

1.0 EXECUTIVE SUMMARY

1.1 Background

The primary objective of the Wastewater Master Plan (WWMP) is to update the hydraulic model of the wastewater collection system (sewer model) and prepare a WWMP for Yorba Linda Water District (YLWD or District). The purposes of this report are to summarize the development of the sewer model and prepare a WWMP that includes: 1) the capacity evaluation of the District's wastewater system under existing and future buildout conditions, 2) the existing and future buildout of the District's wastewater system, and 3) provides recommendations for improvements needed to provide the appropriate level of service under both existing and future buildout conditions. This report contains the planning methodology, criteria, and assumptions used to develop the WWMP, as well as the results of the hydraulic modeling and the recommended capital improvement plan for the District's wastewater collection system. The WWMP also includes an overview of ongoing CCTV inspection and condition assessment being conducted by District staff on the existing collection system as well as the Asset Management Plan (AMP).

1.2 Wastewater Collection System Description

The existing wastewater collection system consists primarily of vitrified clay pipe (VCP) with a small portion of polyvinyl chloride (PVC) pipe, ductile iron pipe (DIP), cast iron pipe, and ABS truss pipe. The diameters range in size from 4-inch to 24-inch. For the purposes of this report, the District's wastewater collection system has been split between the West Area and East Area. This is partly because the previous (2010) master plan only included the West Area as the East Area was not part of the District's system at that time and because the two systems are completely independent and the split makes modeling, mapping/plotting, and reporting more manageable. Information on the length of pipelines and number of manholes the District owns and maintains are provided in Table 1-1 with the breakdown for the West and East Areas. In the East Area the District maintains one sewer lift station.

**Table 1-1
District Owned Pipeline and Manhole Summary**

	Pipelines (miles)	Manholes (each)
West Area	194	4,473
East Area	76	1,767
Total	270	6,240

Wastewater generated within the system flows by gravity to the Orange County Sanitation District (OC San) trunk sewers directly, or in some cases through Placentia sewers. These trunk sewers route the flow to OC San wastewater treatment plants in Fountain Valley and Huntington Beach. Existing average dry weather flow generated within the District's service area totals 5.99 million gallons per day (MGD) with buildout flow estimated at 6.31 MGD (see Tables 8-2 and 8-4 for details).

1.3 Flow Monitoring

As a part of this WWMP, flow monitoring was conducted by ADS during a 23-day period from October 15 to November 6, 2020, at six locations in the West Area and eight locations in the East Area. The primary purpose of this program was to measure and determine the relative flow from different areas of the wastewater collection system. The flow measurement data collected during the flow monitoring program established a benchmark for sewer model calibration and estimating peak dry weather flow (PDWF) conditions.

1.4 Planning Data

The Yorba Linda Water District wastewater collection system has approximately 24,700 service connections. The majority of these customer connections are residential. Based on the composite land use within the YLWD sewer service area by acreage, the land use is comprised of 59% residential, 6% commercial, 2% industrial, 29% open space and 5% planned developments. For planned developments, information provided by the District and the City of Yorba Linda was used to estimate buildout connections and population for the sewer system.

1.5 Design Criteria

Sewer pipe capacities are dependent upon many factors. These include the roughness of the pipe, the chosen maximum allowable depth of flow, and limiting velocity and slope. The Continuity Equation and the Manning's Equation for steady state flow are used for gravity sewer hydraulic calculations.

The capacity criteria for gravity sewers are typically evaluated by a ratio of flow depth over pipe diameter (d/D). Sewers for this analysis were evaluated/sized so the d/D ratios (specified below) are not exceeded while flowing under the PDWF conditions.

15-inch and larger d/D greater than 0.75
12-inch and smaller d/D greater than 0.50

1.6 Model Development and Calibration

As part of the WWMP, a hydraulic model of the wastewater collection system (sewer model) was constructed from the District's sewer Geographic Information System (GIS) geodatabase. The hydraulic modeling software identified for the computer model is InfoSewer, which runs inside of Esri's ArcGIS Software.

The average dry weather flows (ADWF) were allocated and calibrated in the wastewater model based upon land use data and the results of a flow monitoring program conducted from October through November 2020.

Peak dry weather flows were determined using a peaking equation which was developed based on an analysis of the average and peak dry weather flows monitored during the flow monitoring program. The results of the flow calibration are similar to those typically observed in the District's system under dry weather conditions.

1.7 Collection System Analysis

The District's existing wastewater collection system was evaluated using land use data to generate flows. These flows were then calibrated to the wastewater flow monitoring data and compared to existing pipeline system capacity using the design criteria discussed above.

An analysis of existing conditions identified 44 capacity enhancement segments (manhole to manhole) in the existing collection system facilities totaling approximately 12,634 linear feet (LF) in length in the West Area and 461 LF in the East Area for a combined existing and buildout system-wide total of 13,095 LF. An analysis under buildout conditions revealed nine additional capacity enhancement segments in the West Area totaling an additional 1,502 LF for a combined system-wide total of approximately 14,136 LF.

Buildout conditions assumed all undeveloped parcels, including currently unsewered parcels, will eventually be connected to the sewer system, which is a conservative assumption for the purpose of developing recommended sewer sizes. Residents currently on septic systems may continue to utilize their septic tanks if they comply with State Water Resource Control Board (SWRCB) requirements, and septic systems can still be constructed for new developments in accordance with the SWRCB requirements. The parameters currently affecting whether or not new construction or development must connect to the sewer system are minimum lot size, distance to an existing sewer, and the ability of the soil to percolate the effluent as determined by a percolation test. These parameters are discussed in more detail in Chapter 5.

Assessment District financing has typically been the primary method used to convert existing developed areas with septic systems over to a sewer system: however, getting through this process is difficult since the costs are high and a majority approval of the property owners voting, on a dollar-weighted assessment basis, must be obtained.

Since the City ultimately controls the issuance of building permits for new construction, it may be possible for the District to work with City officials to develop a program to encourage septic system conversions to sewers. It may also be possible to obtain grants or low-interest loans based on groundwater quality benefits to help defer some of the costs of this program or to help reduce assessment district financing costs.

1.8 Recommended Capital Improvement Program

The Capital Improvements established in this WWMP are provided to the District as recommended solutions to deal with existing and future wastewater collection system areas identified for capacity enhancements discovered using the above methodologies, and as described in more detail later in this WWMP. Three wastewater collection system improvement projects are recommended for implementation to eliminate current capacity issues and provide additional capacity for buildout developments within the study area:

- 1) Kellogg Drive Capital Improvement
- 2) Yorba Linda Town Center Capital Improvement
- 3) Buena Vista Capital Improvement

These three capacity enhancement areas, and the recommended capital improvement projects in order of priority, are summarized below and described in more detail in Chapter 9, with capital cost estimates in 2022 dollars summarized in Tables 9-2 through 9-4. The project costs include estimated construction costs plus 45% for Professional Services and Contingencies (15% for design and technical services; 10% for administration, construction management, inspection, and project administration; and 20% for contingencies). Additionally, 28 sewer pipeline segments were included on a Watch List to monitor the capacity enhancement pipeline segments which were slightly above their recommended flow depth to pipe diameter ratio.

The Kellogg Drive Capital Improvement has been proposed to correct the areas identified for capacity enhancement in the 10-inch pipelines in Kellogg Drive from Short Street to Orangethorpe Avenue. The recommended improvement is upsizing the westerly of two parallel pipelines to 15-inches. The capital improvement has an estimated project cost of \$2,792,442.

The Yorba Linda Town Center Capital Improvement will correct the areas identified for capacity enhancement in the pipelines along Lemon Drive, Eureka Avenue, and Yorba Linda Boulevard. The improvement involves upsizing 8-, and 10-inch pipelines to 12-inch pipelines to carry the planned development flows and septic parcels in the downtown area. The capital improvement has an estimated project cost of \$2,858,603.

The Buena Vista Capital Improvement will correct the areas identified for capacity enhancement in the pipelines behind Trail View Place between Richfield Road and Highland Avenue. An 8-inch reverse sewer along Buena Vista Avenue is recommended to redirect 123 gallons per minute (gpm) to the 18-inch pipeline along Richfield Road. The capital improvement has an estimated project cost of \$1,602,133.