designed to match peak flows from very small areas that have relatively dramatic flow peaks.
- M26 (average/peak flows): There is a sewer meter balance issue at this location. The sum of the upstream meters (M28, M29, and the Rainbow connection) is greater than the flow at this meter.
- M2009_1 (peak flows): There is a diversion upstream of meters M2009_1 and M2009_2 that is not accurately represented in the model. However, the network configuration in this area is currently being modified as part of the Meyers-Tate capital improvement project. The new network configuration was added to the model based on the design drawings for this project, and the new configuration was simulated in all future system model scenarios.

Appendix D includes plots of modeled versus metered dry weather flow for all of the meters during the 1-week calibration period.

| Table 5.3 Modeled Versus Metered Dry Weather Flows at City WWTPs Sewer Master Plan City of Oceanside | | | | | |
|---|------------------------------|---------------------------------|------------------------|-----------------------|----------------|
| WWTP | Plant Meter (mgd) | V&A Meters (mgd) | Model (mgd) | Difference (%) | |
| | | | | Plant | V&A |
| San Luis Rey WWTP | 9.8 | 10.1 | 10.1 | 3.0% | 0% |
| La Salina WWTP | 2.9 | 2.9 | 2.8 | -3.6% | -3.6% |
| Total Dry Weather Flow | 12.7 | 13.0 | 12.9 | 1.6% | -0.8% |
| Notes: | | | | | |
| (1) Total flow at plants includes groundwater infiltration. | | | | | |
| (2) Metered Flow at SLR WWTP = M07 + M08 + M14 + M15 + M17 + M19 + M20 + M25 | | | | | |
| (3) Metered Flow at La Salina WWTP = M2009_1 + M2009_2 + M04 + M05 | | | | | |

| Table 5.4 Dry Weather Meter vs. Modeled Flows Sewer Master Plan City of Oceanside | | | | | | |
|--|-----------------------------------|-----------------------------------|-----------------------|--------------------------------|--------------------------------|-----------------------|
| Meter | Average Metered Flow (mgd) | Average Modeled Flow (mgd) | Difference (%) | Peak Metered Flow (mgd) | Peak Modeled Flow (mgd) | Difference (%) |
| M01 | 0.016 | 0.016 | 0% | 0.036 | 0.028 | -21% |
| M02 | 0.371 | 0.364 | -2% | 0.578 | 0.646 | 12% |
| M03 | 1.078 | 1.198 | 11% | 1.703 | 1.952 | 15% |
| M04 | 0.152 | 0.146 | -4% | 0.255 | 0.259 | 2% |
| M05 | 0.200 | 0.223 | 11% | 0.383 | 0.397 | 4% |
| M06 | 0.745 | 0.710 | -5% | 1.141 | 1.127 | -1% |
| M07 | 0.174 | 0.180 | 3% | 0.295 | 0.320 | 8% |
| M08 | 2.055 | 2.108 | 3% | 3.638 | 3.693 | 2% |
| M09 | 0.211 | 0.226 | 7% | 0.460 | 0.404 | -12% |
| M10 | 1.742 | 1.612 | -7% | 3.139 | 2.843 | -9% |
| M11 | 0.412 | 0.408 | -1% | 0.628 | 0.658 | 5% |
| M12 | 0.249 | 0.207 | -17% | 0.521 | 0.369 | -29% |
| M13 | 0.342 | 0.324 | -5% | 0.654 | 0.582 | -11% |
| M14 | 0.526 | 0.487 | -7% | 0.841 | 0.789 | -6% |
| M15 | 0.759 | 0.743 | -2% | 1.095 | 1.118 | 2% |
| M16 | 0.136 | 0.147 | 8% | 0.212 | 0.216 | 2% |
| M17 | 0.678 | 0.664 | -2% | 1.258 | 1.054 | -16% |
| M18 | 0.529 | 0.492 | -7% | 0.735 | 0.752 | 2% |
| M19 | 0.721 | 0.679 | -6% | 1.348 | 1.324 | -2% |
| M20 | 1.941 | 1.732 | -11% | 2.873 | 3.039 | 6% |
| M21 | 0.224 | 0.224 | 0% | 0.381 | 0.398 | 5% |
| M22 | 0.015 | 0.015 | 0% | 0.046 | 0.027 | -42% |
| M23 | 0.766 | 0.780 | 2% | 1.315 | 1.386 | 5% |
| M24 | 0.202 | 0.219 | 8% | 0.381 | 0.390 | 2% |
| M25 | 3.205 | 3.238 | 1% | 4.347 | 4.960 | 14% |
| M26 | 1.721 | 2.175 | 26% | 2.630 | 3.247 | 23% |
| M27 | 0.310 | 0.277 | -11% | 0.531 | 0.492 | -7% |
| M28 | 0.421 | 0.394 | -6% | 0.669 | 0.661 | -1% |
| M29 | 0.838 | 0.838 | 0% | 1.579 | 1.495 | -5% |
| M30 | 0.254 | 0.280 | 10% | 0.455 | 0.500 | 10% |
| M2009_1 | 1.464 | 1.369 | -6% | 2.404 | 1.701 | -29% |
| M2009_2 | 1.084 | 1.037 | -4% | 1.857 | 2.171 | 17% |

5.5 WET WEATHER FLOW CALIBRATION

During wet weather calibration, model parameters are adjusted to accurately simulate the volume and timing of rainfall dependent infiltration and inflow (RDI/I) for an observed storm.

5.5.1 Rainfall Event on March 8, 2013

The series of storm events from March 7-10, 2013 were the most significant storms that occurred during the flow monitoring period. During the peak hours of the storm, lasting from approximately midnight on March 7 to 9:00 am on March 8, approximately 1.5 inches of rainfall fell on the City with a peak rainfall rate of 0.5 inch/hour. The high intensity storm had broad coverage over the City's entire service area. It was a relatively isolated event following 2 months of record low rainfall for the region.

Due to the City's very large service area and the high variability in rainfall patterns observed from V&A's five rain gages (installed concurrently with the flow monitoring study), it was decided to purchase radar rainfall data for analyzing the March storm events. Radar rainfall data is advantageous because it accounts for spatial variation throughout the coverage area in 1-kilometer square pixels, which is much better than analyzing the storm using the five rain gages alone. Figure 5.7 illustrates how total rainfall varied between radar rainfall pixels throughout the service area. As shown on Figure 5.7, there was significant variability in the amount of rainfall that fell between March 5 and March 11, 2013 throughout the service area, ranging from less than 1.2 inches to over 1.8 inches of rainfall.

5.5.2 Model Procedures and Assumptions

The City's hydraulic modeling software, InfoSWMM[®], simulates RDI/I as a fraction of rainfall and distributes it over time using three triangular synthetic unit hydrographs, which is commonly referred to as the "RTK" method. The RTK method is one of the most commonly used methods for simulating RDI/I in wastewater collection systems. Each of the triangular unit hydrographs has its own characteristic parameters, namely time to peak (T), recession constant (K), and fraction of an effective rainfall volume allocated to the triangle (R). Each of the three hydrographs represents different components of RDI/I. The first triangle represents rapidly responding (short-term or "fast") components, such as direct inflow or rapid infiltration into shallow pipes such as service laterals. The third triangle represents long-term or "slow" runoff components, which can take up to a day to enter the sewer system. The second triangle represents infiltration with an intermediate or "medium" time response. The total unit hydrograph is the aggregation of the three triangular hydrographs. The technique is illustrated on Figure 5.8.

The unit hydrograph parameters were independently calibrated for each of the City meters used in the wet weather calibration. Due to the predominance of dry weather flows over the wet weather response and the timing of the event, which occurred at night, it was difficult to visualize the RDI/I hydrograph using total sewer flow during the event. Therefore, dry weather flows were subtracted from the wet weather flow to isolate the RDI/I hydrograph

shown above. The calibration was then conducted by matching the isolated metered and modeled hydrographs.

Wet weather parameters were applied to only the contributing acreage of each sub-service area, which was calculated as the areal sum of those parcels, which are sewered. Areas associated with streets and open space were excluded from the contributing area.

For areas of the City that drained directly to the WWTPs, the parameters were derived from those of neighboring meter basins. Wet weather parameters for Rainbow MWD were determined using the billing meter located on Stallion Drive.

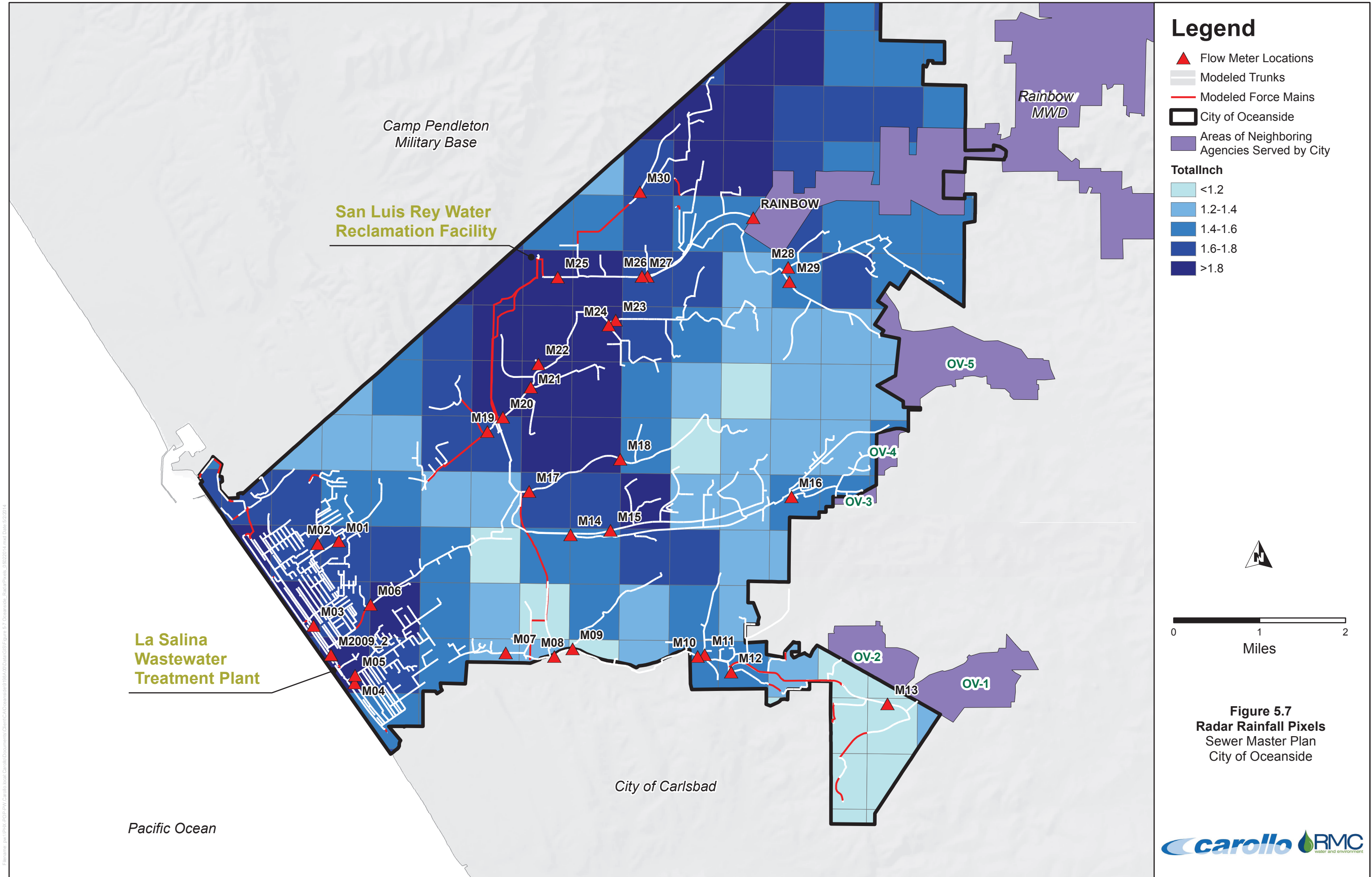
5.5.3 Wet Weather Model Calibration Results

The calibrated parameters for each meter basin are listed in Table 5.5. The results show that Meter M01 has the highest R-value but only captures a very small commercial area near Mission Avenue and Interstate 5.

Other meters with higher R-values included M02, M04, M06, M14, M19, and M24. Most of the RDI/I observed was fast-responding, with peaks occurring within 15 to 30 minutes of the rainfall. A high “fast” component indicates that there may be sources of direct inflow in the City (although sources other than direct inflow can also account for “fast” RDI/I).

The calibrated R-values are low relative to other California agencies of similar age and size. However, the reason that this is the case may be related to the relatively dry soil conditions at the time of the March storms, which may have prevented more RDI/I from entering the system. During a wetter season when soils are saturated and groundwater is elevated, the same storm event may result in higher medium and slow-responding RDI/I that could significantly increase the R-values.

Appendix E shows plots of model versus metered flow for the calibration storm. Table 5.6 compares the model vs. metered wet weather flow at each of the meter locations. The model calibration resulted in an excellent match between modeled and metered peak flow. On average, measured and modeled flows were within 15 percent for 28 of the 30 meters. Meters which were found to be outside the expected accuracy of 15 percent (M12 and M15) appears to be associated with unexpected flow peaks that do not appear to be associated with RDI/I. For this reason, the model calibration for these meters was considered acceptable even though the percent error exceeded 15 percent.



Legend

- ▲ Flow Meter Locations
- Modeled Trunks
- Modeled Force Mains
- City of Oceanside
- Areas of Neighboring Agencies Served by City

Totallnch

- <1.2
- 1.2-1.4
- 1.4-1.6
- 1.6-1.8
- >1.8

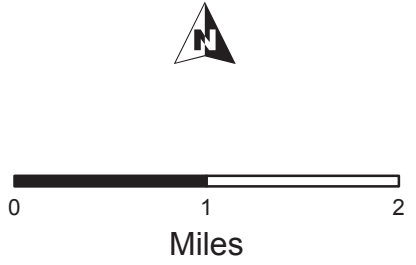


Figure 5.7
 Radar Rainfall Pixels
 Sewer Master Plan
 City of Oceanside

File name: p:\PHK_PDP-PW_Carollo\carollo\Documents\Oceanside\GIS\Force 5.7_Oceanside_Border\Phk_09022014.mxd Date: 02/20/14

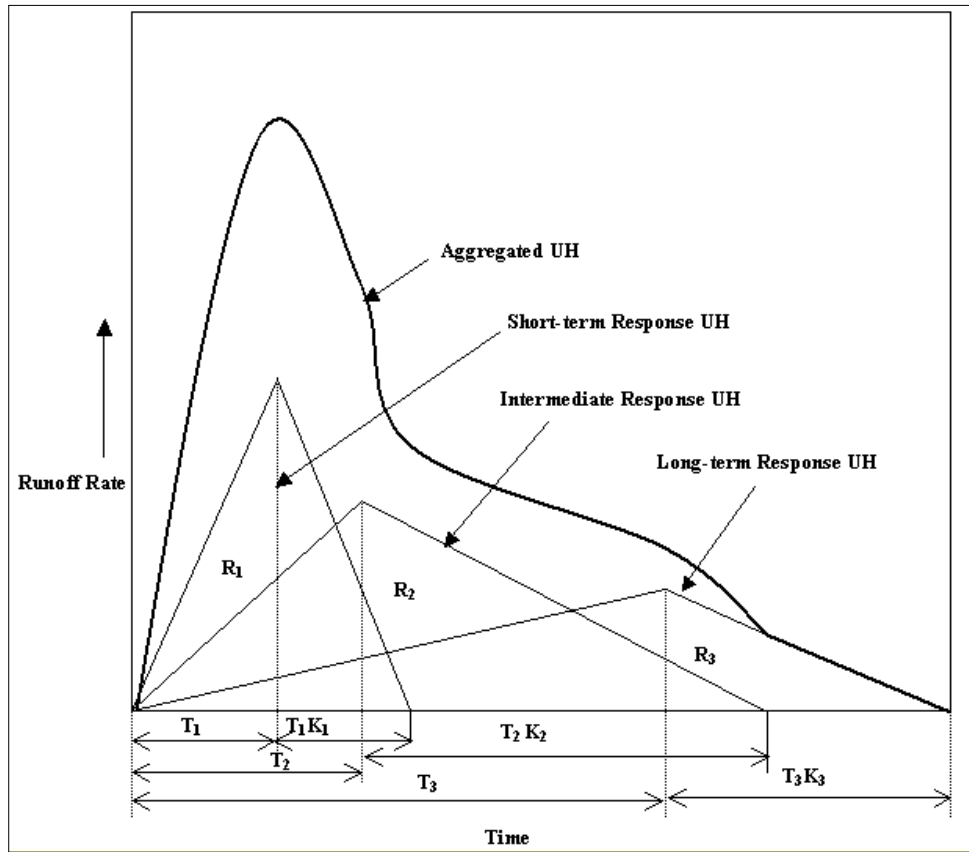


Figure 5.8 InfoSWMM® Wet Weather Hydrograph (RTK Method)

**Table 5.5 Wet Weather Flow Calibration Parameters
Sewer Master Plan
City of Oceanside**

| Meter Basin | R-value (%) | Fast (%) | Medium (%) | Slow (%) |
|--------------------|--------------------|-----------------|-------------------|-----------------|
| M01 | 8.00% | 5.00% | 0.50% | 2.50% |
| M02 | 1.00% | 1.00% | --- | --- |
| M03 | 0.60% | 0.50% | 0.05% | 0.05% |
| M04 | 0.78% | 0.75% | --- | 0.03% |
| M05 | 0.43% | 0.43% | --- | --- |
| M06 | 0.83% | 0.45% | 0.25% | 0.13% |
| M07 | 0.53% | 0.45% | 0.03% | 0.05% |
| M08 | 0.38% | 0.25% | 0.13% | --- |
| M09 | 0.18% | --- | 0.08% | 0.10% |
| M10 | 0.35% | 0.10% | 0.25% | --- |
| M11 | 0.30% | 0.05% | 0.25% | --- |
| M12 | 0.63% | 0.50% | 0.13% | --- |
| M13 | 0.26% | 0.18% | 0.03% | 0.05% |
| M14 | 0.75% | 0.25% | 0.25% | 0.25% |
| M15 | 0.00% | --- | --- | --- |
| M16 | 0.10% | 0.10% | --- | --- |
| M17 | 0.10% | 0.10% | --- | --- |
| M18 | 0.34% | 0.13% | 0.18% | 0.03% |
| M19 | 0.75% | 0.75% | --- | --- |
| M20 | 0.38% | 0.38% | --- | --- |
| M21 | 0.38% | 0.13% | 0.25% | --- |
| M22 | 0.00% | --- | --- | --- |
| M23 | 0.15% | 0.15% | --- | --- |
| M24 | 0.76% | 0.38% | 0.38% | --- |
| M25 | 0.13% | 0.13% | --- | --- |
| M26 | 0.13% | 0.13% | --- | --- |
| M27 | 0.50% | 0.50% | --- | --- |
| M28 | 0.28% | 0.10% | 0.05% | 0.13% |
| M29 | 0.40% | 0.10% | 0.05% | 0.25% |
| M30 | 0.08% | 0.08% | --- | --- |
| LS | 0.60% | 0.50% | 0.05% | 0.05% |
| SLR | 0.13% | 0.13% | --- | --- |

Note:

(1) SLR and LS basins were not metered. Wet weather parameters from neighboring basins were applied.

**Table 5.6 Wet Weather Meter Versus Modeled Flows
Sewer Master Plan
City of Oceanside**

| Meter | Peak Metered Flow (mgd) | Peak Modeled Flow (mgd) | Difference (%) |
|--------------|------------------------------------|------------------------------------|-----------------------|
| M01 | 0.06 | 0.054 | -8% |
| M02 | 0.90 | 0.886 | -2% |
| M03 | 1.78 | 1.690 | -5% |
| M04 | 0.35 | 0.351 | 0% |
| M05 | 0.40 | 0.387 | -3% |
| M06 | 1.44 | 1.401 | -3% |
| M07 | 0.45 | 0.422 | -5% |
| M08 | 3.80 | 3.501 | -8% |
| M09 | 0.53 | 0.473 | -11% |
| M10 | 3.47 | 3.120 | -10% |
| M11 | 0.62 | 0.566 | -9% |
| M12 | 0.67 | 0.493 | -26% |
| M13 | 0.81 | 0.704 | -13% |
| M14 | 1.00 | 0.891 | -11% |
| M15 | 1.42 | 1.055 | -26% |
| M16 | 0.24 | 0.222 | -8% |
| M17 | 1.18 | 1.211 | 2% |
| M18 | 0.81 | 0.739 | -9% |
| M19 | 1.62 | 1.599 | -1% |
| M20 | 3.18 | 2.931 | -8% |
| M21 | 0.45 | 0.397 | -11% |
| M22 | 0.04 | 0.037 | -15% |
| M23 | 1.41 | 1.331 | -5% |
| M24 | 0.41 | 0.396 | -4% |
| M25 | 4.68 | 4.240 | -9% |
| M26 | 2.61 | 2.507 | -4% |
| M27 | 0.60 | 0.570 | -6% |
| M28 | 0.71 | 0.705 | -1% |
| M29 | 1.72 | 1.542 | -10% |
| M30 | 0.50 | 0.459 | -9% |

In summary, a wastewater collection system model is a simplified representation of the real sewer system. Model calibration is a crucial component of the hydraulic modeling effort that ensures the most accurate results possible. The calibration process consists of calibrating simulated flows with the model to both dry and wet weather monitoring data. The calibration process entails adjusting parameters within the model to match the flow monitoring data measured at various locations throughout the collection system.

Based on the information presented in this chapter, it was concluded that the model is “calibrated” and therefore is suitable for use in the capacity evaluation of the wastewater collection under peak flow conditions.

PLANNING AND EVALUATION CRITERIA

The City's sanitary sewer collection system was modeled and evaluated based on the planning criteria defined in this chapter. The planning criteria address the collection system capacity, acceptable gravity sewer pipe slopes, maximum allowable depth of flow, design velocities, and changes in pipe size.

6.1 GRAVITY SEWERS

Gravity sewer pipe capacities are dependent on many factors. The factors include roughness of the pipe, the chosen maximum allowable depth of downstream flow conditions, and limiting velocity and slope. The following sections describe the factors that account for the determination of existing and future pipeline capacities in the City's collection system.

6.1.1 Manning Coefficient (n)

The manning coefficient 'n' is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For sewer pipes, the manning coefficient typically ranges between 0.011 and 0.017, with 0.013 being a representative value used for system planning purposes. Due to unknown conditions of existing pipelines, a conservative manning "n" factor of 0.013 was initially used for the evaluation of all existing collection system pipelines. Pipe roughness values were adjusted within the stated typical range during calibration. The evaluation of all proposed pipelines used a manning "n" factor of 0.013.

6.1.2 Flow Depth Criteria (d/D)

The primary criterion used to identify capacity deficient sewers or to size new sewer improvements is the maximum flow depth to pipe diameter ratio (d/D). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). Based on Carollo's experience, City staff input, and industry standards, the criteria listed in Table 6.1 were used. The following paragraphs explain these criteria in more detail.

6.1.2.1 Flow Depth for Existing Sewers

Maximum flow depth criteria for existing sanitary sewers are established based on a number of factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative d/D ratio when evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, lenient flow depth criteria could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable flow depth criteria should be established to be as cost effective as

possible while at the same time reducing the risk of SSOs to the greatest extent possible. For Oceanside, pipelines were flagged if the d/D exceeded 1.0 (i.e., pipelines that surcharged were flagged).

| | |
|--|--|
| Table 6.1 Maximum Flow Depth Criteria Sewer System Master Plan Update City of Oceanside | |
| Maximum Flow Depth for Existing Sewers | |
| Peak Wet Weather Flow: | Maximum d/D = 1.0 |
| Maximum d/D for New Sewers | |
| <u>Pipe Diameter (inches)⁽¹⁾</u> | <u>Maximum d/D Ratio (during Peak Flows)⁽¹⁾</u> |
| 10 and smaller | 0.50 |
| 12 and larger | 0.67 |
| <u>Note:</u> (1) Obtained from City of Oceanside’s Design and Construction Manual: Section 3- Sewer Systems; http://www.ci.oceanside.ca.us/gov/water/admin/manual.asp | |

A capacity deficient sewer (i.e., system bottleneck) raises the hydraulic grade line of upstream sewers, leading to backwater conditions. The greater the capacity deficiency, the higher water levels will surcharge upstream of the bottleneck pipeline (or pipelines). The hydraulic model is used to determine “backwater” pipelines in order to specify which specific pipelines are the actual root causes of the capacity deficiency. Capital projects are proposed to provide greater flow capacity for the deficient sewers, which eliminates the backwater conditions that cause surcharging.

The criteria summarized in Table 6.1 was used to evaluate existing sewers in the collection system as part of this Master Plan. However, should a development project be considered that proposes a change to the current zoning or land use density, a more conservative criteria will be used by the City to conduct the evaluation of available capacity. Should a zoning change be proposed by a development project, the criteria established below for the sizing of new sewers will be used. The City will use the more conservative criteria to provide reserve capacity due to the uncertainty inherent with flow estimations during the planning phases of development projects.

6.1.2.2 Flow Depth for New Sewers

When designing sewer pipelines, it is common practice to adopt different flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. The City’s Water Utilities Department standards for the evaluation of existing sewers and sizing new trunk lines are summarized in Table 6.1. For pipelines 10 inches and smaller in diameter, the max d/D value is 0.5 or

50 percent of the pipeline depth. Pipelines 12 inches and larger in diameter, the max d/D is 0.67.

6.1.3 Design Velocities and Minimum Slopes

To minimize the settlement of sewage solids, the City's Water, Sewer and Reclaimed Water Design and Construction Manual specify that a minimum velocity of 2 feet per second (ft/s) be maintained when the pipeline is at peak flow. At this velocity, the sewer flow will provide self-cleaning for the pipe.

In accordance with the City's design criteria, Table 6.2 lists the recommended minimum slopes and their corresponding maximum flows for maintaining self-cleaning velocities (equal to or greater than 2 ft/s) when the pipe is flowing at its maximum depth (d/D ratio).

| Table 6.2 Minimum Slope for New Pipes Sewer System Master Plan Update City of Oceanside | | | | |
|--|---|--|---------------------------|--|
| Pipe Diameter (inches) | Minimum Slope⁽¹⁾⁽²⁾ (feet/feet) | Calculated Flow at Maximum d/D⁽²⁾⁽³⁾ | | |
| | | d/D | Maximum Flow (mgd) | |
| 8 | 0.005 | 0.50 | 0.277 | |
| 10 | 0.004 | 0.50 | 0.449 | |
| 12 | 0.004 | 0.67 | 1.15 | |
| 15 | 0.004 | 0.67 | 2.09 | |
| 18 | 0.004 | 0.67 | 3.40 | |
| 21 | 0.004 | 0.67 | 5.12 | |
| 24 | 0.004 | 0.67 | 7.32 | |
| 27 | 0.004 | 0.67 | 10.01 | |
| 30 | 0.004 | 0.67 | 13.26 | |
| 36 | 0.004 | 0.67 | 21.57 | |
| 42 | 0.004 | 0.67 | 32.53 | |

Notes:
 (1) Recommended minimum slope for flows at a velocity greater than or equal to 2 ft/s.
 (2) Manning's n = 0.013.
 (3) Calculated flow is determined using the minimum slope and maximum allowable d/D.

6.1.4 Changes in Pipe Size

When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. For planning purposes and designing new pipes, and in the absence of field data, sewer crowns are matched at the manholes.

6.2 LIFT STATIONS AND FORCE MAINS

Industry standard practice is to require that sewage lift stations have sufficient capacity to pump peak flows with the largest pump out of service (firm capacity).

Force main piping should be sized to provide a minimum velocity of 3 ft/s at the design flow rate of the lift station and no more than 8 ft/s. For the determination of head loss, the Hazen Williams Equation is used with a C-factor of 120. These factors are typical for sewer system master planning purposes.

EXISTING SYSTEM EVALUATION

This chapter discusses the evaluation of existing wastewater collection system facilities and identifies current system deficiencies. This chapter also summarizes the results of the condition assessment of the City's collection system facilities performed as part of this Sewer Master Plan (SMP).

7.1 CAPACITY ANALYSIS

Following the dry and wet weather flow calibration, which is described in Chapter 5, the City's hydraulic model was used to perform a capacity analysis of the existing wastewater collection system. This evaluation involves identifying areas in the collection system where flow restrictions are present or where pipe capacity is inadequate to convey design flows. Sewers that lack sufficient capacity to convey design flows create bottlenecks in the collection system that can potentially contribute to sanitary sewer overflows (SSOs). The wastewater collection system was evaluated based on the planning criteria presented in Chapter 6.

7.1.1 Gravity Collection System Analysis

For the existing sewer collection system, the peak wet weather flow (PWWF) was routed through the hydraulic model. In accordance with the established flow depth criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 1.0 were identified.

Note that the pipelines with an HGL that exceeded this threshold are not necessarily capacity deficient. In some cases, a surcharged condition within a given pipeline segment is due to backwater effects created by a downstream bottleneck. An illustration of backwater effects is shown on Figure 7.1. For this reason, the hydraulic model was analyzed to identify the pipeline segments that are the cause of the surcharged conditions. These capacity deficient sewers are shown on Figure 7.2.

Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies. The recommended improvement projects are discussed in greater detail in Section 7.2. In accordance with the established planning criteria, new sewer pipelines were sized such that the maximum flow depth to pipe diameter ratio (d/D) did not exceed the values summarized in Table 6.1.

7.1.2 Lift Station and Force Main Analysis

The City's hydraulic model includes the majority (27) of the City's operational lift stations. The smaller lift stations of the Oceanside Pier and one of the Harbor Lift Stations were excluded in the model because they have an insignificant effect on system hydraulics in the model.

In accordance with the established planning criteria, the City's existing modeled lift stations were evaluated to determine if they have sufficient capacity to convey existing PWWFs. Lift stations with an influent PWWF above the existing firm capacity were flagged as deficient. Table 7.1 summarizes the results of the lift station evaluation.

As shown in Table 7.1, only the South Pacific Lift Station was found to be capacity deficient under existing flow conditions. In addition, the hydraulic model indicated high velocity in the South Pacific force main. The City has indicated that there have been observed deficiencies in the Oceanside Boulevard Lift Station, however, there may have been unknown operating conditions (e.g., inoperable pumps, severe force main deterioration, etc.) that may have contributed to these observed conditions, as the capacity evaluation indicates that there is sufficient firm capacity at this facility. Further investigation would be necessary to determine if a capacity deficiency may exist at this facility.

7.2 COLLECTION SYSTEM CONDITION ASSESSMENT

In addition to the capacity analysis of the collection system described in Section 7.1 this SMP includes an evaluation of the overall condition of the City's existing collection system infrastructure. A condition assessment and asset management strategy was performed to get a better understanding of the city's collection system infrastructure. An understanding of the existing condition of the collection system assets is critical to 1) providing the baseline projection of collection system renewal needs to be incorporated into this SMP; and 2) allowing for prioritization of capital renewal projects within the SMP.

7.2.1 Gravity Collection System Condition Assessment

The approach used to conduct the age-based renewal analysis of the gravity collection system was based on current practices that are commonly applied within wastewater asset management programs. Pipeline diameter, material, linear feet, and age data was obtained from Oceanside's GIS database. Chapter 4 contains a summary of the existing sewer main information based on pipe diameter, material, and decade of installation. Additionally, a dataset of CCTV condition scores based on the Pipeline Assessment and Certification Program (PACP) for approximately 71 pipe segments was incorporated into the analysis. These 70 pipe segments were targeted as high priority pipelines for video inspection as part of this SMP. Figure 7.3 shows the locations of the pipelines that were CCTV inspected in September 2013 by Innerline Engineering. Appendix F provides a summary of the results of the CCTV inspection. Of the 71 pipeline segments that were CCTV'd, 8 were targeted for rehabilitation and replacement as part of the condition assessment

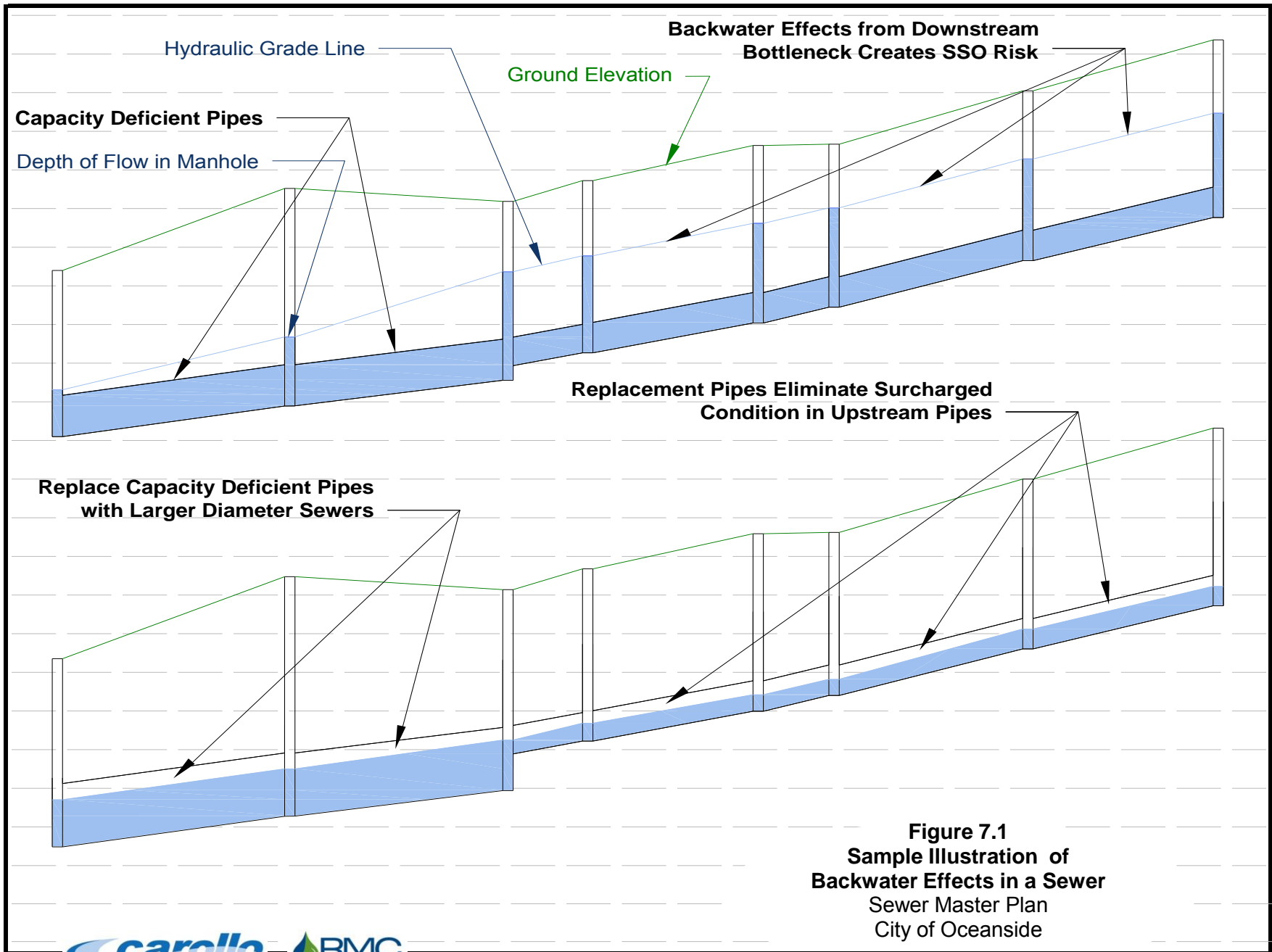
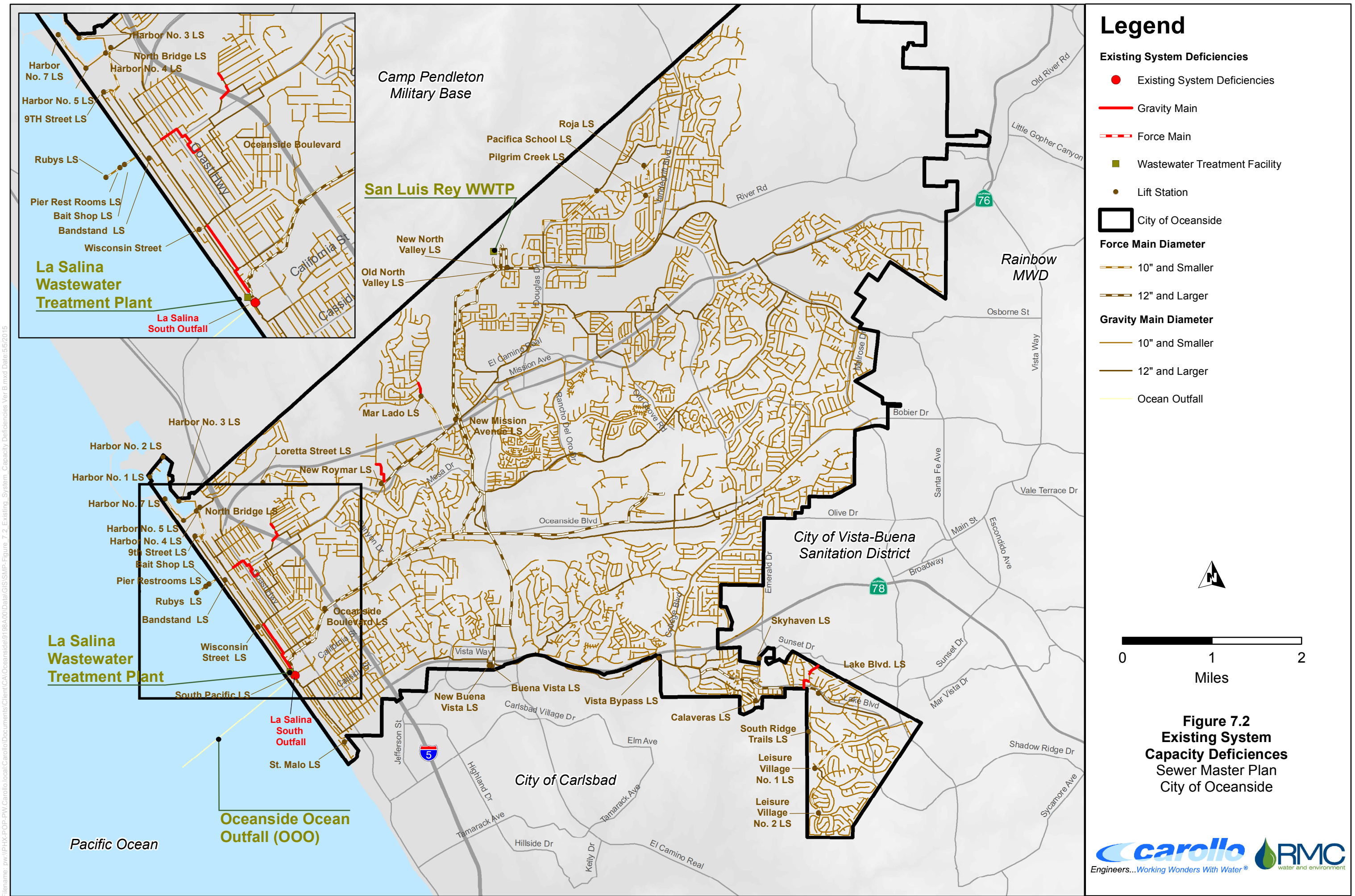


Figure 7.1
Sample Illustration of
Backwater Effects in a Sewer
Sewer Master Plan
City of Oceanside

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Legend

- Existing System Deficiencies**
- Existing System Deficiencies
 - Gravity Main
 - - - Force Main
 - Wastewater Treatment Facility
 - Lift Station
 - City of Oceanside
- Force Main Diameter**
- 10" and Smaller
 - 12" and Larger
- Gravity Main Diameter**
- 10" and Smaller
 - 12" and Larger
 - Ocean Outfall

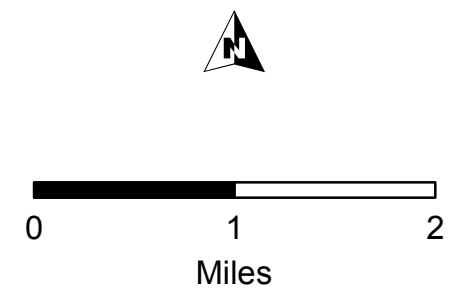
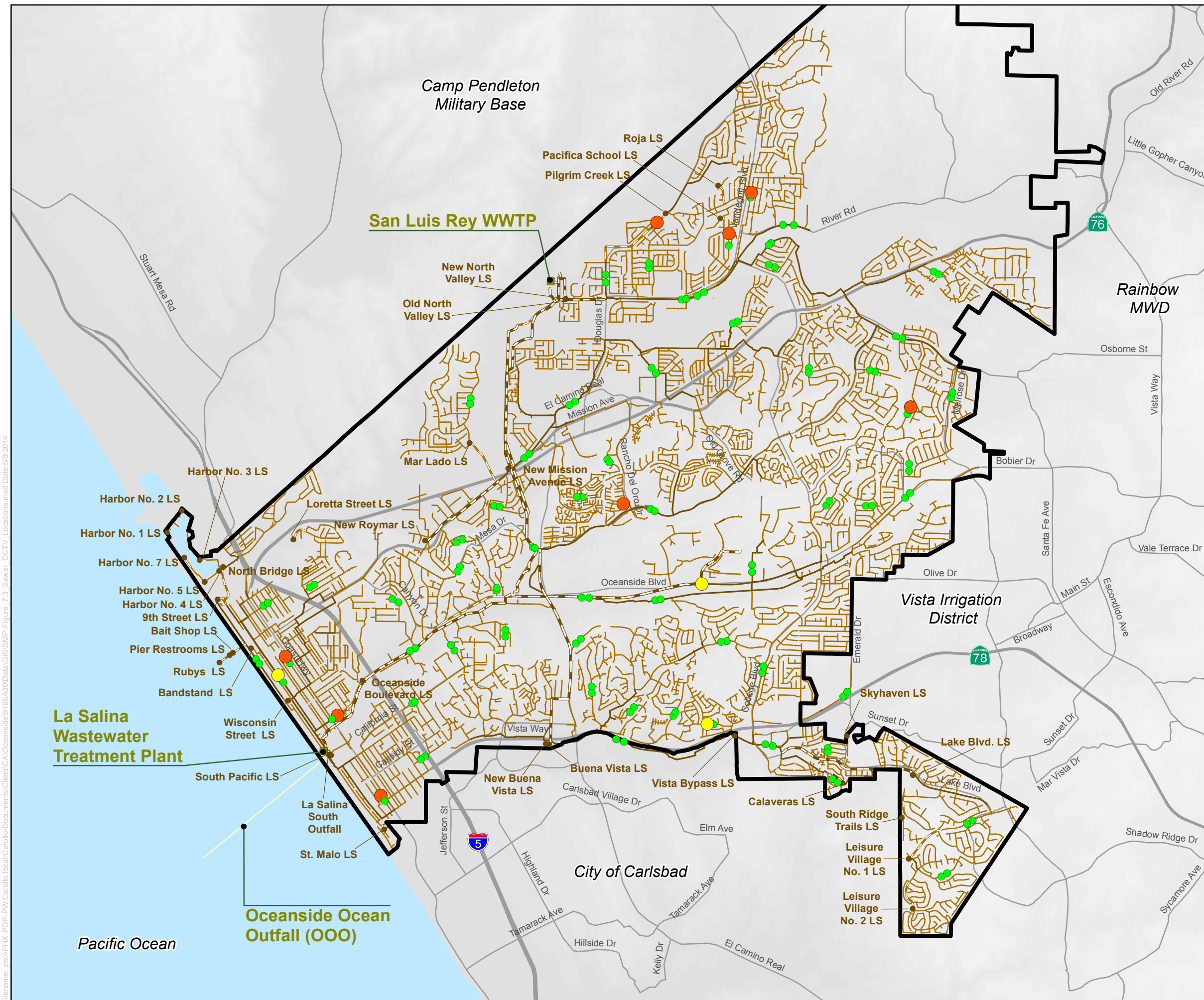


Figure 7.2
Existing System
Capacity Deficiencies
 Sewer Master Plan
 City of Oceanside

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Legend

CCTV Location and Rating


- Poor
- OK
- Good or Better
- Wastewater Treatment Facility
- Lift Station
- City of Oceanside

Force Main Diameter

- 10" and Smaller
- 12" and Larger



Gravity Main Diameter

- 10" and Smaller
- 12" and Larger
- Ocean Outfall



0 1 2
Miles

Figure 7.3
Sewer CCTV Locations and Ratings
Sewer Master Plan
City of Oceanside

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Table 7.1 Existing Lift Station Capacity Evaluation
Sewer Master Plan
City of Oceanside

| Station Name | Address | Modeled Pump Station Information | | | | | | | Existing PWWF (mgd) | Capacity Deficiency? ⁽²⁾ |
|--------------------|-------------------------------|----------------------------------|-------------------|---------------------------|------|------------|--|-------|---------------------|-------------------------------------|
| | | Year Constructed | Wastewater Basin | Flow per pump (gpm) (mgd) | | # of Pumps | Firm Capacity ⁽¹⁾ (gpm) (mgd) | | | |
| Bandstand | 250 North Strand | 1999 | La Salina WWTP | 300 | 0.43 | 2 | 300 | 0.43 | 0.05 | |
| Buena Vista | 2501 Haymar Drive | 1979 | San Luis Rey WWTP | 2,600 | 3.74 | 4 | 7,800 | 11.23 | 6.76 | |
| Calaveras | 3636 Sky Haven Lane | | San Luis Rey WWTP | 850 | 1.22 | 3 | 1,700 | 2.45 | 1.17 | |
| Harbor #1 | 200 North Harbor Drive | 1961 | La Salina WWTP | 150 | 0.22 | 2 | 150 | 0.22 | 0.01 | |
| Harbor #2 | 1830 North Harbor Drive | 1961 | La Salina WWTP | 175 | 0.25 | 2 | 175 | 0.25 | 0.03 | |
| Harbor #3 | 1325 North Harbor Drive | 1961 | La Salina WWTP | 250 | 0.36 | 2 | 250 | 0.36 | 0.04 | |
| Harbor #4 | 284 North Harbor Drive | 1961 | La Salina WWTP | 500 | 0.72 | 2 | 500 | 0.72 | 0.05 | |
| Harbor #5 | North Pacific Street | 1961 | La Salina WWTP | 150 | 0.22 | 2 | 150 | 0.22 | 0.02 | |
| Lake Blvd | 4700 1/2 Lake Boulevard | 1993 | San Luis Rey WWTP | 1,000 | 1.44 | 4 | 3,000 | 4.32 | 1.41 | |
| Leisure Village #1 | 4706 Cannon Road | 1984 | San Luis Rey WWTP | 800 | 1.15 | 3 | 1,600 | 2.30 | 0.38 | |
| Leisure Village #2 | 4300 Leisure Village Way | 1986 | San Luis Rey WWTP | 500 | 0.72 | 2 | 500 | 0.72 | 0.14 | |
| Loretta | 1261 Loretta Street | 1953 | La Salina WWTP | 400 | 0.58 | 2 | 400 | 0.58 | 0.15 | |
| Mar Lado | 401 North Foussat Road | 1986 | San Luis Rey WWTP | 600 | 0.86 | 3 | 1,200 | 1.73 | 1.29 | |
| Mission Avenue | 3476 Mission Avenue | 2002 | San Luis Rey WWTP | 2,900 | 4.18 | 4 | 8,700 | 12.53 | 9.50 | |
| North Bridge | 304 South Harbor Drive | 1988 | La Salina WWTP | 1,200 | 1.73 | 2 | 1,200 | 1.73 | 0.76 | |
| Ninth Street | 997 North Pacific Road | 1975 | La Salina WWTP | 500 | 0.72 | 2 | 500 | 0.72 | 0.08 | |
| North Valley | 3930 North River Road | 1971 | San Luis Rey WWTP | 2,960 | 4.26 | 3 | 5,920 | 8.52 | 6.69 | |
| Oceanside Blvd | 1664 Oceanside Boulevard | 1975 | La Salina WWTP | 1,700 | 2.45 | 3 | 3,400 | 4.90 | 2.92 | |
| Pacifica School | 4991 Marcario Road | 1971 | San Luis Rey WWTP | 400 | 0.58 | 2 | 400 | 0.58 | 0.10 | |
| Pilgrim Creek | 855 Douglas Drive | 1976 | San Luis Rey WWTP | 2,000 | 2.88 | 2 | 2,000 | 2.88 | 1.41 | |
| Roja | 703 Roja Street | 1975 | San Luis Rey WWTP | 250 | 0.36 | 2 | 250 | 0.36 | 0.05 | |
| Roymar | 110 Jones Road | 1957 | San Luis Rey WWTP | 1,600 | 2.30 | 4 | 4,800 | 6.91 | 1.92 | |
| St. Malo | 52 St. Malo Beach | | La Salina WWTP | 200 | 0.29 | 2 | 200 | 0.29 | 0.05 | |
| Sky Haven | 3521A Sky Haven Lane | 1973 | San Luis Rey WWTP | 150 | 0.22 | 2 | 150 | 0.22 | 0.00 | |
| South Pacific | 1330 South Tait Street | 1955 | La Salina WWTP | 700 | 1.01 | 2 | 700 | 1.01 | 1.87 | Yes |
| South Ridge Trails | 4900 Cannon Road | | San Luis Rey WWTP | 600 | 0.86 | 2 | 600 | 0.86 | 0.11 | |
| Wisconsin | Wisconsin and Pacific Streets | | La Salina WWTP | 300 | 0.43 | 2 | 300 | 0.43 | 0.09 | |

Notes:

1. Firm capacity is estimated as the total pump capacity with one pump out of service (Flow per pump x [# of pumps-1]).
2. Lift stations are called out as capacity deficiencies if the peak wet weather flow exceeds the pumping capacity of the lift station.

The GIS and CCTV data was entered into Carollo's Below Ground Asset Manager (BAM) Model. BAM includes a statistical analysis of decay and failure of pipes based on age, material and diameter. This model also contains unit cost information to generate renewal forecasts for any chosen timeframe. An original useful life was assumed for each pipe material type based on typical values reported in industry literature for assumed soil corrosivity conditions. Special soil conditions that vary throughout the City's service area were not considered. These useful life assumptions are shown in Table 7.2. Where CCTV data was available, the PACP score was used to determine the percent useful life and number of years remaining. For all other segments, age was used to determine the number of years remaining.

| Table 7.2 Original Useful Life for Gravity Sewer Pipe by Type Sewer Master Plan City of Oceanside | |
|--|-----------------------------------|
| Pipe Material Type | Useful Life Input to Model |
| Asbestos Cement Pipe (ACP) | 75 |
| Cast Iron Pipe (CI) | 65 |
| Cement Mortar Lined & Coated Steel Pipe (CMLC) | 80 |
| Concrete Cylinder Pipe (CCP) | 80 |
| Ductile Iron Pipe (DIP) | 85 |
| Galvanized Steel Pipe (GALV) | 50 |
| High Density Polyethylene (HDPE) | 80 |
| Polyvinyl Chloride Plastic (PVC) | 85 |
| Reinforced Concrete Pipe (RCP) | 75 |
| Steel Cylinder Pipe (SCP) | 80 |
| Other or Unknown Material (UNK) | 80 |
| Vitrified Clay Pipe (VCP) | 80 |

The BAM model was used to prepare an age-based pipeline rehabilitation and replacement (R&R, or renewal) needs analysis for the City's wastewater collection system. The purpose of this renewal analysis is to provide a long-term financial plan to address aging collection system infrastructure. Section 7.3.3 and Table 7.3 describe the findings of this needs analysis, while the estimated costs associated with the R&R program are summarized in Chapter 9.

| Table 7.3 Rehabilitation/Replacement Pipe Summary (The BAM Model) Sewer Master Plan City of Oceanside | | | | |
|--|--|--------------|--|--------------|
| Pipe Diameter (in) | Near Term Rehab/Replacement (Before 2020) | | Near Term Rehab/Replacement (2020-2050) | |
| | Feet | Miles | Feet | Miles |
| Unknown | 60 | 0.01 | 0 | 0.00 |
| 3 in | 0 | 0.00 | 0 | 0.00 |
| 4 in | 890 | 0.17 | 0 | 0.00 |
| 6 in | 183,120 | 34.68 | 0 | 0.00 |
| 8 in | 55,250 | 10.46 | 251,690 | 47.67 |
| 10 in | 3,980 | 0.75 | 26,010 | 4.93 |
| 12 in | 5,090 | 0.96 | 17,940 | 3.40 |
| 14 in | 770 | 0.15 | 0 | 0.00 |
| 15 in | 3,480 | 0.66 | 13,730 | 2.60 |
| 16 in | 2,120 | 0.40 | 0 | 0.00 |
| 18 in | 1,160 | 0.22 | 12,800 | 2.42 |
| 20 in | 0 | 0.00 | 0 | 0.00 |
| 21 in | 0 | 0.00 | 9,370 | 1.77 |
| 24 in | 29,120 | 5.52 | 1,460 | 0.28 |
| 27 in | 0 | 0.00 | 0 | 0.00 |
| 28 in | 0 | 0.00 | 0 | 0.00 |
| Total | 285,040 | 53.99 | 333,000 | 63.06 |
| Notes: | | | | |
| (1) The City currently has a small diameter replacement program that is targeting pipelines west of Interstate Highway 5 in the downtown area. Appendix H shows the City's current plan. | | | | |

As shown in Table 7.3 it is recommended that approximately 54 miles of sewer pipeline be replaced or rehabilitated before year 2020, while another 63 miles of pipeline will need to be replaced in the period 2020-2050. This equates to approximately 10.7 miles per year on average in the next 5 years and 2.1 miles per year on average for the remaining 30 years.

7.2.2 Lift Station Condition Assessment

A condition assessment of the City's wastewater lift stations was performed on July 9 and 10, 2013 by the Carollo assessment team for ten lift stations identified by the City as most critical. The members consisted of four licensed engineers with specialties in Structural, Mechanical and Electrical and Instrumentation. The nine lift stations identified in the technical memorandum included:

- Pacifica School
- Roymar
- Loretta
- Old Buena Vista
- New Buena Vista
- Leisure Village No. 1
- Harbor No. 3
- Ninth Street
- Wisconsin

The remaining lift stations were inspected by Carollo’s mechanical engineer and pump station expert between July 16 through 18, 2013. The condition assessments included a visual inspection of the site and input from City staff. The facility inspection did not include a full condition assessment from the multi-discipline team that performed the inspections

The purpose of the lift station condition assessment was to provide a planning document that gives the City guidance and direction for facility improvements, project budgeting, and implementation schedules. This condition assessment evaluated and categorized projects identified by the City and personnel familiar with the lift stations. Appendix G provides a technical memorandum that describes the methodology and results of the lift station condition assessment in detail. The key findings and recommendations are summarized in Table 7.4. Costs associated with the recommended lift station rehabilitation projects is provided in Chapter 9.

| Table 7.4 Lift Station Condition Assessment Recommendations Sewer Master Plan City of Oceanside | | | |
|--|-----------------------|--|------------------------|
| Project No. | Lift Station | Major Scope Items | Project Ranking |
| 1 | Harbor No. 5 | Repair Leaks and reline pit, replace damaged piping and electrical gear | 4 |
| 2 | New Buena Vista | Replace pumps and stabilize hillside | 3 |
| 3 | Pilgrim Creek | Install coating in wet well and paint dry well. Install bypass for access and improve ladder safety access | 3 |
| 4 | Harbor No. 3 | Repair dry well, replace pumps and piping and install fall protection | 3 |
| 5 | Roja | Install wet well coating and repair corroded pipe and access hatch | 3 |
| 6 | North Bridge | Install metal roof | 3 |
| 7 | Leisure Village No. 2 | Upgrade electrical gear, conduit and fixtures in pump room | 2 |
| Note: (1) Estimated project costs may vary by plus 30 percent to minus 15 percent. | | | |

7.3 COLLECTION SYSTEM IMPROVEMENTS

This section highlights the improvements recommended to mitigate the existing system deficiencies described in Section 7.1 and 7.2. The recommended improvements to mitigate existing deficiencies are shown on Figure 7.4 and summarized in Table 7.5. The columns used in Table 7.5 refer to the following:

- **Improvement ID:**
Assigned unique identifier associated with each improvement project. This is an alphanumeric number that starts with one letter indicating the type of improvement (WWC= Capacity Improvements, WWR = Rehabilitation Improvements, WWO = Other Misc. Improvements) and continues with a number and a letter.
- **Type of Improvement:**
Pipelines, lift stations, force mains, and jacked steel casings for highway and railroad crossings.
- **Street Description:**
Street in which the improvement is proposed.
- **Limits:**
Description of the beginning and end of a proposed pipeline project.
- **Existing Size:**
This is the size of the existing pipeline/facility. It represents the diameter of the existing pipelines (inches), and the total capacity of lift stations (mgd).
- **Proposed Size:**
This is the size of the proposed improvement. It represents the diameter of the proposed pipelines (inches), and the total capacity of lift stations (mgd). Additionally, for jacked steel casings, the size of the casing as well as the carrier pipe is indicated (inches).
- **Replace/New:**
Indicates whether the proposed improvement is a replacement pipeline, parallel pipeline, or a new facility.
- **Length:**
Estimated length of the proposed improvement (in feet). It should be noted that the length estimates do not account for re-routing the alignment to avoid unknown conditions.

7.3.1 Collection System Capacity Improvements

For the majority of the City, the existing wastewater collection system contains sufficient capacity to convey the PWWF without exceeding capacity criteria discussed in Chapter 6. There are a few exceptions where existing sewers will need to be replaced by larger

diameter sewers, or parallel sewers will need to be constructed to bypass flow around hydraulically deficient sewers. These projects are discussed below:

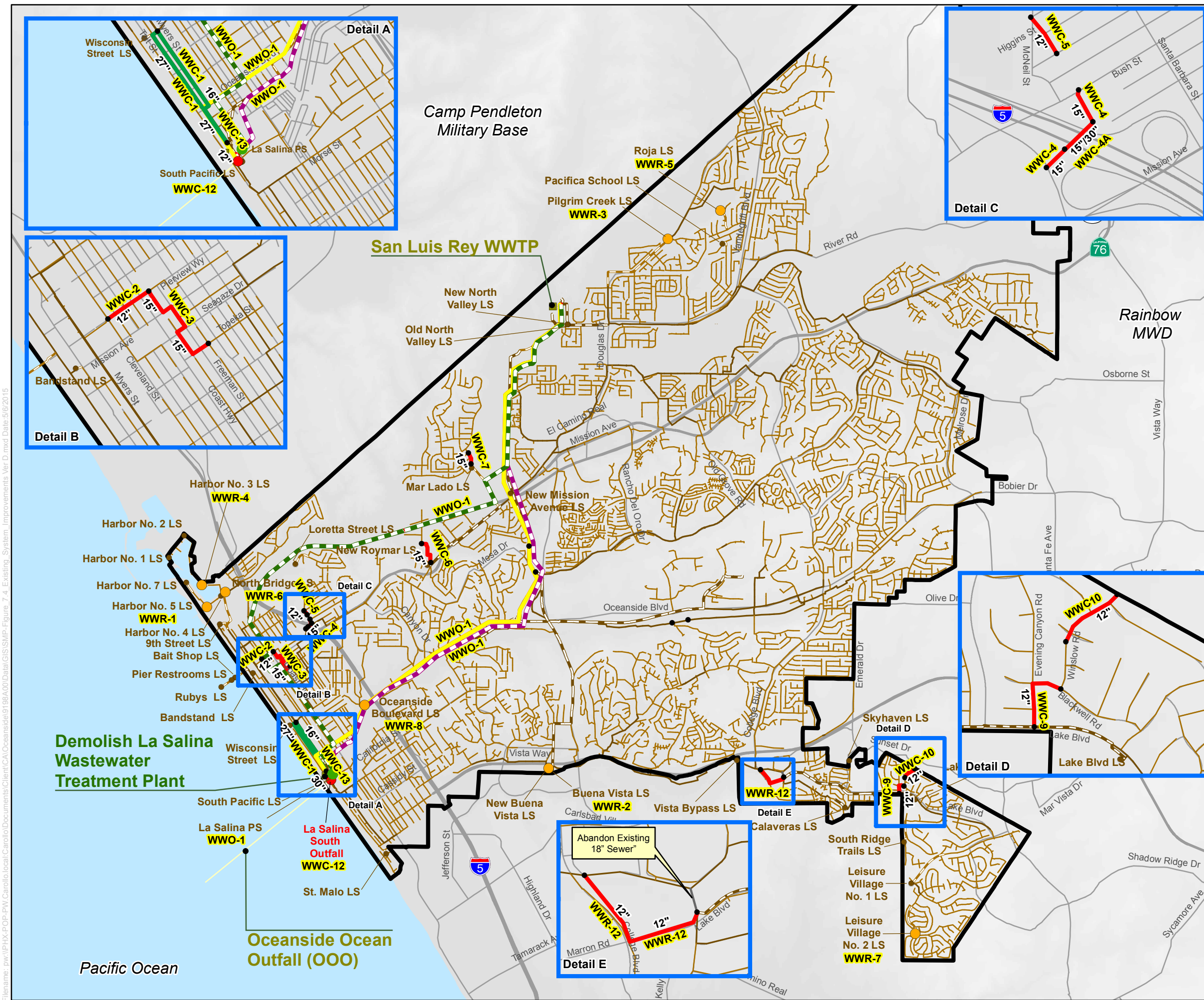
- **Myers/Tait Capital Improvement (Project WWC-1):**

At the time of model calibration the 16-inch and 18-inch diameter gravity mains located on South Meyers Street, Oceanside Boulevard, and Tait Street from Wisconsin Avenue to Crosswaithe Street had significant capacity deficiencies. The City has recently addressed these deficiencies through construction of the Myers/Tait Street Sewer Line Replacement Project. The City provided design drawings for this project, which consists of constructing a new 27-inch diameter pipeline on Tait Street from Wisconsin Avenue to Witherby Street, diverting flow from the existing 16-inch sewer on South Meyers Street from Wisconsin Avenue to Oceanside Boulevard, lining the existing 16-inch diameter sewer on South Meyers Street, and constructing a new 30-inch diameter sewer on Tait Street from Oceanside Boulevard to Witherby Street and on Oceanside Boulevard from Myers Street to Tait Street. The limits of this project are shown on Figure 7.4 Detail A.
- **Pier View Way/Freeman Street Sewer (Project WWC-2 and WWC-3):**

It is recommended that a new 15-inch diameter sewer be constructed (Project WWC-3) to replace the existing 8-inch and 10-inch diameter sewers on North Freeman Street and the North Freeman Street Alley from Topeka Street to Pier View Way, and a new 10-inch diameter sewer be constructed (Project WWC-2) on Pier View Way from the Freeman Street Alley to South Cleveland Street (Figure 7.4 Detail B).
- **Interstate 5 Sewer Crossing (Project WWC-4, WWC-4A, and WWC-5):**

The capacity evaluation revealed two reaches of capacity deficient sewer near Interstate 5 and Mission Avenue. It is recommended that the existing 10-inch diameter sewer from Bush Street to Interstate 5 and the 12-inch diameter pipeline crossing Interstate 5 be replaced with a 15-inch diameter sewer and the existing 10-inch diameter sewer from McNeil Street to Puls Street be upsized to a 12-inch diameter pipeline (Figure 7.4 Detail C).
- **Jones Road Sewer (WWC-6):**

Under PWWF conditions, the hydraulic model indicated that the existing 10-inch diameter sewer upstream of the Roymar Lift Station to Jones Road is capacity deficient. It is recommended that this pipeline be replaced with a larger 15-inch diameter sewer from Jones Road to the Roymar Lift Station.



Legend

Existing System Improvements

- Capacity Lift Station Improvement
- Rehabilitation/Replacement Lift Station
- Capacity Upgrade Gravity Main
- Capacity Upgrade Force Main
- Rehabilitation Replacement Gravity Main
- Capacity Upgrades Performed

La Salina Pipeline Improvements

- Repurpose FPU D Outfall to La Salina
- Force Main
- Convert Brine Line to Recycled Water Pipeline
- Relocate Existing Land Outfall

■ Wastewater Treatment Facility

● Lift Station

□ City of Oceanside

Force Main Diameter

- 10" and Smaller
- 12" and Larger

Gravity Main Diameter

- 10" and Smaller
- 12" and Larger
- Ocean Outfall
- Abandoned Pipeline



Figure 7.4
Existing System Improvements
Sewer Master Plan
City of Oceanside

Filename: p:\a\PHX-POP-PW_Carollo.local\Carollo\Documents\Client\CA_Oceanside\9198A00\GIS\SWMP-Figure_7.4_Existing_System_Improvements_Ver.D.mxd Date: 5/6/2015

| Table 7.5 Proposed Existing System Improvements Sewer Master Plan City of Oceanside | | | | Project Length/Size | | | |
|---|-----------------|---|--|----------------------|----------------------|-----------------|-------------|
| ID | Type of Improv. | Description/ Street | Description / Limits | Existing | Proposed | Replace/ New | Length (ft) |
| | | | | Ex. Size/ Diam. (in) | New Size/ Diam. (in) | | |
| Capacity Related CIPs | | | | | | | |
| Gravity Mains | | | | | | | |
| WWC-1 ⁽¹⁾ | Pipe | S. Myers St./Tait St. | Myers/Tait St. Sewer Line | Varies | 8-30 | Liner/Replace | 6,550 |
| WWC-2 | Pipe | Pier View Way | Alley south of N. Freeman St. to N. Cleveland St. | 8 | 12 | Replace | 730 |
| WWC-3 | Pipe | N. Freeman St./Topeka St. | Alley south of S. Ditmars St. to Pier View Way | 8-10 | 15 | Replace | 1,700 |
| WWC-4 | Pipe | Near I-5 | Bush St. to Buena St. | 10 | 15 | Replace | 230 |
| WWC-4A | Pipe/Casing | Interstate 5 | I-5 Crossing | 12 | 15/30 | Replace | 420 |
| WWC-5 | Pipe | McNeil St. | Alley west of Higgins St. to Puls St. | 10 | 12 | Replace | 290 |
| WWC-6 | Pipe | East of Jones Rd. | Jones Rd. to San Luis Rey Rd. | 10 | 15 | Replace | 1,430 |
| WWC-7 | Pipe | Foussat Rd. | Shadow Tree Dr. to Benet Rd. | 10 | 15 | Replace | 590 |
| WWC-9 | Pipe | Evening Cyn. Rd./Blackwell Rd. | Winslow Rd. to Lake Blvd. | 8 | 12 | Replace | 730 |
| WWC-10 | Pipe | Winslow Rd. | Sheridan Rd. to Warwick Cir. | 8 | 12 | Replace | 710 |
| Lift Stations and Force Mains | | | | | | | |
| WWC-12 | Lift Station | South Pacific Lift Station | 2-1,500 gpm pumps with a firm capacity of 2.16 mgd | -- | 4.32 mgd | Replace/ Upsize | -- |
| WWC-13 | Force Main | South Pacific Force Main | Replace existing force main | 6 | 12 | Replace | 215 |
| Rehab Related CIPs | | | | | | | |
| Lift Station Rehab | | | | | | | |
| WWR-1 | Lift Station | Harbor #5 Lift Station | Repair leaks and reline pit, replace damaged piping and electrical gear | -- | -- | Rehab | -- |
| WWR-2 | Lift Station | New Buena Vista Lift Station | Replace pumps and stabilize hillside | -- | -- | Rehab | -- |
| WWR-3 | Lift Station | Pilgrim Creek Lift Station | Install coating in wet well and paint dry well. Install bypass for access and improve ladder safety access | -- | -- | Rehab | -- |
| WWR-4 | Lift Station | Harbor #3 Lift Station | Repair dry well, replace pumps and piping and install fall protection | -- | -- | Rehab | -- |
| WWR-5 | Lift Station | Roja Lift Station | Install wet well coating and repair corroded pipe and access hatch | -- | -- | Rehab | -- |
| WWR-6 | Lift Station | North Bridge Lift Station | Install metal roof | -- | -- | Rehab | -- |
| WWR-7 | Lift Station | Leisure Village No. 2 Lift Station | Upgrade electrical gear, conduit and fixtures in pump room | -- | -- | Rehab | -- |
| WWR-8 | City CIP | Oceanside Blvd Lift Station Relocation | Project funded FY 2013-14 | -- | -- | Rehab | -- |
| WWR-9 | City CIP | Future Lift Station Rehab | Remaining Lift Station Rehab | -- | -- | Rehab | -- |
| Pipeline Rehab | | | | | | | |
| WWR-10 | City CIP | Haymar Interceptor Sewer Repair and Feasibility Study | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- |
| WWR-11 | City CIP | Haymar Interceptor | Project funded FY 2013-14 through 2015-17 | -- | -- | -- | -- |
| WWR-12 | City CIP | Lake Boulevard Sewer Replacement | Project funded FY 2013-14 | -- | -- | -- | -- |
| WWR-13 | City CIP | CIPP Slip lining Project | Project funded FY 2013-14 through 2016-17 | -- | -- | -- | -- |
| Near Term Pipeline Replacement | | | | | | | |
| WWR-14 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 0 |
| WWR-15 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 29,430 |
| WWR-16 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 55,250 |
| WWR-17 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 3,980 |
| WWR-18 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 5,090 |
| WWR-19 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 770 |
| WWR-20 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 3,480 |
| WWR-21 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 2,120 |
| WWR-22 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 1,160 |
| WWR-23 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 0 |
| WWR-24 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 29,100 |
| WWR-25 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 |
| Long Term Pipeline Replacement | | | | | | | |
| WWR-26 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 890 |
| WWR-27 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 153,690 |
| WWR-28 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 251,690 |
| WWR-29 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 26,010 |
| WWR-30 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 17,940 |
| WWR-31 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 0 |
| WWR-32 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 13,730 |

| Table 7.5 Proposed Existing System Improvements Sewer Master Plan City of Oceanside | | | | Project Length/Size | | | |
|--|------------------------|--|---|-----------------------------|-----------------------------|---------------------|---------------|
| ID | Type of Improv. | Description/ Street | Description / Limits | Existing | Proposed | Replace/ New | Length |
| | | | | Ex. Size/ Diam. (in) | New Size/ Diam. (in) | | |
| WWR-33 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 0 |
| WWR-34 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 12,800 |
| WWR-35 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 9,370 |
| WWR-36 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 1,460 |
| WWR-37 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 |
| San Luis Rey Water Reclamation Facility | | | | | | | |
| WWR-38 | Rehab | San Luis Rey Phase 1 Improvements | Phase 1 Improvements | -- | -- | Rehab | -- |
| | Rehab | Plant 1 Upgrades | Replace Aeration Basin influent and effluent gates and repair and reline influent channel, remove abandoned screw pump station, and miscellaneous improvements. At the Secondary Clarifiers, repair localized areas of concrete corrosion, install traffic bollards for safety and replace damaged conduit and wiring to clarifier drives. | -- | -- | Rehab | -- |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Install grating walkway for safety, remove abandoned pipes and conduits, replace corroded electrical conduits and pipes, and remove embedded pipe supports. | -- | -- | Rehab | -- |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Remove embedded pipe supports and repair concrete walls. | -- | -- | Rehab | -- |
| WWR-39 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- |
| WWR-40 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- |
| WWR-41 | Rehab | Headworks, Grit Chamber, LET & Diversion Structure Upgrades | Repair and reline concrete channels, replace screenings washer compactor controls, abandon old grit chamber, replace LET 1 effluent valve, repair Diversion Box 2 gate stems, repair corroded metals, and replace miscellaneous items no longer in service. | -- | -- | Rehab | -- |
| WWR-42 | Rehab | Digester & Boiler Room Upgrades | In the Boiler Room of Digesters 1 and 2, replace Transfer Pump No. 2, replace Boilers 1 and 2 including repair of concrete around boilers, remove abandoned boiler digester gas feed pipe, replace corroded louver, replace corroded door, and repair roof. Replace Digester 3 overflow pipe vents, replace Digester 3 ferrous water pipe, repaint Digester 3 exterior, provide anchorage for heat exchanger, demolish hydrogen peroxide tank and containment, and repair asphalt at sinkhole near Digester 3 stairs. | -- | -- | Rehab | -- |
| WWR-43 | Rehab | Replace Rented Chemical Storage Facilities | Install City-owned chemical storage and pumping facilities at multiple locations to replace rented facilities. | -- | -- | Rehab | -- |
| WWR-44 | Rehab | Digester Cleaning | Clean each digester every 5 years. | -- | -- | Rehab | -- |
| WWR-45 | Rehab | Thickening & Dewatering Upgrades | Replace bollards at GBT Building, replacing leaking air pipe at Waste Gas Burners, repaint flares, and replace diversion gates in Centrifuge Building. | -- | -- | Rehab | -- |
| WWR-46 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- |
| WWR-47 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- |
| WWR-48 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 3 (5 to 10 years). | -- | -- | Rehab | -- |
| WWR-49 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 4 (10 to 15 years). | -- | -- | Rehab | -- |
| WWR-50 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 3 (10 to 15 years). | -- | -- | Rehab | -- |
| WWR-51 | Cleaning | SLR Digester Cleaning | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- |
| WWR-52 | Rehab | SLR Maint Bldg Upgrades | Project funded FY 2013-14 to 2014-15 | -- | -- | -- | -- |
| La Salina Pump Station/Treatment Plant Demolition | | | | | | | |
| WVO-1 | New | La Salina Wastewater Treatment Plant Demolition/Pump Station | Demolition of the La Salina Wastewater Treatment Plant and construction of a new pump station from LSWWTP to SLRWWTP. See section 7.3.5 for details on project description. | -- | -- | New | -- |
| Other Projects | | | | | | | |
| WVO-2 | Other | Sewer SCADA Upgrades | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- |
| WVO-3 | Other | Ocean Outfall Capacity Study | Project funded FY 2013-14 | -- | -- | -- | -- |
| WVO-4 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- |
| WVO-5 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- |
| Notes: | | | | | | | |
| 1. This project has been recently constructed by the City. | | | | | | | |

- **Foussat Road Sewer (WWC-7):**
The hydraulic model indicated that a short reach of 10-inch diameter sewer upstream of the Mar Lado Lift Station (on Foussat Road from Shadow Tree Drive to Benet Road) was capacity deficient under existing PWWF conditions. It is recommended that the City replace this section of pipeline with a 15-inch diameter sewer.
- **Evening Canyon/Winslow Road Sewer (Project WWC-9 and WWC-10):**
The capacity evaluation revealed that two reaches of 8-inch diameter sewer on Evening Canyon and Winslow Road between Lake Boulevard and the City limits (Figure 7.4 Detail D) were capacity deficient. It is recommended that these be upsized to 12-inch diameter pipelines.
- **South Pacific Lift Station (Project WWC-12 and WWC-13):**
The capacity evaluation revealed a capacity deficiency for the South Pacific Lift Station and force main. This lift station has also been planned for replacement in the City's fiscal budget. It is recommended that the City upgrade this lift station for a firm capacity of 2.16 mgd and replace the existing 6-inch diameter force main with a new 12-inch diameter force main.

7.3.2 Collection System Lift Station Rehabilitation Projects

Lift station rehabilitation projects were ranked according to criticality and cost. Overall, the majority of the City's lift stations were found to be in good working order. Minor in-house repairs can be applied to most of the lift stations in order to improve safety and maintenance access and to extend the facilities expected operating life. CIP projects have been identified for eight lift stations. These are summarized below according to importance:

- **Harbor No. 5 Lift Station (Project WWR-1):**
The Harbor No. 5 Lift Station was evaluated by Carollo's mechanical engineer and pump station expert. As part of the evaluation, severe leakage at the wet well and concerns on the pump discharge pipe and electrical gear were observed. The following improvements are recommended:
 - Reline wet well.
 - Replace piping and electrical gear in the dry pit.
 - Add fall protection to ladder.
- **New Buena Vista Lift Station (Project WWR-2):**
The New Buena Vista Lift Station was constructed in 1980, according to the available record drawings. The lift station contains a wet well with a separate pump room and four centrifugal pumps with extended drive shafts. The motors are mounted on the second level above the pumps, creating somewhat of a cramped atmosphere. Staff noted difficulties in removing pumps for maintenance. At similar installations, the City has replaced this style of pump with dry pit submersibles to ease maintenance and access. During the inspection, it was noted that the concrete pad supporting the transformer had significant settlement of approximately 3 to 4 inches. The transformer

pad is located at the edge of the slope leading down to the Buena Vista WWTP. Further slope inspection revealed obvious erosion of the hillside. Additional notes of concern are provided below:

- Install dry-pit submersible pumps to improve maintenance.
- Stabilize slope with retaining wall or gunite.
- Provide anchorage for bioxide tank.
- Repair minor spalling at pump access openings in top deck.
- Provide spill containment for generator fuel tank.
- Provide vehicle bollards in front of fuel tank.
- Pump room fixtures and receptacles not properly rated.

- **Pilgrim Creek Lift Station (WWR-3):**

The Pilgrim Creek Lift Station was evaluated by Carollo's mechanical engineer and pump station expert. The following improvements are recommended:

- Replace flowmeter.
- Coat wet pit.
- Paint dry pit.
- Install isolation valves and piping for wet pit.
- Install bypass for trash pumps.
- Install fall protection on ladder.

- **Harbor No. 3 Lift Station (WWR-4):**

Harbor No. 3 includes a wet well manhole and a steel pipe, dry pit containing the pumps, discharge valves, and some piping. The facilities are fairly deep and the small-diameter pits make access difficult. The previous 2006 Master Plan noted that the Harbor Department was going to replace the Harbor No. 3 Lift Station within 3 years; however, the replacement has not occurred and multiple deficiencies should be addressed:

- The existing pumps should be replaced.
- Discharge piping has been wrap repaired and should be replaced.
- Valves should be replaced.
- Piping noted by staff to be blocked and needs to be cleared.
- Pump impeller wear is reported as an issue.
- No safety pole or fall protection on ladder.
- Coating failure at manhole access to wet well.
- Moderate to severe corrosion to floor of dry pit.
- Minor corrosion in main disconnect panel.
- Minor corrosion in SCADA battery enclosure.

- **Roja Lift Station (WWR-5):**
The Roja Lift Station was evaluated by Carollo's mechanical engineer and pump station expert. The following improvements are recommended:
 - Install concrete coating within wet well.
 - Repair rusted pipes.
 - Replace access hatch.
 - Install access ladder with fall protection.
- **North Bridge Lift Station (WWR-6):**
The following improvements are recommended for the North Bridge Lift Station:
 - Install metal roof to reduce termite issues.
 - Repair wet well coatings.
- **Leisure Village No. 2 Lift Station (WWR-7):**
Based on the results of the condition assessment performed by Carollo's pump station expert, the following improvements are recommended for the Leisure Village No. 2 Lift Station:
 - Bubbler panel upgrade to meet exposure environment.
 - Upgrade electrical to meet ventilation requirements.
- **Oceanside Lift Station (WWR-8):**
The City's fiscal year 2013-14 budget included a \$4,400,000 line item for the relocation of the Oceanside Boulevard Lift Station, and was carried over to the City's collection system Capital Improvement Program (CIP).
- **Future Lift Station Rehabilitation (WWR-9):**
This SMP includes an allowance for additional lift station rehabilitation projects not specifically identified by the condition assessment in order to plan for future rehabilitation in both the near term and in the long term. Of the City's 32 lift stations, eight have been targeted for CIP projects. This SMP assumes that the remaining 24 lift stations will each need to be rehabilitated at some point by year 2050.

7.3.3 Collection System Pipeline Rehabilitation Projects

The City's BAM model was developed to identify the remaining useful life of the City's collection system pipelines and to develop a plan to fund collection system R&R projects through the planning horizon of this SMP. Overall rehabilitation/replacement investment needs were evaluated by running the BAM model with unit costs associated with the individual segments (unit costs, by pipeline diameter are described in Chapter 9) at their estimated end of service life. Table 7.3 presents a summary of the length of pipeline that will reach its useful life by year 2020 (Near Term) and by year 2050 (Long Term). As shown in Table 7.3, approximately 24.7 miles of pipeline are targeted for rehabilitation or replacement in the near term. Of the 24.7 miles, approximately 65-percent (16.0 miles) consist of 6- and 8-inch diameter pipe. In the long term, an additional 92.3 miles are

targeted for rehabilitation or replacement, approximately 83-percent of which consists of 6- and 8-inch diameter pipeline. Costs associated with the R&R program are presented in Chapter 9.

7.3.4 San Luis Rey WWTP Improvements

The City's 2012 San Luis Rey Wastewater Treatment Plant (WWTP) Facility Needs Assessment (Carollo, 2012) identified and prioritized potential improvement projects at the City's San Luis Rey WWTP. These projects were identified during an on-site condition assessment review, and project costs and priorities were developed. This document was reviewed as part of this SMP to determine if any the projects identified in the Facility Needs Assessment have been completed to date and which projects are still required. Based on this review, a final list of projects were developed and included in the City's Master CIP (see Chapter 9).

7.3.5 La Salina WWTP Decommissioning and New Pump Station

The La Salina WWTP is nearing the end of useful life and in the need of costly repairs and upgrades. The City has conducted a review of the two treatment facilities (San Luis Rey WWTP and La Salina WWTP) to determine the needed upgrades and repairs to sustain treatment at the two treatment sites. The City determined that the most cost effective alternative is to decommission the La Salina WWTP and build a new pump station to convey the wastewater flows up to the San Luis Rey WWTP. This project includes the following:

- Site demolition of the La Salina WWTP;
- Relocation of the 24" Oceanside Land Outfall and 16" Fallbrook Outfall Pipe;
- Repurpose the 16" Fallbrook Public Utilities District (FPUD) line for conveying raw wastewater from the new pump station to the San Luis Rey WWTP;
- Convert the City's brine line to a reclaimed water pipeline to supply reclaimed water to the El Corazon sports facility and the Goat Hill golf course;
- Perform mechanical and electrical upgrades at the San Luis Rey WWTP;
- Construct a new 5.5 mgd with a peak hour of 10.2 mgd pump station;
- Construct recycled water plan upgrades at the San Luis Rey WWTP;
- Construct a booster pump station and storage reservoir at Goat Hill and El Corazon;
and
- Sell the extra land from the La Salina WWTP after demolition of existing facilities and constructing the pump station.

7.3.6 Other Existing System Improvements

The City's current budget also included some miscellaneous wastewater projects that were carried over to the City Master CIP (Chapter 9). These projects include SCADA system upgrades associated with the sewer collection system, the Ocean Outfall Capacity Study, and the Land Outfall.

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FUTURE SYSTEM EVALUATION

This chapter outlines the evaluation of the City's wastewater collection system under future peak flow conditions. This section provides recommendations for improvement projects to address future deficiencies and serve future growth.

8.1 CAPACITY EVALUATION

Similar to Chapter 7, future system capacity analysis evaluated the sewer collection system following dry and wet weather calibration. The assessments included gravity pipelines, lift stations, and associated force mains. This section identifies the wastewater collection system infrastructure required to serve future growth within the City's service area for both near-term (2020) and long-term (2050) peak flow conditions.

8.1.1 Gravity Collection System Analysis

The future system analysis of the gravity collection system was performed in a manner similar to the existing system analysis (see Chapter 7). In accordance with the established flow depth criteria for existing sewers, pipelines with a maximum flow depth to pipe diameter (d/D) ratio greater than 1.0 were identified for both the near-term scenario and the long-term scenario. In addition, pipeline improvements that were sized to mitigate existing capacity deficiencies were checked under both near term and long term peak wet weather flow (PWWF) conditions to confirm that the proposed size (diameter) is appropriate to accommodate future growth.

Figure 8.1 shows the locations of the capacity deficiencies under future peak flow conditions. As shown on Figure 8.1, two additional capacity deficient pipeline segments were identified as part of this analysis, one under near term PWWF conditions, and one under long term PWWF conditions.

8.1.2 Lift Station and Force Main Analysis

As with the existing system analysis (Chapter 7), the City's modeled lift stations were checked against the near term and long term PWWF conditions. No additional modeled lift stations were flagged as deficient. Table 8.1 summarizes the future system lift station capacity evaluation.

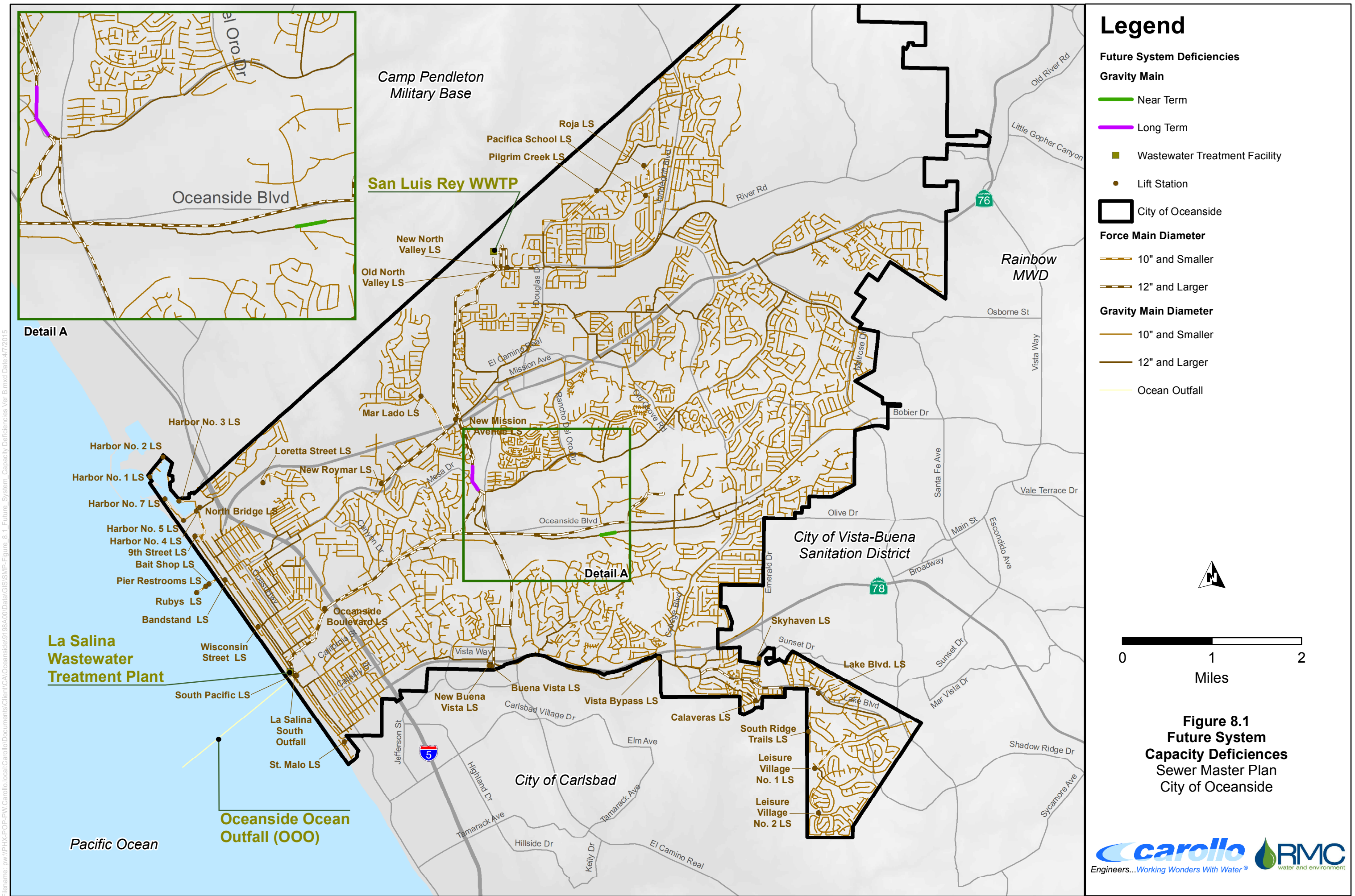
Table 8.1 Future Lift Station Capacity Evaluation
Sewer Master Plan
City of Oceanside

| Station Name | Address | Modeled Pump Station Information | | | | | | | | | | Peak Wet Weather Flow | | | Capacity Deficiency ⁽²⁾ | |
|--------------------|-------------------------------|----------------------------------|-------------------|---------------------|------------|------------------------------------|--------------|-----------------|-----------------|-------------|-----------|-----------------------|--------|-----------|------------------------------------|------------------|
| | | Year Constructed | Wastewater Basin | Flow per pump (gpm) | # of Pumps | Firm Capacity ⁽¹⁾ (mgd) | Exist. (mgd) | Near Term (mgd) | Long Term (mgd) | Exist. Term | Near Term | Long Term | Exist. | Near Term | Long Term | |
| | | | | | | | | | | | | | | | | Wastewater Basin |
| Bandstand | 250 North Strand | 1999 | La Salina WWTP | 300 | 2 | 300 | 0.43 | 2 | 300 | 0.43 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | |
| Buena Vista | 2501 Haymar Drive | 1979 | San Luis Rey WWTP | 2,600 | 4 | 7,800 | n/a | 4 | 7,800 | 11.23 | 6.76 | 7.11 | 7.72 | 7.72 | | |
| Calaveras | 3636 Sky Haven Lane | | San Luis Rey WWTP | 850 | 3 | 1,700 | 1.22 | 3 | 1,700 | 2.45 | 1.17 | 1.42 | 1.43 | 1.43 | | |
| Harbor #1 | 200 North Harbor Drive | 1961 | La Salina WWTP | 150 | 2 | 150 | 0.22 | 2 | 150 | 0.22 | 0.01 | 0.01 | 0.01 | 0.01 | | |
| Harbor #2 | 1830 North Harbor Drive | 1961 | La Salina WWTP | 175 | 2 | 175 | 0.25 | 2 | 175 | 0.25 | 0.03 | 0.03 | 0.03 | 0.03 | | |
| Harbor #3 | 1325 North Harbor Drive | 1961 | La Salina WWTP | 250 | 2 | 250 | 0.36 | 2 | 250 | 0.36 | 0.04 | 0.04 | 0.04 | 0.04 | | |
| Harbor #4 | 284 North Harbor Drive | 1961 | La Salina WWTP | 500 | 2 | 500 | 0.72 | 2 | 500 | 0.72 | 0.05 | 0.05 | 0.05 | 0.05 | | |
| Harbor #5 | North Pacific Street | 1961 | La Salina WWTP | 150 | 2 | 150 | 0.22 | 2 | 150 | 0.22 | 0.02 | 0.02 | 0.02 | 0.02 | | |
| Lake Blvd | 4700 1/2 Lake Boulevard | 1993 | San Luis Rey WWTP | 1,000 | 4 | 3,000 | 1.44 | 4 | 3,000 | 4.32 | 1.41 | 1.41 | 1.60 | 1.60 | | |
| Leisure Village #1 | 4706 Cannon Road | 1984 | San Luis Rey WWTP | 800 | 3 | 1,600 | 1.15 | 3 | 1,600 | 2.30 | 0.38 | 0.38 | 0.50 | 0.50 | | |
| Leisure Village #2 | 4300 Leisure Village Way | 1986 | San Luis Rey WWTP | 500 | 2 | 500 | 0.72 | 2 | 500 | 0.72 | 0.14 | 0.14 | 0.15 | 0.15 | | |
| Loretta | 1261 Loreita Street | 1953 | La Salina WWTP | 400 | 2 | 400 | 0.58 | 2 | 400 | 0.58 | 0.15 | 0.15 | 0.16 | 0.16 | | |
| Mar Lado | 401 North Fousat Road | 1986 | San Luis Rey WWTP | 600 | 3 | 1,200 | 0.86 | 3 | 1,200 | 1.73 | 1.29 | 1.30 | 1.32 | 1.32 | | |
| Mission Avenue | 3476 Mission Avenue | 2002 | San Luis Rey WWTP | 2,900 | 4 | 8,700 | 4.18 | 4 | 8,700 | 12.53 | 9.50 | 10.05 | 11.85 | 11.85 | | |
| North Bridge | 304 South Harbor Drive | 1988 | La Salina WWTP | 1,200 | 2 | 1,200 | 1.73 | 2 | 1,200 | 1.73 | 0.76 | 0.76 | 0.83 | 0.83 | | |
| Ninth Street | 997 North Pacific Road | 1975 | La Salina WWTP | 500 | 2 | 500 | 0.72 | 2 | 500 | 0.72 | 0.08 | 0.08 | 0.11 | 0.11 | | |
| North Valley | 3930 North River Road | 1971 | San Luis Rey WWTP | 2,960 | 3 | 5,920 | 4.26 | 3 | 5,920 | 8.52 | 6.69 | 6.89 | 7.34 | 7.34 | | |
| Oceanside Blvd | 1664 Oceanside Boulevard | 1975 | La Salina WWTP | 1,700 | 3 | 3,400 | 2.45 | 3 | 3,400 | 4.90 | 2.92 | 2.92 | 3.24 | 3.24 | | |
| Pacifica School | 4991 Marcaro Road | 1971 | San Luis Rey WWTP | 400 | 2 | 400 | 0.58 | 2 | 400 | 0.58 | 0.10 | 0.10 | 0.10 | 0.10 | | |
| Pilgrim Creek | 855 Douglas Drive | 1976 | San Luis Rey WWTP | 2,000 | 2 | 2,000 | 2.88 | 2 | 2,000 | 2.88 | 1.41 | 1.62 | 1.66 | 1.66 | | |
| Roja | 703 Roja Street | 1975 | San Luis Rey WWTP | 250 | 2 | 250 | 0.36 | 2 | 250 | 0.36 | 0.05 | 0.05 | 0.05 | 0.05 | | |
| Roymar | 110 Jones Road | 1957 | San Luis Rey WWTP | 1,600 | 4 | 4,800 | 2.30 | 4 | 4,800 | 6.91 | 1.92 | 2.00 | 2.31 | 2.31 | | |
| St. Malo | 52 St. Malo Beach | | La Salina WWTP | 200 | 2 | 200 | 0.29 | 2 | 200 | 0.29 | 0.05 | 0.05 | 0.06 | 0.06 | | |
| Sky Haven | 3521A Sky Haven Lane | 1973 | San Luis Rey WWTP | 150 | 2 | 150 | 0.22 | 2 | 150 | 0.22 | 0.00 | 0.00 | 0.01 | 0.01 | | |
| South Pacific | 1330 South Tait Street | 1955 | La Salina WWTP | 700 | 2 | 700 | 1.01 | 2 | 700 | 1.01 | 1.87 | 1.87 | 2.15 | 2.15 | | |
| South Ridge Trails | 4900 Cannon Road | | San Luis Rey WWTP | 600 | 2 | 600 | 0.86 | 2 | 600 | 0.86 | 0.11 | 0.11 | 0.11 | 0.11 | | |
| Wisconsin | Wisconsin and Pacific Streets | | La Salina WWTP | 300 | 2 | 300 | 0.43 | 2 | 300 | 0.43 | 0.09 | 0.09 | 0.11 | 0.11 | | |

Notes:

1. Firm capacity is estimated as the total pump capacity with one pump out of service (Flow per pump x [# of pumps-1]).

2. Lift stations are called out as capacity deficiencies if the peak wet weather flow exceeds the pumping capacity of the lift station.



Legend

Future System Deficiencies

- Gravity Main
 - Near Term (Green line)
 - Long Term (Purple line)
- Wastewater Treatment Facility (Green square)
- Lift Station (Black dot)
- City of Oceanside (Black outline)

Force Main Diameter

- 10" and Smaller (Thin brown line)
- 12" and Larger (Thick brown line)

Gravity Main Diameter

- 10" and Smaller (Thin brown line)
- 12" and Larger (Thick brown line)
- Ocean Outfall (Yellow line)

0 1 2
Miles

North arrow pointing up.

Figure 8.1
Future System Capacity Deficiencies
 Sewer Master Plan
 City of Oceanside

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8.2 FUTURE COLLECTION SYSTEM IMPROVEMENTS

The following summarizes the locations of existing pipelines that would need to be replaced in order to accommodate near term and long term PWWFs:

- **Rancho Del Oro Sewer (Project WWC-8):** The capacity evaluation indicated a short reach of 15-inch diameter sewer south of Oceanside Boulevard at Rancho Del Oro Road that will be capacity deficient for the near term PWWF condition. The required size to mitigate this deficiency is an 18-inch diameter sewer. In addition, the City is in the process of completing a storm drain detention basin project along Loma Alta Creek adjacent to this sewer. The Project is to construct stormwater detention basins in the existing creek bed by using retention walls as a way to capture stormwater peaks to reduce the chance of downstream flooding. The City has contracted with Carollo to conduct a feasibility study to identify potential alternative alignments to relocate the existing sewer. For the purposes of this SMP, it has been assumed that only the capacity deficient reach of sewer would be replaced. However, upon completion of the feasibility study, the SMP and Master CIP shall be updated to include the recommended project alignment and estimated project costs.
- **Mesa Drive Sewer (Project WWC-11):** Under long-term PWWF conditions, the existing 24-inch diameter sewer on Mesa Drive from west of the El Camino Real to north of Mesa Drive was shown to be capacity deficient. It is recommended that this sewer be replaced with a 30-inch diameter sewer.
- **Collection System Pipeline Rehabilitation Projects:** As discussed in Chapter 7, the City's BAM model was developed to identify the remaining useful life of the City's collection system pipelines and to develop a plan to fund collection system R&R projects through the planning horizon of this SMP. The majority of the pipeline rehabilitation projects will be required in the future as pipelines within the existing collection system reach their useful life. Refer to Table 7.3 for a summary of the length of pipeline that will reach its useful life by year 2020 (Near Term) and by year 2050 (Long Term). Costs associated with the R&R program are presented in Chapter 9.

8.2.1 Existing versus Future Improvement

An existing deficiency is one where the existing facility's capacity is insufficient to meet the planning criteria (e.g., pipeline upgrades required to prevent severe surcharging during the design wet weather event) for existing users. If a project was proposed to correct an existing deficiency exclusively, then existing users were assigned 100 percent of the project's benefit, and therefore, 100 percent of the costs.

Some of the improvements presented in this SMP will serve future users, even when an improvement calls for the upgrade of an existing facility. In these cases, an existing sewer

or lift station may have sufficient capacity to convey current PWWFs, but as growth continues and more users are added to the system, the increased flow results in capacity deficiencies. These projects are future improvements. Future users were assigned 100 percent of the future project's benefit and 100 percent of the costs.

In many cases, a project is needed to correct an existing capacity deficiency, but is sized to accommodate additional flows from future development. In these cases, the hydraulic modeling results were used to determine the cost breakdown between existing and future users based on the ratio of existing and build out average dry weather flows. More information on the breakdown in cost split between existing and future users and whether a proposed improvement is intended to correct an existing deficiency, to serve a future user, or both, is provided in Chapter 9.

8.2.2 Project Prioritization

When fully implemented, the capital projects identified will allow the for the collection system to reliably convey PWWFs through the year 2050. Prioritization of the required capital improvements for the City's sewer system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies.
- Upgrading existing facilities to accommodate increased wastewater flows associated the Near-Term (2020) and Long-Term (2050) planning years.
- Implementing condition assessment projects for the City's lift stations and wastewater treatment facilities based on criticality ranking.
- Planning for pipeline rehabilitation projects based on remaining useful life.

Based on these factors, each project was categorized as either a "Near Term" or "Long Term" project. Near-Term projects are targeted for implementation by year 2020. For capacity improvements, "existing" improvements are categorized as Near-Term Improvements. Long-Term projects are targeted for implementation between year 2021 and 2050.

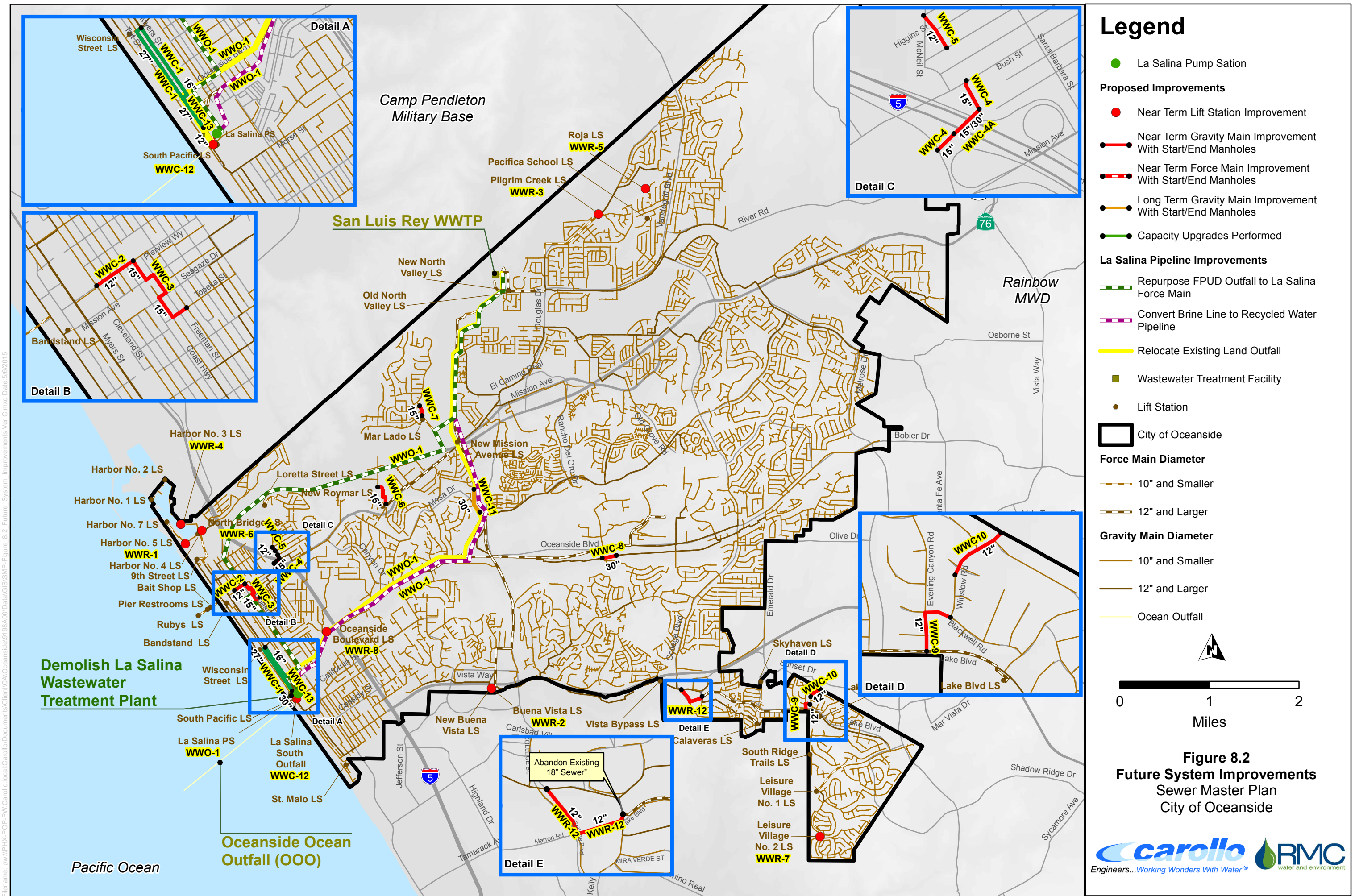
Figure 8.2 shows the proposed collection system improvement projects, color coded by implementation phase. Table 8.2 lists specific details related to each of the improvement project recommendations, as well as the project prioritization of each project for reference.

| Table 8.2 Future System Improvements Sewer Master Plan City of Oceanside | | | | | Project Length/Size | | | | Project Prioritization |
|--|--------------------|---|--|--|--|-----------------|----------------|----------------------|---------------------------|
| ID | Type of Improv. | Description/ Street | Description / Limits | Existing Ex. Size/ Diam. (in) | Proposed New Size/ Diam. (in) | Replace/ New | Length (ft) | | |
| Capacity Related CIPs | | | | | | | | | |
| Gravity Mains | | | | | | | | | |
| WWC-1 ⁽¹⁾ | Pipe | S. Myers St./Tait St. | Myers/Tait St. Sewer Line | Varies | 8-30 | Liner/Replace | 6,550 | Recently Constructed | |
| WWC-2 | Pipe | Pier View Way | Alley south of N. Freeman St. to N. Cleveland St. | 8 | 12 | Replace | 730 | Near Term (Existing) | |
| WWC-3 | Pipe | N. Freeman St./Topeka St. | Alley south of S. Ditmars St. to Pier View Way | 8-10 | 15 | Replace | 1,700 | Near Term (Existing) | |
| WWC-4 | Pipe | Near I-5 | Bush St. to Buena St. | 10 | 15 | Replace | 230 | Near Term (Existing) | |
| WWC-4A | Pipe/Casing | Interstate 5 | I-5 Crossing | 12 | 15/30 | Replace | 420 | Near Term (Existing) | |
| WWC-5 | Pipe | McNeil St. | Alley west of Higgins St. to Puls St. | 10 | 12 | Replace | 290 | Near Term (Existing) | |
| WWC-6 | Pipe | East of Jones Rd. | Jones Rd. to San Luis Rey Rd. | 10 | 15 | Replace | 1,430 | Near Term (Existing) | |
| WWC-7 | Pipe | Foussat Rd. | Shadow Tree Dr. to Benet Rd. | 10 | 15 | Replace | 590 | Near Term (Existing) | |
| WWC-8 | Pipe | Near New Storm Basin | Assume replacement for now (Future Special Study) | 15 | 18 | Replace | 860 | Near Term | |
| WWC-9 | Pipe | Evening Cyn. Rd./Blackwell Rd. | Winslow Rd. to Lake Blvd. | 8 | 12 | Replace | 730 | Near Term (Existing) | |
| WWC-10 | Pipe | Winslow Rd. | Sheridan Rd. to Warwick Cir. | 8 | 12 | Replace | 710 | Near Term (Existing) | |
| WWC-11 | Pipe | Mesa Drive | West of El Camino Real to north of Mesa Drive | 24 | 30 | Replace | 1,480 | Long Term | |
| Lift Stations and Force Mains | | | | | | | | | |
| WWC-12 | Lift Station | South Pacific Lift Station | 2-1,500 gpm pumps with a firm capacity of 2.16 mgd | -- | 4.32 mgd | Replace/ Upsize | -- | Near Term (Existing) | |
| WWC-13 | Force Main | South Pacific Force Main | Replace existing force main | 6 | 12 | Replace | 215 | Near Term (Existing) | |
| Rehab Related CIPs | | | | | | | | | |
| Lift Station Rehab | | | | | | | | | |
| WWR-1 | Lift Station | Harbor #5 Lift Station | Repair leaks and reline pit, replace damaged piping and electrical gear | -- | -- | Rehab | -- | Near Term | |
| WWR-2 | Lift Station | New Buena Vista Lift Station | Replace pumps and stabilize hillside | -- | -- | Rehab | -- | Near Term | |
| WWR-3 | Lift Station | Pilgrim Creek Lift Station | Install coating in wet well and paint dry well. Install bypass for access and improve ladder safety access | -- | -- | Rehab | -- | Near Term | |
| WWR-4 | Lift Station | Harbor #3 Lift Station | Repair dry well, replace pumps and piping and install fall protection | -- | -- | Rehab | -- | Near Term | |
| WWR-5 | Lift Station | Roja Lift Station | Install wet well coating and repair corroded pipe and access hatch | -- | -- | Rehab | -- | Near Term | |
| WWR-6 | Lift Station | North Bridge Lift Station | Install metal roof | -- | -- | Rehab | -- | Near Term | |
| WWR-7 | Lift Station | Leisure Village No. 2 Lift Station | Upgrade electrical gear, conduit and fixtures in pump room | -- | -- | Rehab | -- | Near Term | |
| WWR-8 | City CIP | Oceanside Blvd Lift Station Relocation | Project funded FY 2013-14 | -- | -- | Rehab | -- | Near Term | |
| WWR-9 | City CIP | Future Lift Station Rehab | Remaining Lift Station Rehab | -- | -- | Rehab | -- | Near/Long Term | |
| Pipeline Rehab | | | | | | | | | |
| WWR-10 | City CIP | Haymar Interceptor Sewer Repair and Feasibility Study | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- | Near Term | |
| WWR-11 | City CIP | Haymar Interceptor | Project funded FY 2013-14 through 2015-17 | -- | -- | -- | -- | Near Term | |
| WWR-12 | City CIP | Lake Boulevard Sewer Replacement | Project funded FY 2013-14 | -- | -- | -- | -- | Near Term | |
| WWR-13 | City CIP | CIPP Slip lining Project | Project funded FY 2013-14 through 2016-17 | -- | -- | -- | -- | Near Term | |
| Near Term Pipeline Replacement | | | | | | | | | |
| WWR-14 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 0 | Near Term | |
| WWR-15 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 29,430 | Near Term | |
| WWR-16 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 55,250 | Near Term | |
| WWR-17 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 3,980 | Near Term | |
| WWR-18 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 5,090 | Near Term | |
| WWR-19 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 770 | Near Term | |
| WWR-20 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 3,480 | Near Term | |
| WWR-21 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 2,120 | Near Term | |
| WWR-22 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 1,160 | Near Term | |
| WWR-23 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 0 | Near Term | |
| WWR-24 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 29,100 | Near Term | |
| WWR-25 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 | Near Term | |
| Long Term Pipeline Replacement | | | | | | | | | |
| WWR-26 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 890 | Long Term | |
| WWR-27 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 153,690 | Long Term | |
| WWR-28 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 251,690 | Long Term | |
| WWR-29 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 26,010 | Long Term | |
| WWR-30 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 17,940 | Long Term | |
| WWR-31 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 0 | Long Term | |
| WWR-32 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 13,730 | Long Term | |

| Table 8.2 Future System Improvements Sewer Master Plan City of Oceanside | | | | | | | | |
|---|-----------------|--|---|--|--|-----------------|----------------|---------------------------|
| ID | Type of Improv. | Description/ Street | Description / Limits | Project Length/Size | | | | Project Prioritization |
| | | | | Existing Ex. Size/ Diam. (in) | Proposed New Size/ Diam. (in) | Replace/ New | Length (ft) | |
| WWR-33 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 0 | Long Term |
| WWR-34 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 12,800 | Long Term |
| WWR-35 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 9,370 | Long Term |
| WWR-36 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 1,460 | Long Term |
| WWR-37 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 | Long Term |
| San Luis Rey Water Reclamation Facility | | | | | | | | |
| WWR-38 | Rehab | San Luis Rey Phase 1 Improvements | Phase 1 Improvements | -- | -- | Rehab | -- | Near Term |
| | Rehab | Plant 1 Upgrades | Replace Aeration Basin influent and effluent gates and repair and reline influent channel, remove abandoned screw pump station, and miscellaneous improvements. At the Secondary Clarifiers, repair localized areas of concrete corrosion, install traffic bollards for safety and replace damaged conduit and wiring to clarifier drives. | -- | -- | Rehab | -- | Near Term |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Install grating walkway for safety, remove abandoned pipes and conduits, replace corroded electrical conduits and pipes, and remove embedded pipe supports. | -- | -- | Rehab | -- | Near Term |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Remove embedded pipe supports and repair concrete walls. | -- | -- | Rehab | -- | Near Term |
| WWR-39 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- | Near Term |
| WWR-40 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- | Near Term |
| WWR-41 | Rehab | Headworks, Grit Chamber, LET & Diversion Structure Upgrades | Repair and reline concrete channels, replace screenings washer compactor controls, abandon old grit chamber, replace LET 1 effluent valve, repair Diversion Box 2 gate stems, repair corroded metals, and replace miscellaneous items no longer in service. | -- | -- | Rehab | -- | Near Term |
| WWR-42 | Rehab | Digester & Boiler Room Upgrades | In the Boiler Room of Digesters 1 and 2, replace Transfer Pump No. 2, replace Boilers 1 and 2 including repair of concrete around boilers, remove abandoned boiler digester gas feed pipe, replace corroded louver, replace corroded door, and repair roof. Replace Digester 3 overflow pipe vents, replace Digester 3 ferrous water pipe, repaint Digester 3 exterior, provide anchorage for heat exchanger, demolish hydrogen peroxide tank and containment, and repair asphalt at sinkhole near Digester 3 stairs. | -- | -- | Rehab | -- | Near Term |
| WWR-43 | Rehab | Replace Rented Chemical Storage Facilities | Install City-owned chemical storage and pumping facilities at multiple locations to replace rented facilities. | -- | -- | Rehab | -- | Near Term |
| WWR-44 | Rehab | Digester Cleaning | Clean each digester every 5 years. | -- | -- | Rehab | -- | Near Term |
| WWR-45 | Rehab | Thickening & Dewatering Upgrades | Replace bollards at GBT Building, replacing leaking air pipe at Waste Gas Burners, repaint flares, and replace diversion gates in Centrifuge Building. | -- | -- | Rehab | -- | Near Term |
| WWR-46 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- | Near Term |
| WWR-47 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- | Near Term |
| WWR-48 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 3 (5 to 10 years). | -- | -- | Rehab | -- | Long Term |
| WWR-49 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 4 (10 to 15 years). | -- | -- | Rehab | -- | Long Term |
| WWR-50 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 3 (10 to 15 years). | -- | -- | Rehab | -- | Long Term |
| WWR-51 | Cleaning | SLR Digester Cleaning | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- | Near/Long Term |
| WWR-52 | Rehab | SLR Maint Bldg Upgrades | Project funded FY 2013-14 to 2014-15 | -- | -- | -- | -- | Near Term |
| La Salina Pump Station/Treatment Plant Demolition | | | | | | | | |
| WVO-1 | New | La Salina Wastewater Treatment Plant Demolition/Pump Station | Demolition of the La Salina Wastewater Treatment Plant and construction of a new pump station from LSWWTP to SLRWWTP. See section 7.3.5 for details on project description. | -- | -- | New | -- | Near Term |
| Other Projects | | | | | | | | |
| WVO-2 | Other | Sewer SCADA Upgrades | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- | Near Term |
| WVO-3 | Other | Ocean Outfall Capacity Study | Project funded FY 2013-14 | -- | -- | -- | -- | Near Term |
| WVO-4 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- | Near Term |
| WVO-5 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- | Near Term |

Notes:

1. This project has recently been constructed by the City.



Legend

- La Salina Pump Station
- Proposed Improvements**
 - Near Term Lift Station Improvement
 - Near Term Gravity Main Improvement With Start/End Manholes
 - Near Term Force Main Improvement With Start/End Manholes
 - Long Term Gravity Main Improvement With Start/End Manholes
 - Capacity Upgrades Performed
- La Salina Pipeline Improvements**
 - Repurpose FPUD Outfall to La Salina Force Main
 - Convert Brine Line to Recycled Water Pipeline
 - Relocate Existing Land Outfall
- Wastewater Treatment Facility
- Lift Station
- City of Oceanside
- Force Main Diameter**
 - 10" and Smaller
 - 12" and Larger
- Gravity Main Diameter**
 - 10" and Smaller
 - 12" and Larger
 - Ocean Outfall

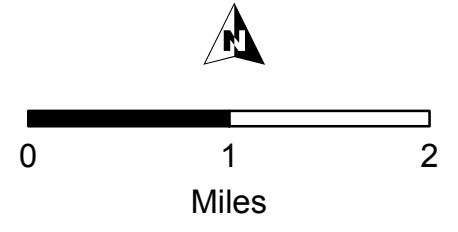


Figure 8.2
Future System Improvements
 Sewer Master Plan
 City of Oceanside

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CAPITAL IMPROVEMENT PLAN

This chapter presents the recommended capital improvement plan (CIP) for the City wastewater collection system and a summary of the capital costs. This chapter is organized to assist the City in making financial decisions, and is based on the evaluation of the City's sewer system.

9.1 PROJECT PRIORITIZATION

As discussed in Section 8.2.2, the capital projects identified will allow the for the collection system to reliably convey PWWFs through the year 2050. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies.
- Upgrading existing facilities to accommodate increased wastewater flows associated the near-term (2020) and long-term (2050) planning years.
- Implementing condition assessment projects for the City's lift stations and wastewater treatment facilities based on criticality ranking.
- Planning for pipeline rehabilitation projects based on remaining useful life.

Based on these factors, each project was categorized as either a "near-term" or "long-term" project. Near-term projects are targeted for implementation by year 2020. For capacity improvements, "existing" improvements are categorized as Near-Term Improvements. Long-term projects are targeted for implementation between year 2021 and 2050.

Figure 8.2 shows the proposed collection system improvement projects are shown on Figure 8.2, color coded by implementation phase, and described in detail in Table 8.2.

9.2 CAPITAL IMPROVEMENT PROJECT COSTS

The capacity upgrades set the foundation for the City's related sewer system CIP. The cost estimates presented in this study are opinions developed from bid tabulations, cost curves, information obtained from previous studies, and Carollo Engineers, Inc. (Carollo) experience on other projects. The costs are based on an Engineering News Record Construction Cost Index (ENR CCI) 10,736 (Los Angeles, January 2014).

9.3 COST ESTIMATING ACCURACY

The cost estimates presented in the CIP have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project

scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent. This section presents the assumptions used in developing order of magnitude cost estimates for recommended facilities.

9.4 CONSTRUCTION UNIT COSTS

The construction costs are representative of sewer system facilities under normal construction conditions and schedules. Costs have been estimated for public works construction.

9.4.1 Gravity Pipeline Unit Costs

Sewer pipeline improvements range in size from 8-inches to 30-inches in diameter in this study. Pipe casings up to 30-inches in diameter are included for major crossings (e.g., creeks, canals, highways, and railroad) of the trunk sewers. Unit costs for the construction of pipelines and appurtenances (e.g., manholes) are shown in Table 9.1. The construction cost estimates are based upon these unit costs. The unit costs are for “typical” field conditions with construction in stable soil at a depth ranging between 10 feet to 15 feet.

9.4.2 Lift Station Replacement Unit Costs

This SMP includes two types of lift station improvement projects, projects to increase the pumping capacity of the lift station, and projects associated with rehabilitation of the lift station. The estimated costs for projects to increase the pumping capacity of a lift station assume complete replacement of the lift station, and are based on the lift station cost versus capacity curve shown in Figure 9.1. Figure 9.1 was developed based on projects of similar size in California. Costs were generated by inputting the appropriate capacity and calculating the corresponding construction costs.

9.4.3 Lift Station Rehabilitation Costs

The estimated cost to rehabilitate each of the lift stations identified in the Lift Station Condition Assessment Technical Memorandum (Carollo, 2013) were developed on a case-by-case basis. For more information regarding the methodology used to estimate costs for a particular lift station, refer to Appendix G.

| Table 9.1 Gravity Pipeline Unit Construction Costs Sewer Master Plan City of Oceanside | | |
|---|--|--|
| Pipe Diameter (inches) | Replacement Unit Construction Cost (\$/linear foot)⁽¹⁾ | R&R Program Unit Construction Cost (\$/linear foot)⁽¹⁾⁽²⁾⁽³⁾ |
| 4 | 154 | 154 |
| 6 | 154 | 154 |
| 8 | 154 | 125 |
| 10 | 161 | 131 |
| 12 | 170 | 138 |
| 14 | 178 | 145 |
| 15 | 182 | 148 |
| 18 | 197 | 160 |
| 21 | 254 | 206 |
| 24 | 275 | 223 |
| 27 | 311 | 253 |
| 30 | 345 | 280 |
| 33 | 389 | 316 |
| 36 | 433 | 352 |
| Pipeline Casing for Major Crossings | | |
| 15/30 | 491 | -- |
| 18/30 | 532 | -- |
| 21/42 | 686 | -- |
| Notes: | | |
| (1) ENR CCI = 10,736 (Los Angeles, January 2014). | | |
| (2) 2.4-inch and 6-inch pipes are assumed to be replaced by 8-inch pipes for R&R program. | | |
| (3) 3.8-inch to 36-inch pipeline R&R unit costs assume 75% of pipelines will be rehabilitated at 75% of the Replacement Unit Cost, and the remaining 25% of pipelines will be replaced at the Replacement Unit Cost (R&R Unit Cost = 0.75 x 0.75 x Replacement Unit Cost + 0.25 x Replacement Unit Cost). | | |

9.4.4 Force Mains

One of the recommended improvement projects, the South Pacific Lift Station Project WWWC-13, includes the replacement of existing 6-inch diameter piping with 12-inch diameter. Unit costs for the construction of force mains are shown in Table 9.2. The construction cost estimates are based upon these unit costs.

| Table 9.2 Force Main Unit Construction Costs Wastewater Master Plan City of Oceanside | |
|--|---|
| Pipe Size (inches) | Unit Construction Cost⁽¹⁾ (\$/LF) |
| 6 | 157 |
| 8 | 156 |
| 12 | 172 |

Note:
(1) ENR CCI = 10,736 (Los Angeles, January 2014).

9.5 PROJECT COSTS AND CONTINGENCIES

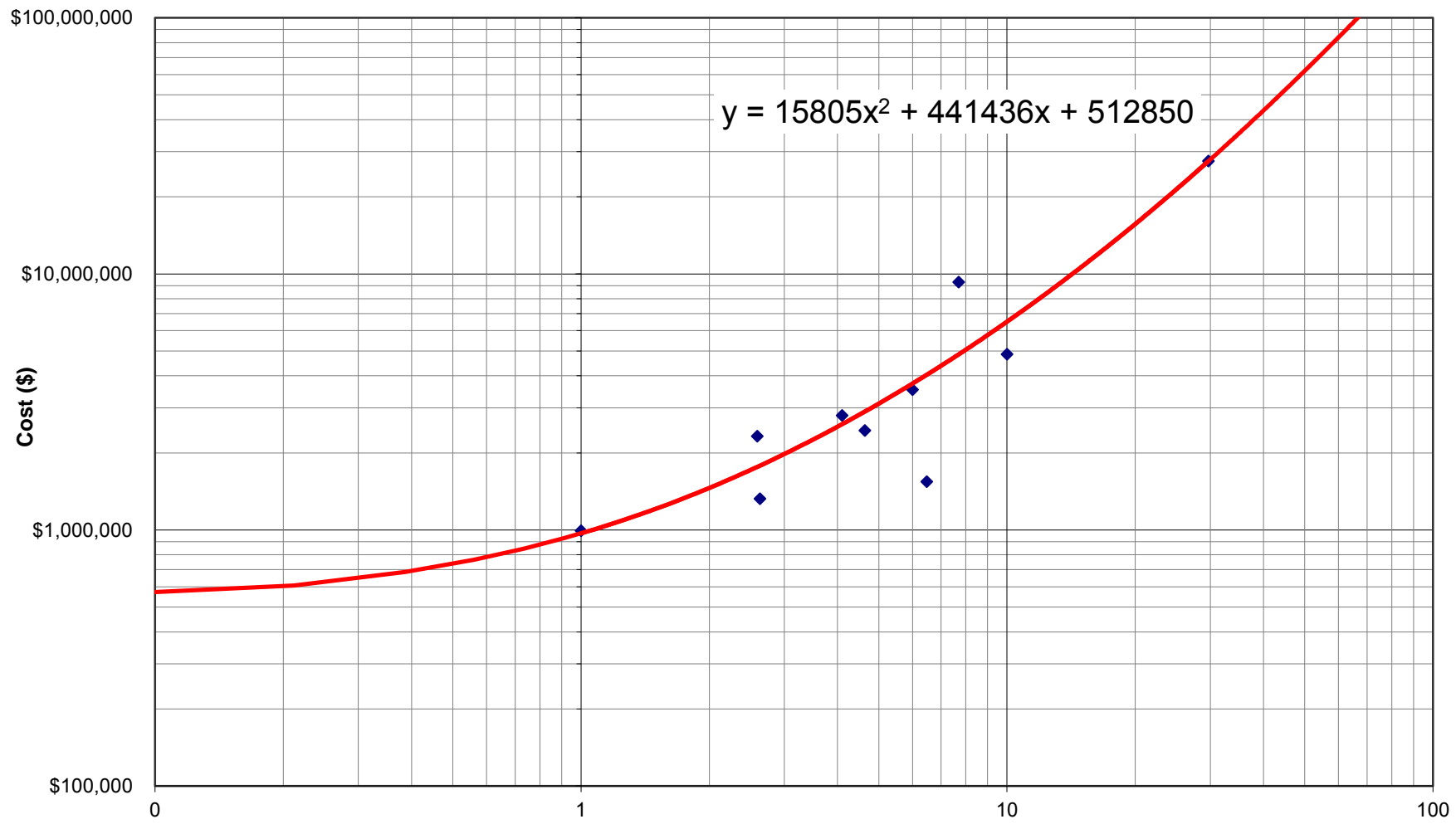
Project cost estimates are calculated based on elements, such as the project location, size, length, land acquisition needs, and other factors. Allowances for project contingencies consistent with an “Order of Magnitude” estimate are also included in the project costs prepared as part of this study, as outlined in this section.

9.5.1 Baseline Construction Cost

This is the total estimated construction cost, in dollars, of the proposed improvement for pipelines and lift stations. Baseline construction costs were calculated by multiplying the estimated length by the unit cost.

9.5.2 Estimated Construction Cost

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. Consequently, it is appropriate to allow for uncertainties associated with the preliminary layout of a project. Such factors as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities are a few of the items that can increase project costs for which it is wise to make allowances in preliminary estimates. To assist the City in making financial decisions for these future construction projects, contingency costs will be added to the planning budget as percentages of the total construction cost, divided into two categories: Estimated Construction Cost and Capital Improvement Cost.



Total Pump Capacity (mgd)

Figure 9.1

Lift Station Construction Cost vs. Capacity Curve

Sewer Master Plan

City of Oceanside

Since knowledge about site-specific conditions of each proposed project is limited at the master planning stage, a 30 percent contingency was applied to the Baseline Construction Cost to account for unforeseen events and unknown conditions. This contingency accounts for unknown site conditions such as poor soils, unforeseen conditions, environmental mitigations, and other unknowns and is typical for master planning projects. The Estimated Construction Cost for the proposed sewer system improvement consists of the Baseline Construction Cost plus the 30 percent construction contingency.

9.5.3 Capital Improvement Cost

Other project construction contingency costs include costs associated with project engineering, construction phase professional services, and project administration. Engineering services associated with new facilities include preliminary investigations and reports, Right of Way (ROW) acquisition, foundation explorations, preparation of drawings and specifications during construction, surveying and staking, sampling of testing material, and start-up services. Construction phase professional services cover such items as construction management, engineering services, materials testing, and inspection during construction. Finally, there are project administration costs, which cover such items as legal fees, environmental/California Environmental Quality Act (CEQA) compliance requirements, financing expenses, administrative costs, and interest during construction.

The cost of these items can vary, but for the purpose of this study, it is assumed that the other project contingency costs will equal approximately 27.5 percent of the Estimated Construction Cost.

As shown in the following sample calculation of the capital improvement cost, the total cost of all project construction contingencies (construction, engineering services, construction management, and project administration) is 65.8 percent of the baseline construction cost. Calculation of the 65.8 percent is the overall mark-up on the baseline construction cost to arrive at the capital improvement cost. It is not an additional contingency.

Example:

| | |
|---------------------------------------|--------------------|
| Baseline Construction Cost | \$1,000,000 |
| <u>Construction Contingency (30%)</u> | <u>\$300,000</u> |
| Estimated Construction Cost | \$1,300,000 |
| Engineering Cost (10%) | 130,000 |
| Construction Management (10%) | 130,000 |
| <u>Project Administration (7.5%)</u> | <u>\$97,500</u> |
| Capital Improvement Cost | \$1,657,500 |

A summary of the capital project costs is presented in Table 9.3. This table identifies the projects, provides a brief description of the project, identifies facility size (e.g., pipe diameter and length), and the capital improvement cost. The table also shows the phase in which the project has been targeted for implementation. The implementation timeframe was based on the priority of each project to correct existing deficiencies or to serve future users.

| Table 9.3 Sewer System Capital Improvement Plan Sewer Master Plan City of Oceanside | | | | | | | | | | | | | |
|---|-----------------|---|--|-------------------------------|-------------------------------|-----------------|-------------|--|----------------------------------|----------------------------------|--------------------------|----------------------------|--------------------------|
| ID | Type of Improv. | Description/ Street | Description / Limits | Project Length/Size and Cost | | | | | Phasing | | Future Users Benefit (%) | Reimbursement Category | |
| | | | | Existing Ex. Size/ Diam. (in) | Proposed New Size/ Diam. (in) | Replace/ New | Length (ft) | Capital Improvement Cost ^{(1),(2),(3)} (\$) | Phase 1 Near Term 2014-2020 (\$) | Phase 2 Long Term 2020-2050 (\$) | | Existing Improvements (\$) | Future Improvements (\$) |
| Capacity Related CIPs | | | | | | | | | | | | | |
| Gravity Mains | | | | | | | | | | | | | |
| WWC-1 ⁽⁵⁾ | Pipe | S. Myers St./Tait St. | Myers/Tait St. Sewer Line (PROJECT HAS BEEN COMPLETED) | Varies | 8-30 | Liner/Replace | 6,550 | \$ - | \$ - | 0% | \$ - | \$ - | |
| WWC-2 | Pipe | Pier View Way | Alley south of N. Freeman St. to N. Cleveland St. | 8 | 12 | Replace | 730 | \$ 205,700 | \$ 205,700 | 27% | \$ 149,600 | \$ 56,100 | |
| WWC-3 | Pipe | N. Freeman St./Topeka St. | Alley south of S. Ditmars St. to Pier View Way | 8-10 | 15 | Replace | 1,700 | \$ 512,800 | \$ 512,800 | 30% | \$ 360,300 | \$ 152,500 | |
| WWC-4 | Pipe | Near I-5 | Bush St. to Buena St. | 10 | 15 | Replace | 230 | \$ 69,400 | \$ 69,400 | 20% | \$ 55,800 | \$ 13,600 | |
| WWC-4A | Pipe/Casing | Interstate 5 | I-5 Crossing | 12 | 15/30 | Replace | 420 | \$ 341,800 | \$ 341,800 | 20% | \$ 274,600 | \$ 67,200 | |
| WWC-5 | Pipe | McNeil St. | Alley west of Higgins St. to Puls St. | 10 | 12 | Replace | 290 | \$ 81,700 | \$ 81,700 | 10% | \$ 73,500 | \$ 8,200 | |
| WWC-6 | Pipe | East of Jones Rd. | Jones Rd. to San Luis Rey Rd. | 10 | 15 | Replace | 1,430 | \$ 431,400 | \$ 431,400 | 39% | \$ 261,700 | \$ 169,700 | |
| WWC-7 | Pipe | Foussat Rd. | Shadow Tree Dr. to Benet Rd. | 10 | 15 | Replace | 590 | \$ 178,000 | \$ 178,000 | 10% | \$ 160,100 | \$ 17,900 | |
| WWC-8 | Pipe | Near New Storm Basin | Assume replacement for now (Future Special Study) | 15 | 18 | Replace | 860 | \$ 280,800 | \$ 280,800 | 27% | \$ 204,000 | \$ 76,800 | |
| WWC-9 | Pipe | Evening Cyn. Rd./Blackwell Rd. | Winslow Rd. to Lake Blvd. | 8 | 12 | Replace | 730 | \$ 205,700 | \$ 205,700 | 7% | \$ 191,000 | \$ 14,700 | |
| WWC-10 | Pipe | Winslow Rd. | Sheridan Rd. to Warwick Cir. | 8 | 12 | Replace | 710 | \$ 200,100 | \$ 200,100 | 5% | \$ 190,800 | \$ 9,300 | |
| WWC-11 | Pipe | Mesa Drive | West of El Camino Real to north of Mesa Drive | 24 | 30 | Replace | 1,480 | \$ 846,300 | \$ 846,300 | 100% | \$ - | \$ 846,300 | |
| Gravity Main Subtotals | | | | | | | | \$ 3,353,700 | \$ 2,507,400 | \$ 846,300 | | \$ 1,921,400 | \$ 1,432,300 |
| Lift Stations and Force Mains | | | | | | | | | | | | | |
| WWC-12 | Lift Station | South Pacific Lift Station | 2-1,500 gpm pumps with a firm capacity of 2.16 mgd | -- | 4.32 mgd | Replace/ Upsize | -- | \$ 4,499,800 | \$ 4,499,800 | 35% | \$ 2,928,100 | \$ 1,571,700 | |
| WWC-13 | Force Main | South Pacific Force Main | Replace existing force main | 6 | 12 | Replace | 215 | \$ 61,350 | \$ 61,350 | 35% | \$ 39,900 | \$ 21,450 | |
| Lift Station and Force Main Subtotals | | | | | | | | \$ 4,561,150 | \$ 4,561,150 | \$ - | \$ 2,968,000 | \$ 1,593,150 | |
| Capacity Related CIP Subtotals | | | | | | | | \$ 7,914,850 | \$ 7,068,550 | \$ 846,300 | \$ 4,889,400 | \$ 3,025,450 | |
| Rehab Related CIPs | | | | | | | | | | | | | |
| Lift Station Rehab | | | | | | | | | | | | | |
| WWR-1 | Lift Station | Harbor #5 Lift Station | Repair leaks and reline pit, replace damaged piping and electrical gear | -- | -- | Rehab | -- | \$ 325,000 | \$ 325,000 | 0% | \$ 325,000 | \$ - | |
| WWR-2 | Lift Station | New Buena Vista Lift Station | Replace pumps and stabilize hillside | -- | -- | Rehab | -- | \$ 846,000 | \$ 846,000 | 0% | \$ 846,000 | \$ - | |
| WWR-3 | Lift Station | Pilgrim Creek Lift Station | Install coating in wet well and paint dry well. Install bypass for access and improve ladder safety access | -- | -- | Rehab | -- | \$ 400,000 | \$ 400,000 | 0% | \$ 400,000 | \$ - | |
| WWR-4 | Lift Station | Harbor #3 Lift Station | Repair dry well, replace pumps and piping and install fall protection | -- | -- | Rehab | -- | \$ 325,000 | \$ 325,000 | 0% | \$ 325,000 | \$ - | |
| WWR-5 | Lift Station | Roja Lift Station | Install wet well coating and repair corroded pipe and access hatch | -- | -- | Rehab | -- | \$ 350,000 | \$ 350,000 | 0% | \$ 350,000 | \$ - | |
| WWR-6 | Lift Station | North Bridge Lift Station | Install metal roof | -- | -- | Rehab | -- | \$ 150,000 | \$ 150,000 | 0% | \$ 150,000 | \$ - | |
| WWR-7 | Lift Station | Leisure Village No. 2 Lift Station | Upgrade electrical gear, conduit and fixtures in pump room | -- | -- | Rehab | -- | \$ 175,000 | \$ 175,000 | 0% | \$ 175,000 | \$ - | |
| WWR-8 | City CIP | Oceanside Blvd Lift Station Relocation | Project funded FY 2013-14 | -- | -- | Rehab | -- | \$ 4,400,000 | \$ 4,400,000 | 0% | \$ 4,400,000 | \$ - | |
| WWR-9 | City CIP | Future Lift Station Rehab | Remaining Lift Station Rehab | -- | -- | Rehab | -- | \$ 8,400,000 | \$ 1,750,000 | \$ 6,650,000 | 0% | \$ 8,400,000 | \$ - |
| Lift Station Rehab Subtotals | | | | | | | | \$ 15,371,000 | \$ 8,721,000 | \$ 6,650,000 | \$ 15,371,000 | \$ - | |
| Pipeline Rehab | | | | | | | | | | | | | |
| WWR-10 | City CIP | Haymar Interceptor Sewer Repair and Feasibility Study | Project funded FY 2014-15 | -- | -- | -- | -- | \$ 500,000 | \$ 500,000 | 0% | \$ 500,000 | \$ - | |
| WWR-11 | City CIP | Haymar Interceptor | Project funded FY 2015-16 through 2019-20 Interceptor construction Project | -- | -- | -- | -- | \$ 12,500,000 | \$ 12,500,000 | 0% | \$ 12,500,000 | \$ - | |
| WWR-12 | City CIP | Lake Boulevard Sewer Replacement | Project funded FY 2014-15 | -- | -- | -- | -- | \$ 2,600,000 | \$ 2,600,000 | 0% | \$ 2,600,000 | \$ - | |
| WWR-13 | City CIP | CIPP Slip lining Project | Project funded FY 2015-16 through 2019-20 | -- | -- | -- | -- | \$ 2,200,000 | \$ 2,200,000 | 0% | \$ 2,200,000 | \$ - | |
| Near Term Pipeline Replacement | | | | | | | | | | | | | |
| WWR-14 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| WWR-15 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 29,430 | \$ 7,512,100 | \$ 7,512,100 | 0% | \$ 7,512,100 | \$ - | |
| WWR-16 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 55,250 | \$ 10,226,100 | \$ 10,226,100 | 0% | \$ 10,226,100 | \$ - | |
| WWR-17 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 3,980 | \$ 770,100 | \$ 770,100 | 0% | \$ 770,100 | \$ - | |
| WWR-18 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 5,090 | \$ 1,039,900 | \$ 1,039,900 | 0% | \$ 1,039,900 | \$ - | |
| WWR-19 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 770 | \$ 164,800 | \$ 164,800 | 0% | \$ 164,800 | \$ - | |
| WWR-20 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 3,480 | \$ 761,200 | \$ 761,200 | 0% | \$ 761,200 | \$ - | |
| WWR-21 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 2,120 | \$ 471,300 | \$ 471,300 | 0% | \$ 471,300 | \$ - | |
| WWR-22 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 1,160 | \$ 274,500 | \$ 274,500 | 0% | \$ 274,500 | \$ - | |
| WWR-23 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| WWR-24 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 29,100 | \$ 9,618,000 | \$ 9,618,000 | 0% | \$ 9,618,000 | \$ - | |
| WWR-25 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| Long Term Pipeline Replacement | | | | | | | | | | | | | |
| WWR-26 | Pipe | 4-inch Pipeline Replacement | Pipeline Replacement Program | 4 | 8 | Replace | 890 | \$ 227,200 | \$ 227,200 | 0% | \$ 227,200 | \$ - | |
| WWR-27 | Pipe | 6-inch Pipeline Replacement | Pipeline Replacement Program | 6 | 8 | Replace | 153,690 | \$ 39,230,200 | \$ 39,230,200 | 0% | \$ 39,230,200 | \$ - | |
| WWR-28 | Pipe | 8-inch Pipeline Replacement | Pipeline Replacement Program | 8 | 8 | Rehab/Replace | 251,690 | \$ 46,585,000 | \$ 46,585,000 | 0% | \$ 46,585,000 | \$ - | |
| WWR-29 | Pipe | 10-inch Pipeline Replacement | Pipeline Replacement Program | 10 | 10 | Rehab/Replace | 26,010 | \$ 5,032,900 | \$ 5,032,900 | 0% | \$ 5,032,900 | \$ - | |
| WWR-30 | Pipe | 12-inch Pipeline Replacement | Pipeline Replacement Program | 12 | 12 | Rehab/Replace | 17,940 | \$ 3,665,500 | \$ 3,665,500 | 0% | \$ 3,665,500 | \$ - | |
| WWR-31 | Pipe | 14-inch Pipeline Replacement | Pipeline Replacement Program | 14 | 14 | Rehab/Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| WWR-32 | Pipe | 15-inch Pipeline Replacement | Pipeline Replacement Program | 15 | 15 | Rehab/Replace | 13,730 | \$ 3,003,300 | \$ 3,003,300 | 0% | \$ 3,003,300 | \$ - | |
| WWR-33 | Pipe | 16-inch Pipeline Replacement | Pipeline Replacement Program | 16 | 16 | Rehab/Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| WWR-34 | Pipe | 18-inch Pipeline Replacement | Pipeline Replacement Program | 18 | 18 | Rehab/Replace | 12,800 | \$ 3,030,600 | \$ 3,030,600 | 0% | \$ 3,030,600 | \$ - | |
| WWR-35 | Pipe | 21-inch Pipeline Replacement | Pipeline Replacement Program | 21 | 21 | Rehab/Replace | 9,370 | \$ 2,860,400 | \$ 2,860,400 | 0% | \$ 2,860,400 | \$ - | |
| WWR-36 | Pipe | 24-inch Pipeline Replacement | Pipeline Replacement Program | 24 | 24 | Rehab/Replace | 1,460 | \$ 482,500 | \$ 482,500 | 0% | \$ 482,500 | \$ - | |
| WWR-37 | Pipe | 30-inch Pipeline Replacement | Pipeline Replacement Program | 30 | 30 | Rehab/Replace | 0 | \$ - | \$ - | 0% | \$ - | \$ - | |
| Pipeline Rehab Subtotals | | | | | | | | \$ 152,755,600 | \$ 48,638,000 | \$ 104,117,600 | \$ 152,755,600 | \$ - | |

**Table 9.3 Sewer System Capital Improvement Plan
Sewer Master Plan
City of Oceanside**

| ID | Type of Improv. | Description/ Street | Description / Limits | Project Length/Size and Cost | | | | Phasing | | Future Users Benefit (%) | Reimbursement Category | | |
|--|-----------------|--|---|-------------------------------|-------------------------------|--------------|-------------|--|----------------------------------|--------------------------|----------------------------------|----------------------------|--------------------------|
| | | | | Existing Ex. Size/ Diam. (in) | Proposed New Size/ Diam. (in) | Replace/ New | Length (ft) | Capital Improvement Cost ^{(1),(2),(3)} (\$) | Phase 1 Near Term 2014-2020 (\$) | | Phase 2 Long Term 2020-2050 (\$) | Existing Improvements (\$) | Future Improvements (\$) |
| San Luis Rey Water Reclamation Facility | | | | | | | | | | | | | |
| WWR-38 | Rehab | San Luis Rey Phase 1 Improvements | Phase 1 Improvements | -- | -- | Rehab | -- | \$ 2,369,000 | \$ 2,369,000 | | 0% | \$ 2,369,000 | \$ - |
| | Rehab | Plant 1 Upgrades | Replace Aeration Basin influent and effluent gates and repair and reline influent channel, remove abandoned screw pump station, and miscellaneous improvements. At the Secondary Clarifiers, repair localized areas of concrete corrosion, install traffic bollards for safety and replace damaged conduit and wiring to clarifier drives. | -- | -- | Rehab | -- | | \$ - | | 0% | \$ - | \$ - |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Install grating walkway for safety, remove abandoned pipes and conduits, replace corroded electrical conduits and pipes, and remove embedded pipe supports. | -- | -- | Rehab | -- | | \$ - | | 0% | \$ - | \$ - |
| | Rehab | Plant 1 Pipe Gallery Upgrades | Remove embedded pipe supports and repair concrete walls. | -- | -- | Rehab | -- | | \$ - | | 0% | \$ - | \$ - |
| WWR-39 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- | \$ 1,284,000 | \$ 1,284,000 | | 0% | \$ 1,284,000 | \$ - |
| WWR-40 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 1 (1 to 3 years). | -- | -- | Rehab | -- | \$ 690,000 | \$ 690,000 | | 0% | \$ 690,000 | \$ - |
| WWR-41 | Rehab | Headworks, Grit Chamber, LET & Diversion Structure Upgrades | Repair and reline concrete channels, replace screenings washer compactor controls, abandon old grit chamber, replace LET 1 effluent valve, repair Diversion Box 2 gate stems, repair corroded metals, and replace miscellaneous items no longer in service. | -- | -- | Rehab | -- | \$ 851,000 | \$ 851,000 | | 0% | \$ 851,000 | \$ - |
| WWR-42 | Rehab | Digester & Boiler Room Upgrades | In the Boiler Room of Digesters 1 and 2, replace Transfer Pump No. 2, replace Boilers 1 and 2 including repair of concrete around boilers, remove abandoned boiler digester gas feed pipe, replace corroded louver, replace corroded door, and repair roof. Replace Digester 3 overflow pipe vents, replace Digester 3 ferrous water pipe, repaint Digester 3 exterior, provide anchorage for heat exchanger, demolish hydrogen peroxide tank and containment, and repair asphalt at sinkhole near Digester 3 stairs. | -- | -- | Rehab | -- | \$ 465,000 | \$ 465,000 | | 0% | \$ 465,000 | \$ - |
| WWR-43 | Rehab | Replace Rented Chemical Storage Facilities | Install City-owned chemical storage and pumping facilities at multiple locations to replace rented facilities. | -- | -- | Rehab | -- | \$ 1,246,000 | \$ 1,246,000 | | 0% | \$ 1,246,000 | \$ - |
| WWR-44 | Rehab | Digester Cleaning | Clean each digester every 5 years. | -- | -- | Rehab | -- | \$ 490,000 | \$ 490,000 | | 0% | \$ 490,000 | \$ - |
| WWR-45 | Rehab | Thickening & Dewatering Upgrades | Replace bollards at GBT Building, replacing leaking air pipe at Waste Gas Burners, repaint flares, and replace diversion gates in Centrifuge Building. | -- | -- | Rehab | -- | \$ 145,000 | \$ 145,000 | | 0% | \$ 145,000 | \$ - |
| WWR-46 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- | \$ 999,000 | \$ 999,000 | | 0% | \$ 999,000 | \$ - |
| WWR-47 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 2 (3 to 5 years). | -- | -- | Rehab | -- | \$ 490,000 | \$ 490,000 | | 0% | \$ 490,000 | \$ - |
| WWR-48 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 3 (5 to 10 years). | -- | -- | Rehab | -- | \$ 332,000 | | \$ 332,000 | 0% | \$ 332,000 | \$ - |
| WWR-49 | Rehab | Electrical & Instrumentation Upgrades | Electrical Replacement Project No. 4 (10 to 15 years). | -- | -- | Rehab | -- | \$ 324,000 | | \$ 324,000 | 0% | \$ 324,000 | \$ - |
| WWR-50 | Rehab | Electrical & Instrumentation Upgrades | SCADA/PLC Replacement Project No. 3 (10 to 15 years). | -- | -- | Rehab | -- | \$ 98,000 | | \$ 98,000 | 0% | \$ 98,000 | \$ - |
| WWR-51 | Cleaning | SLR Digester Cleaning | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- | \$ 8,250,000 | \$ 1,650,000 | \$ 6,600,000 | 0% | \$ 8,250,000 | \$ - |
| WWR-52 | Rehab | SLR Maint Bldg Upgrades | Project funded FY 2013-14 to 2014-15 | -- | -- | -- | -- | \$ 2,000,000 | \$ 2,000,000 | | 0% | \$ 2,000,000 | \$ - |
| San Luis Rey Water Reclamation Facility Subtotals | | | | | | | | \$ 20,033,000 | \$ 12,679,000 | \$ 7,354,000 | | \$ 20,033,000 | \$ - |
| Rehab Related CIP Subtotals | | | | | | | | \$ 188,159,600 | \$ 70,038,000 | \$ 118,121,600 | | \$ 188,159,600 | \$ - |
| La Salina Pump Station/Treatment Plant Demolition | | | | | | | | | | | | | |
| WVO-1 | New | La Salina Wastewater Treatment Plant Demolition/Pump Station | Demolition of the La Salina Wastewater Treatment Plant and construction of a new pump station from LSWWTP to SLRWTP. See Appendix I for details on the cost breakdown. | -- | -- | New | -- | \$ 31,829,000 | \$ 31,829,000 | | 0% | \$ 31,829,000 | \$ - |
| La Salina Pump Station/Treatment Plant Demolition | | | | | | | | \$ 31,829,000 | \$ 31,829,000 | \$ - | | \$ 31,829,000 | \$ - |
| Other Projects | | | | | | | | | | | | | |
| WVO-2 | Other | Sewer SCADA Upgrades | Project funded FY 2013-14 through 2015-16 | -- | -- | -- | -- | \$ 2,000,000 | \$ 2,000,000 | | 0% | \$ 2,000,000 | \$ - |
| WVO-3 | Other | Ocean Outfall Capacity Study | Project funded FY 2013-14 | -- | -- | -- | -- | \$ 100,000 | \$ 100,000 | | 0% | \$ 100,000 | \$ - |
| WVO-4 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- | \$ 14,287,700 | \$ 14,287,700 | | 0% | \$ 14,287,700 | \$ - |
| WVO-5 | Other | Land Outfall | Project funded FY 2014-15 through 2016-17 | -- | -- | -- | -- | \$ 4,711,700 | \$ 4,711,700 | | 0% | \$ 4,711,700 | \$ - |
| Other Projects | | | | | | | | \$ 21,099,400 | \$ 21,099,400 | \$ - | | \$ 21,099,400 | \$ - |
| La Salina Pump Station/Other Projects Subtotal | | | | | | | | \$ 52,928,400 | \$ 52,928,400 | \$ - | | \$ 52,928,400 | \$ - |
| Grand Total CIP | | | | | | | | \$ 249,002,850 | \$ 130,034,950 | \$ 118,967,900 | | \$ 245,977,400 | \$ 3,025,450 |

Notes:
1. Estimated Construction Cost to account for unforeseen events and unknown conditions (30%).
2. Additional markups include engineering, management, environmental, and legal (27.5%)
3. Total Contingency Markup = 65.8% (130%x127.5%-100%). For rehab/misc. projects, capital costs were input based on relevant facility plans or CIP budget dollars.
4. Future lift station rehab assumed at \$350,000 per lift station. Five additional lift stations for the Near term and 19 lift stations in the Long Term.
5. This project has been recently constructed by the City.

9.5.4 Capital Improvement Implementation

As outlined in Chapter 8, the proposed capital improvements are prioritized based on their urgency to mitigate existing deficiencies and condition issues and for servicing future growth. The implementation phases are separated into two phases, Near-Term and Long-Term. As mentioned previously, the near-term phase extends from 2014 to 2020, and the long-term phase begins in 2021 and continues until 2050. Each project is itemized by phase in Table 9.3 and a summary by phase is provided in Table 9.4.

| Table 9.4 Summary of Capital Improvement Costs Sewer Master Plan City of Oceanside | | | |
|---|---------------------------------|---------------------------------|-------------------------------|
| Reimbursement Category | Implementation Phase | | Total (\$ million) |
| | 2014-20 (\$ million) | 2020-50 (\$ million) | |
| Cost to Existing Users | 127.85 | 118.12 | 245.98 |
| Cost to Future Users | 2.18 | 0.85 | 3.02 |
| Total | 130.03 | 118.97 | 249.00 |
| <u>Note:</u> | | | |
| (1) Costs are based on ENR CCI 10,736 (Los Angeles, January 2014). | | | |

9.5.5 Existing Versus Future Users Cost Share

The improvements proposed in this study either benefit existing users, or is required to service new development and future users. Some of the projects provide benefits to both existing and future users. An opinion of benefit to future users is included in Table 9.3. A summary of the existing and future user cost share for the proposed projects by phase is summarized in Table 9.4.

As shown in Table 9.4, the total estimated cost for sewer collection system improvements through the year 2050 is nearly \$249 million. The vast majority of improvement projects (\$246 million) are associated with existing system improvements. Near-term projects account for about \$130 million, which equates to roughly \$22 million per year through year 2020. Long-term projects account for \$119 million, which equals about \$6 million per year in the period 2020-2050.

The distribution of project cost by project type are listed in Table 9.5 and depicted on Figure 9.2. As shown on Figure 9.2, the majority of the proposed improvements consist of rehabilitation projects. Pipeline rehabilitation accounts for approximately 66 percent of the total CIP costs. Lift station rehabilitation accounts for approximately 7 percent, and treatment plant rehabilitation accounts for an additional 13 percent of the CIP total. Capacity projects account for only 5 percent of the recommended improvement projects, while the remaining 9 percent of CIP costs are associated with the land outfall and other miscellaneous items.

| Table 9.5 Existing Versus Future Cost by Classification Type Sewer Master Plan City of Oceanside | | | | |
|---|--------------------------------------|------------------------------------|------------------------------------|---------------------------|
| Reimbursement Category | Capacity Related (\$ million) | Rehabilitation (\$ million) | Misc. Projects (\$ million) | Total (\$ million) |
| Existing Users | 4.89 | 188.16 | 52.93 | 245.98 |
| Future Users | 3.025 | - | - | 3.02 |
| Total | 7.91 | 188.16 | 52.93 | 249.00 |

Note:
(1) Costs are based on ENR CCI 10,736 (Los Angeles, January 2014).

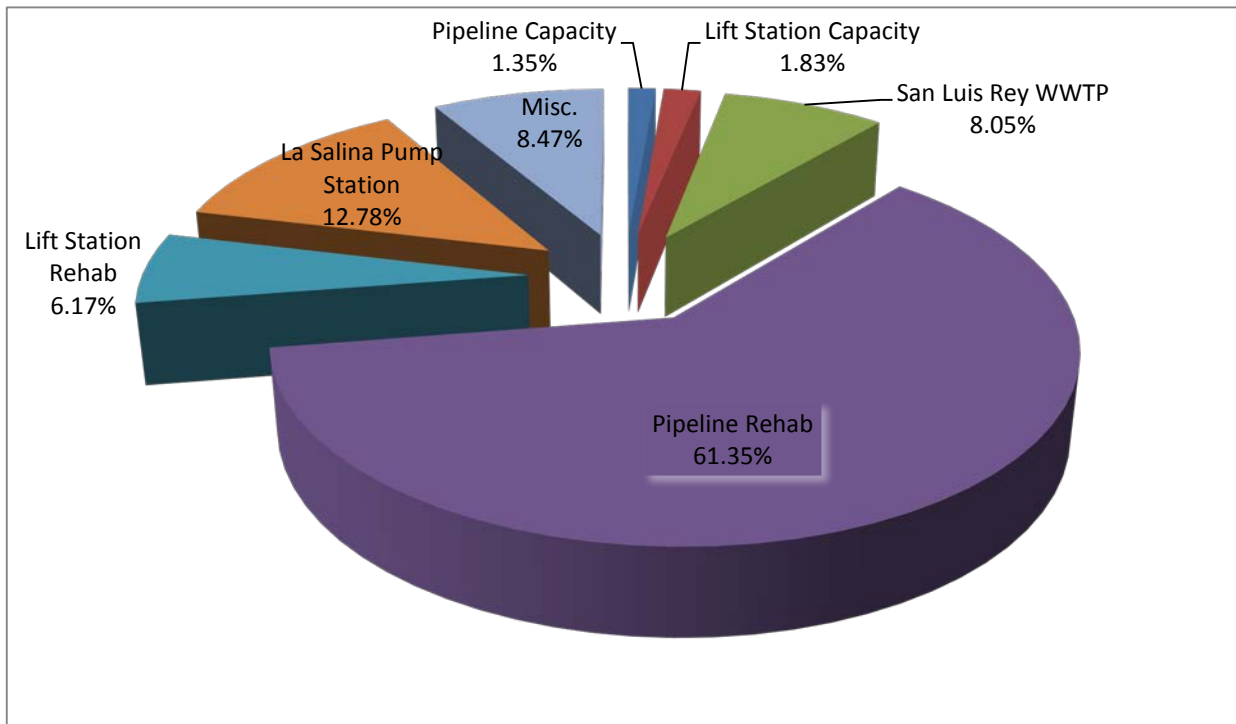


Figure 9.2 Existing and Future Cost by Project