Costa Mesa Sanitary District

… an Independent Special District

WASTEWATER MASTER PLAN UPDATE

FOR

THE COSTA MESA SANITARY DISTRICT

November 8, 2021

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Contents

Table of Figures

Definitions, Acronyms & Abbreviations

CMSD - Costa Mesa Sanitary District

CNB - City of Newport Beach

OC - Orange County

OCFCD - Orange County Flood Control District

OCSD - Orange County Sanitation District

cfs - cubic feet per second

gpad - gallons per acre per day

gpcd - gallons per capita (person) per day

gpm - gallons per minute

mgd - million gallons per day

CMOM - Capacity, Management, Operations & Maintenance

FOG - Fats, oils, and grease

GASB34 - Governmental Accounting Standards Board Rule No. 34

SSMP - Sewer System Management Plan

WDR - Waste Discharge Requirements

H2S - Hydrogen sulfide

H2SO4 - Sulfuric acid

1/1 - Inflow & Infiltration

Costa Mesa Sanitary District

Wastewater Master Plan Update

Purpose

The primary goal of a Wastewater Master Plan is to determine whether the system has the capacity to handle flows from ultimate build-out of the service area. The plan compares the capacity of the sewer mains to the ultimate flow generated from complete build-out of the land uses inside the jurisdictional boundaries of the agency. In the case of the Costa Mesa Sanitary District, this means providing sewer capacity for the land uses adopted by the City of Costa Mesa, the City of Newport Beach, and the County of Orange. When the wastewater system was originally designed in the early 1950s, the development densities and anticipated ultimate flows were very low when compared to today's calculated maximums. Additionally, stormwater runoff is making its way into the system through infiltration and inflow. These additional flows require wastewater lines to be larger to accommodate the added flows during periods of heavy rain.

Background

The Costa Mesa Sanitary District ("CMSD" or "DISTRICT") was formed in 1944 under the State of California Health and Safety code. The District is an independent special district, meaning the District is funded through user fees and charges. A dependent special district, such as a cemetery district, depends on funding from the County.

The boundaries of the District include all of the City of Costa Mesa, and portions of the City of Newport Beach and the unincorporated Territory of the County of Orange. CMSD serves a residential population of approximately 116,700 plus various public, commercial, industrial and retail land uses. CMSD's facilities include 219.4 miles of gravity mainline, 4.8 miles of pressurize mainline, 24,955 service lateral connections, 4,707 manholes and 20 pumping stations. The 109.3 miles of private property sewer lateral pipelines within the district are privately maintained. Because the Board of Directors is focused solely on sewer service and trash collection, the sewer system is in excellent condition and has been kept in top shape through regular monitoring, maintenance, cleaning, and repairs.

Total Flow From the District

As owner of the treatment plants and disposal facilities, the Orange County Sanitation District (OCSD) has developed flow coefficients for forecasting total daily dry weather (without storm water inflow or infiltration) flow from a tributary area.

OCSD has converted total flows from residential and other land uses into a flow coefficient related directly to population. The flow rate per capita has been dropping steadily over the years. OCSD estimated a measured flow rate of 100 gallons per capita per day in 2005 dropping to 75 gallons per capita per day in 2015, with projected flows to be 70 gallons per capita per day by 2022. A flow coefficient of 71.5 gallons per capita per day (gpcd) will be used for the purposes of this report. Using a District population of approximately 117,000, the estimated daily flow from the District is:

CMSD total daily dry weather flow = 71.5 gpcd x 117,000 population

= 8.4 mgd (million gallons per day)

Overview of Sewer System and Maintenance Program

CMSD's facilities include 219.4 miles of gravity mainline, 4.8 miles of pressurize mainline, 24,955 service lateral connections, 4,707 manholes and 20 pumping stations. A detailed list of the sizes and lengths of pipes are shown on the Fixed Asset Schedule in **Appendix A**.

The gravity portion of the sewer system is in excellent condition and the District has adopted the industry standard of cleaning the system. Trouble spots identified within the district system are cleaned more frequently. Maintenance is performed in one specific area of the District at a time. Each public sewer line in this area is first cleaned and then televised to see the structural condition of the sewer main. This maintenance is performed in compliance with the Costa Mesa Sanitary District Sewer System Management Plan (SSMP). This routine maintenance allows the District staff to identify potential defects in the sewer system that have the potential to cause a stoppage or failure. Once identified, corrective repairs are performed. The District hires contractors to repair or rehabilitate these sewer lines or facilities. The Costa Mesa Sanitary District Sewer System Management Plan (SSMP) is included in **Appendix B.**

Pump Stations & Force Mains

Because of high flows in the pump stations and force mains that could result in large sewer spills, pumping stations and force mains are a high priority and regularly discussed during District's quarterly pump station meetings attended by the General Manager, District Engineer, Sewer Maintenance Superintendent, and Pump Station Crew. When the pump station maintenance crew finds deficiencies, the repair is completed as soon as possible.

A map of the service areas for each of the pump stations is included in **Appendix C.**

Rehabilitation and reconstruction of force mains has been the top priority with the District since 2009. More recently, the installation of redundant force mains has been incorporated into force main upgrade projects to allow the pump stations to remain in use in the event of a force main break, without the delays caused by implementing by-pass operations.

Tables 1A below lists the most recent status of work on the force main projects.

Table 1: Completed Force Main Rehabilitation Projects

Name	Force Main Description	Project/Completion
President Force Main	Replacing the force main	#200-B/ 2016
Harbor Force Main	Harbor Force Main is nearly 600 feet long made of cast and ductile iron pipe.	#200-B/ 2016
Victoria Force Main	Victoria Force Main is 940 feet long. 88% of the pipeline is made of cast iron pipe. The remaining 12% is made of PVC pipe.	#313/ 2016

South Coast Plasza Force Main	South Coast Plaza Force Main is 470 feet long made of ductile iron pipe.	#200C/ 2017
Mendoza Force Main	Mendoza Force Main is made of ductile iron pipe.	#200C/ 2014
Canyon Force Main	Canyon Force Main is 1,120 feet in length and made of cast iron pipe.	#319/ 2019
Iowa Force Main	The Iowa force main is 220 feet long and made of asbestos cement pipe (ACP).	#322/ 2021
Aviemore Terrace Force Main	Aviemore Terrace force main is 165 feet long and made of 4" Transite pipe.	#312/ 2016
19th Street Force Main	19th Street force main is 818 feet long and made of 4" Transite pipe.	#326/ 2020

Table 2 lists the planned future force main improvement projects.

Table 2: Scheduled Future Force Main Rehabilitation Projects

Name	Force Main Description	Projected Completeion
Gisler Force Main	1,160 feet of 6" C.I.P. Force Main. Project #334.	2021-2022
Elden Pump Station Force Main Valve Rehabilitation	In-line by-pass valves on Newport Blvd. will be replaced. Project #338.	2022-2023
21st Street Pump station Force Main Rehab	Existing 8" D.I.P. force main will be rehabilitated by installing C.I.P.P. liner. Project #339.	2022-2023
Sea Bluff Force Main and Pump Station Rehabilitation	1146 feet of 4" C.I.P. Force Main	2023-2024
California Pump Station Force Main and Pump Station Rehabilitation	55 feet of 6" C.I.P. Force Main	2024-2025
Mendoza Pump Station Force Main Rehab & Redundancy	260 feet of 8" C.I.P. Force Main	2025-2026
Irvine Pump Station Force Main Redundancy	2830 feet of 10" D.I.P. Force Main	2025-2026
Elden Pump Station Force Main Redundancy	3290 feet of 18" D.I.P. Force Main	2026-2027 2027-2028

Prior Master Plan Update

The District's prior master plan was prepared in 2005 and identified 7 gravity sewer segments that would eventually need additional capacity. These segments are listed in Table 3 below.

Table 3: 2005 Master Plan Update Identified Potential Under Capacity Segments

No.	Description
1	8" Sewer on Bristol Street West of Irvine Avenue/Campus Drive. 15" Replacement pipe constructed in 2012 as Project #129.
7	8" & 12" Sewer on Hamilton West of Harbor. Although calculations showed a parallel sewer was required, the existing flows have not reached a point where additional capacity is required.
9	8" & 10" Sewer on Wilson West of Placentia. Although calculations showed a parallel sewer was required, the existing flows have not reached a point where additional capacity is required.
9	10" & 12" Sewer on Wilson East of Canyon Pump Station. Although calculations showed a parallel sewer was required, the existing flows have not reached a point where additional capacity is required.
10	8" Sewer on Country Club South of Gisler. Although calculations showed a parallel sewer was required, the existing flows have not reached a point where additional capacity is required.
11	18" Sewer on Harbor South of Baker. Although calculations showed a parallel sewer was required, the existing flows have not reached a point where additional capacity is required.

With the exception of the sewer on Bristol Street, which was replaced in 2012, flow monitoring done as part of this Master Plan Update indicates that current flows in the sewer segments listed above are still below the pipe capacity.

Currently Budgeted Wastewater Capital Improvement Projects

The Costa Mesa Sanitary District Adopted Budget FY 2021-2022 and FY 2022-2023 include the following Capital Improvement Projects.

Project #309 City Project Manhole Program

This is an annual project that adjusts existing manholes to grade as part of City Street Improvement projects. CMSD reimburses the City for the work involved in adjusting the manholes to grade after resurfacing of the streets. The budgeted amount is $70,000 for both FY 2021-22 and FY 2022-23.

Project #311 CMSD Manhole Surface Repairs

This is an annual project that identifies surface defects in the existing sewer manholes. Once identified, the District hires a contractor to remove the existing frames and covers and replace

them with composite frames and covers. The budgeted amount is $72,000 for both FY 2021-22 and FY 2022-23.

Project #324 Brick Manhole Rehabilitation Phase 2

In 1953 when the first District manholes were installed, contractors had an option to construct brick manholes or pre-cast manholes similar to today's pre-cast manholes. Because no steel mesh or rebar was installed in the brick manholes they are very susceptible to damage during seismic events. The District will structurally reinforce brick manholes by using a one piece structural cured-in-place-pipe (CIPP) liner. The budgeted amount is $130,000 for both FY 2020-21 and FY 2022-23.

Project #327 Calcium Removal

The District is fortunate not to have sustained any calcium-caused sanitary sewer overflows (SSOs) from calcium build-up in the sewer mains. Calcium buildup is an emerging concern across the United States and there are limited tools available for calcium removal and the tools and removal techniques are expensive. Most of the District's calcium buildup occurs in the Santa Rosa Avenue – San Marino Circle area in north Costa Mesa where it is suspected that high groundwater laden with minerals causes calcium deposits in the mains. As part of the Sewer Master Plan Update, a complete analysis and mitigation program for sewer mains with calcium is being established. The budgeted amount is $75,000 for FY 2021-22 to test the effectiveness and cost of various calcium removal techniques. The budgeted amount is $400,000 for FY 2022-23.

Project #328 Ductile Iron Pipe Rehabilitation

Ductile Iron Pipe (DIP) is stronger and more flexible than Vitrified Clay Pipe (VCP) and was used in many locations throughout the District. However, it is subject to corrosion both on the inside and outside of the pipe that can degrade the walls of ductile iron pipe. The rehabilitation method consists of chain flailing the interior then installing a liner. The first phases of the project were previously budgeted. The budget for fiscal years 2021-22 is $400,000.

Project #329 Aviemore Force Main Replacement

Aviemore Pump Station and Force Main serve the smallest tributary area of a CMSD pump station, only 26 residences. Nevertheless, the force main is 130 linear feet of 4-inch cast iron pipe built in 1959 and has reached its life expectancy. The project will include construction of a dual PVC force main to replace the existing one. The budgeted amount is $230,000 for FY 2021-22.

Project #330 Westbluff Pump Station Rehabilitation

The Westbluff force main was replaced and realigned in 2006 by a private residential land developer so the force main is relatively young. The proposed work is normal replacement of pumps, valves, and piping that have reached their life expectancy. The budgeted amount is $175,000 for FY 2021-22.

Project #334 Gisler Pump Station Force Main Replacement

The Gilser Pump Station and force main were constructed in 1960. The station was remodeled in 1985 and 2007, however the force main has not been replaced. The force main is a 1,160 foot long 6" C.I.P. The project will include construction of a dual 6" PVC force main to replace the existing force main. The budgeted amount is $520,000 for FY 2021-22.

Project #335 Sewer Siphon Rehabilitation

Project #331 completed in 2021, evaluated the condition of the 8 sewer siphons located in the District. The current project will install C.I.P.P. liners in the siphons, extending their life expectancy of the siphons. The budgeted amount is $250,000 for FY 2021-22 and $300,000 in FY 2022-23.

Project #336 Grade 4 Sewer Repairs

The project will install C.I.P.P. liners or construct spot repairs of the Grade 4 sewer main defects identified during routine maintenance. The budgeted amount is $120,000 for FY 2021-22 and $170,000 in FY 2022-23.

Project #337 Sewer Force Main Air Release Valve Removals/Improvements.

There are 8 air release valves on force mains in the District. Malfunctioning air release valves have been responsible for a number of sewer spills over the years. The project will remove air release valves that are not necessary on the force mains and construct drain line improvements on the valves that cannot be removed. The budgeted amount is $165.000 in FY 2021-22 and $260,000 in FY 2022-23.

Project #338 Elden Pump Station Force Main Valve Replacement

Elden Pump Station is the largest in the District. The 18" D.I.P. force main was installed in 1990, 1994 and 1995. This project is the first stage in constructing a secondary force main to serve the pump station. There are three valves on Newport Boulevard near Mesa Drive that connect the newer force amin to the old force main. This project will replace those 30 years old valves. The budgeted amount is $260,000 in FY 2022-23.

Project #339 21st Street Pump Station Force Main Rehabilitation

The 21st Street Pump Station Force Main is a 10" D.I.P. installed in 1991. The force main spans the 55 Freeway in a utility overpass. This project will install a C.I.P.P. liner in the existing pipe. The budgeted amount is $200,000 in FY 2022-23.

Sewer Flow Coefficients

In prior Master Plan Updates, Flow Coefficients were developed for Commercial, Industrial, Public/Institutional/School, Parks/Golf Courses, High Density Residential, Medium Density Residential, and Low Density Residential Uses. In those earlier Master Plan Updates, the flow coefficients were applied to the gross areas of the land uses, including streets and drainage channel

easements. After reviewing flow coefficients from other districts, Land Use Population statistics for the City of Costa Mesa, Zoning and Development Codes for the Cities of Costa Mesa and Newport Beach, and the County of Orange, it was decided to use the flow coefficients from the prior Master Plan but apply them to the net areas of the parcels. This change reduces the total expected flow from the land uses by between 20 and 25 percent, which is in general agreement with the reduced flows per capita measured by OCSD over the last few decades. The flow coefficients are shown below in Table 4.

Table 4: Land Use Flow Coefficients

Land Use	Ultimate Build-out Density Sewer Flow Coefficient (GPD/Acre)
Commercial	5,000
Industrial	3,500
Public/Institutional/School	2,525
Streets	0
Parks/Golf Course	200
High Density Residential (30 DU/A)	4,625
Medium Density Residential (15 DU/A)	2,525
Low Density Residential (8 DU/A)	1,545
Storm Inflow/Infiltration	800

The Costa Mesa Sanitary District boundaries include approximately 10,555 acres, including 1155 acres of commercial land use, 1054 acres of industrial land use, 4122 acres of residential land use, 560 acres of golf courses and 1584 acres of public land uses. A breakdown of the General Plan Land Uses is included in Table 5 below.

Table 5: Costa Mesa Sanitary District Land Uses

Land Use Type	Land Use Code	Acres
Commercial Center	CC	101.16
Commercial-Residential	CR	47.81
General Commercial	GC	690.90
Neighborhood Commercial	NC	40.49
Regional Commercial	RC	148.66
Urban Center Commercial	UCC	126.33
	Total Commercial	1155.36
Industrial Park	IP	675.44
Light Industrial	LI	378.83
	Total Industrial	1054.27
High Density Residential	HDR	849.79

Medium Density Residential	MDR	919.54
Low Density Residential	LDR	2353.12
	Total Residential	4122.44
Fairgrounds	F	151.34
Public/Institutional	PI	1375.34
Cultural Arts Center	CAC	57.34
Golf Course	G	559.98
Unclassified (streets, water, drainage, etc.)	-	2079.22
	Total Acres for CMSD	**10555.28**

Maps of the Pump Station Service Areas are included in **Appendix C.** Maps of the Gravity Sewer Service Areas are included in **Appendix E**.

Flow coefficients for the various land uses were assigned to each of the expected land uses and the area of each type of land use within each of the service area boundaries was determined. The resulting sums were the anticipated average daily flows for the sewer mains. The district's peaking factor was applied to the average flow to determine the expected ultimate peak flow.

The ultimate peak flow also includes an expected 800 gallons per day per acre inflow from storm runoff. The storm inflow rate is applied to all land uses within the District boundaries except parks, golf courses and open space as these areas do not normally have sewer mains in them, eliminating the chance of inflow or infiltration.

Accessory Dwelling Unit Density Increase

The City of Costa Mesa's Accessory Dwelling Unit Ordinance took effect on January 1, 2020. The City of Newport Beach's Accessory Dwelling Unit Ordinance took effect April 20, 2020. Both are based on the requirements of SB 1069. Of note in the ordinance is:

- Both ordinances allow for the construction of an accessory dwelling unit of up to 1200 square feet on existing single-family residential lots, even if the additional unit exceeded the zoning density for the lot.
- Both ordinances allow for the construction of a junior accessory dwelling unit within the existing dwelling on single family lots. There are several restrictions on these types of units that will probably limit their construction.
- Both ordinances allow for A.D.U. construction of at least one and up to 25% of the existing dwelling units on multi-family residential lots within the existing non-habitable building spaces.

This increase in density could account for a significant increase in dwelling units served by the District's sewers if every property owner availed themselves of the chance to build A.D.U.'s. The pace of construction of ADU's within the District for the last year has not indicated a significant increase in density. The district is going to monitor the pace of construction of the ADU's over the next few years to determine if there is going to be a significant impact.

Inflow & Infiltration (I/I)

The District's sewer system, just as virtually every agency's sewer system, experiences greater flows during the winter months. During the rainy season, intersections become flooded and water enters the sewer system through the pick holes in the manhole covers. In addition, illegal storm drain connections contribute water to the system. Property owners who experience surface drainage problems sometimes relieve the ponding by illegally connecting a drainage system to the sewer system. These two sources of Inflow to the system have been measured and are sufficient enough to be incorporated into the design and analysis of the sewer system. In this sewer Master Plan Update, the District's historical coefficient for Inflow of 800 gpd/acre is used.

The Orange County Sanitation District (OCSD) has found their daily flow to the treatment plants nearly doubles during large storms. With respect to Inflow, the Sanitary District has used two options to reduce Inflow through manhole covers. Either the manhole covers are replaced with watertight covers or the holes in the covers are plugged. The District has taken measures such as smoke testing and dye tests to identify and eliminate illicit connections that allow stormwater runoff to be drained into the sewer system. Common sources of these illicit connections can be sewer cleanouts in yards that are missing covers or drain grates that are illegally connected to the sewer pipes.

Infiltration as a source of water in the system is caused by underground water entering the sewer system through pipe joints, manholes, and cracked or broken pipe sections. The District's comprehensive sewer line video program beginning in 1989 has allowed the District to identify significant sources of Infiltration and apply corrective measures. The pipe system is sound, and for the most part located above the water table, and there are very few known instances of saturated soil near the system.

Master Plan Flow Calculations

The following steps were required to evaluate the sewer system’s ability to handle the expected ultimate flows:

1. Compiling a GIS database of the District's facilities and projected land use. The sewer main and structure information, sizes, slopes, and materials were obtained from the CMSD Atlas and as-built plans and added to the database.
2. Parcel lines and areas for the land served by the district were obtained from the County of Orange and added to the digital database to ensure accuracy. Flow area boundaries were then developed for the different segments of pipe and pump stations to be evaluated in the district.
3. The latest General Plan Land Uses were obtained from the City of Costa Mesa, City of Newport Beach and the County of Orange and assigned to the parcels in the digital database.
4. Flow coefficients for the various land uses were assigned to each of the expected land uses and the area of each type of land use within the flow area boundaries was determined. In prior Master Plans, the flow coefficients were applied to the gross areas of the land uses, including streets and drainage channel easements. The ultimate peak flow also includes an expected 800 gallons per day per acre inflow from storm runoff.

5. The expected ultimate flows for the sewer system were calculated for the different segments of the sewer system and compared to the design capacity of the sewer mains and pump stations. The segments of sewer pipe that are expected to be surcharged in the ultimate build-out were identified and the severity of the expected capacity deficiency classified as flowing more than half full, more than ¾ full or more than completely full.
6. The sewer mains that were identified as being under sized based on the expected future flows were then visually inspected at peak flow times to determine if they were flowing at or near half full now. The mains that appeared to be flowing nearly half full had flow meters installed and the flows monitored for two weeks.

The results of the flow calculations for the pump stations are included in **Appendix D**.

The results of the flow calculations for the gravity sewers are included in **Appendix F**.

Future Sewer Main Improvements Required to Meet Ultimate Demand

The District has adopted the industry standard of designing new sewer lines up to 18 inches in diameter to be flowing no more than half full at peak wet weather flow and 21 inch or larger sewers to be flowing no more than three quarters full at wet weather peak flow. However, when analyses of existing conditions are completed for the purposes of determining when additional capacity is required, flows above these limits are acceptable. However, at no time are sewers allowed to flow in a surcharged or pressure conditions because gravity sewers are not designed to flow under pressure. For the purposes of this study, pipes that will be flowing above three quarters full at ultimate build-out will be considered over capacity.

The following sewer mains and pump stations listed in Table 6 below, will be flowing above three quarters depth at ultimate build-out, and should be considered for replacement. The mains should be flow monitored every two to five years and when the measured peak flow depths approach or exceed 75 percent of the pipe diameter, the construction projects should be implemented.

Table 6: Ultimate Build-Out Sewer Capacity Improvements

Service Area No.	Description	Estimated Cost
9	12” Sewer on Santa Ana Avenue Northeast of 23rd Street. The project will include construction of 1500 feet of sewer main between Cynthia Court and Brentwood Place.	$ 675,000
21	8” Sewer Main on 21st Street Southeast of Orange Avenue. The project will include construction of 640 feet of sewer main between Orange Avenue and Westminster Avenue.	$ 290,000
28 & 104	15” Hamilton – Thurin Sewer Main The project will include construction of 1600 feet of sewer main on Hamilton Avenue east of Harbor Blvd. and Thurin Avenue south of Victoria Avenue.	$ 720,000
52	8” Sewer on Wilson West of Placentia.	$ 665,000

	The project will include construction of 1480 feet of sewer main on Wilson Street between Placentia Avenue and National Avenue.	
62	18" Sewer Main on Harbor Blvd. South of Baker Street. The project will include construction of 2400 feet of sewer main between Baker Street and Adams Avenue.	$ 1,100,000
109	18" Sewer on Victoria Street between Thurin and Newport Avenue. The project will include construction of an interconnect between the existing 18" and 21" sewers on Victoria Street.	$ 50,000
PS5	Canyon Pump Station Pump capacity will have to be increased from 800 gpm to 1160 gpm. The project will include replacing the pumps, pump base, controls, and wet well pipes for the pump Station.	$ 200,000

Developer's Responsibility to Provide Additional Sewer Capacity

In the interest of fairness, the District is committed to providing sewer capacity to the level identified in the Cities' and County's General Plan but any additional capacity needed as a result of a developer proposing an even more intense land use would be the responsibility of the developer. This policy relieves the District and the rate payers of the burden of funding sewer improvements made necessary by the scenario of increasing project densities.

The District's policy is to require the developer to make a cash deposit to the District to fund a sewer analysis of the system where the new development is proposed. The analysis checks the capacity of the system assuming the proposed development is the only project that exceeds the General Plan density, but also checks line capacities assuming redevelopment of neighboring parcels also occurs to levels beyond the General Plan. An appropriate participation level is then determined for the developers.

Calcium Build-up on Sewer Pipe Walls

The District completed its first District-wide CCTV program over a four-year period from 1989-1992. Little did the District know, the small white colored and black colored circles on the pipe wall were the beginning stages of calcium build-up.

When the District embarked on its second District-wide CCTV program in a three-year period from 2006-2009, the District found the small circles and chalky film had grown into a full-diameter layer of extremely hard calcium. Carbide cutting tools and chain flail heads were unsuccessful in removing the deposits.

After working with other local agencies and the National Clay Pipe Institute (NCPI), the emerging calcium problem was found to be nation-wide and was affecting other pipe materials besides vitrified clay pipe (VCP), NCPI took the lead and found the calcium (also referred to as "mineral deposits") could be dissolved using a high concentration mixture of hydrochloric acid

and citric acid. However, due to extensive federal and state regulations, chemical removal cannot be accomplished, and the removal of the calcium build-up must be completed through mechanical means. In 2017, technology advanced to the point where a cleaning hose nozzle could deliver water at over 29,000 pounds per square inch (psi), well above the threshold to break calcium and even concrete. A few municipalities have rented the service and found the removal of calcium to be successful, but slow.

One definite cause of calcium build-up is calcium laden ground water that infiltrates into openings in pipe joints or manholes. The areas of the District located north of the 405 Freeway has been identified as having potentially high ground water levels. Most of the sewer segments experiencing calcium buildup are in this region. However, sewer laterals and mains inside the Costa Mesa Sanitary District where there is no near surface groundwater have also been subject to calcium build-up, possibly indicating the build-up can be due to other causes. Some possible causes are household products such as detergents, water softener regeneration or backflushing of pool filters.

As part of this wastewater master plan update, the number of sewer segments and lengths of main with calcium have been categorized and are shown in below in Table 7. The program would include video inspections after the major cleaning effort to ascertain any damage to the pipes. A CIPP Liner will be installed in each segment after cleaning to eliminate ground water intrusion through the pipe joints. The initial phase of the project would be to conduct several small scale projects to ascertain the best and most cost effective method to do the removal.

Table 7: Sewer Segments Severely Impacted by Calcium Build-Up

No.	Description
1	Corporate Drive East of Business Park Drive
2	Santa Rosa Avenue from Santa Clara Drive to Smalley Road
3	San Rafael Circle
4	Santa Clara Circle North of Salinas Drive
5	Lavendar Lane North of Poppy Circle
6	Tulare Drive South of Salinas Avenue
7	Redding Avenue West of Turlock Drive
8	Brentwood Street Northwest of Santa Ana Avenue
9	Brittany Woods Lane
10	Irvine Avenue Southwest of 23rd Street.
11	Irvine Avenue Northeast of 19th Street
12	Westward Way & Westward Lane
13	Meadowview Lane

The current District budget for Wastewater Capital Improvements includes Project #327 Calcium Removal.

Ductile Iron Pipe (DIP)

The District's regulations require that gravity sewer pipes are constructed of vitrified clay pipe. Because VCP is a rigid pipe, it will crack rather than deflect when subjected to excessive loading. To prevent cracking, sewer system designers substituted ductile iron pipe (DIP) for shallow sewers or where excessive loading might occur due to situations where large utility conduits crossed in close vertical proximity to the sewer main. DIP was also extensively used to satisfy health code requirements for vertical and horizontal separation of sewer and water mains.

Unfortunately, DIP corrodes both from the inside due to the wastewater environment and from the outside due to acidic soils. Ductile Iron Pipes typically have interior and exterior coatings applied to inhibit corrosion. Over time, these coatings become compromised, and corrosion occurs. If allowed, corrosion will continue to weaken the pipe until it fails. Today's sewer system operators try and avoid using ductile iron pipe due to its susceptibility to corrosion.

The District has identified eighteen full length (manhole to manhole) sewer segments of DIP and eighty-six other sewer segments with shorter sections of DIP in its sewer system. One of the recommendations of this wastewater master plan is to remove the corrosion from ductile iron pipe segments and then install cured-in-place-pipe (CIPP) liners to extend the life expectancy. A listing of the pipe segments and approximate cost for corrosion removal and lining is in **Appendix G**.

The current District budget for Wastewater Capital Improvements includes Project #328 Ductile Iron Pipe Rehabilitation.

Developer's Responsibility to Provide Additional Sewer Capacity

In the interest of fairness, the District committed to providing sewer capacity to the level identified in the Master Plan but any additional capacity needed as a result of a developer proposing an even more intense land use would be the responsibility of the developer. This policy relieves the District and the rate payers of the burden of funding sewer improvements made necessary by the scenario of increasing project densities.

The District's policy is to require the developer to make a cash deposit to the District to fund a sewer analysis of the system where the new development is proposed. The analysis checks the capacity of the system assuming the proposed development is the only project that exceeds the General Plan density, but also checks line capacities assuming redevelopment of neighboring parcels also occurs to levels beyond the General Plan. An appropriate participation level is then determined for the developers.

This method can be applied to property owners who desire to construct accessory dwelling units that would increase the density of development, dwelling units per acre, above the General Plan density for their lot. The property owners could be assessed a fair share portion of the total cost of sewer system improvements necessary to provide the additional capacity for the A.D.U.'s.

High Volume Water Users

The District experienced a major change in sewer discharge when various properties in the Airway Ave./Red Hill Avenue area were inhabited by high volume water users. Manufacturers of computer components and food processors have discharge volumes significantly above the values used in planning the sewer lines in the area. For instance, historical industrial uses within the Sanitary District discharge no more than 3,500 gallons per day per acre of development. One user was discharging 55,000 gallons per day per acre and was single-handedly responsible for overloading the sewer line. Just prior to planning for a new sewer, this particular user vacated the location. However, other high-volume water users are located in the area and a continuous monitoring program has been implemented.

Users who generate flows that exceed the Master Plan flow coefficients should provide for additional sewer capacity in the same manner as developers proposing increased density developments. The District should continue to monitor existing potential high-volume water users. The industrial users are identified during the Development Review process at the City. As part of the process the District will require them to provide estimated flows and, if necessary, sewer capacity studies. If they discharge more than the master planned flows for their parcels, they would be required to contribute to the construction of the necessary improvements to carry the excess capacity.

Long Term Sewer Replacement Fund

The District's gravity sewer system is predominantly constructed using vitrified clay pipe (VCP) which is a combination of clay and shale subjected to high temperatures to produce vitrification. The resultant pipe is inert, meaning it will not chemically decompose when subjected to acids or other chemicals. A 50-year old pipe will have the virtually same strength characteristics as a new pipe. This property coupled with being naturally abrasion resistant gives VCP a life expectancy that makes it the material of choice for use in sewer systems. The major causes of failure in VCP sewers are from outside forces. Earthquake damage, construction over the top or near the sewer main, and root intrusion are the main factors that compromise VCP sewers. Absent damage caused by these outside forces; a vitrified clay pipe can last well over 100 years. The District has been proactive in regularly cleaning and videoing the sewer system on a regular basis. Corrective maintenance is performed to repair defects found throughout the sewer system that have the potential to cause a stoppage or failure.

A survey of sewer agencies throughout the United States disclosed two distinct philosophies of long-term sewer replacement. Some agency boards and managers believe it is their duty to establish a reserve that provides readily available substantial funds when the sewer system reaches its life expectancy. Other agencies choose to wait until the substantial repair time has arrived, then incur debt in the form of bonds or COPs to fund the improvements. Their philosophy is driven by the lack of a dedicated sewer fee plus the idea that current residents have already paid for their sewer system and that future owners should pay for a new one by paying off the debt.

The Board of Directors and Staff of the District believe it is prudent to fund a replacement program rather than pass on an unfunded liability to the property owners. Consequently, the District completed a study in December 1998 and established a sinking fund. The study is included herein for reference as **Appendix H**.

As described in the project report, Staff continues to monitor the advances in pipeline rehabilitation without excavation. Because repair and reconstruction of sewer lines in busy intersections and other hard to access areas is expensive, various no-dig methods were developed to provide repair or replacement of sewer lines without excavation. Methods include pipe bursting, directional drilling, and installing C.I.P.P. liners. The technology of no-dig is constantly improving, and it is anticipated that in the future, no-dig methods will be able to handle all pipe rehabilitation needs. The District has used all of these methods on various repair and improvement projects.

When the District initiated its Long-Term Sewer Replacement Fund, costs for traditional sewer construction were easy to calculate but it is uncertain what methods and costs will be associated with no-dig methods 30 years from now when a large portion of the system will approach the 100 year mark.

Waste Discharge Requirements (WDR)

The Santa Ana Region of the State Water Quality Control Board oversees the water quality in the local waters of the State, particularly the Pacific Ocean and the Newport Beach Upper and Lower Bay. The beaches along the coast have been closed numerous times due to contaminated surface water runoff and sewer spills and the closures have impacted the economy associated with summer beach activity.

In response to the beach closures, the Regional Water Quality Control Board adopted new storm drain and sewer regulations. The sewer regulations, termed the Waste Discharge Requirements (WDR), were adopted on April 26, 2002, and applied to all the sewer system owners in Orange County whose lines are tributary to the Orange County Sanitation District treatment plants. Therefore, these regulations applied directly to the Costa Mesa Sanitary District. Subsequent to the regional order, on May 2, 2006 a statewide WDR was adopted and the local order was rescinded.

One of the requirements of the WDR is the preparation and implementation of a comprehensive Sewer System Management Plan (SSMP). By preparing and practicing the procedures in the plan, the occurrence of sewer spills should decrease. The SSMP is continually updated and every two years it is audited by an outside consulting firm to evaluate the effectiveness of the document and determine the District's compliance with the WDR. The SSMP is recertified by the Board of Directors every five years. The last recertification was approved on January 25, 2021.

The Costa Mesa Sanitary District recognizes the importance of protecting ocean water quality by preventing sewer spills and has historically taken a proactive approach to comprehensive sewer

system management. The Costa Mesa Sanitary District's Sewer System Management Plan (SSMP) is included herein as **Appendix B**.

Low Flow Diversion of Storm Water into Sewer System

In an effort to assist the coastal cities in decreasing ocean pollution from contaminated surface water runoff, OCFCD has expressed interest in Low Flow Diversion Programs where low volume runoff flows are diverted from natural drainage channels to a nearby sewer system. The water is then treated with regular sewer flows. The Costa Mesa Sanitary District has been generally supportive of the idea as long as it doesn't adversely impact peak flows in the sewer system. To date, there are no active Low Flow Diversion Projects in the District.

Apppendix: A: Fixed Asset Schedule

Appendix A

CMSD FIXED ASSETS

GRAVITY SEWER – VCP (FEET)									
4”	6”	8”	10”	12”	15”	18”	21”	24”	30”
1,029	570,988	980,510	50,187	37,164	41,364	28,030	9,942	2,596	59

GRAVITY SEWER – DIP (FEET)								
4”	6”	8”	10”	12”	15”	18”	21”	24”
1,146	1,297	1,967	102	95	20	30	8	13

GRAVITY SEWER – PVC (FEET)		
6”	8”	10”
82	3,827	16

PRESSURE MAIN (FEET)							
4”	5”	6”	8”	10”	12”	15”	18”
1,415	300	5,021	8,966	1,124	6,053	164	5,461

STRUCTURES			
MANHOLE	LAMPHOLE	PUMP STATION	GENERATOR
4,722	71	20	5

Apppendix: B: Sewer System Management Plan (SSMP)

COSTA MESA SANITARY DISTRICT

SEWER SYSTEM MANAGEMENT PLAN

(SSMP)

WDID: 8SSO10566

Certified by the Board of Directors on 10/26/09

Amended by the Board of Directors on 12/17/09

Ratified by the Board of Directors on 1/28/10

Amended and Recertified by the Board of Directors on 6/23/11

Amended and Recertified by the Board of Directors on 7/31/13

Amended and Recertified by the Board of Directors on 12/17/15

Amended and Recertified by the Board of Directors on January 25, 2021

Table of Contents

List of Tables

List of Figures

Attachments

APPENDIX

I. GOAL

A. INTRODUCTION

The Costa Mesa Sanitary District (CMSD) is an independent special district governed by an independent five-member Board of Directors elected at large by the residents. CMSD was formed in 1944, nine years before the City of Costa Mesa was incorporated and provides wastewater service and solid waste collection. The boundaries of CMSD include the entire City of Costa Mesa and portions of the City of Newport Beach and the unincorporated territory of the County of Orange.

CMSD serves a residential population of approximately 116,700 plus various public, commercial, industrial and retail land uses. CMSD's facilities include 219.4 miles of gravity mainline, 4.8 miles of pressurize mainline, 109.3 miles of private property sewer lateral pipelines, 24,955 service lateral connections, 4,707 manholes and 20 pumping stations. A detailed list of the sizes and lengths of CMSD owned sewer lines can be found in the Costa Mesa Sanitary District's Sewer Master Plan.

CMSD's headquarters is located at 290 Paularino Avenue, Costa Mesa and CMSD's Yard is located at 174 W. Wilson Street, Costa Mesa. CMSD moved into the new headquarter building on November 11, 2016. The yard facility became operational in October 2010 and in February 2011, the U.S. Green Building Council (USGBC) certified the Yard as Platinum LEED (Leadership in Energy and Environmental Design) for demonstrating the building uses of sustainability practices and environmental protection. Platinum LEED is the highest certification awarded by USGBC.

In 2012 and 2015, the Costa Mesa Sanitary District was named Collection System of the Year by the Santa Ana River Basin Section (SARBS) of the California Water Environment Association (CWEA). SARBS, which boundaries include Orange, Riverside and San Bernardino Counties, is one of 17 geographical local sections of CWEA that trains and certifies wastewater professionals and promotes sound policies to benefit society through protection and enhancement of statewide water environment. In 2012, CMSD won the award again from CWEA. The designation of 'Collection System of the Year' is one of the most prestigious SARBS/CWEA awards which recognizes an agency's significant accomplishments, safety record, training program, regulatory compliance, maintenance program along with documented administrative and emergency procedures. In 2019, CMSD won SARBS Community Engagement & Outreach award for educating the public about wastewater collections and preventing sanitary sewer overflows.

The Santa Ana Region of the State Water Quality Control Board oversees the water quality in the local waters of the State, particularly the Pacific Ocean and the Newport Beach Upper and Lower Bay. The beaches along the coast have been closed

numerous times due to contaminated surface water runoff and sewer spills and the closures have impacted the economy associated with summer beach activity.

In response to the beach closures, the Regional Water Quality Control Board adopted new storm drain and sewer regulations. The sewer regulations, termed the Waste Discharge Requirements (WDR), were adopted on April 26, 2002, and applied to all the sewer system owners in Orange County whose lines are tributary to the Orange County Sanitation District treatment plants. Therefore, these regulations applied directly to the Costa Mesa Sanitary District. Subsequent to the regional order, on May 2, 2006 a statewide WDR was adopted and the local order was rescinded.

One of the requirements of the WDR is the preparation and implementation of a comprehensive Sewer System Management Plan (SSMP). By preparing and practicing the procedures in the plan, the occurrence of sewer spills should decrease. The SSMP is continually updated and every two years it is audited by an outside consulting firm to evaluate the effectiveness of the document and determine the District's compliance with the WDR. The SSMP is recertified by the Board of Directors every five years. The last recertification was approved on December 17, 2015 with the next recertification adopted on January 25, 2021.

The Costa Mesa Sanitary District recognizes the importance of protecting ocean water quality by preventing sewer spills and has historically taken a proactive approach to comprehensive sewer system management.

B. REGULATORY BACKGROUND

The Costa Mesa Sanitary District lies in Region 8 of the State Water Resources Control Board. The Region 8 WDR adopted in 2002 was partially in response to the Orange County Grand Jury report that analyzed ocean water pollution and identified grease in sewer lines as a substantial cause of sanitary sewer overflows (SSOs). Along with the WDR, the Regional Water Quality Control Board (RWQCB) also adopted Monitoring and Reporting Requirements in order to insure consistent and accurate sewer spill reporting.

After the State Water Resources Control Board viewed the success of the regional WDR, a statewide order was adopted and the local order rescinded. The statewide order is nearly identical to the regional order and covers all sewer system owners in the State of California who own one mile or more of sewer lines. The statewide order is Order No. R3-2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Overflows, (SSOs) and was adopted on May 2, 2006. The Costa Mesa Sanitary District Sewer System Management Plan (SSMP) is tailored to meet this order.

The SWRCB developed the WDR to promote uniformity in the management of California's wastewater collection systems and reduce SSOs. The SWRCB found that cities and districts that have implemented SSMPs similar to this have been effective

not only in improving spill reporting, but also in mitigating SSO impacts. Data also supported the conclusion that better collection system management will benefit water quality and prolong the life of sanitary sewer systems.

The SWRCB may regulate sanitary sewer overflows based on authority in the Federal Clean Water Act (EPA 2002) and the Porter-Cologne Water Quality Control Act, Section 13263 (California Water Code of Regulation 2006).

C. PURPOSE AND GOALS OF THE SSMP

This document has been developed to comply with WDR R3-2006-003-DWQ and sets specific wastewater collection system requirements and upholds State water quality standards. The WDR requires permittees to prepare and implement a SSMP in order to:

- Protect public health and the environment,
- Provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system in order to provide reliable service in the future,
- Prevent or minimize the frequency of SSOs,
- Ensure corrective action is taken in a timely manner, and.
- Maintain and improve the condition and performance of the District's wastewater collection system.

Sanitary sewer overflows are overflows from sanitary sewer systems of domestic, industrial, and/or commercial wastewater. SSOs may cause a public nuisance, particularly when untreated wastewater is discharged to waters designated for contact recreation. CMSD will proactively manage the operations of its sewage system in a way that prevents SSOs.

II. ORGANIZATION

A. RESPONSIBLE OFFICIALS

The Legally Responsible Official (LRO) for the Costa Mesa Sanitary District is the District Engineer. The Wastewater Maintenance Superintendent and General Manager serve as CMSD's alternate LROs.

B. RESPONSIBILITIES FOR THE CMSD SSMP

General Manager

Alternate Legally Responsible Official (LRO)

Responsible for overseeing the day-to-day operations of CMSD.

Establish administrative policies and implements said policies.

Allocate resources.

Delegate responsibility

Serves as public information officer

Authorizes outside contractors to perform services.

Assist with the planning and budgeting of capital improvement projects

District Engineer

Legally Responsible Official (LRO)

Design and construction standards and specifications for sewer systems.

Procedures and standards for inspecting and testing the installation of new and rehabilitated sewer systems.

System Evaluation and Capacity Assurance Plan / Capital Improvement Program including:

- Hydraulic capacity evaluation.
- Capacity enhancement measures.
- Schedule replacements.
- Regular visual and TV inspections of manholes and sewer pipes.
- Prioritizing and scheduling rehabilitation projects.
- Rehabilitation and replacement plan to identify and prioritize system deficiencies including potential sources for future SSOs.

Coordinates FOG program with EEC Environmental

Collaborates with PIO on public communications

Regulatory notifications and communications (including SSO reporting on CIWQS)

FOG (fats, oil, and grease) program enforcement, education and outreach

Assist with the planning and budgeting of capital improvement projects

Supervises the completion of capital improvement projects

Wastewater Maintenance Superintendent

Alternate Legally Responsible Official (LRO)

Primary responder for SSOs

Implements Emergency Response

Supervises field crew for collection system maintenance.

Contract manager for outside services.

Routine preventive operation and maintenance activities.

Allocates program resources.

Assigns work orders through the Computerized Maintenance Management System (CMMS).

Staff training in sanitary sewer system operations and maintenance.

Equipment and replacement part inventories.

SCADA Technician/Industrial Electrician

Ensures CMSD's pump stations are maintained in a safe and effective working condition.

Troubleshoots electrical control panels.

Monitors the Supervisory Control and Data Acquisition (SCADA) system.

Monitors smart-cover sensors.

Performs routine preventive maintenance on pump stations.

Conducts annual pump station inspections

Receives training in wastewater collection system operations and maintenance.

Assign to on-call and/or standby duties.

Wastewater Maintenance Workers I, II & III

Primary responder for SSOs.

Implements Emergency Response.

Performs routine preventive operation and maintenance activities.

Receives training in wastewater collection system operations and maintenance.

Assigned to on-call and/or standby duties.

Performs Closed Circuit Television (CCTV) of pipeline.

Management Analyst I

Prepares request for proposals for SSMP self-auditing services

Administers SSMP self-auditing contract.

Engineering Technician/Construction Inspector

Reviews wastewater plans and specifications for compliance with applicable codes and standards.

Issues permits for construction projects.

Ensures new construction meets standards.

Implements emergency response.

Oversight of contractors hired to work on CMSD facilities.

Oversees the District's Sewer Inspection Rebate Program (SIRP)

EEC Environmental (Contractor)

Administers the District's FOG Program

Performs inspections at food service establishments

Prepares GIS maps

Maintains and updates data in GIS and CMMS

C&R Drains (Contractor)

Performs emergency response during after hours, holidays and weekends.

Receives training on overflow response.

Figure 2-1: CMSD Organization Chart

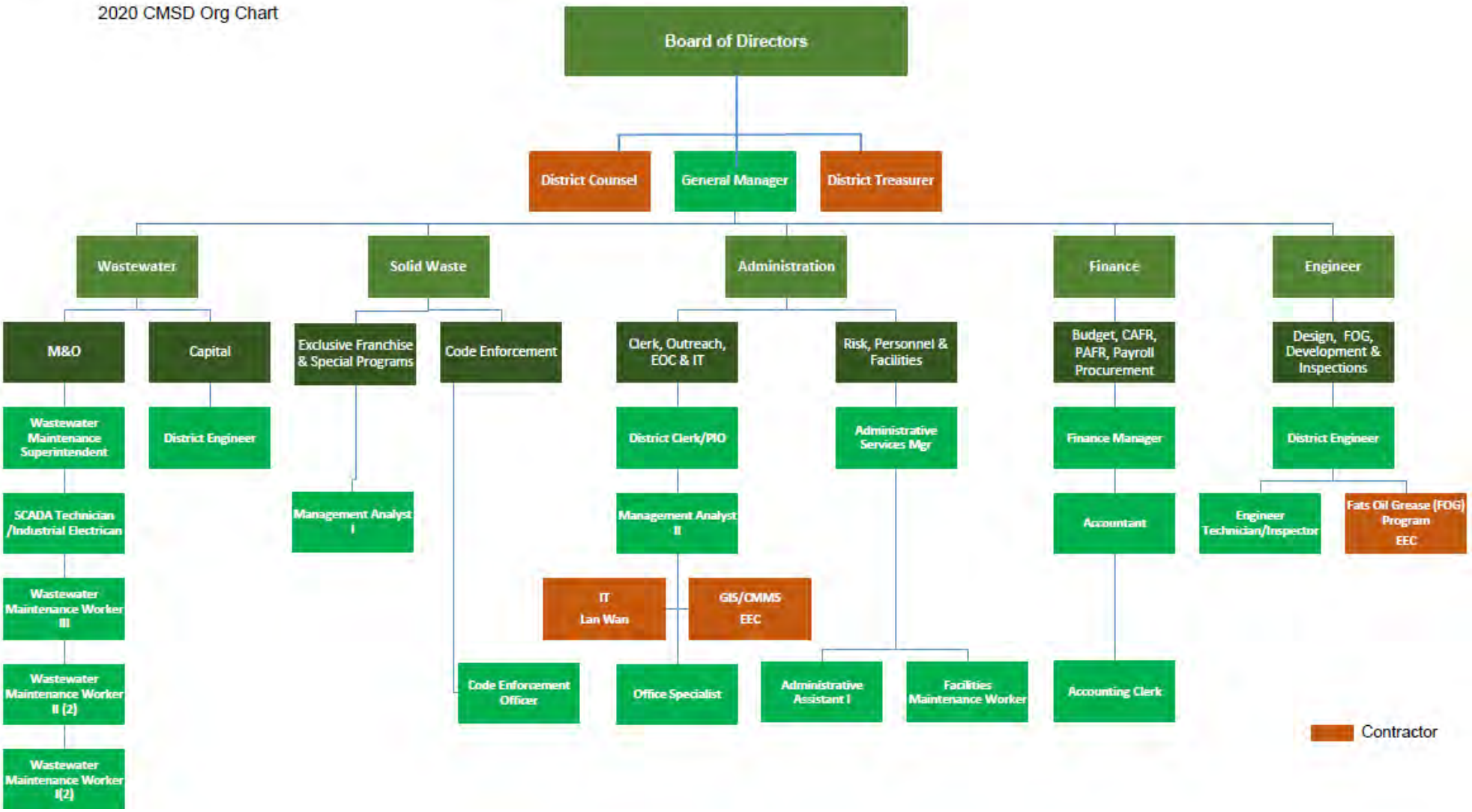


Table 2-1: CMSD Contacts Responsible for SSMP

SSMP Element	Responsible Party (Position)	Responsible Party (Name)	Phone Number 949-645-8400	Email Address
Introduction	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov
1 – Goals	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov
2 – Organization	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov
3 – Legal Authority	District Engineer	Mark Esquer	Ext. 241	mesquer@cmsdca.gov
4 – O&M Program	Wastewater Maintenance Superintendent	Steve Cano	Ext. 235	scano@cmsdca.gov
5 – Design & Performance Provisions	District Engineer	Mark Esquer	Ext. 241	mesquer@cmsdca.gov
6 – Overflow Emergency Response Program	Wastewater Maintenance Superintendent	Steve Cano	Ext. 235	scano@cmsdca.gov
7 – FOG Control Program	District Engineer & EEC Environmental	Mark Esquer & Joe Jenkins (EEC)	Ext. 241 714-667-2300	mesquer@cmsdca.gov jjenkins@eecenvironmental.com
8 – SECAP	District Engineer	Mark Esquer	Ext. 241	mesquer@cmsdca.gov
9 – Monitoring, Measurement, and Program Modifications	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov
10 – SSMP Audits	Mgt Analyst I	Nabila Guzman	Ext. 230	nguzman@cmsdca.gov
11-Communication	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov
12 - Change Log	General Manager	Scott Carroll	Ext. 223	scarroll@cmsdca.gov

C. CHAIN OF COMMUNICATION FOR REPORTING SSOs

The SSO reporting chain of communication is illustrated in Figure 6-1, Chapter VI, Overflow Emergency Response Plan, which details the procedures and responsibilities during an SSO event. The process is briefly described below.

After receiving a complaint or report of a potential SSO, the Wastewater Maintenance Superintendent and the District Engineer are notified. In the case of a power failure or other emergency within a pumping station, an alarm auto-dialer system will call to inform all wastewater maintenance employees, District Engineer and the General Manager. The first responder will report an overflow or hazard immediately to the Wastewater Maintenance Superintendent and/or the District Engineer and then to the General Manager. The General Manager is responsible for reporting the overflow, via telephone, to the appropriate regulatory agencies. The response process for SSOs is described in Chapter VI in more detail.

The District's Engineer is the Legally Responsible Official (LRO) and is responsible for overseeing the reporting process. The District Engineer receives the spill report from the Wastewater Maintenance Superintendent and drafts up the required report with consideration given to volume calculations, vacuum and wash down operations, cause of spill, timeliness of response, etc. After discussions are complete, the report is finalized, reviewed by the Wastewater Maintenance Superintendent and then transmitted to the appropriate authorities by the District Engineer. CMSD reports all spills except private property spills where the spill is contained on-site.

As a first priority during a sewer spill, CMSD staff and field crews notify the appropriate personnel by phone that a spill has occurred instead of depending on the report as a means of notification.

If the spill is significant or the result of a major emergency involving CMSD sewer lines or pumping stations, CMSD follows a pre-described procedure. In order to properly respond to a sewer system emergency that requires reconstruction of CMSD sewer facilities, CMSD maintains a list of high quality contractors for emergency services. The list contains contractors who have demonstrated expertise in pumping station construction, pipeline construction, televising, and pipeline rehabilitation utilizing trenchless technology. These contractors are staffed with well-experienced workers who are able to handle the scope of emergencies related to sanitary sewer systems.

III. LEGAL AUTHORITY

The District must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

(A) Prevent illicit discharges into its sanitary sewer system.
(B) Require that sewers and connections be properly designed and constructed.
(C) Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by CMSD.
(D) Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and
(E) Enforce any violation of its sewer ordinances.

A. PREVENT ILLICIT DISCHARGES INTO ITS SANITARY SEWER SYSTEM

The Sanitary District has the power to install sewers and enact regulations related thereto, including the prohibition of private sewer systems and requiring all inhabited property to be connected to CMSD sewers (Health and Safety Code Section 6400 et seq.) Once exercised, a sanitary district's power is controlling over any general law city or county regulation pertaining to the same subject (Home Gardens Sanitary District v. City of Corona (2002) 116 Cal.Rptr.2d 638.)

A permit from CMSD is required to connect to, use, or maintain a connection to the CMSD's facilities (District Operations Code Section 6.04.060 (a)). Any person, firm or corporation that connects or discharges to CMSD's wastewater system without a valid permit is guilty of a misdemeanor (CMSD Operations Code Section 6.04.060 (f)).

In the Costa Mesa Sanitary District, illegal connections are usually connections to the sewer system by property owners who have drainage problems due to flat areas and low spots and who solve those problems by draining those areas to an inlet that is connected to the sewer system. When instances of these illegal connections are found, the property owner is required to immediately remove the connection.

B. REQUIRE THAT SEWERS AND CONNECTIONS BE PROPERLY DESIGNED AND CONSTRUCTED

Results of CMSD-wide video inspection show that vitrified clay pipe will remain in excellent condition if proper construction practices are followed. Providing continuous inspection during the installation procedure insures the proper construction practices are followed. Continuous inspection of other utilities being installed in the vicinity of the sewer lines insures proper protection methods are provided for the sewer lines and lengthens the life expectancy of the lines.

Title 6 of the Operations Code regulates sewer construction. All sewer construction must be in accordance with CMSD standards (Section 6.01.010). The type of materials and inspection requirements by CMSD staff are provided in Chapter 6.01.

The Sanitary District has its Standard Plans and Specifications for the Construction of Sanitary Sewers that ensures the sewer lines and connections are properly designed and constructed. CMSD's specifications by reference incorporate the Standard Plans and Specifications for Public Works Construction (Green Book), which assists in insuring proper design and construction of sewer facilities.

C. MAINTENANCE, INSPECTION, OR REPAIRS OF SEWER LATERALS

The Costa Mesa Sanitary District does not own or maintain the sewer laterals within CMSD boundary. By ordinance, the sewer laterals, even when located within public streets remain private and are owned and maintained by the property owner (CMSD Operations Code Chapter 6.02.020).

CMSD does require CCTV inspection and repairs of private sewer laterals under certain conditions that will assist in preventing sewer spills (CMSD Operations Code Chapter 6.03).

D. LIMIT THE DISCHARGE OF FATS, OILS, AND GREASE AND OTHER DEBRIS THAT MAY CAUSE BLOCKAGES

Every owner, tenant and persons using property shall have a duty not to cause, permit or allow the accumulation of grease in CMSD's sewer line so that sewage spills may occur. Such persons shall use reasonable methods to reduce grease accumulation in the CMSD's sewer lines including but not limited to reducing or eliminating the grease that is deposited in the sewer and utilizing enzymes and similar products that prevent grease build-up. No person shall discharge grease into the sewer system so as to cause an accumulation in the CMSD's lines so as to substantially contribute to the possibility of a sewage overflow (CMSD Operations Code Section 6.07.040).

On November 21, 2011, CMSD implemented a convenient program for residents to dispose of unwanted cooking grease. In a partnership with the Orange Coast College (OCC), residents can bring any type of grease filled jugs, bottles and/or containers to the OCC Recycling Center located on Adams Street between Harbor Blvd and Fairview Road in Costa Mesa. The grease is poured into one of the two 50 gallon vats that are stored in front of the recycling center. When the vats are full, a contractor will arrive to pump out the grease and then transport the material to a rendering facility where the grease is recycled into useable products such as candles, soap, pet food and biofuel for automobiles. If the Recycling Center is closed during the holiday months (November & December), a temporary cooking grease drop-off site will be established at CMSD HQ.

No Food Service Establishment shall discharge into the CMSD's system without obtaining a permit from CMSD and shall implement Best Management Practices in their

business operations to minimize discharge of any FOG to the sewer system in accordance with this chapter (CMSD Operations Code Section 6.07.050).

CMSD has adopted Operations Code Chapter 6.07, which control fats, oils, and greases (FOG). Grease has been identified as the number one cause of sewer line stoppages and spills by the Sanitary District and by the Orange County Grand Jury who conducted a countywide study. Because of this finding, FOG has been identified as the most important first step in improving sewer system reliability.

As stated earlier, CMSD has the legal authority to control discharges to the sewer system for all sewer facilities located on private property that are outside any structures located on the property. This authority allows CMSD to require grease interceptors, as by Code the interceptor is located outside the building.

The legal authority for plumbing fixtures inside a building rests with the local agency building department. CMSD controls the discharge of other debris into the sewer system through its ordinances and through the ordinances of the Orange County Sanitation District, whose regulations prohibit unapproved debris from being discharged into the system (CMSD Operations Code Chapter 6.09). Both the Costa Mesa Sanitary District and the Orange County Sanitation District only allow discharges from permanently install plumbing fixtures unless authorized by special discharge permit.

E. ENFORCEMENT OF VIOLATIONS OF CMSD SEWER ORDINANCES

CMSD has enacted an Operations Code by ordinance. Any person, firm, or corporation violating the penal provisions of this ordinance shall be guilty of a misdemeanor and punishable by a fine of up to one thousand dollars per day and/or up to six months in jail (Section 1.02.010).

Violations of the connection permit provisions of the Operations Code are also subject to administrative citations (Section 1.06.010(d).

Violations of the Operations Code may result in termination of service in accordance with Health and Safety Code Section 6523.2.

CMSD is also authorized to abate conditions on property and to collect the costs on the assessment roll or as a lien (CMSD Operations Code Chapter 6.10).

Table 3-1: Legal Authority Checklist

Requirements	CMSD Code Reference
Public Wastewater System	
Ability to prevent illicit discharges into the wastewater collection system	CMSD Operations Code Section 6.04.060(a)
Ability to require that sewers and connections be properly designed and constructed.	CMSD Operations Code Chapter 6.01
Laterals	
CMSD does not own or maintain the sewer laterals within CMSD service area. Laterals are owned and maintained by private property owners.	Ordinance No. 8 and 81 CMSD Operations Code Section 6.02.020
CMSD requires private property owners to televise and repair their laterals under certain conditions.	CMSD Operations Code Chapter 6.03
FOG Source Control	
Ability to limit the discharge of FOG and other debris that may cause blockages.	Ordinance No. 81 CMSD Operations Code Section 6.07.040
No Food Service Establishment shall discharge into CMSD's wastewater system without obtaining a permit	Ordinance No. 51 CMSD Operations Code Section 6.07.050
Food Service Establishments shall implement Best Management Practices.	Ordinance No. 113 Section 6.07.060
Enforcement	
Ability to enforce any violation of CMSD wastewater ordinances.	CMSD Operations Code Chapters 1.02, 1.03 and 1.06 6.08, 6.09, 6.10

IV. OPERATION AND MAINTENANCE PROGRAM

A. THE CMSD SANITARY SEWER SYSTEM MAP

The Costa Mesa Sanitary District uses Geographic Information System (GIS) technology to create, maintain, and manage maps and data sets associated with its wastewater collection system. The wastewater system GIS mapping is maintained by EEC Environmental, a private contractor under contract with CMSD. Pipe inventory data includes ownership, installation year, diameter, length, material, slope, status, record drawing reference and other information. Manhole inventory data includes ownership, installation year, shaft diameter, depth, invert elevation, rim elevation, record drawing reference and other information.

In FY 2014-15, CMSD installed wireless tablets in its wastewater fleet that enables staff to gain access to GIS maps and Computerized Maintenance Management System (CMMS) work orders. Field staff no longer need to thumb through large sewer and storm drain atlas maps or carry large binders of work orders. With the tablets and access to CMSD's Cityworks asset management system, powered by Esri's ArcGIS, all the information they need is at their fingertips. In 2016, CMSD added features to the GIS/CMMS by allowing staff to view CCTV from the tablets. The crew cleans 150 miles of pipeline a year, so access to CMSD's asset management system gives them important information such as last cleaning date, notes about obstructions (if any), pipeline length and material, pipeline and manhole conditions, and CCTV observations. Cityworks, empowers the crews to access work orders and maintenance history. With a click of a button staff can query specific data in the field such as pipeline condition, maintenance history, photos, lift station run times, and asset lifecycles. The tablets can be removed from inside vehicle cabs and used in the field to take pictures, open and close work orders, take notes, send emails, search for reports, or log inspections among other things. Hard copy Atlas maps are also available and maintained in CMSD's fleet and in the vehicles of its after-hours emergency responder, C&R Drains. CMSD's new GIS atlas maps are reprinted whenever significant updates are made.

The locations of all the storm water conveyance facilities are shown on separate maps prepared by the agencies owning the storm drains and copies of these plans in reduced size format have been distributed to the District Engineer, Engineering Technician/Construction Inspector, Field Crews, Administrative Office, and to CMSD's after-hour emergency responder, C&R Drains. CMSD recognizes the link between a sewer spill and its travel in a storm drain facility to the receiving waters. CMSD has educated its staff and C&R Drains to understand the storm drain network and utilize it to capture a spill if it has entered the storm drain system.

CMSD understands the National Pollutant Discharge Elimination System (NPDES) regulations for storm drain system owners contain requirements prohibiting sewer system spills into the storm drains. The NPDES requires the storm drain system owners to adopt measures that will decrease the possibility of sewer spills reaching the waters of the state.

B. PREVENTATIVE MAINTENANCE PLAN

1. Proactive Wastewater System Cleaning

The District owns two combination sewer cleaning units that are operated by two, two person crews. The goal is to clean the entire system within eighteen months. When a unit is down for a long period of time for repairs, the District will hire a private contractor to assist with the cleaning and/or rent a combination sewer cleaning unit from a private company that is operated by District staff to ensure the cleaning goal is met. The District will continue reevaluating the system-wide cleaning frequency to identify enhancements that will assist achieving the objective of cleaning the entire system within eighteen months. Enhancements will include, but not limited to:

- Increase contractor cleaning use
- Hire additional wastewater maintenance staff
- Purchase additional maintenance equipment
- Reduce the cleaning frequency for segments that do not require eighteen month cleaning frequency.

Appendix 1 provides a map of CMSD's sewer system that includes pump stations, pressurized mains, gravity mains, and inverted siphons.

2. Enhance Maintenance Areas

Areas needing more frequent cleaning – known as enhanced maintenance areas – are cleaned as frequently as necessary due to root intrusion, grease accumulation, or structural defects. These include the inverted siphons that run under flood control channels or commercial areas with multiple restaurants. Cleaning frequencies for hot spots range from twice a year to four times a year.

In 2011, a Hot Spot Committee, consisting of CMSD management and field crew, was created to reduce the number of hot spot locations. CMSD has successfully reduced the number of hot spot locations from 95 to 18. On January 14, 2020, staff gave a report to the Board of Directors indicating the number of hot spot locations could be as low as fourteen within a few years. Reducing the number of hotspots from 97 to 14 saves

approximately 72 hours and 45 minutes of labor per year. The hours saved is transferred to the annual cleaning cycle program.

The fourteen locations will remain on a permanent hot spot list because it is more cost effective to clean these locations at a high frequency rather than performing repairs and/or rehabilitation work. Because the Hot Spot Committee has achieved its objective, the General Manager has decided to disband the Committee. The Hot Spot Committee is no longer meeting on a quarterly basis and will only meet when necessary.

3. Pump Station Operation and Maintenance

CMSD currently owns, operates and maintains 20 wastewater pump stations. The District has one two-person crew that is responsible for performing daily inspections and annual preventative maintenance on the stations. Each of the lift stations are equipped with supervisory control and data acquisition (SCADA) and monitored daily by CMSD's SCADA Technician/Industrial Electrician. The SCADA Technician/Industrial Electrician can monitor lift station SCADA data from the office or remotely on his cellular phone or from his wireless tablet. CMSD addresses SCADA alarms on a daily basis.

The District has in its fleet a Ford F-750 Super Cab XLT utility truck with a mounted outrigger crane. The crane can lift up to 11,000 pounds and the truck came with special accessories such as welding equipment, generator, 2" trailer hitch, air compressor and pressure washer. The pump station maintenance crew uses the Ford F-750 to perform annual preventative maintenance at lift stations. The crew performs the following PM functions:

- Remove the motors to examine the impellers for wear and torque;
- Change the oil;
- Check the motor windings for resistance;
- Test and check the general condition of the pumps;
- Re-install the pumps and test the system.

Replacement parts are inventoried at the District Yard, located at 174 West Wilson Street, and replaced at pump stations in accordance with manufacturer operations and maintenance manual.

CMSD acquired emergency equipment to ensure the stations that require back up power had back up power in the event of a CMSD wide or regional wide power outage. Table 4-1 below describes the emergency equipment assigned to each station.

Table 4-1: CMSD Pump Station Emergency Equipment

Lift Station	Location	Emergency Equipment	Exercise Frequency	Annual PM Performed by
Canyon	999 Wilson St	On-site 50 kW Kohler generator	Weekly	Global Power Group
Irvine	2677 Irvine Ave	On-site 150 kW natural gas Kohler generator	Weekly	Global Power Group
Elden	146 Mesa Drive	On-site 99 HP Godwin bypass pump	Weekly	Xylem
Victoria	550 Victoria Street. At the end of Miner St	On-site 24 HP Godwin bypass pump	Weekly	Xylem
Mendoza	2899 Mendoza Drive	On-site 24 HP Godwin bypass pump	Weekly	Xylem
19th Street	1035 W. 19th St	On-site 30kW John Deere generator	Weekly	Global Power Group
Valley	1140 Aviemore Terrace	Portable 17.1 kW bypass pump	Monthly	Charles King Company
Corp Yard	2300 Placentia	Portable 17.1 kW bypass pump	Monthly	Charles King Company
Harbor	521 Wilson St	Portable 160 kW Generac generator	Monthly	YC Power
Adams	2054 Adams Ave	Portable 71 kW Generac generator	Monthly	YC Power

23rd Street	2401 23rd Street, NB	On-site 30kW Kohler generator	Weekly	Global Power Group
President	2034 President Place	Portable 36 kW Multiquip generator	Monthly	YC Power
California	1803 California Street	Portable 33.6 kW Doosan generator	Monthly	YC Power
Santa Ana	2449 Santa Ana Ave	Portable 33.6 kW Doosan generator	Monthly	YC Power
Gisler	3003 Iowa St	Portable 33.6 kW Doosan generator	Monthly	YC Power
Iowa	1601 Iowa St	Portable 33.6 kW Doosan generator	Monthly	YC Power
Seabluff	1099 Seabluff Drive	Portable 33.6 kW Doosan generator	Monthly	YC Power
Westbluff	1059 Westward Lane	Portable 33.6 kW Doosan generator	Monthly	YC Power
South Coast Plaza	Parking lot behind Bloomingdale's	South Coast Plaza provides two sources of Edison power plus an on-site generator.		
21st Street	114 21st Street	Lift station has two-way manhole, which drains to the Elden Lift Station. No backup power is necessary.		

Every quarter (once every three months), the Pump Station Committee, which consist of CMSD management and the pump station crew, meet to discuss pump station operations and needed repairs. The pump station crew will report what they are observing on a weekly basis and share with the group the pump run times according data collected from SCADA. Needed repairs are scheduled accordingly.

In an effort to help prevent private SSOs, CMSD staff came up with an innovative program to help diagnose the operational condition of private sewer pump stations. This service is free to any of the twenty-six existing private pump station owners that are currently located within CMSD service area. Upon request and after receiving permission to enter their property,

staff will inspect the pumps and make recommendations for improvements. Staff will perform the following inspections:

- Observe station in normal working condition
- Check valves
- Exercise plug valves
- Check electrical wiring and components
- Check motor starters, breakers and fuses
- Check motor chords and check resistance
- Check motor windings
- Take amperage reading for the motors

At the conclusion of the inspection a list of recommended repairs will be given to the property owner/manager and it will be up to the owner/manager to perform those repairs. A list of qualified contractors will be provided to the owner/manager, but staff will not recommend a specific contractor.

In order to prevent private property sanitary sewer overflows from residential properties, the Board of Directors replaced Sewer Lateral Assistance Program with the Sewer Inspection Rebate Program (SIRP).The SIRP allows resident to receive $200 to $250 rebate for televising and videoing the condition of their sewer lateral. Residents can also receive $500 rebate for installing a ground level cleanout. The program was developed to encourage homeowners to take a proactive approach to sewer lateral maintenance.

4. Closed Circuit Television (CCTV)

Included in the District's fleet is a CCTV trailer. The CCTV trailer is greatly enhancing operations because when the cleaning crew finds obstructions in the pipeline, CMSD can immediately analyze the problem by using the CCTV trailer and then quickly implement mitigation efforts. The trailer is used for inspecting locations that have roots, FOG and/or structural defects. CMSD staff is trained on reviewing wastewater videos and how to identify pipe conditions by using National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP).

C. REHABILITATION AND REPLACEMENT PLAN

Approximately 73% of CMSD's wastewater system was constructed prior to 1965. See Figure 4-1 below. The vast majority of the system constructed before 1965 is made of vitrified clay pipe (VCP). Of the 27% of pipeline constructed after 1965, 93% is VCP. Other materials used for wastewater pipeline include ductile iron pipe (DIP), polyvinyl chloride (PVC) and cast iron pipe (CIP). See Figure 4-2 below regarding pipe material for the entire wastewater system.

Figure 4-1: CMSD Wastewater System Age

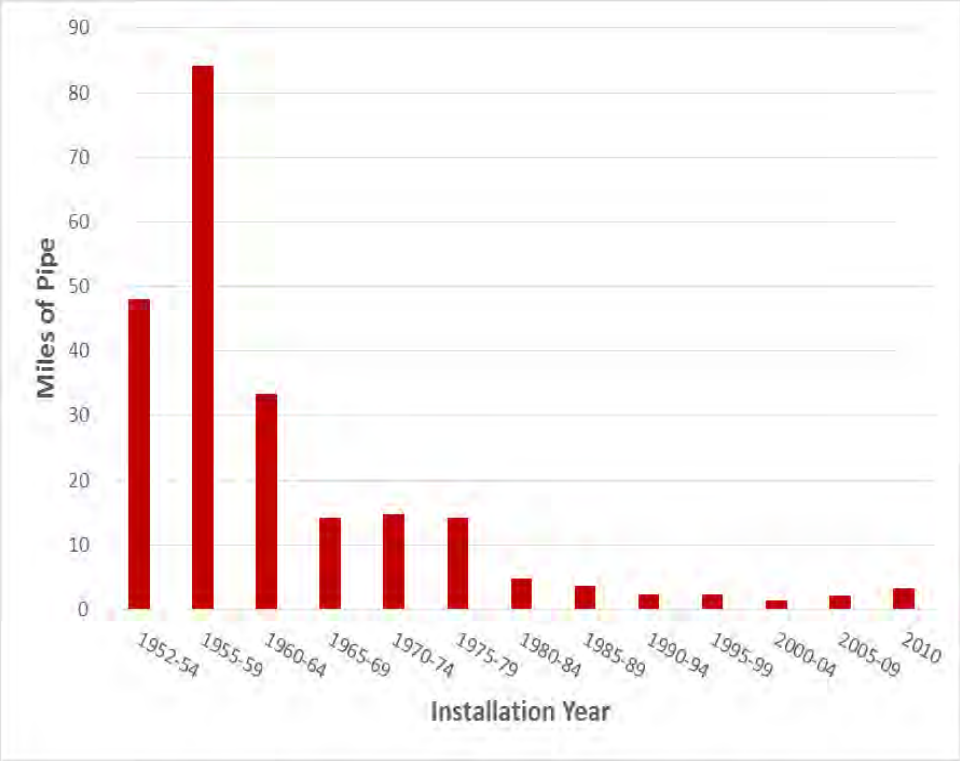
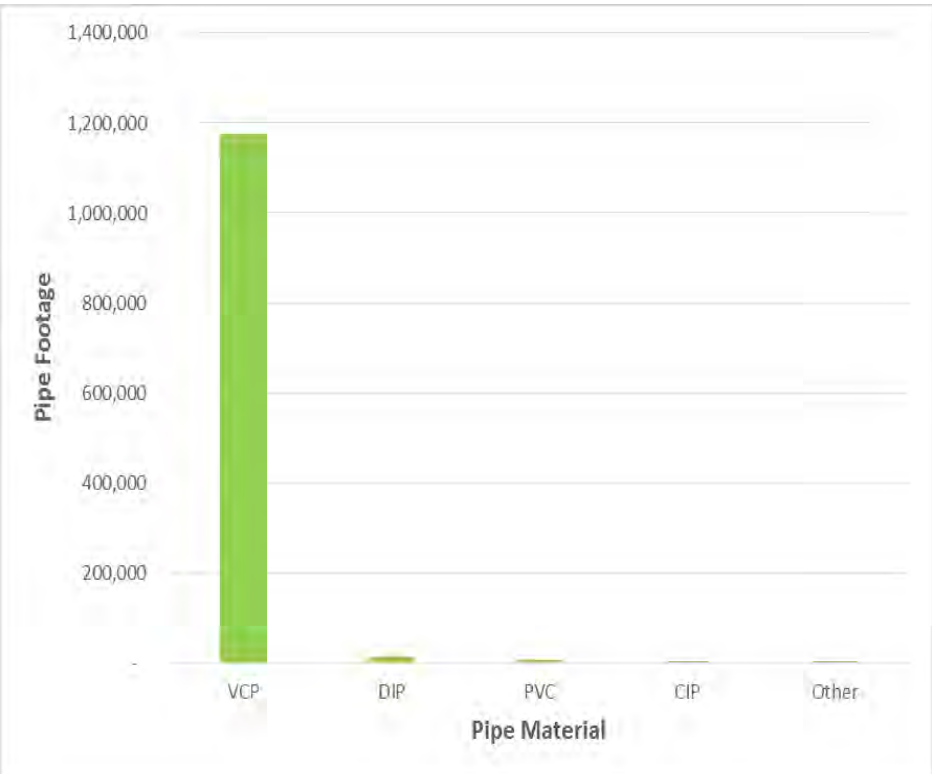


Figure 4-2: Pipe Material



The oldest VCP pipe is 63 years with the average pipe age being 50 years old. Vitrified Clay Pipe is the most sustainable pipe available for wastewater systems. According to National Clay Pipe Institute (NCPI), the U.S. Army Corps of Engineers assumes a one hundred year service life for VCP and the Canadian National Research Council/Institute for Construction Research estimates the service life of VCP at 132 years (source: http://www.ncpi.org/GreenStandards.asp). The following describes how CMSD performs inspection and condition assessment for its wastewater manholes and pipelines.

Manholes

CMSD has 4,707 wastewater manholes. 71% of CMSD manholes were constructed prior to 1967 and made of brick. The remaining 29% of manholes are made of concrete. Every year, when the wastewater maintenance crew is cleaning the system, they open the manholes to access the mainline. When the manholes are open, the crew will observe the condition of the manhole interior, specifically where corrosion has deteriorated the brick walls, concrete walls, steps or manhole bases. CMSD uses the National Association of Sewer Service Companies (NASSCO) Manhole Assessment Certification Program (MACP) format for documenting manhole conditions. The MACP method is similar to NASSCO's Pipeline Assessment Condition Program (PACP) system. The MACP process provides a system for identifying and documenting specific defects within the manhole. Furthermore, the MACP documentation includes taking note of physical features of the manhole which is valuable information for updating CMSD's asset management program and can provide useful information for determining rehabilitation options. The documentation of physical features are logged into GIS and CMSD's asset management program. Other manholes are evaluated based on their years of service described in the asset management plan. CMSD's standard form of rehabilitation for manholes is applying a polyurethane coating. From 2013 through 2021, the District has rehabilitated 276 manhole covers, rings and surface area, and lined 22 brick manholes.

Pipelines

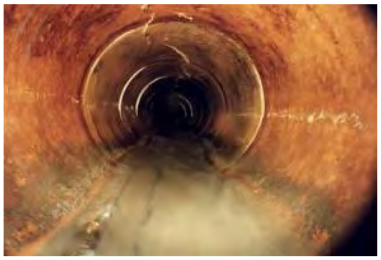
a. Gravity Main: From 2016 through 2018, the District televised the entire wastewater system. By viewing the videos from 2016-18District staff was able to assess the condition of gravity pipeline using NASSCO PACP standardized ratings. NASSCO has developed this standardized system in order to provide a consistent assessment of sanitary sewer conditions, as well as to provide the capability of benchmarking wastewater conditions in order to track deterioration over time. Two key concepts in collection system asset management are criticality and condition severity.

   Critical wastewater can be classified as wastewater where costs associated with the failure are likely to be high. These are generally strategically important wastewater systems where costs of failure are driven by high construction costs associated with repairs, costly traffic delays and impacts

on property owners and stakeholders. In addition, proximity to waterways, flows, and potential impacts to public health and the environment should also be considered when classifying wastewater as critical.

Ratings of condition severity are provided by the PACP process and assist the owner in prioritizing the pipeline to be considered for renovation. The PACP process identifies the major deterioration factors and assigns a grade that is related to the likelihood of failure or collapse. Deterioration factors include surrounding soil condition, position of groundwater table, frequency of wastewater surcharging, above ground traffic loading, methods and materials used in construction, third party damages and defects such as roots, grease and debris causing more frequent cleaning. Deterioration factors are classified into categories of structural defects. PACP defects are assigned a grade of 1 to 5 in order of increasing severity, as described in Table 4-2

Table 4-2: NASSCO PACP Grades

Grade	Importance	Likelihood of Failure	Structural Grade Example
1 Excellent	Minor defects	Failure unlikely in the foreseeable future	
2 Good	Defects that have not begun to deteriorate	Pipe unlikely to fail for at least 20 years	 Longitudinal Cracking
3 Fair	Moderate defects that will continue to deteriorate	Pipe may fail in 10 to 20 years	 Multiple Fractures
4 Poor	Severe defects	Pipe will probably fail in 5 to 10 years	 Broken Pipe
5 Imminent Failure	Defect requires immediate action	Pipe has failed or will likely fail within the next 5 years	 Collapsed Pipe

Using the table above CMSD has repaired 311 Grade 5 pipeline segments from 20172019 at a cost of $515,000. There are approximately 493 Grade 4 line segments. These line segments will be periodically evaluated and planed for rehabilitation in the near future.

b. Force Main: Force mains are considered critical pipeline in CMSD's wastewater system because of the velocity and volume of wastewater flowing through the system. For instance, the Elden Pump Station pumps 3,750 gallons per minute and has an 18" force main pipeline that is approximately 3,290 feet long making this station the largest of CMSD's assets. CMSD has four miles of force mains. Force mains near waterways such as the Santa Ana Delhi Channel and Santa Isabela Channel, both channels are tributary to Upper Newport Bay, and the Santa Ana River are considered critical assets. Force mains near Orange County Flood Control Channel are also considered critical to CMSD's wastewater system.

   67% of force mains are made of cast iron pipe (CIP) or ductile iron pipe (DIP). 21% of force mains are made of other materials while 12% of force mains are made of polyvinyl chloride (PVC). Because CIP and DIP are susceptible to corrosion CMSD is proactive to replacing force mains before they fail.

CMSD staff prioritizes the replacement or rehabilitation of force mains by taking into consideration the pipeline age, flow and proximity to waterways. From 2017 through 2020 the District has replaced and/or rehabilitated the following force mains:

South Coast Plaza	Construction Cost: 413,000
Victoria	Construction Cost: $267,000
Canyon	Construction Cost: $793,000
President	Construction Cost: $674,000

A long-term action plan for rehabilitating and/or replacing force mains is described in more details in CMSD's Capital Improvement Program (CIP).

The Costa Mesa Sanitary District Wastewater Master Plan is in the process of being updated to reflect subsequent growth and wastewater improvements. Adoption of the Sewer Master Plan is anticipated in 2020.

Table 8-1 and 8-2 is a list of short and long term capital improvement projects that focuses on rehabilitating and/or replacing force mains and pump stations, ductile iron pipeline, calcium removal, sewer siphons, and rehabilitating brick manholes.

D. EDUCATION AND TRAINING

CMSD provides training on a regular basis to all employees performing operations and maintenance activities on the wastewater system assets. CMSD also requires contractors working on the wastewater system to be appropriately trained.

CMSD uses a combination of on-the-job training, conferences, seminars, and other training opportunities to provide technical training for its wastewater collection system staff. Vendors provide training for new equipment. Examples of technical training and training material CMSD's wastewater collection staff might take advantage of are listed below in Table 4-3.

Table 4-3: Education and Training

Sponsor	Event	Timeframe	Reference
Santa Ana River Basin Section (SARBS) of CWEA	Collections and Safety Seminar	Annually	www.sarbsofcwea.com
	PDC Seminars	Quarterly	
California Water Environment Association (CWEA)	State Conference	Annually	www.cwea.org
	Southern Regional Safety Committee	Annually	
	Webinars	Quarterly	
Tri-State Conference	Annual Conference	Annually	www.tristateseminar.com
Orange County Sanitation District	OC WDR Steering Committee	Monthly	www.ocsd.com

In addition to technical training provided by outside resources, CMSD provides in-house technical training to equipment and collection system operations and maintenance. The focus on in-house training is hands-on training at a work site. All employees receive thorough training on the District's SSMP, their roles and the roles of others. The District conducts table top exercises to reinforce this training. All employees are required to keep relevant portions of the SSMP with them at all appropriate times.

The District Engineer is a member of the Orange County WDR General Group that recommends or identifies training opportunities for wastewater professionals. Some additional training opportunities that will be made available to District staff will include, but not limited to:

- Cleaning procedures, including sewer combination units
- Use of the District's Computerized Maintenance Management System (CMMS)
- Emergency response procedures to pump stations
- SSO volume estimation
- Conduct emergency bypass training at high risk pump stations
- Conduct periodic SSO simulation training at District Yard

Every CMSD employee in the wastewater maintenance division must obtain CWEA Collection System Maintenance Grade 1 certification within one year of employment. CMSD offers pay incentives, up to 1.5%, for each grade certification obtained. CMSD's Wastewater Maintenance Superintendent has successfully obtain Grade 4 certification, which is the highest grade for collection system maintenance. Several District Wastewater Maintenance Workers have earned Grade 2 Certification or higher.

CMSD documents all training activities using a Training Sign-In Sheet with signatures of attendees along with training agendas. These documents are managed and stored by the Wastewater Maintenance Superintendent.

Contractors responsible for being first responders to SSOs receive refresher training annually regarding CMSD's standard operating procedures for responding to SSOs. This training is documented using a Training Sign-In Sheet with signatures of attendees along with training agendas. All contractors are required to keep relevant portions of the District's SSMP with them at all appropriate times. In addition, CMSD requires contractors who work on CMSD wastewater projects to be qualified with wastewater collection system experience. Each contractor must provide CMSD with three references to demonstrate they are qualified to perform the work and CMSD performs reference checks to verify contractor qualifications. Also, during the process of selecting contractors for specific project, CMSD requires each contractor to submit a list of three local comparable projects performed using the equipment and techniques specified. These references are checked during the selection process for a specific project. If confined space entry is required contractors must provide evidence their staff are trained and certified to perform this task.

E. EQUIPMENT AND REPLACEMENT PARTS INVENTORY

For the Sanitary District, keeping critical replacement parts available encompasses stocking spare pumps that can be used as replacements while pumps are serviced or replaced. CMSD attempts to use the same model pumps in as many stations as

possible to simplify maintenance and replacement. CMSD also attempts to use the identical equipment in each of the pumping stations, including electrical panels, liquid level sensors, back up sensors, valves, by-pass connection, etc.

CMSD has in its inventory emergency equipment for pump stations, such as portable and standby generators, pipes, pumps, electrical panels, etc. In addition, the District has composite manhole covers in its inventory for replacing dilapidated manhole covers, and acquired new equipment to improve operations and maintenance

All equipment is maintained in accordance with owner's manual and the maintenance is performed by licensed and experienced contractors. Maintenance records are maintained by the Wastewater Maintenance Superintendent.

CMSD has identified pump stations pumps and motors as critical spare parts. CMSD owns spare pumps and motors for all pump stations. In addition, CMSD owns spare level transducers enabling quick replacement when needed. CMSD has designed backup pumps and backup power providing redundancy at each lift station. The Wastewater Maintenance Superintendent is responsible for maintaining and updating the inventory of critical parts and equipment on hand.

All parts are stored at CMSD's Yard and all potential responders have been given appropriate keys and access codes so that such parts may be accessed in an emergency.

V. DESIGN AND PERFORMANCE PROVISIONS

A. STANDARDS FOR INSTALLATION, REHABILIATION AND REPAIR

CMSD requires all new or rehabilitated sewer installations be tested and inspected pursuant to the provisions of Title 6 of CMSD Operations Code and a permit is required for such connections. The primary design and performance standards the District uses in design and installations of new sewer systems are:

- Chapter 6.01 of the District Operations Code
- The Costa Mesa Sanitary District Standard Plans and Specifications for the Construction of Sanitary Sewers
- Standard Specifications for Public Works Construction ("Green Book").
- American Public Works Association Standard Plans for Public Works Construction

The standards listed above outline construction specifications for installing new wastewater systems, pump stations, and other appurtenances, and for rehabilitation and repair of existing wastewater systems. Design criteria include specifications for items such as pipe materials, minimum sizes, minimum cover, strength, minimum slope, trenching and backfill, structure standards, and other related provisions. All new construction, rehabilitation, or repair of the sanitary sewer system adheres to these standards.

Additionally, CMSD has standardized its use of equipment in the pumping stations for ease of maintenance and replacement. This includes the pumps, liquid level indicators, electrical components, valves, piping and telemetry. CMSD is implementing no-dig pipeline rehabilitation as one of the methods for replacement. The Sanitary District considers no-dig technology to be the future answer to pipeline rehabilitation as systems reach their life expectancy. Parts of the Sanitary District's system will be 100 years old in 2050 and although vitrified clay pipe may have a life expectancy far greater than 100 years, CMSD believes no-dig rehabilitation methods will be the standard rehabilitation practice. In FY 16 CMSD adopted the Greenbook (Standard Specifications for Public Works Construction, latest edition) as the authoritative standard for new technology. In addition, CMSD will use additional written specifications of the particular construction method being used.

B. STANDARDS FOR INSPECTION AND TESTING OF NEW AND REHABILITATED FACILITIES

CMSD's standard public works contract provides the work is not placed into service and accepted by the Board of Directors until inspection and testing is completed.

Additionally, no dedication will be accepted and no tie into CMSD facilities will be allowed where the District Engineer has not approved the plans and drawings and has not inspected the project during its course of construction (CMSD Operations Code Section 6.01.070).

CMSD provides continuous inspection during the construction of sewer facilities and believes that proper installation is the key element to insure proper operation and maximum life expectancy. Inspection and testing of new or rehabilitated facilities ensures that the established standards are being implemented in the field. Acceptance testing for gravity sewers can include low pressure air test or water test to identify leakage, mandrel test to identify deflection of flexible pipe, and television inspection to identify grade variations or other construction defects. CMSD adheres to these standards for inspection and testing of new or rehabilitated facilities that are outlined in the above listed standards.

VI. OVERFLOW EMERGENCY RESPONSE PLAN

The Overflow Emergency Response Plan (OERP) is developed as part of the CMSD Sewer System Management Plan. The purpose of the plan is to establish guidelines and measures to protect public health and the environment in case of an accidental overflow.

In the case of an overflow, CMSD shall dispatch the appropriate crews to investigate, identify the cause, and provide appropriate action to minimize the effects of the overflow on public health and quality of surface waters. The OERP further specifies the required notification and reporting that is necessary for local and state agencies.

Appropriate CMSD personnel will be required to read the OERP and familiarize themselves with the procedures. The OERP should be kept in an easily available location for all utility personnel and public access reference.

A. SSO NOTIFICATION PROCEDURES

Normal Work Hours

The normal working hours for CMSD office staff for answering emergency calls is from 7:30 am to 4:30 pm Monday through Thursday and 7:30 am to 3:30 pm every other Friday. When a report of an SSO is made, the front office staff takes the information from the caller and communicates this information to the Wastewater Maintenance Superintendent or to the person in charge of the Wastewater Maintenance Department when the superintendent is on leave. The Wastewater Maintenance Superintendent or the person in charge will report to the site to assess the situation and take appropriate action.

After Hours

Outside of regular business hours, CMSD's general phone number (949) 645-8400 has information on who to call for after-hours emergencies, and the Costa Mesa Police Department Dispatch follows CMSD procedures for SSO's. Also, the City of Newport Beach Utilities Department and the County of Orange Public Works Department has emergency contact information for CMSD. Because the majority of after-hours emergency calls for gravity sewer SSOs pertain to private small size sewers, the first responder is C&R Drains, a local plumber. C&R Drains is under contract to CMSD to provide first responder service and has the ability to unclog any private sewer backup. They are trained how to read sewer and storm drain atlas maps and their first responder must have maps, CMSD's Standard Operating Procedures (SOP) reports, tarps, sandbags and SSO warning signs in his/her vehicle at all times. In addition, C&R Drains first responder must bring a high pressure jetter equipment to all after hour calls.

If upon arrival at the SSO C&R Drains finds the backup to be in a CMSD sewer main, C&R Drains will call the CMSD's on-call personnel who will respond to investigate and take appropriate action.

If there is a sewer alarm from one of the sewer pumping stations, all CMSD's Wastewater Maintenance Department staff, including the District Engineer and General Manager will receive the alarm via cellular phone text and email.

All CMSD staff and field crews have preprogrammed cellular phones to facilitate instant communications. In addition, back-up phone numbers or contact information shall be available for all critical personnel and listed in the chart of contact persons. Should cellular phone communications be down during the emergency, CMSD has low band two-way radios for use to communicate between District staff, field crews and the Water Emergency Response Organization of Orange County (WEROC) if need be.

B. APPROPRIATE RESPONSE TO ALL OVERFLOWS

CMSD policy is to respond to all spills within the CMSD service area – and even provide mutual aid outside CMSD – whether on public or private property and to take all steps possible to prevent the spills from reaching the storm drains, flood control channels, or waters of the State, all in accordance with the waste discharge requirements.

Organization of this document details the lines of authority and responsibilities of CMSD personnel during an emergency. Because CMSD provides only wastewater and trash collection services, CMSD has equipment and manpower dedicated solely to wastewater system maintenance, operation, and emergency response.

C. REGULATORY NOTIFICATION PROCEDURES

If an SSO occurs, it is required that certain regulatory agencies be contacted. The following reporting criteria explain when notifications should be sent and the various forms that are required. Regulatory notification procedures are administered by the District's Engineer.

1) Oral Notification

As a first priority during a Category 1 sewer spill, the General Manager will immediately notify the California Office of Emergency Services (Cal-OES) (not later than two hours after becoming aware of the discharge) by phone that a spill has occurred. The General Manager will then notify Orange County Health Care Agency (OCHCA), Orange County Public Works and the Santa Ana Regional Water Quality Control Board, if necessary. CMSD notifies OCHCA by phone on all private property spills that are not fully recoverable immediately upon discovery.

Category 1 sewer spills are spills from CMSD sanitary sewer system of any volume that:

a. Reach surface water and/or reach a drainage channel tributary to a surface water; or

b. Reach a Municipal Separate Storm Water System (MS4) and is not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. (Any volume of wastewater not recovered from the municipal separate storm water system is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or ground water infiltration basin (e.g. infiltration, pit, percolation pond).)

Notify OES and obtain a notification control number is SSO is greater than or equal to 1,000 gallons.

Notify OCHCA as soon as practical for SSO volume is less than 1,000 gallons.

Cal-OES	(800) 852-7550 (within two hours after being notified of the spill)	
OCHCA	(714) 433-6419	Control 1: (714) 628-7008 After Hours
RWCQB	(951) 782-4130	Santa Ana Region: (951) 782-4130
OCPW	(877) 897-7455	Control 1: (714) 628-7008 After Hours

Category 2 spills are discharges of untreated or partially treated wastewater of equal or greater than 1,000 gallons that did not reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.

Category 3 spills are all other discharges of sewage that result from a failure in the Agency's sanitary sewer system.

2) Written Report

For Category 1 spills, CMSD will adhere to the following written procedures:

- Within 24 hours of notification of a Category 1 spill, CMSD will certify to the appropriate RWQCB, by phone or with a follow up email, that Cal-OES and OCHCA were notified.
- Within 3 business days of being notified of the spill event, CMSD will certify the initial report using the CIWQS online SSO Reporting System
- Within 15 calendar days of the conclusion of the SSO response and remediation, CMSD will certify the final report using the CIWQS online SSO Reporting System.
- CMSD will update CIWQS and re-certify the SSO report as new or changed information becomes available. The updates will be submitted as soon as new information is verified. All updated reports will be certified.

For Category 2 spills, CMSD will adhere to the following written procedures:

- Within 3 business days of being notified of the spill event, CMSD will certify the initial report using the CIWQS online SSO Reporting System.
- Within 15 calendar days of the conclusion of the SSO response and remediation, CMSD will certify the final report using the CIWQS online SSO Reporting System.
- CMSD will update CIWQS and re-certify the SSO report as new or changed information becomes available. The updates will be submitted as soon as new information is verified. All updated reports will be certified.

For Category 3 spills, CMSD will adhere to the following written procedures:

- Within 30 calendar days after the end of the calendar month in which the SSO occurred, CMSD will submit a certified report using the Online SSO Reporting System. The report will include the information to meet the GWDR requirements.

The District's Engineer is responsible for overseeing the reporting process. The District Engineer receives the spill report from the Wastewater Maintenance Superintendent and drafts up the required report with the consideration given to volume calculations, vacuum and wash down operations, cause of spill, timeliness of response, etc. The reports are located in CMSD's Standard Operating Procedures for responding to SSOs. After discussions are complete, the report is finalized and submitted to the Wastewater Maintenance Superintendent for review. After the Wastewater Maintenance Superintendent has submitted his comments, the District Engineer transmits the spill report to the appropriate authorities.

As required in the Monitoring and Reporting Requirements, CMSD also completes the annual questionnaire by the end of December each year.

D. WATER QUALITY SAMPLING

The District relies on the Orange County Heath Care Agency (OCHCA) for monitoring water quality and posting beach closures. The District also has procedures for conducting water quality sampling and preparing a SSO Technical Report for any Category 1 SSO in which 50,000 gallons or greater are spill to surface waters. The procedures are described in the District's Standard Operating Procedures for SSO.

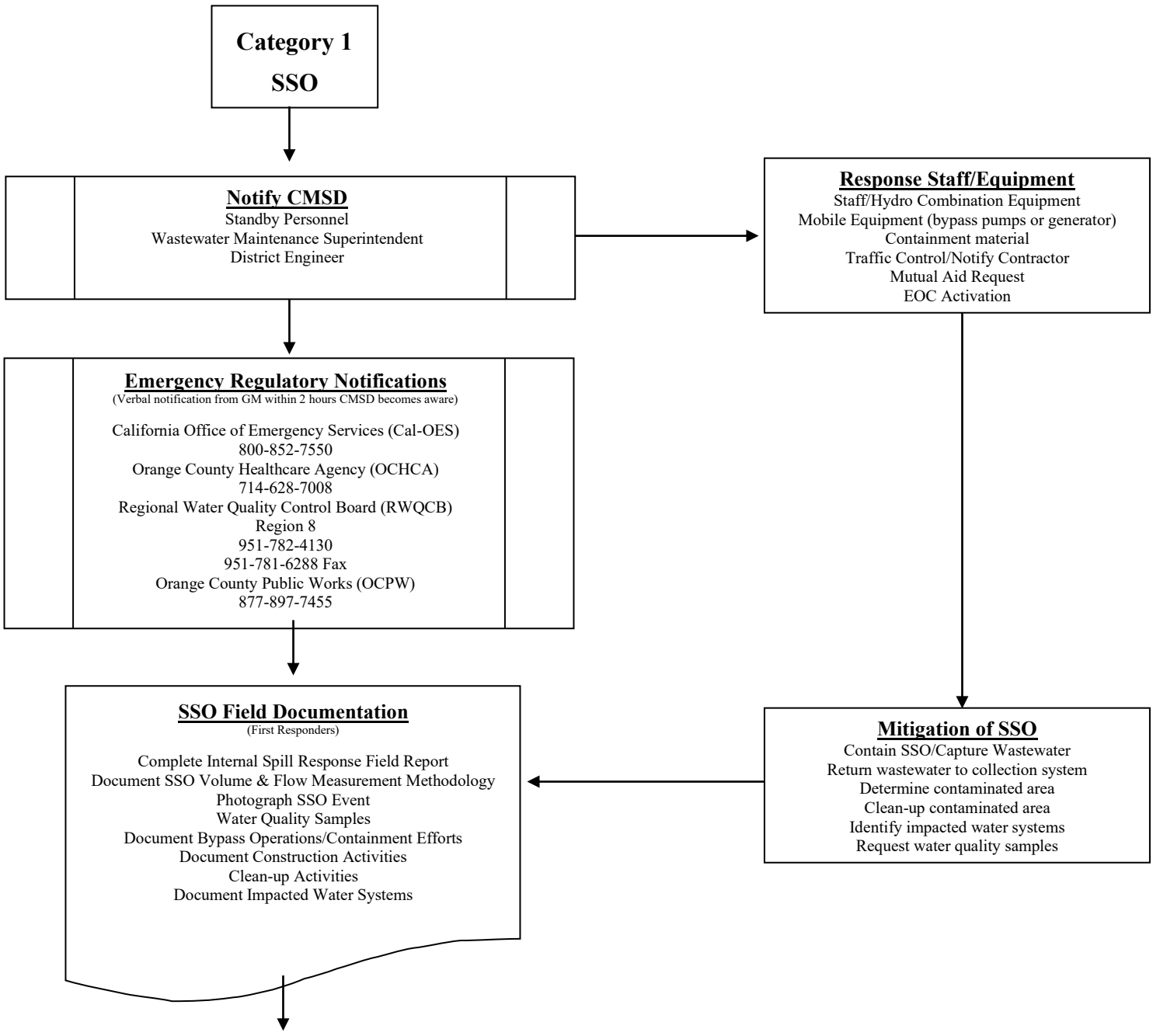
E. TRAINING PROCEDURES

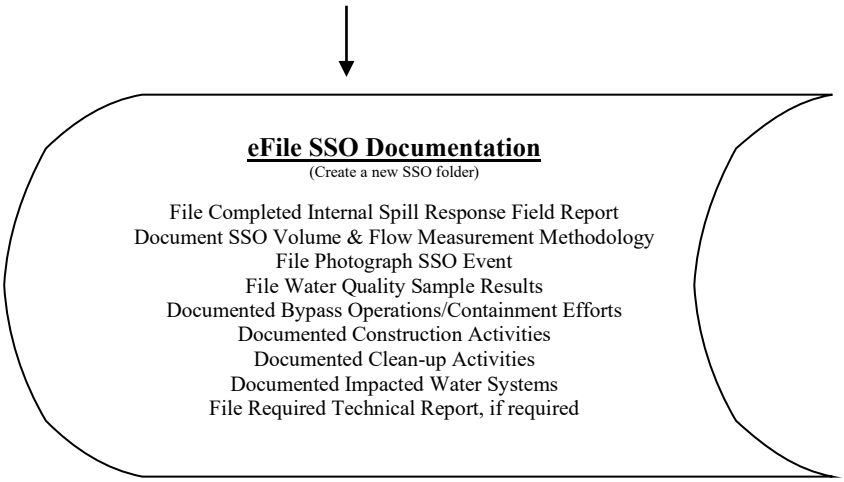
All Wastewater Maintenance Department personnel, including the District Engineer, Engineering Technician/Construction Inspector, General Manager and C&R Drains, who have a role in responding to, reporting, and/or mitigating a wastewater collection system overflow receive annual training on the contents of this OERP. The training includes emergency operations, such as traffic and crowd control, procedures for volume estimation and SSO start time determinations.

Periodic field drills and exercises are conducted to assure the Wastewater Division personnel practice under actual conditions.

CMSD maintains records for all OERP training provided in support of this plan. The records for all scheduled training courses and for each overflow emergency response training include date, time, place, content, name of trainer(s) and names of attendees.

Figure 6-1: SSO Response Flow Chart




eFile SSO Documentation
(Create a new SSO folder)
File Completed Internal Spill Response Field Report
Document SSO Volume & Flow Measurement Methodology
File Photograph SSO Event
File Water Quality Sample Results
Documented Bypass Operations/Containment Efforts
Documented Construction Activities
Documented Clean-up Activities
Documented Impacted Water Systems
File Required Technical Report, if required

F. EMERGENCY RESPONSE OPERATIONS

The Wastewater Division personnel adheres to the response procedures described in Chapter 3 of CMSD's Standard Operating Procedures (SOP) for Sanitary Sewer Overflows. Every wastewater maintenance employee has a copy of the SOP and the document is stored in CMSD's fleet. In addition, C&R Drains have copies of the SOP in their vehicles and the General Manager and District Engineer have copies as well. The response procedures described in Chapter 3 are as follows:

The first responder's priorities are:

- ✓ To follow safe work practices.
- ✓ To respond promptly with the appropriate equipment.
- ✓ To evaluate the cause of spill and determine responsibility.
- ✓ To stop the spill and restore the flow as soon as possible.
- ✓ To contain the spill.
- ✓ To minimize public access to and/or contact with the spilled sewage.
- ✓ To promptly notify the General Manager, District Engineer and/or appropriate CMSD personnel in the event of a major SSO.
- ✓ To return the spilled sewage to the sewer system.
- ✓ To restore the area to its original condition (or as close as possible).

The first responder is responsible for following safety procedures at all times. Special safety precautions must be observed when performing sewer work. Special consideration should be given to following all local traffic, confined space, and safety procedures.

All wastewater system calls require a response to the reported location of the event in an attempt to minimize or eliminate an overflow. During normal working hours, staff must respond to the site immediately and initiate response activities. After normal working hours the first responder must respond to the site of the problem and initiate response activities within 60 minutes after initial reporting of the spill to the District. C&R Drains must respond to the scene with their high pressure jetter trailer unit. If the responder cannot be at the spill location within 60 minutes after the spill, then the late response shall be reported per the requirements in Chapter 6 of the SOP.

The first responder should determine appropriate response measures based on the circumstances and information provided by the caller (e.g. weather and traffic conditions, small backup vs. sewage flowing on the ground, etc.). If additional help is needed, contact other employees, contractors, agencies and/or equipment

suppliers. Based on available information, the first responder should determine if a combination sewer cleaning truck and/or a spill response vehicle is needed.

Upon arrival at the site, the first responder should:

- ✓ Note arrival time at spill site (include in Sanitary Sewer Overflow Field Report Form).
- ✓ Verify the existence of a sewer system spill or backup.
- ✓ Field verify the address and nearest Cross street, making sure it's part of the District's sewer/conveyance system.
- ✓ Identify and clearly assess the affected area and extent of spill.
- ✓ Comply with all safety precautions (traffic, confined space, etc.)
- ✓ Contact caller, if time permits.
- ✓ Take pictures of the impacted area.
- ✓ Always notify the District Engineer and/or the General Manager, particularly if:
    - The spill appears to be large, in surface water or drainage channel tributary to a surface water, or there is doubt regarding the extent, impact, or how to proceed; or
    - Additional help is needed for line cleaning or repair, containment, recovery, lab analysis, and/or site cleanup.
    - Make sure persons required to report the spill to other agencies are notified and have all needed information.

Upon arrival at the location of a spill into a house or a building, the first responder should evaluate and determine if the spill was caused by a blockage in the lateral or in CMSD's owned sewer main, caused either by a backup in the sewer main line or nearby O&M activities.

- ✓ If a blockage is found in a property owner's lateral, it should be clearly communicated that it is not CMSD's responsibility to work on a private lateral. Block the spill if wastewater is entering or will enter storm drain system. Inform property owner that he/she has thirty minutes to restore flow or CMSD will use C&R Drains and the property owner will be billed for the services, including staff's time. Take pictures.

- ✓ If a backup in the main line is found to have caused the SSO in a house or building, relieve the blockage in the main line.

The first responder should attempt to remove the blockage from the system and restore flow to the area. Using the appropriate cleaning tools, the field Crew should set up downstream of the blockage and hydro-clean upstream from a clear

manhole. The flows should be observed to ensure that the blockage does not recur downstream.

If the blockage cannot be cleared within a reasonable time, or system requires construction repairs to restore flow, then initiate containment and/or bypass pumping. If assistance is required, immediately contact other employees, contractors, agencies and equipment suppliers.

The first responder to a potential pump station or force main failure should:

- ✓ Determine whether flow can be restored within a reasonable time.

- ✓ If it appears that flow cannot be restored within a reasonable time or if the conveyance system facility requires construction and/or repairs, then employ CMSD's Overflow Emergency Response Plan for pumping stations.
- ✓ If assistance is required, immediately contact other employees, contractors, agencies and equipment suppliers as required.

The first responder should attempt to contain as much of the spilled sewage as possible using the following steps:

- ✓ Determine the immediate destination of the overflowing sewage.
- ✓ Plug storm drains using available equipment and materials to contain the spill, whenever appropriate. If spilled sewage has made contact with the storm drainage system, attempt to contain the spilled sewage by plugging downstream storm drainage facilities.
- ✓ Contain/direct the spilled sewage using dike/dam or sandbags.
- ✓ Pump around the blockage/pipe failure/pump station or vacuum flow from upstream of the blockage and dispose of downstream of the blockage to prevent further overflow.
- ✓ Take pictures of the containment area.
- ✓ When an SSO occurs inside of a house or building, the first responder should provide a copy of the residential sewage contamination flyer in Appendix 3 of the SOP and the property owner should be instructed to follow these guidelines:
    - Keep all family members and pets away from the affected area.
    - Place towels, rags, blankets, etc between areas that have been affected and areas that have not been affected.
    - Do not remove any contaminated items
    - Turn off the HVAC system
    - Move any uncontaminated property away from the overflow area.

Barriers shall be installed to prevent the public from having contact with the sewage if possible. Signs should be posted to keep pedestrians away from contact with spilled sewage. Do not remove the signs until directed by the District Engineer.

SSO Field Reports are located in the SOP document and consistent with the September 2015 Guide for Development and Updating SSMPs that was developed by a consortium of sewer collection system agencies and environmental professionals throughout the State of California.

In addition, CMSD has also developed an Emergency Response Plan for the majority of the sewer pumping stations within the District. The District is currently in the process of completing an Emergency Response Plan for four remaining pump stations. These stations were originally planned for abandonment, but the project was cancelled due to Orange County Sanitation District decision to withdraw from this project due to sharply increasing project costs and because the abandonment project will divert wastewater away from Reclamation Plant #1 in Fountain Valley where wastewater recycling occurs. The Emergency Response Plans contain the procedures to be implemented to prevent an SSO should the pump station become inoperable or a major emergency, such as a downed bridge that contains a force main, occurs. The plans include calculations of the number of pumper trucks required, two different pre-determined driving routes to two disposal points while avoiding potential high traffic or disaster points such as bridges, emergency contact list, etc. A copy is present in all the field vehicles, in the Wastewater Maintenance Superintendent, General Manager and District Engineer's offices.

VII. FOG CONTROL PROGRAM

Studies have shown that FOG is one of the leading causes for SSOs, so it's important to implement a FOG Control Program because of 730 food service establishments (FSE) within CMSD service area. In recent years CMSD has also put an emphasis on preventing residential FOG from entering the wastewater system. CMSD has retained the firm of EEC Environmental to manage its FOG program at a yearly cost of $110,475. Approximately five staff members from EEC perform functions in the FOG program including engineers, administrators, and inspectors.

In addition to EEC, CMSD works with Orange County Sanitation District to coordinate FOG Best Management Practices (BMPs) inspections from the Orange County Health Care Agency (OCHCA). These inspections complement the EEC inspections giving CMSD a two-pronged approach for insuring the FSEs follow the prescribed practices in the FOG notebook developed for each FSE.

A. PUBLIC EDUCATION OUTREACH PROGRAM

CMSD's contractor EEC has prepared and distributed a FOG notebook to each FSE inside CMSD service area. The notebook includes log sheets for interceptor cleaning, employee education, BMPs, guidelines, and posters.

Additionally, CMSD has made available, on its website, educational materials regarding Fats, Oils and Grease (FOG) and the sewer system. The site contains the following educational materials that can be downloaded by the public:

- Fight the FOG - Keep Fats, Oils, & Grease Out of Your Drain brochure (English & Spanish version)
- Homeowner's Guide to Sewer Lateral Maintenance.
- FOG Control Program Manual
- Kitchen Best Management Practices for FOG
- Permit Conditions
- FAQs about FOG
- Grease Interceptor Diagram

The District also issues a quarterly newsletter with information regarding keeping Fats, Oils and Grease (FOG) out of the sewer system.

In 2011, the District implemented its residential FOG Recycling Program to coincide with traditional holidays (e.g. Thanksgiving, Passover, Christmas, etc.) where residents will be able to properly dispose their grease. Residents can deliver their jug filled grease to the Orange Coast College (OCC) Recycling Center, which is open to the public seven days a week. A contractor will periodically arrive at OCC to remove the grease and transport it to a recycling facility where it will be recycled for reusable products such as bio-fuel, candles, soap, etc. If the Recycling Center is

closed during the holiday months (November & December), a temporary drop-off site for cooking grease will be available at District HQ.

B. FOG DISPOSAL PLAN

The District requires all new commercial construction and existing commercial properties that have been found responsible for previous SSOs to install appropriate grease-reducing devices, including grease interceptors. The interceptors are required to be inspected and pumped out by a licensed company on a regular basis, normally on a quarterly basis.

Grease hauling companies serving the Costa Mesa area are shown in Table 7-1 and FOG disposal facilities serving the Costa Mesa area are shown in Table 7-2. The source of this information is http://www.calfog.org/Hauler.html#Orange and http://www.calfog.org/GreaseFacilities.html.

Table 7-1: Grease Hauling Companies Serving Orange County

COMPANY	PHONE NUMBER	WEBSITE
Ameriguard Maintenance Services	800-347-7876, Ext. 14	N/A
Grand Natural, Inc.	855-519-5550	http://www.greasecollection.com
Coastal Byproducts	805-845-8086	http://www.coastalbyproducts.com
JR Grease Traps and Interceptor Service	323-997-9602	http://www.greaseservices.com
New Leaf Biofuel	619-236-8500	http://www.newleafbiofuel.com
One More Time, Inc.	800-624-5504	http://onemoretimeinc.com/
SMC Grease Specialist, Inc.	951-788-6042	http://www.smcgrease.com/
Triple A Pumping & Jetting	800-284-2617	http://www.tripleapumping.com

Table 7-2: Grease Rendering/Drop Off Points for Costa Mesa Area

Company	Address	Phone Number	Grease Type	Type of Operations
Baker Commodities, Inc.	4020 Bandini Blvd Los Angeles, CA (Vernon, CA)	323-269-6177 800-427-0696	Yellow, brown	Grease recycler. Drop off location and grease trap cleaning/hauling
Darling International	2626 E 25th St Los Angeles, CA	800-447-3273	N/A	Drop off location and grease trap cleaning/hauling
One More Time	4144 Bandini Blvd Los Angeles, CA (Vernon, CA)	800-624-5504	Yellow	Used cooking oil only
Orange County Sanitation District, Plant No. 1	10844 Ellis Ave Fountain Valley CA	714-593-7428	Yellow, brown	Primary grease drop off point for grease haulers serving CMSD
Southwest Processors	4120 Bandini Blvd Los Angeles, CA (Vernon, CA)	800-900-3366	N/A	Grease recycler. Drop off location and grease trap cleaning/hauling
West Coast Rendering	4120 Bandini Blvd Los Angeles, CA (Vernon, CA)	323-261-4176	N/A	Small operation. Typically only accept grease from known hauler (Triple A). No grease trap service.
Orange Coast College Recycling Center	Adams Ave between Harbor Blvd & Fairview Rd Costa Mesa, CA	714-432-5131	Yellow	Used cooking oil from residential households. No commercial grease is accepted.

C. LEGAL AUTHORITY TO PROHIBIT DISCHARGES TO THE SYSTEM

A permit from CMSD is required to connect to, use or maintain a connection to t CMSD's facilities (CMSD Operations Code Section 6.04.060 (a)). Any person, firm or corporation that connects or discharges to CMSD's sewerage system without a valid permit is guilty of a misdemeanor (CMSD Operations Code Section 6.04.060 (f)).

CMSD also has the right to terminate a property from CMSD's service (District Operations Code Section 6.02.080).

Every owner, tenant and persons using property shall have a duty not to cause, permit or allow the accumulation of grease in CMSD's wastewater line so that sewage spills may occur. Such persons shall use reasonable methods to reduce grease accumulation in CMSD's sewer lines including but not limited to reducing or eliminating the grease that is deposited in the sewer and utilizing enzymes and similar products that prevent grease build-up. No person shall discharge grease into the wastewater system so as to cause an accumulation in CMSD's lines so as to substantially contribute to the possibility of a sewage overflow (CMSD Operations Code Section 6.07.040).

D. GREASE REMOVAL DEVICE REQUIREMENTS

CMSD's Operation Code requires that no Food Service Establishment (FSE) shall discharge into CMSD's system without obtaining a permit from CMSD describing the business operations and discharge and any FOG prevention measures being undertaken or to be undertaken to reduce the discharge of FOG into the District's system in accordance with this chapter (Section 6.07.040). In addition, FSE's are required to install, operate and maintain approved type and adequate sized grease interceptors (Section 6.07.070). Furthermore, All new commercial construction of FDRs shall have a grease interceptor that has been approved by the District unless the developer demonstrates, to the District's satisfaction, that such a device is not necessary based on engineering findings which are set forth in writing (Section 6.07.080) and existing FSEs undergoing remodeling or a change in operations, or FSEs that change ownership, shall be required to install a grease interceptor (Section 6.07.090(b)).

In addition, the Orange County Sanitation District, which is the sewer treatment agency for all the wastewater generated within the CMSD boundaries, has adopted Ordinance No. OCSD-25 regarding FOG control which requires the installation of interceptors on all food service establishments, including existing establishments, to install appropriate grease-reducing devices, including sewer interceptors.

E. INSPECTION OF GREASE PRODUCING FACILITIES

CMSD has adopted four grease control ordinances, Ordinance 41, in 2003, Ordinance 51, in 2005, Ordinance 81 in 2010, Ordinance 113 in 2016 codified as Chapter 6.07 of CMSD's Operations Code, giving CMSD legal authority to implement a comprehensive grease control program. CMSD retained EEC Environmental (EEC) to manage CMSD's FOG Control Program. EEC performs several types of FSE inspections to ensure FSEs comply with FOG regulations and FOG Control Program requirements. The types of inspections performed by EEC are identified below.

Permitting Inspections
EEC physically inspects and educates FSEs within CMSD that are new to the FOG Program. These FSEs include new FSEs and existing FSEs that have a change in ownership or name change requiring re- permitting.

For those FSE that have been identified in the vicinity of hot spots or identified as FOG sources, EEC meets and discusses, with the FSE management, the enforcement options that are available to CMSD and the steps that the FSE can take to avoid additional enforcement.

Grease Removal Equipment (GRE) Inspections
EEC physically conducts GRE inspections for FSEs with a grease interceptor or grease trap to evaluate compliance with the FSEs grease removal equipment requirements.

Kitchen Best Management Practice (BMP) Inspections
EEC conducts kitchen BMP inspections for FSEs without GREs and evaluates compliance with the FSEs BMP requirements.

Combined Kitchen BMP and GRE Inspections
EEC conducts combined kitchen BMP and GRE inspections for FSEs

Compliance Inspections
EEC conducts compliance inspections where it is determined by CMSD that a follow-up inspection is required for a non-compliance issue that has been identified in previous BMP, GRE or FOG source wastewater pipe inspections. This may include the issuance of written warnings or notice of violations (NOVs) to FSEs that are found to be in non - compliance of the FOG control ordinance or permit.

CCTV Source Inspections
EEC assesses hot spots to identify FSEs that are discharging FOG in CMSD's wastewater collection system.

Enforcement Inspections
These inspections are conducted when elevated enforcement of the permit requirements are required or when the revocation of the FSEs grease interceptor installation Conditional Waiver, Waiver or Variance is required. Due to the serious nature of these inspections, EEC attempts to meet with the FSE manager or property owner to discuss the enforcement and the FSE's plans to achieve compliance.

F. FOG PROGRAM STAFFING

FOG Control Program staffing consists of a combination of CMSD staff and contractor staff. EEC provides one full time equivalent (1 FTE) staff person dedicated to CMSD's FOG Control Program. EEC staff person is responsible for the following activities:

- FOG Control Management, including database and GIS management.
- FSE inspections
- FSE compliance follow-up
- FOG Control Program enforcement
- FOG Control Program education, outreach and customer support
- CCTV coordination and source inspection

In addition to EEC staff, the District Engineer provides staffing (0.25 FTE) for CMSD's FOG Control Program. The District Engineer is responsible for the following activities:

- Grease removal device plan review and processing
- FOG Control Program variance and waiver evaluation and processing.

G. CLEANING SCHEDULE FOR SEWER SYSTEM SECTIONS SUBJECT TO FOG BLOCKAGES

CMSD has identified a number of problem areas that are more prone to blockages and SSOs. These areas are typically inverted sewer siphons and areas with excess grease build-up. These enhanced cleaning areas, or 'hot spots', are shown on the GIS map prepared by EEC.

In addition, CMSD employs preventive maintenance as a means to address areas prone to FOG accumulation in the system. CMSD has identified areas in the wastewater system with FOG issues through a combination of maintenance crew knowledge, past grease related SSOs, CCTV data and the collaboration of EEC and District personnel. CMSD addresses these locations through a combination of FOG source control, wastewater cleaning, and CCTV. CMSD will continue to adjust the wastewater cleaning frequency of pipes to address the FOG issue while optimizing the amount of wastewater cleaning performed.

H. SOURCE CONTROL MEASURES FOR 'ENHANCED MAINTENANCE AREAS'

CMSD and Orange County Sanitation District, which is the sewer treatment agency for all the sewage generated within the CMSD boundaries, have adopted ordinances requiring installation of appropriate grease-reducing devices, including sewer interceptors, on all new commercial developments and existing food service establishments. Furthermore, CMSD has adopted an ordinance allowing CMSD to require the installation of appropriate grease-reducing devices, including sewer interceptors, on existing properties that are found to be causing or potentially causing SSOs.

Additional source control measures for the 'Enhanced Maintenance Areas' identified by CMSD consist of a public education and awareness program that includes distribution of the CMSD's pamphlets for restaurant and homeowner grease control, FOG video on the CMSD's website and a newsletter. CMSD has also distributed its grease control notebooks to all 730 food service establishments inside CMSD. The notebook contains a poster, BMP list, and other information relative to CMSD's grease control program.

VIII. SYSTEM EVALUATION AND CAPACITY ASSURANCE PLAN

The District has a Sewer Master Plan that assesses the capacity of the sewer system. The main purpose of a Master Plan is to compare the projected peak flow from the land uses adopted in the General Land Use Plan with the carrying capacity of the sewer lines. The Sewer Master Plan was updated in 2020.

A. EVALUATION

CMSD's Sewer Master Plan incorporates a hydraulic model analysis of the wastewater mains in the system. The peak flow estimates are estimated using flow coefficients developed by CMSD based on land usage. The flow coefficients used by CMSD have been compared to the coefficients used by Orange County Sanitation District and found to be reasonable. Special cases, such as high-rise office buildings, hotels and high volume industrial uses are evaluated separately using a peak flow estimate for the individual parcels.

The capacity of each line is determined and those lines unable to handle future master planned flows are identified. The current system capacity is able to handle, without surcharge, the current dry weather flow, which has decreased from 10.1 to 8.9 mgd (million gallons per day) and wet weather peak sewer flows.

B. DESIGN CRITERIA

CMSD has adopted the industry standard of designing new sewer lines up to 18 inches in diameter to be flowing no more than half full at peak wet weather flow. Lines 21 inches or larger are designed to be flowing no more than three quarters full at peak wet weather flow. However, when analysis of existing conditions are completed for the purposes of determining when additional capacity is required, flows above these limits, but less than completely full are accepted. At no time is wastewater allowed to flow in a surcharged or pressurized condition.

C. CAPACITY ENHANCEMENT MEASURES

CMSD's Sewer Master Plan includes the short and long term CIP to address identified hydraulic deficiencies. Funding for the Capital Improvement Plan is from fees collected from new construction and from wastewater rates that are assessed on property tax rolls.

CMSD is also active in reducing Inflow and Infiltration (I/I). CMSD has ruled out Infiltration as a source of water in the system after televising the entire system from 2016 through 2018.. CMSD has identified Inflow as a source of water and has plugged and sealed manhole covers in identified flood zones, low lying areas and particularly manhole covers located in gutters and alley flow lines. In addition, the District found two illegal connections from the Orange County Fairgrounds that was contributing inflow into the Mendoza Tributary Area. The two illegal

connections were plugged to prevent further inflow. In 2020, the District smoke tesedt the entire Fairgrounds property to determine if more illegal connections exist and need of plugging.

D. CIP SCHEDULE

CMSD's Sewer Master Plan was updated in 2020. CMSD had identified short and long term needs for renewal and replacement of existing infrastructure. The prioritization of these projects is based on the following criteria:

- ✓ Age or life expectancy
- ✓ Flow capacity and/or flow rate
- ✓ Proximity to waterways
- ✓ Risk to public health and the environment

Table 8-1 identifies CMSD's short term CIP Schedule while Table 8-2 is CMSD's long term CIP Schedule. CIP projects are funded from CMSD's Asset Management Fund. The purpose of the Asset Management Fund is to accumulate reserves for capital improvements. This fund has a reserve requirement of $5,000,000. Annual Reserve Contributions are made with transfers from the Wastewater Fund estimated by the Asset Management Program. Transfers back to the Wastewater Fund are in accordance with CMSD's capital budget plan and provide funding for capital projects. Both schedules below may be modified after the completion of the hydraulic modeling analysis.

Table 8-1: CMSD Short Term CIP Schedule

The following projects are approved in CMSD's 2020-21 CIP Budget

Name	Description	Total Project Cost	Funding Source	Estimated Completion
Brick Manhole Rehabilitation Phase 2	In 1953 when the first District manholes were installed, contractors had an option to construct brick manholes or pre-cast manholes similar to today's pre-cast manholes, unfortunately, no steel mesh or rebar was installed in the brick manholes. Un-reinforced brick structures are very susceptible to damage during seismic events so the District will structurally reinforce brick manholes by using a one piece cured-in-place-pipe (CIPP) liner similar to the CIPP liners used in gravity sewer mains.	$117,000	Capital Improvement Adopted Budget	2021
President Pump Station Rehabilitation	The pump station was constructed in 1953 and has never been remodeled due to the proposed west side abandonment project. The West Side Pump Station Abandonment Project was cancelled in 2016, therefore, the Costa Mesa Sanitary District will continue to own and operate President Pump Station. The proposed project will reconstruct the pump station to current District standards.	$1,600,000	Capital Improvement Adopted Budget	2021
19th Street Pump Station Force Main Replacement	The force main is 818 linear feet of 4-inch asbestos cement pipe constructed in 1971 and is one of the three remaining force mains that will complete this cycle of the force main rehabilitation program. The maintenance crew has periodic trouble with the force main, so the project is timely. The force main is asbestos cement pipe (ACP), so lawful guidelines for working with asbestos are mandatory.	$490,000	Capital Improvement Adopted Budget	2021

Ductile Iron Pipe Rehabilitation	In yesteryear, engineers believed the use of ductile iron pipe (DIP) was the answer to protect shallow sewers because of the inherent strength in the pipe walls. However, air in the line reacts with the dissolved sulfides in wastewater causing the formation of sulfuric acid and iron subjected to air causes corrosion, thereby degrading the inside walls of ductile iron pipe. Additionally, acidic soils corrode the exterior of DIP. The rehabilitation method consists of chain flailing the interior then installing a liner.	$750,000	Capital Improvement Adopted Budget	2021
Iowa Force Main Replacement	The Iowa force main is 220 feet long and made of asbestos cement pipe (ACP). The pipeline is 44 years old and ACP is brittle and vulnerable to seismic activity. The force main will be replaced with PVC. Asbestos protection and removal regulations will apply to this project.	$270,000	Capital Improvement Adopted Budget	2021
Calcium Removal Phase 1	The District is fortunate not to have sustained any calcium-caused sanitary sewer overflows (SSOs) from calcium build-up in the sewer mains. Calcium buildup is an emerging concern across the United States and there are limited tools available for calcium removal and the tools and removal techniques are expensive. Most of the District's calcium buildup occurs in the Santa Rosa Avenue – San Marino Circle area in north Costa Mesa where high groundwater laden with minerals causes calcium in the mains.	$450,000	Capital Improvement Adopted Budget	2021
Aviemore Force Main Replacement	Aviemore Pump Station and Force Main serve the smallest tributary area of a CMSD pump station, only 26 residences. Nevertheless, the force main is 130 linear feet of 4-inch cast iron pipe built in 1959 and has reached its life expectancy.	$230,000	Capital Improvement Adopted Budget	2021

Westbluff Pump Station Rehabilitation	The Westbluff force main was replaced and realigned in 2006 by a private residential land developer so the force main is relatively young. The proposed work is normal replacement of pumps, valves, and piping that have reached their life expectancy.	$175,000	Capital Improvement Adopted Budget	2021

Table 8-2: CMSD Long Term CIP Schedule

Name	Description	Total Project Cost	Funding Source	Estimated Completion
Gisler Force Main Upgrades	Gisler Force Main is 1,160 feet in length and made of cast iron pipe. The pipe is 55 years old, but the gallon per minute is 250 making this station one of the lowest flowing stations in the system	$520,000	Asset Management Fund	2021-22
Sewer Siphon Upgrade	After evaluating the condition of ten sewer siphons it was determined that two of the siphons need repair.	$600,000	Asset Management Fund	2021-22
Brick Manhole Rehabilitation Phase 3	In 1953 when the first District manholes were installed, contractors had an option to construct brick manholes or pre-cast manholes similar to today's pre-cast manholes, unfortunately, no steel mesh or rebar was installed in the brick manholes. Un-reinforced brick structures are very susceptible to damage during seismic events so the District will structurally reinforce brick manholes by using a one piece cured-in-place-pipe (CIPP) liner similar to the CIPP liners used in gravity sewer mains.	$120,000	Asset Management Fund	2021-22
Elden Force Main Upgrades	Elden Force Main is the largest force main in the system. It is 3,290 feet long and the pipeline is 18" in diameter. It is only 25 years old, but due to the flow (3,750 GPM) and close proximity to the Delhi Channel and	$500,000	Asset Management Fund	2022-23

	Upper Newport Bay, an analysis of the pipeline will be conducted to determine condition and replacement, if necessary			
Wastewater Pipeline Rehabilitation	Evaluate condition of Grade 4 pipeline segments and rehabilitate if necessary.	$500,000	Asset Management Fund	2022-23
Brick Manhole Rehabilitation Phase 5	In 1953 when the first District manholes were installed, contractors had an option to construct brick manholes or pre-cast manholes similar to today's pre-cast manholes, unfortunately, no steel mesh or rebar was installed in the brick manholes. Un-reinforced brick structures are very susceptible to damage during seismic events so the District will structurally reinforce brick manholes by using a one piece cured-in-place-pipe (CIPP) liner similar to the CIPP liners used in gravity sewer mains.	$120,000	Asset Management Fund	2022-23
21st Street Force Main Upgrades	21st Street force main is 430 feet long and made of ductile iron pipe. It is 24 years old and has a flow rate of 825 GPM	$200,000	Asset Management Fund	2023-24
Calcium Removal Phase 2	The District is fortunate not to have sustained any calcium-caused sanitary sewer overflows (SSOs) from calcium build-up in the sewer mains. Calcium buildup is an emerging concern across the United States and there are limited tools available for calcium removal and the tools and removal techniques are expensive. Most of the District's calcium buildup occurs in the Santa Rosa Avenue – San Marino Circle area in north Costa Mesa where high groundwater laden with minerals causes calcium in the mains.	$400,000	Asset Management Fund	2023-24
Brick Manhole Rehabilitation Phase 5	In 1953 when the first District manholes were installed, contractors had an option to construct brick	$120,000	Asset Management Fund	2023-24

	manholes or pre-cast manholes similar to today's pre-cast manholes, unfortunately, no steel mesh or rebar was installed in the brick manholes. Un-reinforced brick structures are very susceptible to damage during seismic events so the District will structurally reinforce brick manholes by using a one piece cured-in-place-pipe (CIPP) liner similar to the CIPP liners used in gravity sewer mains.			
California Force Main and Pump Station Rehabilitation	By 2024, the California Force Main will be 55 years old, but it's only 55 feet in length and the cast iron pipe diameter is 6 inches. It's one of the smallest force mains in the system that that collects 269 gallons of wastewater per minute. The pump station will be 26 years old in 2025.	$500,000	Asset Management Fund	2023-24
Sea Bluff Force Main and Pump Station Rehabilitation	By 2025, the Sea Bluff Force Main and Pump Station will be 47 years old, but the force main pipe consist of four inch PVC and pumps 110 gallons of wastewater per minute.	$400,000	Asset Management Fund	2024-25
Brick Manhole Rehabilitation Phase 6	In 1953 when the first District manholes were installed, contractors had an option to construct brick manholes or pre-cast manholes similar to today's pre-cast manholes, unfortunately, no steel mesh or rebar was installed in the brick manholes. Un-reinforced brick structures are very susceptible to damage during seismic events so the District will structurally reinforce brick manholes by using a one piece cured-in-place-pipe (CIPP) liner similar to the CIPP liners used in gravity sewer mains.	$120,000	Asset Management Fund	2024-25
System Wide Sewer Assessment	It good industry practice to assess the condition of an entire wastewater system every ten years. 2026 will be ten years since the District performed its last assessment.	$350,000	Asset Management Fund	2025-26

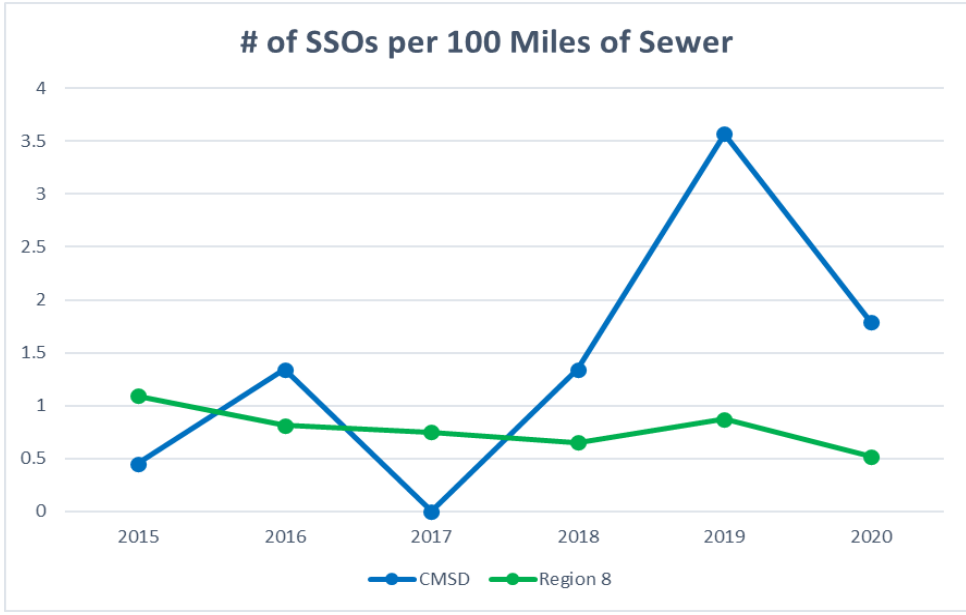
IX. MONITORING, MEASUREMENT, AND PROGRAM MODIFICATIONS

CMSD will evaluate the performance of its wastewater system at least annually using the performance measures identified in the Performance Measurement Program that was adopted by CMSD in 2018. CMSD updates the data and analysis of performance measures on a quarterly basis.. The data from the performance measures is reported to the Board of Directors on a quarterly basis and maintained on the District's website. The following are the measures being monitored.

White: No outcome; Green: Outcome fully met the goal; Yellow: Outcome missed the goal, but close OR making progress to achieving the goal; Red: Clearly missed the goal OR a very bad trend; 👍 **up = trend better;** 👎 **down = trend worse; ≤ is "less than or equal"; ≥ means "greater or equal"**

ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Number of Sanitary Sewer Overflows (SSOs) per 100 miles of Sewer is below Region 8	2018: ≤ 0.65 2019: ≤ 0.87 2020: ≤ 0.53	**1.34**	**3.57**	**1.79**	👎	Current Goal is from Region 8 (Santa Ana) of the California Integrated Water Quality System (CIWQS) database, which is a computer system used by the State Water Control Board to track SSOs in California. The District had 4 SSOs in 2020.



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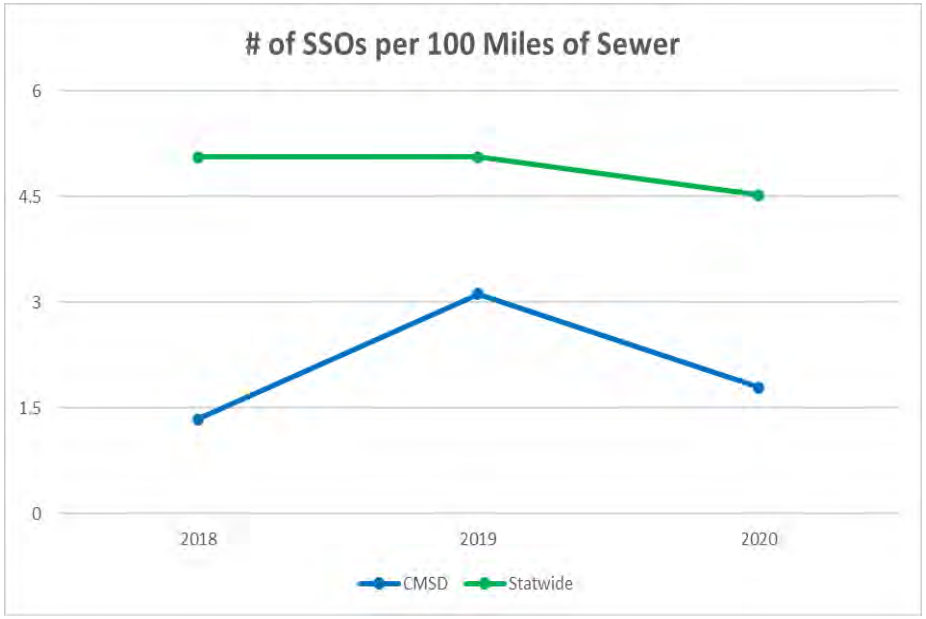
ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Number of Sanitary Sewer Overflows (SSOs) per 100 miles of Sewer is below the number of SSO's per 100 miles statewide for sewer collection systems similar in size.	2018: ≤ 5.06 2019: ≤ 5.06 2020: ≤ 3.80	**1.34**	**3.57**	**1.79**	👍	Current Goal is from Region 8 (Santa Ana) of the California Integrated Water Quality System (CIWQS) database, which is a computer system used by the State Water Control Board to track SSOs in California. The District had 4 SSOs in 2020.



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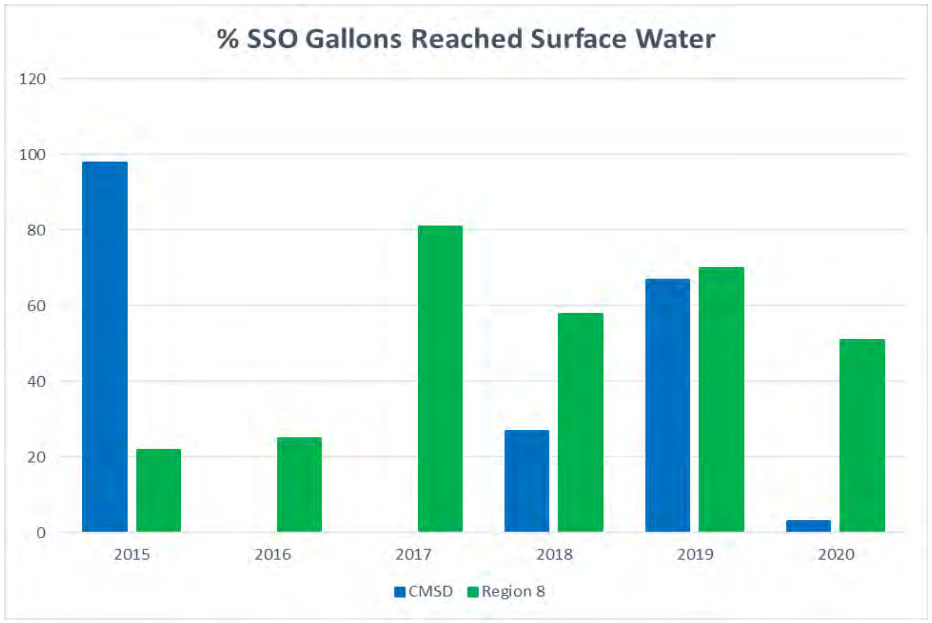
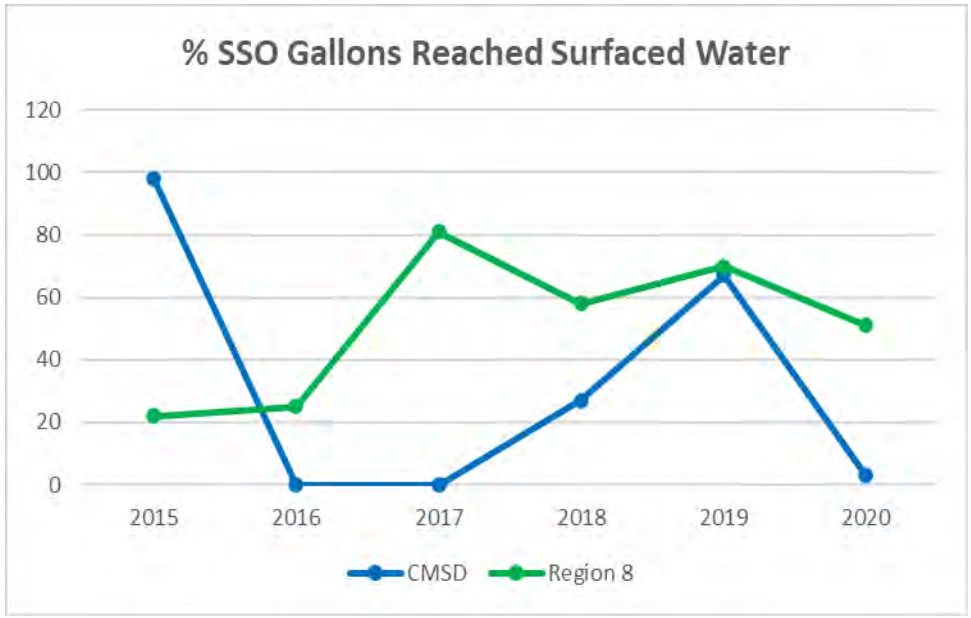
ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Percent of sewage gallons spilled reached surface water is below percent of sewage gallons spilled reached surface water in Region 8.	2018: ≤ 58% 2019: ≤ 70% 2020: ≤ 51%	**27%**	**67%**	**3%**	👍	Goal is from Region 8 (Santa Ana) of the California Integrated Water Quality System (CIWQS) database, which is a computer system used by the State Water Control Board to track SSOs in California.





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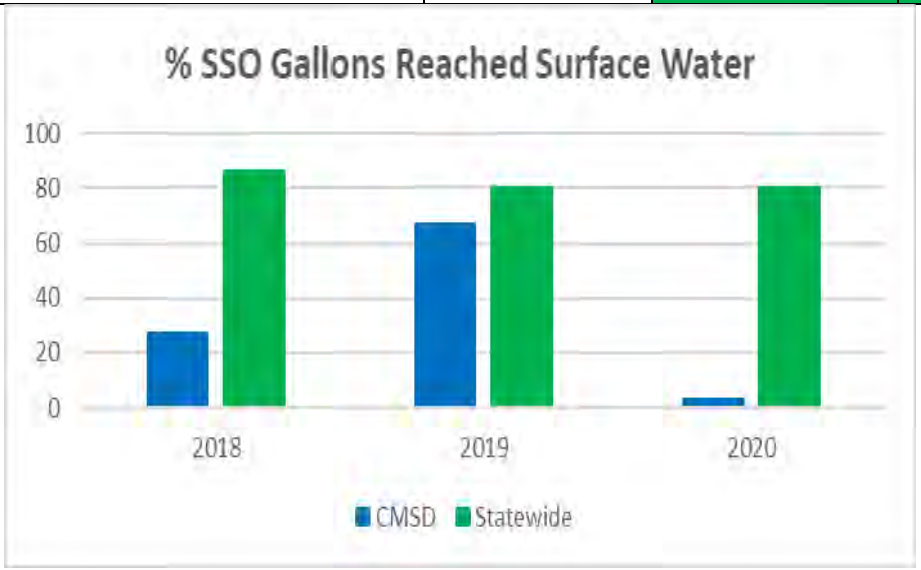
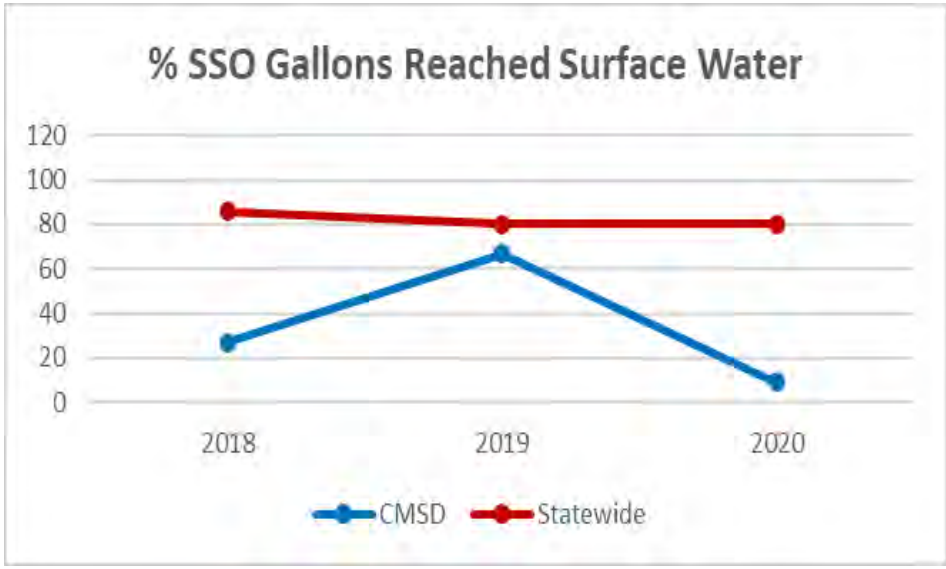
ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Percent of sewage gallons spilled reached surface water is below percent of sewage gallons spilled reached surface water statewide.	2018: ≤ 86% 2019: ≤ 80% 2020: ≤ 80%	**27%**	**67%**	**3%**	👍	Goal is from Region 8 (Santa Ana) of the California Integrated Water Quality System (CIWQS) database, which is a computer system used by the State Water Control Board to track SSOs in California.





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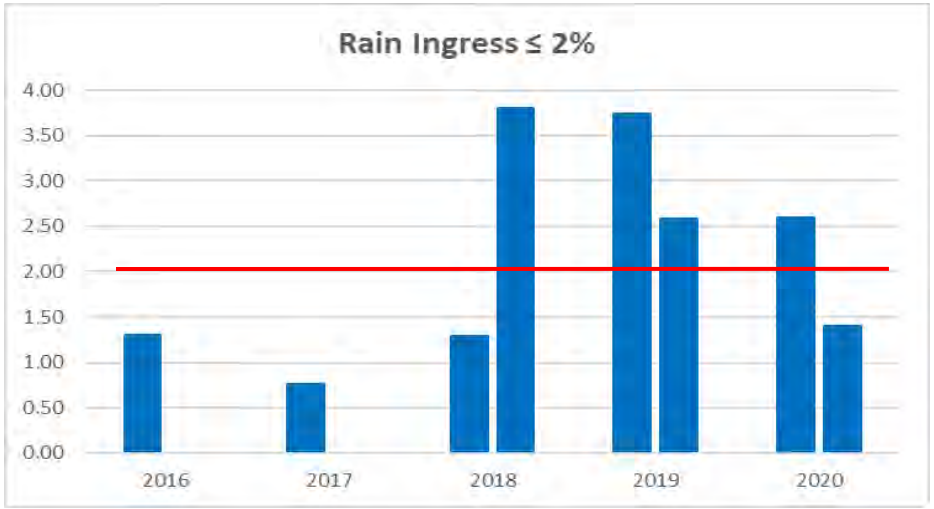
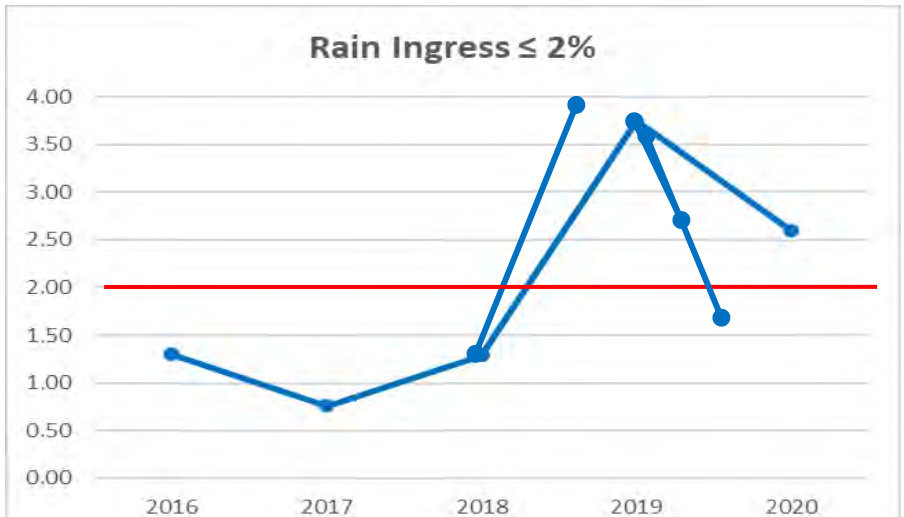
ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Rain ingress entering wastewater system	≤ 2%	**1/9: 1.29%**	**1/12: 3.75%**	**3/13: 2.6%**	👎	Inflow of rain water entering wastewater systems can cause SSOs. Orange County Sanitation District (OCSD) encourages rain ingress of less than 2%. From Dec 13, 2019 – March 24, 2020, the District conducted a Wet Weather Sewer Flow Study at the Mendoza Pump Station Tributary area. Staff dye tested five manholes on OC Fairground property and determine two illegal connections. Fairground officials plugged two basins with concrete.
		12/7: 3.8%	**2/15: 2.59%**	**12/28: 1.4%**	👍	





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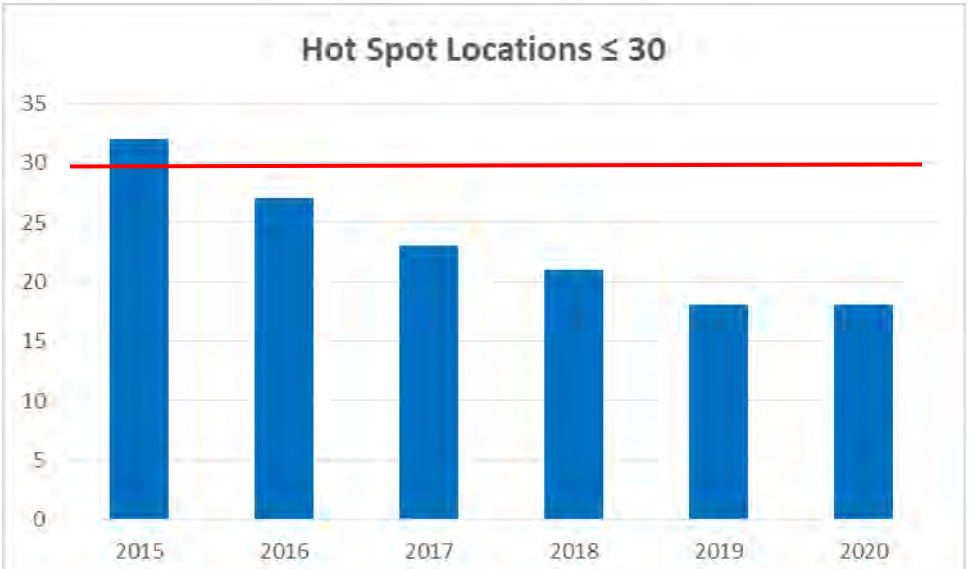
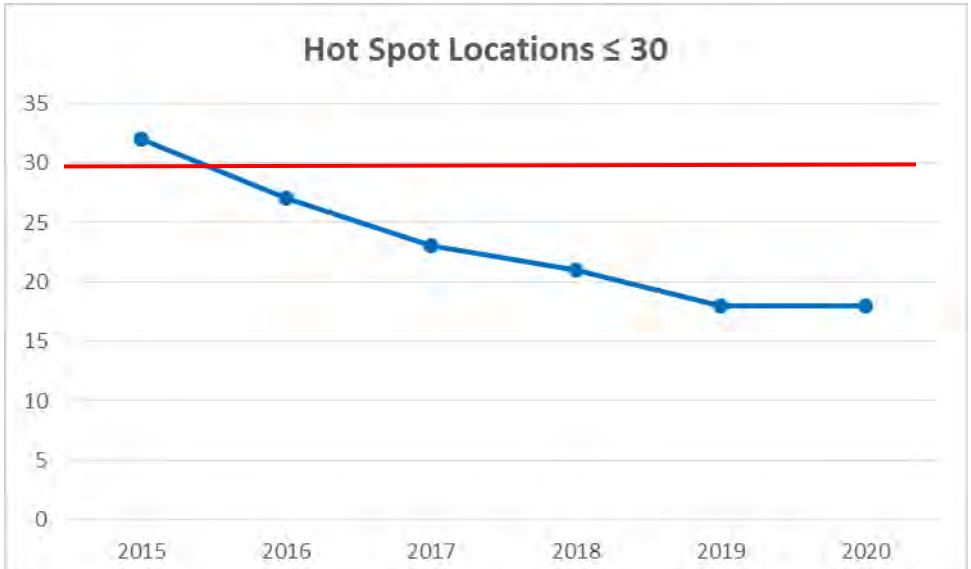
ATTRIBUTE	**WHY IMPORTANT?**
Recruit and retain a highly engaged and effective workforce	**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**

Performance Measures	Current Goal	Outcome			Trend	Comments or Analysis
		CY 2018	CY 2019	CY 2020		
Enhanced Maintenance Areas	≤ 30	**21**	**18**	**18**	👍	Enhanced maintenance areas (Hot Spots) require higher frequency of cleaning (e.g. 2 to 3X per year). Reducing the number of hot spots allow CMSD to reallocate more staff hours dedicated to cleaning the entire system within 18 months.





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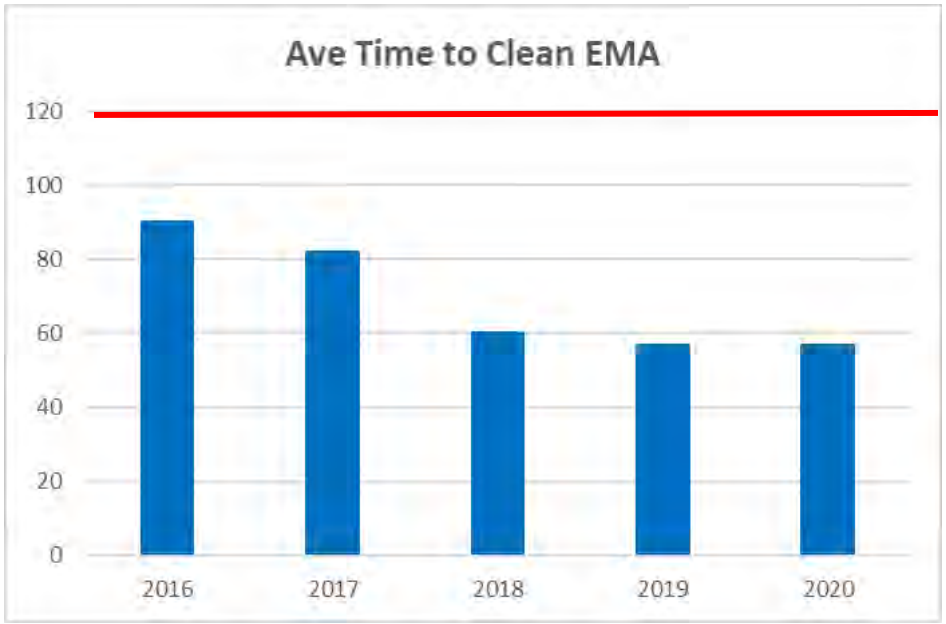
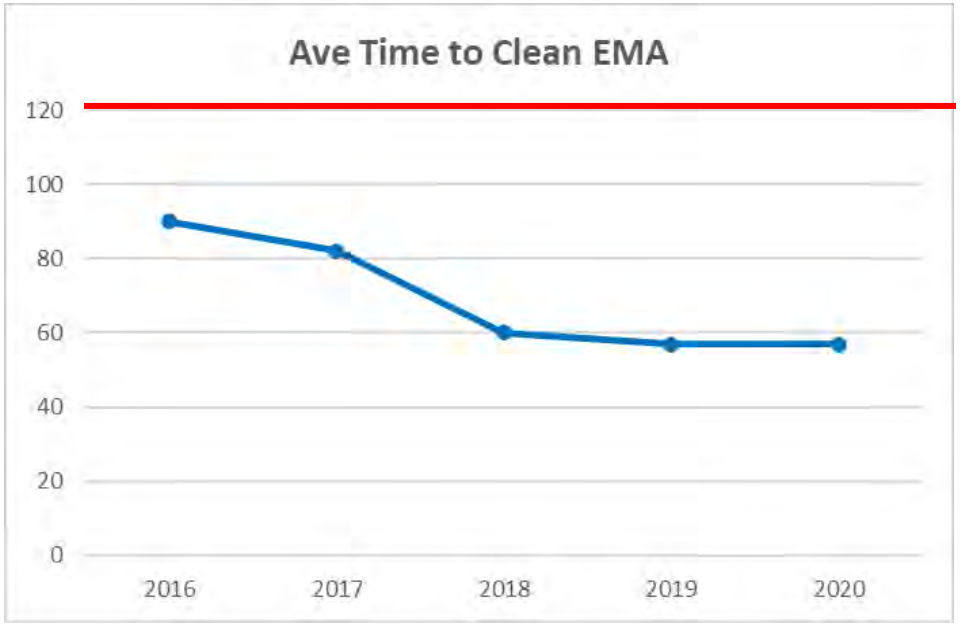
ATTRIBUTE	**WHY IMPORTANT?**
Efficiency: Performing to the best of our abilities with the least amount of lost time and effort	**Being efficient demonstrates how well CMSD is using its resources. It proves functions are completed in a timely manner and there is less bureaucracy within the organization.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Average time to clean one Enhanced Maintenance Area (EMA)	120 Minutes or 2 Hours	**1 Hour**	**57 Minutes**	**57 Minutes**	👍	One crew designated to clean EMA. CMSD has 18 hotspots.





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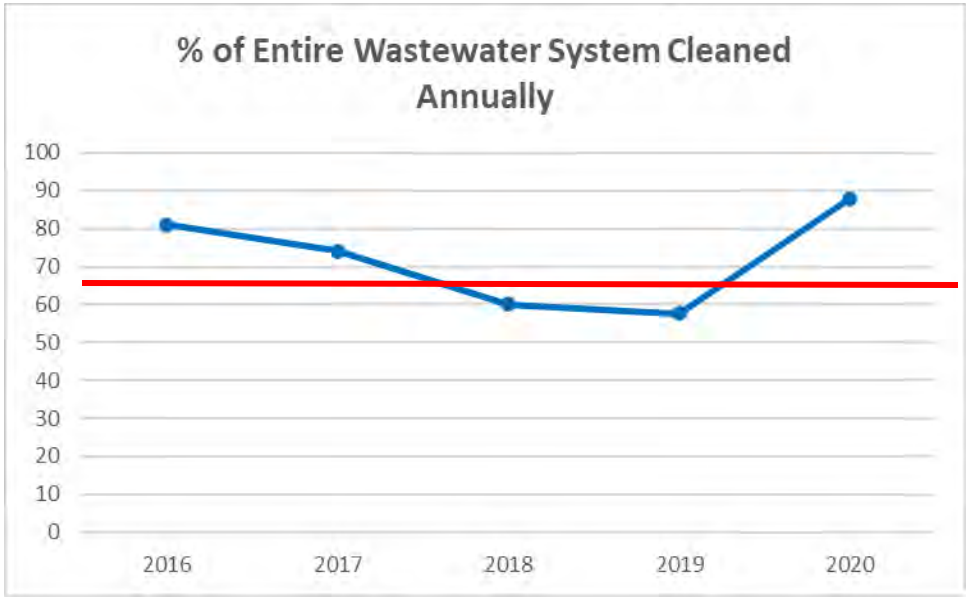
ATTRIBUTE	**WHY IMPORTANT?**
Efficiency: Performing to the best of our abilities with the least amount of lost time and effort	**Being efficient demonstrates how well CMSD is using its resources. It proves functions are completed in a timely manner and there is less bureaucracy within the organization.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Percentage of entire wastewater system cleaned annually	67%	**60%**	**57.6%**	**88%**	👍	CMSD goal is to clean the entire system within 18 months. The entire system has 1,184,813 feet of pipeline (224 miles). This measurement is on target to achieve its goal. The use of private contractors to assist with cleaning helped achieved this goal.



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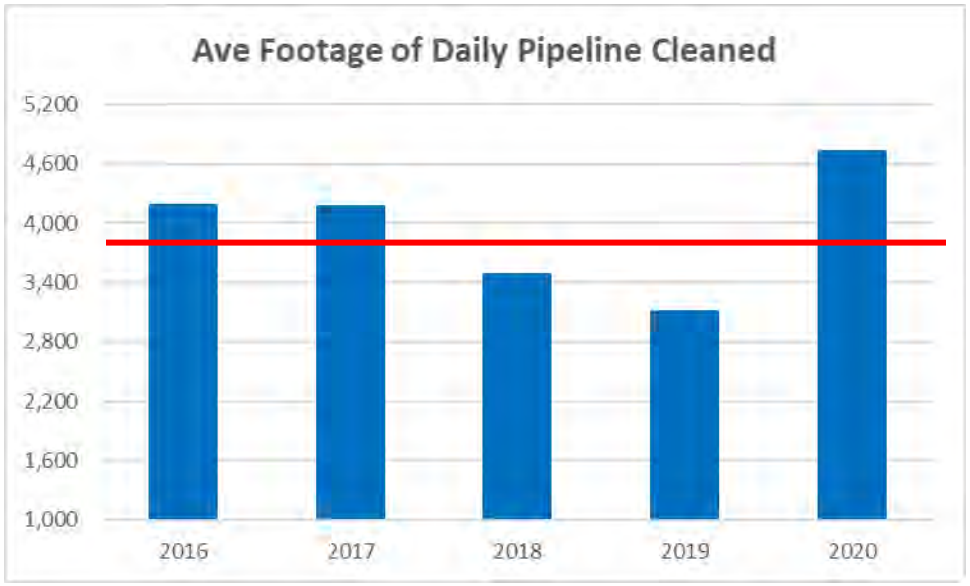
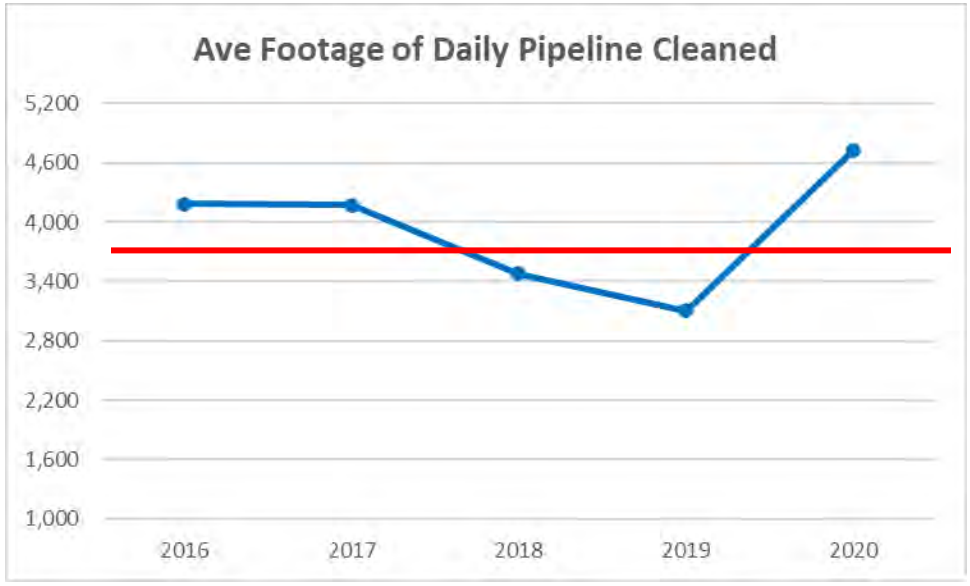
ATTRIBUTE	**WHY IMPORTANT?**
Efficiency: Performing to the best of our abilities with the least amount of lost time and effort	**Being efficient demonstrates how well CMSD is using its resources. It proves functions are completed in a timely manner and there is less bureaucracy within the organization.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Average footage of daily pipeline cleaned.	3,602	**3,479**	**3,102**	**4,722**	👍	Cleaning 220 days in a year. Days excluded from cleaning include weekends, holidays, vacation, sick leave and training. The use of private contractors to assist with cleaning helped achieved this goal.





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ATTRIBUTE					**WHY IMPORTANT?**	
Recruit and retain a highly engaged and effective workforce					**A high performing and engaged workforce will achieve desired results and move the organization forward to achieving its mission.**	
Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Number of annual hours of staff training completed	140	**NA**	**NA**	**NA**	👍	Data will be collected in 2021. Number of hours is the total hours completed by all wastewater staff.

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ATTRIBUTE	**WHY IMPORTANT?**
Efficiency: Performing to the best of our abilities with the lease amount of lost time and effort	**Being efficient demonstrates how well CMSD is using its resources. It proves functions are completed in a timely manner and there is less bureaucracy within the organization.**

Performance Measures	Current Goal	Outcome			Trend	Comments or Analysis
		CY 2018	CY 2019	CY 2020		
Average response time to SSOs	1 Hour	**17 Minutes**	**1 Hour 41 Minutes**	**25 Minutes**	👍	The average time it took to respond to an SSO in 2020 was 25 minutes. SSOs in 2018 and 2020 occurred during regular business hours.

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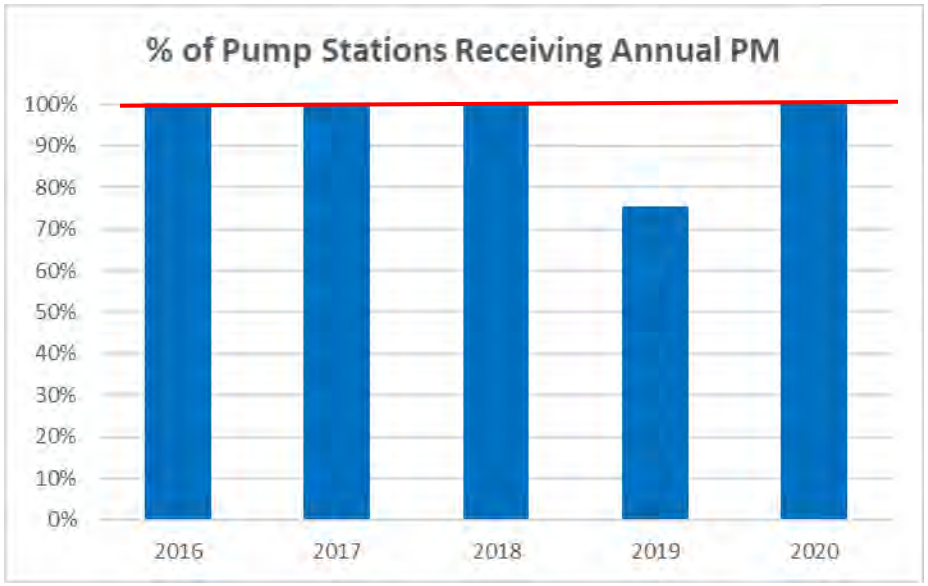
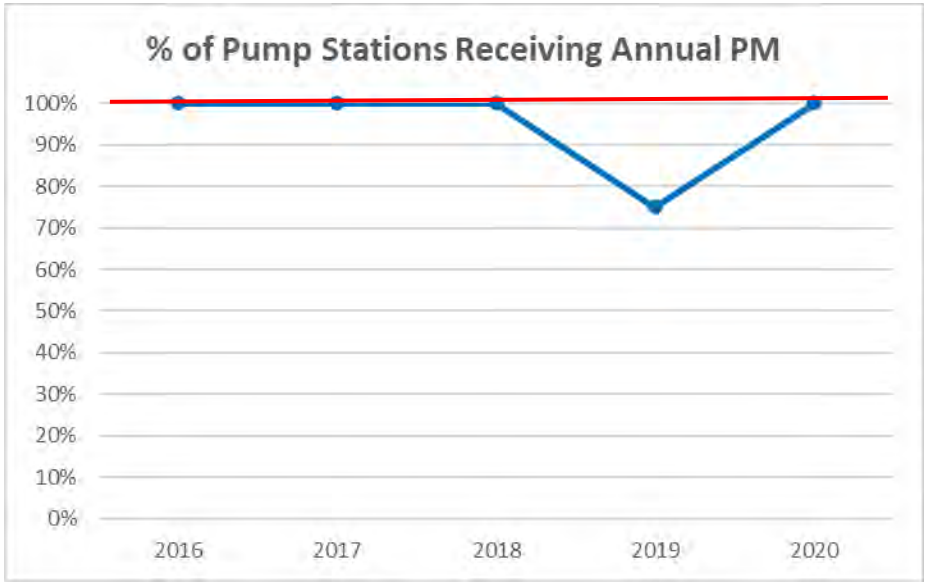
ATTRIBUTE	**WHY IMPORTANT?**
Efficiency: Performing to the best of our abilities with the least amount of lost time and effort	**Being efficient demonstrates how well CMSD is using its resources. It proves functions are completed in a timely manner and there is less bur within the organization.**

Performance Measures	**Current Goal**	**Outcome**			**Trend**	**Comments or Analysis**
		CY 2018	**CY 2019**	**CY 2020**		
Percentage of wastewater pump stations that received their annual preventive maintenance (PM)	100%	**100%**	**75%**	**100%**	👍	There are 20 wastewater pump stations. Annual PMs prevents SSOs. PM includes checking cord connections, circuit breakers, fuses, amps, volts, wet well coating, changing oil and coolant, clean and exercise all valves, observe pump in use and record pump down times.





CMSD staff will seek approval from the CMSD Board of Directors for any significant changes to the SSMP. The authority for approval of minor changes such as employee names, contact information, or minor procedural changes is delegated to the General Manager. Copies of the current SSMP document will be available to all interested parties on CMSD's website.

X. SSMP PROGRAM AUDITS

CMSD will audit its SSMP every two years. Table 10-1 below show when previous audits were performed as well as a schedule for future SSMP audits. The SSMP audit will determine whether the SSMP meets the current requirements of the WDR, whether the SSMP reflects CMSD's current practices, and whether CMSD is following the SSMP. The audit will be conducted by an outside independent consulting firm that has experience performing SSMP audits. The results of the audit will be presented to the Board of Directors during an open public meeting.

Table 10-1: Past SSMP Audits and Future Scheduled Audits

SSMP Audit Schedule	Name of Auditor	Status
May, 2011	EEC Environmental	Completed
May 2013	EEC Environmental	Completed
September 2015	Willdan Engineering	Completed
February 2018	EEC Environmental	Completed
November 2020	EEC Environmental	Completed
February 2022	N/A	Future

XI. COMMUNICATIONS PROGRAM

CMSD has developed the following Communications Program to ensure the public is aware on the development, implementation and performance of the SSMP. The Program provides the public the opportunity to comment on the SSMP and the implementation of the Plan.

- CMSD produces a quarterly newsletter that is mailed to over 23,000 households. CMSD will highlight the SSMP in the newsletter and encourage public comments about the Plan. CMSD's newsletter is written in both English and Spanish.
- Significant amendments of the SSMP are presented to CMSD's Citizens Advisory Committee (CAC) for review and comments. CAC meetings are open to the public giving members of the public an opportunity to review and comment on the SSMP.
- Significant amendments of the SSMP are presented to the Board of Directors at a study session and/or special meetings, which are open to the public. The Board of At a regular Board of Directors meeting, Directors will approve and recertify the SSMP after significant amendments have been made. Regular Board of Directors meetings are open to the public.
- SSMP audit results will be presented to the Board of Directors during one of their standard regular meetings where a presentation of the SSMP performance will be made available to the public.
- The SSMP document is available on CMSD's website for the public to review and comment.
- Sewer overflow performance information is available to the public on the State Water Resources Control Board (SWRCB) California Integrated Water Quality System (CIWQS). Go to:

  https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/PublicReportSSOServlet?reportAction=criteria&reportId=sso_main. Type in "Costa Mesa Sanitary District" in the "Enter a sanitary sewer agency name" field. Click on "Generate Report" button.

[Emergency Contractors Next Page]

EMERGENCY CONTRACTORS

Atlas Underground	(909) 622-7738 Office
1295S. East End Ave.	(909) 622-7174 Fax
Pomona, CA 91766	(909) 628-4485 Home
Contact: Hector Loya	(909) 876-6909 Pager
ESSCO Pumps & Controls	(323) 261-2181 Office
4935 Telegraph Road	(323) 261-1523 Fax
Los Angeles, CA 90022	
Contact: John Ivins	(562) 412-9091 Cell
Jamison Engineering	(714) 620-5048 24-HR
17197 Newhope St. Ste. J	(714) 434-9196 Office
Fountain Valley, Ca 92708	(714) 434-3762 Fax
Contact: Don Jamison	
Jimni Systems, Inc	
11161 Jeffery Road	(949) 770-7654 Office
Irvine, CA 92602	
Contact: Jim Pleasant	
Kennedy Pipeline	(949) 380-8363 Office
61 Argonaut	(949) 380-0172 Fax
Aliso Viejo, CA 92656-1423	
Contact: John Shoffeitt	(949) 770-1241 Home
Manhole Adjusting	
9500 Beverly, Rd	(323) 558-8000 Office
Pico Riviera, CA 90660-2135	(323) 558-8045 Fax
Contact: Abe Gonzalez	

Leo	(949) 718-6625 Cell

National Plant Services, Inc.
1461 Harbor Ave. (800) 445-3614 Office

Long Beach, CA 90813-2741 (562) 495-1528 Fax
Contact: Dennis Keene

Schuler Engineering Corporation
564 West Bateman Circle (951) 738-9215 Office
Corona, Ca 92880-2011 (951) 738-0162 Fax
Contact: Bruce Schuler (951) 277-2627 Home

Mike Kilbride, Ltd.
P.O. Box 3341 (949) 548-0106 Home
Newport Beach, CA 92659-8341 (949) 548-1616 Fax
Contact: Dennis Ruiz (714) 240-0741 Cell

GCI Construction
245 Fischer Avenue
Costa Mesa, CA 92626
Contact: Terry Gillespie (714) 721-8661 Cell

Plumbers

C&R Drains (714) 641-1545 24-HR
1525 W. MacArthur, #11 (714) 641-3189 Fax
Costa Mesa, CA 92626
Contact: John Melrose (714) 875-7800 Cell
Kim Melrose (714) 915-2403 Cell

Pumper Trucks

Darling International/Minuteman
2624 S. Hickory Street (800) 628-7867
Santa Ana, CA 92707
Contact: Dispatch

United Pumping Service
14016 E. Valley Blvd. (626) 961-9326 Office
City of Industry, CA 91746 (626) 931-3166 Fax
Contact: Dispatch

Orange County Pumping Inc.
630 S. Hathaway (714) 953-6700 Office
Santa Ana, CA 92705 (714) 541-8421 Fax
Contact: Margaret or Sandy (714) 410-4845 Pager

Services Available:

- 1500 & 3000 gal mild steel tank vacuum truck for sewage
- 5000 gal mild steel tank vacuum truck for sewage

Ocean Blue Environmental Services, Inc.
925 West Esther Street
Long Beach, CA 90813 (800) 990-9930 24 hours
Contact: Ed Acosta (562) 755-4698

Rain for Rent
6400 Fischer Road (909) 653-2171 Office
Riverside, CA 92507 (909) 656-1926 Fax

- By-pass pumping equipment and materials

Contact:

Wayne Trawinski (909) 772-1065 Cell / Pager

Video Inspections

Pro Pipe (714) 666-0436 Anaheim Office
1181 N. Kramer Place (800) 386-1497 Arizona Office
Anaheim, CA 92806 (714) 632-7924 Fax
Contact: Mike Hollis

Services Available:

- Combo Trucks, Hydro flushers, Rodders, Balling, Bucketing Machines
- Video Inspection

National Plant Services, Inc.
1461 Harbor Avenue (800) 445-3614 Office
Long Beach, CA 90813-2741 (562) 495-1528 Fax
Contact: Dennis Keene (714) 772-6250 Home

Services Available:

- Combination Sewer Cleaning Truck with 2-man Crew
- Industrial Vacuum truck with 2-man Crew for grit and debris removal 3000 gal. mild steel tank vacuum truck for sewage

Southern California Edison Company (800) 655-4555 24-Hr
Operating Department (714) 895-0226 Office
(714) 895-0230 Fax

Planning Department (714) 895-0244 Office
(714) 934-0892 Fax

Traffic Control

Traffic Control Services
1881 Betmor Lane (714) 937-0422 Office
Anaheim, CA 92805 (714) 937-1070 Fax

Contact: Craig Terry (800) 222-8274 24-HR

Traffic control equipment and services

Coastal Traffic Systems
1261 Logan Avenue (866) 641-3744 24-HR
Costa Mesa, Ca 92626 (714) 641-3738 Fax
Contact: Duty Person

California Barricade
1550 E. Saint Gertrude Pl. (800) 327-8844 24-HR
Santa Ana, Ca 92705 (714) 558-3821 Fax
Contact: Duty Person

OCSD (714) 962-2411 24-HR

Emergency Generator Suppliers

US Rental (714) 842-7765 24-HR
16300 Gothard St. (714) 843-2029 Fax
Huntington Beach, CA 92647

Towable Generator
60 KVW Generator, $140.00/day

Charles King Company
2841 Gardenia Ave. (562) 426-2974 Office
Signal Hill, CA 920755 (562) 426-9714 Fax
Contact: Butch King (310) 505-5655 Cell
Steve (310) 505-7524 Cell

Contractor Equipment

Anaheim	(714) 535-7731 Office
	(714) 535-1239 Fax
Riverside	(951) 682-6823 Office
	(951) 682-3225 Fax
	(951) 416-7674 Pager

Generators - 3 phase
30 KVW to 360 KVW/240 to 440 Volts
5 to 6 in stock; Bypass water pumps in stock

Portable Toilets

Andy Gump
533 W. Collins (800) 540-1700 Office
Orange, CA 926867 (714) 538-1246 Fax
Contact: Bill Wedgeworth

A - Throne Co.
1850 E. 33rd St. (800) 446-4669 Office
Long Beach, CA (562) 981-1197 Office
(562) 426-9896 Fax

Household Hazardous

Ocean Blue Environmental Services
925 W. Esther St. (800) 990-9930 Office
Long Beach, CA 90813 (562) 624-4127 Fax
Contact: On Duty Manager

United Pumping Service
14016 E. Valley Blvd. (626) 961-9326 Office
City of Industry, CA 91746 (626) 961-3166 Fax
Contact: Dispatch

Costa Mesa Sanitary District
Sewer System Management Plan
Change Log

Date	SSMP Element/ Section	Description of Change/Revision Made	Change Authorized by:

Apppendix: C: Pump Station Service Area Maps

Apppendix: D: Pump Station Flow Calculations

Pump Station Flow Analysis for Costa Mesa Sanitary District

PS Name	Pump Station/ Location Description	Service Area ID	Pipe ID	Land Use Areas (acres)	LDR	MDR	PI	Land Use Flow Contribution (MGD)	Modeled Average Flow (MGD)	Modeled Peak Flow (MGD)	Total Inflow (MGD)	Modeled Total Flow (MGD)	Modeled Total Flow (GPM)	Pump Station Capacity (GPM)
Mendoza	1	200	137692	GC: 0 HDR: 2 LI: 0				GC: 0.0 HDR: 0.01 LI: 0.0	0.010	0.026	0.002	0.028	19.2	
	1	201	137693	F: 14 GC: 1 HDR: 16 LDR: 133 LI: 0 MDR: 7 NC: 1 PI: 67				F: 0.0 GC: 0.01 HDR: 0.07 LDR: 0.21 LI: 0.0 MDR: 0.02 NC: 0.0 PI: 0.01	0.322	0.648	0.242	0.891	618.4	
	Total PS1	-		----------					*0.331*	*0.674*	*0.244*	*0.918*	**637.6**	***960***
Gisler	2	202	149523	G: 0 LDR: 8				G: 0.0 LDR: 0.01	0.013	0.034	0.010	0.044	30.8	
	2	203	137040	G: 0 HDR: 0 LDR: 42 PI: 0				G: 0.0 HDR: 0.0 LDR: 0.06 PI: 0.0	0.066	0.150	0.048	0.198	137.5	
	Total PS2			----------					*0.079*	*0.184*	*0.058*	*0.242*	**168.3**	***250***
Adams	3	204	138303	G: 0 LDR: 76 PI: 0				G: 0.0 LDR: 0.12 PI: 0.0	0.117	0.256	0.084	0.340	236.3	
	3	237	138301	G: 2 LDR: 56 PI: 19				G: 0.0 LDR: 0.09 PI: 0.0	0.091	0.202	0.081	0.284	197.1	
	Total PS3			----------					*0.208*	*0.458*	*0.166*	*0.624*	**433.5**	***500***
Harbor	Total PS4	205	139808	G: 1 GC: 6 HDR: 9 LDR: 36 LI: 34 MDR: 54 NC: 3 PI: 9				G: 0.0 GC: 0.03 HDR: 0.04 LDR: 0.06 LI: 0.12 MDR: 0.14 NC: 0.02 PI: 0.0	*0.403*	*0.798*	*0.154*	*0.952*	661.3	*1700*
	Total PS4 (Inc PS5)			----------					*0.844*	*1.758*	*0.526*	*2.285*	**1586.5**	***2500***

PS Name	Pump Station/ Location Description	Service Area ID	Pipe ID	Land Use Areas (acres)	LDR	MDR	PI	Land Use Flow Contribution (MGD)	Modeled Average Flow (MGD)	Modeled Peak Flow (MGD)	Total Inflow (MGD)	Modeled Total Flow (MGD)	Modeled Total Flow (GPM)	Pump Station Capacity (GPM)
Canyon	5	206	135209	HDR: 2 LDR: 53 MDR: 13 PI: 0				HDR: 0.01 LDR: 0.08 MDR: 0.03 PI: 0.0	0.125	0.272	0.078	0.350	243.2	
	5	207	138747	MDR: 41 NC: 0 PI: 0				MDR: 0.1 NC: 0.0 PI: 0.0	0.104	0.229	0.071	0.300	208.0	
	5	208	135208	G: 0 MDR: 4 PI: 170				G: 0.0 MDR: 0.01 PI: 0.03	0.043	0.102	0.146	0.249	172.9	
	5	209	138754	HDR: 2 LDR: 12 LI: 2 MDR: 45 NC: 3 PI: 14				HDR: 0.01 LDR: 0.02 LI: 0.01 MDR: 0.11 NC: 0.02 PI: 0.0	0.168	0.357	0.076	0.434	301.1	
	Total PS5			----------					*0.441*	*0.961*	*0.372*	*1.332*	**925.2**	***800***
Aviemore Terrace	6	210	138790	LDR: 3 MDR: 1 PI: 3				LDR: 0.0 MDR: 0.0 PI: 0.0	0.008	0.022	0.006	0.029	19.8	
	6	213	138794	HDR: 0 LDR: 2 MDR: 0 PI: 4				HDR: 0.0 LDR: 0.0 MDR: 0.0 PI: 0.0	0.005	0.013	0.006	0.019	13.4	
	Total PS6			----------					*0.013*	*0.036*	*0.012*	*0.048*	**33.2**	***45***
President	7	214	150257	GC: 0 HDR: 7 LDR: 51 MDR: 1 NC: 0 PI: 14				GC: 0.0 HDR: 0.03 LDR: 0.08 MDR: 0.0 NC: 0.0 PI: 0.0	0.119	0.261	0.073	0.333	231.5	
	7	215	139121	HDR: 1 LDR: 65 LI: 0 MDR: 0 PI: 1				HDR: 0.0 LDR: 0.1 LI: 0.0 MDR: 0.0 PI: 0.0	0.106	0.233	0.071	0.304	211.1	
	Total PS7			----------					*0.225*	*0.494*	*0.144*	*0.637*	**442.6**	***634***
Victoria	9	216	139819	LDR: 0 MDR: 3				LDR: 0.0 MDR: 0.01	0.008	0.023	0.003	0.026	18.0	
	9	217	139847	GC: 0 HDR: 36 LDR: 26 LI: 8 MDR: 38 NC: 1 PI: 5				GC: 0.0 HDR: 0.16 LDR: 0.04 LI: 0.03 MDR: 0.1 NC: 0.0 PI: 0.0	0.336	0.674	0.115	0.788	547.6	
	Total PS9			----------					*0.344*	*0.696*	*0.118*	*0.814*	**565.6**	***785***
	10	218	140147	CR: 10 HDR: 1 LDR: 4 MDR: 65				CR: 0.05 HDR: 0.01 LDR: 0.01 MDR: 0.16	0.224	0.465	0.081	0.545	378.7	

PS Name	Pump Station/ Location Description	Service Area ID	Pipe ID	Land Use Areas (acres)	LDR	MDR	PI	Land Use Flow Contribution (MGD)	Modeled Average Flow (MGD)	Modeled Peak Flow (MGD)	Total Inflow (MGD)	Modeled Total Flow (MGD)	Modeled Total Flow (GPM)	Pump Station Capacity (GPM)
Elden	10	219	140136	CR: 27 HDR: 2 MDR: 3				CR: 0.14 HDR: 0.01 MDR: 0.01	0.155	0.330	0.031	0.361	250.7	
	10	220	140135	LDR: 41 MDR: 127 PI: 8				LDR: 0.06 MDR: 0.32 PI: 0.0	0.386	0.766	0.174	0.941	653.2	
	Total PS10			----------					*0.765*	*1.561*	*0.286*	*1.847*	1282.6	*3750*
	Total PS10 (Inc PS11)			----------					*1.752*	*3.380*	*0.600*	*3.980*	**2763.9**	***3750***
Irvine	**Total PS11**	221	140015	F: 1 G: 194 GC: 56 HDR: 31 LDR: 134 MDR: 15 PI: 2 RC: 56				F: 0.0 G: 0.04 GC: 0.28 HDR: 0.14 LDR: 0.21 MDR: 0.04 PI: 0.0 RC: 0.28	*0.987*	*1.818*	*0.315*	*2.133*	**1481.3**	***1800***
Santa Ana	12	222	140310	LDR: 0 MDR: 24 PI: 1				LDR: 0.0 MDR: 0.06 PI: 0.0	0.061	0.140	0.024	0.163	113.5	
	12	223	140251	LDR: 28 MDR: 22 PI: 9				LDR: 0.04 MDR: 0.06 PI: 0.0	0.102	0.224	0.059	0.284	196.9	
	12	224	140317	LDR: 178 MDR: 34 PI: 17				LDR: 0.28 MDR: 0.09 PI: 0.0	0.365	0.728	0.231	0.959	666.2	
	12	225	140318	LDR: 1 MDR: 1				LDR: 0.0 MDR: 0.0	0.003	0.007	0.001	0.009	6.2	
	Total PS12			----------					*0.530*	*1.099*	*0.316*	*1.415*	**982.8**	***1050***
23rd. Street	13	226	150532	LDR: 42	42			LDR: 0.07	0.065	0.149	0.043	0.192	133.2	
	13	227	140424	LDR: 3		3		LDR: 0.0	0.005	0.013	0.005	0.018	12.8	
	13	228	140451	LDR: 62 MDR: 5 PI: 3	62	5	3	LDR: 0.1 MDR: 0.01 PI: 0.0	0.109	0.239	0.070	0.309	214.6	
	Total PS13			----------					*0.178*	*0.401*	*0.118*	*0.519*	**360.6**	***550***
California	14	229	135690	LDR: 5 PI: 1				LDR: 0.01 PI: 0.0	0.008	0.022	0.008	0.030	20.9	
	14	230	135696	LDR: 22 PI: 0				LDR: 0.03 PI: 0.0	0.034	0.082	0.027	0.109	75.6	
	Total PS14			----------					*0.042*	*0.104*	*0.035*	*0.139*	**96.5**	***269***
South Coast Plaza	**Total PS16**	238	139209	HDR: 0 LDR: 8 LI: 2 MDR: 8 PI: 2				HDR: 0.0 LDR: 0.01 LI: 0.01 MDR: 0.02 PI: 0.0	*0.041*	*0.098*	*0.023*	*0.120*	**83.5**	***100***
19th. Street	**Total PS17**	231	135860	HDR: 6 LDR: 0 PI: 1				HDR: 0.03 LDR: 0.0 PI: 0.0	*0.030*	*0.073*	*0.008*	*0.081*	**56.2**	***150***
Iowa	**Total PS18**	232	138811	LDR: 0 MDR: 10 PI: 0				LDR: 0.0 MDR: 0.02 PI: 0.0	*0.024*	*0.060*	*0.008*	*0.067*	**46.7**	***110***
Sea Bluff	Total PS19	233	149414	MDR: 6				MDR: 0.01	*0.014*	*0.037*	*0.005*	*0.041*	28.7	*160*

PS Name	Pump Station/ Location Description	Service Area ID	Pipe ID	Land Use Areas (acres)	LDR	MDR	PI	Land Use Flow Contribution (MGD)	Modeled Average Flow (MGD)	Modeled Peak Flow (MGD)	Total Inflow (MGD)	Modeled Total Flow (MGD)	Modeled Total Flow (GPM)	Pump Station Capacity (GPM)
	Total PS19 (Inc PS18)			----------					*0.038*	*0.096*	*0.012*	*0.109*	**75.4**	***270***
21st. Street	21	235	140762	CR: 10 GC: 3 HDR: 11 LDR: 7 MDR: 20				CR: 0.05 GC: 0.01 HDR: 0.05 LDR: 0.01 MDR: 0.05	0.179	0.378	0.051	0.429	297.9	
	21	236	140760	CR: 1 HDR: 4 LDR: 64 MDR: 34 PI: 5				CR: 0.01 HDR: 0.02 LDR: 0.1 MDR: 0.09 PI: 0.0	0.212	0.441	0.111	0.552	383.0	
	Total PS21			----------					*0.390*	*0.818*	*0.162*	*0.980*	**680.9**	***825***

Apppendix: E: Gravity Sewer Service Area Maps

Apppendix: F: Gravity Sewer Flow Calculations

CMSD Gravity Sewer
Flow Calculations

Facility ID				Total Area (acres)	Comm (acres)	HDR (acres)	MDR (acres)	LDR (acres)	Ind. (acres)	Public Inst. (acres)	Parks (acres)	Streets (acres)	Inflow[2] (MGD)	PS Flow (MGD)	EEC Q (MGD)	PS Split Factor	Split Flow Factor	Ultimate Land Use Qavg[1] (MGD)	Ultimate Land Use Qpeak (MGD)	Ultimate Land Use Condition	Pipe Dia (in)	Slope	Pipe Capacity D/d=0.5 (MGD)	Pipe Capacity D/d=0.75 (MGD)	Pipe Capacity Full (MGD)
1	Irvine at Flower	156		197.6	25.4	0.0	50.0	83.2		0.0		39	0.158		0.92		1.0	0.38	0.92		15	0.0076	1.82	3.32	3.64
2	Irvine NE of 17th	119		150.2	25.4	0.0	49.8	45.9		0.0		29	0.120		0.77		1.0	0.32	0.77	d>0.5D	15	0.0009	0.62	1.12	1.23
3	1st Alley NE of Flower	220		285.8	54.7	51.6	39.1	69.9		2.6		68	0.229		1.59		1.0	0.72	1.59		15	0.0190	2.88	5.24	5.75
4	Raymond N.E. of Flower	28		37.2				28.2				9	0.030		0.07		0.5	0.02	0.07		10	0.0052	0.51	0.93	1.02
5	Tustin SW of Walnut	65		80.7			14.8	42.1		8.8		15	0.065		0.29		1.0	0.10	0.29	d>0.5D	8	0.0036	0.23	0.42	0.47
6	Irvine at Costa Mesa	117		145.2			14.8	92.6		8.8		29	0.116		0.5		1.0	0.18	0.50	d>0.5D	10	0.0023	0.34	0.62	0.68
7	Irvine SW of 19th	429		547.3	78.7	51.3	97.3	181.5		13.6		125	0.438		2.55		1.0	1.16	2.55		24	0.0088	N/A	12.48	13.69
8	23rd St Pump Station	78		82.6			4.8	58.3		2.5		17	0.066		0.3		1.0	0.10	0.29	d>0.5D	8	0.0042	0.25	0.46	0.50
9	Santa Ana NE of 23rd	108		109.0			18.8	59.3		10.9		20	0.087	0.79	1.18	1	1.0	0.14	1.18	d>0.75D	12	0.0031	0.64	1.16	1.27
10	Brentwood NW Santa Ana	39		65.5			20.7	26.8		4.0		14	0.052		0.26		1.0	0.09	0.26	d>0.5D	8	0.0030	0.21	0.39	0.43
11	Santa Ana SW of Mesa	98		119.0			64.2	31.4		4.5		19	0.095	2.19	1.02	0.5	1.0	0.21	2.73		18	0.0040	N/A	3.91	4.29
12	Mesa SE of Elden	43		173.6			102.2	41.0		4.5		26	0.139	2.19	2.29	1	1.0	0.32	2.98	d>0.75D	18	0.0021	N/A	2.81	3.08
14	Bristol NW of Acacia	119		144.4	38.2			70.6		0.0	11.6	24	0.106		0.72		1.0	0.30	0.72	d>Full	8	0.0064	0.31	0.57	0.62
15	FC Channel SE of Kline 1	73		79.2	17.1		19.5	25.8		1.3	6.6	9	0.058		0.43		0.5	0.09	0.23		12	0.0025	0.58	1.06	1.16
16	Irvine Pump Station	436		508.2	113.9	2.6	32.9	116.4		20.2	154.3	68	0.283		1.92		1.0	0.88	1.92		21	0.0040	N/A	5.90	6.48
17	Elden SW of Wilson	55		64.0	8.3	0.2	38.5	5.0				12	0.051		0.37		1.0	0.15	0.37	d>0.5D	8	0.0040	0.25	0.45	0.49
18	Elden at Mesa So. 8 inch	30		13.2			11.2					2	0.011		0.08		1.0	0.03	0.08		8	0.0040	0.25	0.45	0.49
19	Elden at Mesa No. 10 inch	104		118.1	9.7	1.1	83.6	4.7				19	0.094		0.65		1.0	0.27	0.65	d>0.5D	10	0.0034	0.41	0.75	0.82
20	Newport at Victoria	29		22.0	20.9	0.0	0.0	0.0				1	0.018	1.58	0.72	0.5	0.5	0.05	0.92		15	0.0039	1.30	2.37	2.60
21	21st SE of Orange	77		86.0			12.8	49.3		3.9		20	0.069		0.31		1.0	0.11	0.31	d>0.5D	8	0.0021	0.18	0.33	0.36
22	21st at Newport	41		52.9	8.8	8.9	19.3	7.0				9	0.042		0.35		1.0	0.14	0.35	d>0.5D	10	0.0021	0.32	0.58	0.64
24	President Pump Station	69		84.3		0.0	0.0	66.2	0.0	0.1		18	0.067		0.29		1.0	0.10	0.29	d>0.5D	8	0.0044	0.26	0.47	0.52
28	Thurin South of Victoria 15 in.	171		171.7	38.2	36.8	26.8	23.3		16.7		30	0.137	0.98	1.96	0.5	1.0	0.47	2.03	d>0.75D	15	0.0024	1.02	1.85	2.03
30	Victoria Pump Station	116		104.6	0.7	34.3	27.5	9.5	7.4	5.1		20	0.084		0.64		1.0	0.27	0.64		8	0.0329	0.71	1.29	1.42
33	Anaheim South of Center	114		14.4		11.4						3	0.012		0.13		1.0	0.05	0.13		12	0.0006	0.28	0.50	0.55
34	18th West of Crestmont	135		177.1	38.7	78.4	0.4	10.7	0.3	12.6		36	0.142		1.25		1.0	0.58	1.25		15	0.0056	1.56	2.84	3.12
35	17th East of Pomona	172		199.3	42.6	82.9	0.4	10.5	11.3	12.6		39	0.159		1.41		1.0	0.66	1.41		15	0.0059	1.60	2.92	3.20
41	17th West of Placentia	39		52.4					44.4			8	0.042		0.37		1.0	0.16	0.37	d>0.5D	8	0.0040	0.25	0.45	0.49
44	17th West of Pomona 10 inch	43		42.3	1.6	24.4			8.4			8	0.034		0.36		0.5	0.08	0.19		10	0.0212	1.03	1.88	2.06
46	Pomona North of 17th	15		21.4		10.3			7.1			4	0.017		0.18		1.0	0.07	0.18		8	0.0277	0.65	1.18	1.30
47	Pomona South of 17th	460		555.6	46.5	143.9	10.7	37.5	197.0	24.0		96	0.444	0.14	1.85	1	0.5	0.84	1.86		21	0.0026	N/A	4.74	5.20
48	16th West of Newport	25		34.0	13.2	1.5		0.6	12.6	0.1		6	0.027		0.28		1.0	0.12	0.28	d>0.5D	8	0.0049	0.27	0.50	0.54
49	Newport North of 16th	25		26.7	23.2	0.5						3	0.021		0.28		1.0	0.12	0.28	d>0.5D	8	0.0049	0.27	0.50	0.55
50	Canyon Drive	87		91.0	3.4	2.3	43.3	11.6	2.0	14.5		14	0.073		0.42		1.0	0.16	0.42	d>0.5D	8	0.0100	0.39	0.71	0.78
51	Canyon Drive Pump Station	71		86.1		2.2	8.1	53.7		0.1		22	0.069		0.32		1.0	0.11	0.32		8	0.0153	0.48	0.88	0.97
52	Wilson West of Placentia 8 in.	454		453.8	3.4	4.5	97.0	74.6	2.0	216.3	0.0	56	0.363		0.62		0.5	0.22	0.65	d>Full	8	0.0066	0.32	0.58	0.63
53	WIlson East of Placentia 10 in.	68		510.5	11.9	5.8	104.6	72.7	37.3	216.3	0.0	62	0.408		0.81		0.5	0.32	0.85	d>Full	10	0.0027	0.36	0.67	0.73
54	Wilson East of Placentia 12 inch	16		475.3	3.4	4.5	101.0	83.9	2.0	218.5	0.0	62	0.380	0.12	0.77	0.5	0.5	0.24	0.74	d>0.5D	12	0.0040	0.72	1.32	1.45
57	Wilson East of Harbor 10"	100		101.1	29.2	24.8	2.7	21.4		5.0		18	0.081		0.35		0.5	0.15	0.36	d>0.5D	10	0.0012	0.25	0.45	0.49
58	Fair Dr. at Harbor	126		169.5	28.9	17.7	0.0	77.9		8.0		37	0.136		0.83		1.0	0.35	0.83		15	0.0030	1.15	2.09	2.30
59	Harbor South of Adams	632		709.9	55.6	93.7	11.2	125.0		116.5	236.0	72	0.379		2.22		1.0	1.00	2.22		18	0.0025	N/A	3.12	3.43
60	Adams Pump Station	75		96.2	0.0			55.9		19.3		21	0.077		0.28		1.0	0.09	0.28	d>0.5D	8	0.0026	0.20	0.36	0.40

CMSD Gravity Sewer
Flow Calculations

																Ultimate Land Use							
Facility ID				Total Area (acres)	Comm (acres)	HDR (acres)	MDR (acres)	LDR (acres)	Ind. (acres)	Public Inst. (acres)	Parks (acres)	Streets (acres)	Inflow[2] (MGD)	PS Flow (MGD)	EEC Q (MGD)	PS Split Factor	Split Flow Factor	Qavg[1] (MGD)	Qpeak (MGD)	Condition	Pipe Dia (in)	Slope	Pipe Capacity D/d=0.5 (MGD)	Pipe Capacity D/d=0.75 (MGD)	Pipe Capacity Full (MGD)
61	Adams West of Harbor	256		312.2	24.2	15.1	24.0	165.2		26.7	0.1	57	0.250		1.24		1.0	0.51	1.24	d>0.5D	15	0.0023	1.00	1.83	2.01
62	Harbor South Baker into OCSD	918		1045.0	95.0	107.2	35.2	291.8		147.6	236.2	132	0.647		3.46		1.0	1.59	3.46	d>Full	18	0.0020	N/A	2.77	3.04
63	Harbor into 30 inch County	113		140.0	45.5	9.8		51.4		1.3		32	0.112	0.72	1.18	0.5	1.0	0.35	1.54		18	0.0030	N/A	3.37	3.69
64	Gisler Pump Station	49		57.7	0.0	0.0		41.7				16	0.046		0.19		1.0	0.06	0.19		8	0.0222	0.58	1.06	1.16
65	Country Club at Gisler	230		260.1			3.6	84.3		0.0	142.3	30	0.094		0.23		0.5	0.08	0.24	d>0.5D	8	0.0023	0.19	0.34	0.38
66	Gisler at Bermuda	311		361.2	0.0		3.6	146.2		13.1	144.3	54	0.174		0.72		1.0	0.27	0.72		12	0.0045	0.77	1.40	1.54
67	Gisler at Gibralter	101		132.7	2.0	0.0		79.3		17.3		34	0.106		0.4		1.0	0.14	0.40	d>0.5D	10	0.0020	0.32	0.58	0.63
68	Paularino East of Bristol	96		45.5	0.6	25.7		5.9	7.4	0.0		6	0.036		0.37		1.0	0.16	0.37		12	0.0223	1.72	3.13	3.44
69	12" s'ly Mendoza Pump Station	221		370.3	0.7	15.4	7.0	135.9	0.0	72.6	69.8	69	0.240		0.91		1.0	0.33	0.90	d>0.5D	12	0.0024	0.56	1.03	1.13
70	Santa Ana SW of 18th	71		92.3	30.1	17.6	21.9			2.6		20	0.074		0.66		1.0	0.29	0.66		8	0.0546	0.91	1.66	1.82
71	Flower SE of Santa Ana 12 inch	177		235.5	53.3	51.3	39.2	33.1		2.6		56	0.188		0.72		0.5	0.33	0.75	d>0.5D	12	0.0028	0.61	1.12	1.22
72	Old Newport Blvd.	134		181.6	57.6	1.7	42.8	1.5	19.7	9.3		49	0.145		1.08		1.0	0.48	1.08		10	0.0325	1.28	2.33	2.55
100	Newport Blvd SW of Mesa	33		36.2	27.1	2.5	3.6					3	0.029		0.36		1.0	0.16	0.36	d>0.5D	8	0.0033	0.22	0.41	0.45
101	Hamilton at cl of Harbor	100		123.8	15.4	33.6	14.6	22.8		16.3		21	0.099	0.98	1.27	1	0.5	0.15	0.87		15	0.0022	0.98	1.79	1.96
102	Hamilton West of Harbor	89		85.7	1.3	25.6		25.7		17.2		16	0.069	0.98	0.67	0.5	0.5	0.08	0.71	d>0.5D	12	0.0020	0.51	0.93	1.02
103	Hamilton West of Harbor	20		16.5	7.4	7.2	0.0					2	0.013		0.09		0.5	0.03	0.09		8	0.0022	0.18	0.33	0.36
104	Hamilton East of Harbor 15 in.	126		152.4	35.3	33.1	18.1	22.7		16.2		27	0.122	0.98	1.39	0.5	1.0	0.41	1.92	d>Full	15	0.0016	0.85	1.54	1.69
105	Newport 18 in. N.E. of Victoria (Incl. Victoria PS)	519		64.5	14.6	14.9	15.9	4.0		5.1		10	0.052	1.07	1.68		1.0	0.19	1.52		18	0.0012	N/A	2.13	2.34
108	17th East of Placentia 12 in.	252		266.3	2.7	47.8	1.4	17.3	154.0	9.1		34	0.213	0.14	1	1	0.5	0.40	0.97	d>0.5D	12	0.0040	0.73	1.32	1.45
109	Victoria at Newport 18 in. (incl. President PS)	258		216.7	46.9	55.9	30.6	25.9		21.4		36	0.173	0.98	2.26	0.5	1.0	0.61	2.33	d>Full	18	0.0009	N/A	1.90	2.09
110	Victoria at Newport 21 in. (incl. Victoria PS)	350		63.6	13.7	14.9	15.9	4.0		5.1		10	0.051	1.07	1.67		1.0	0.18	1.51		21	0.0018	N/A	3.91	4.29
111	Victoria East of Harbor	233		153.3	34.1	33.2	18.1	22.9		16.1		29	0.123	0.98	1.84	0.5	1.0	0.41	1.91		12	0.0677	2.99	5.46	5.99
112	21st at Newport	153		135.0	1.5	3.9	33.7	62.0		3.9		30	0.108		0.54		1.0	0.21	0.54		10	0.0102	0.72	1.31	1.43
113	President Pump Station #2	64		75.1	0.4	7.4	0.7	50.6		0.1		16	0.060		0.31		1.0	0.12	0.31	d>0.5D	8	0.0064	0.31	0.57	0.62
114	Flower SE of Santa Ana 18 in.	177		235.2	53.9	51.2	38.5	33.0		2.6		56	0.188		1.43		1.0	0.65	1.43		18	0.0027	N/A	3.22	3.53
115	FC Channel SE of Kline 2	202		245.2	88.2	2.6	4.0	75.9		0.6	32.9	41	0.170		0.65		0.5	0.29	0.68	d>0.5D	12	0.0020	0.51	0.94	1.03
117	Anaheim South of Center 15 in.	102		125.0	38.7	52.9		4.5	0.0	3.9		25	0.100		0.97		1.0	0.45	0.97	d>0.5D	15	0.0014	0.77	1.40	1.54
118	Irvine SW of 23rd	43		47.9				40.9				7	0.038		0.18		1.0	0.06	0.18		12	0.0040	0.73	1.33	1.46
119	Victoria Pump Station 12 inch	51		102.1	0.2	34.0	9.2	25.7	6.9	5.1		21	0.082		0.29		0.5	0.12	0.31		12	0.0031	0.64	1.17	1.29
120	17th West of Pomona 12 inch	273		310.3	2.7	49.4	9.9	26.3	167.6	11.4		43	0.248		0.96		0.5	0.45	1.00		12	0.0282	1.93	3.53	3.87
121	Wilson West of PS 12 inch	89		105.0	1.0	8.1	36.9	27.1		8.9		23	0.084	1.15	1.04	0.5	1.0	0.18	1.61		12	0.0240	1.78	3.25	3.57
122	Gisler Pump Station 8 inch	20		10.6	0.0			7.6				3	0.008		0.04		1.0	0.01	0.04		8	0.0108	0.41	0.74	0.81
123	Wilson West of Placentia 10 in.	477		421.2	3.4	4.5	97.0	72.1	2.0	187.3		55	0.337		0.6		0.5	0.22	0.62	d>0.5D	10	0.0041	0.45	0.83	0.91
124	Santa Ana SW of 18th	71		98.0	29.0	17.7	27.7			2.6		21	0.078		0.69		1.0	0.30	0.68		18	0.0031	N/A	3.42	3.76
125	Newport N.E. of Victoria	427		508.3	89.4	105.0	86.7	87.9	8.0	25.3		106	0.407		2.78		1.0	1.32	2.78		24	0.0013	N/A	4.72	5.18
127	Santa Ana Pump Station	30		26.2			21.5	0.2		0.6		4	0.021		0.15		1.0	0.05	0.15		8	0.0020	0.18	0.32	0.35
128	Santa Ana Pump Station	247		286.8			34.5	180.1		18.2		54	0.229		0.96		1.0	0.37	0.96		12	0.0147	1.39	2.54	2.79

CMSD Gravity Sewer
Flow Calculations

																	Ultimate Land Use							
Facility ID				Total Area (acres)	Comm (acres)	HDR (acres)	MDR (acres)	LDR (acres)	Ind. (acres)	Public Inst. (acres)	Parks (acres)	Streets (acres)	Inflow[2] (MGD)	PS Flow (MGD)	EEC Q (MGD)	PS Split Factor	Split Flow Factor	Qavg[1] (MGD)	Qpeak (MGD)	Condition	Pipe Dia (in)	Slope	Pipe Capacity D/d=0.5 (MGD)	Pipe Capacity D/d=0.75 (MGD)	Pipe Capacity Full (MGD)
129	**Wilson East of Harbor**	**34**		8.3	0.0	2.7		3.6				2	0.007	2.39	2.5	1	1.0	0.02	2.44		21	0.0014	N/A	3.48	3.81
130	**Wilson West of PS 12 in.**	**160**		105.0	8.9	5.6	21.9	10.4	35.2	8.9		14	0.084		0.89		0.5	0.13	0.33		12	0.0040	0.73	1.33	1.46
131	**Indus E/O Santa Ana**	**27**		29.4			11.9	13.2		1.3		3	0.024		0.14		1.0	0.05	0.14		10	0.0066	0.57	1.05	1.15
132	**Newport at Victoria**	**29**		26.2	24.8	0.0	0.0	0.0		0.3		1	0.021		0.15		0.5	0.06	0.15	d>0.5D	8	0.0012	0.13	0.24	0.27
133	**Irvine Pump Station**	**29**		34.3	1.3		6.4	16.6		4.0		6	0.027		0.14		1.0	0.05	0.14		8	0.0265	0.64	1.16	1.27

Apppendix: G: Ductile Iron Pipe Rehabilitation

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
FULL LENGTH DIP										
136122	DI	105545	105540	8	203	S-75-25.9-	31		Meadow Brook	
138140	DI	101763	101692	8	172		289		Sanderling Cir.	
139514	DI	103157	103142	8	148		41		Hamilton & Harbor	
140177	DI	105083	105042	8	163		98		Poplar Ln.	
140178	DI	105016	105003	8	163		104		Eucalyptus Ln.	
134845	DI	102766	102786	8	140		185		Commercial Way	
134858	DI	102610	102643	8	140		182		Industrial Way	
135893	DI	102542	102546	12	197		52		Michigan Ave.	
136152	DI	105689	105683	8	193		36		South Coast Plaza @ PS	
137893	DI	105733	105751	8	165-A		145		Bristol St.	
137904	DI	105695	105704	8	178	S-90-5.1-3	221		Bristol St.	
137907	DI	105696	105695	8	178	S-95-1.1	67		Brisrol St.	
138616	DI	104814	104815	10	168		66		Fair Dr.	
138695	DI	105751	105756	8	165		103		Bristol St.	
140917	DI	102831	102850	8	140		174		16th. St.	
140982	DI	104188	104194	8	137		30		alley (Broadway St. & Tustin Ave.)	
149489	DI	102440	102439	10	139		84		Beacon St at Westminster Ave.	
150356	DI	111700	105020	8	179		35		DeSoto Ave.	
PARTIAL LENGTH DIP										
135398	VCP	104526	104561	8	195		80	18	Danielle Dr.	
								36		18
135399	VCP	104643	104644	8	195		198	13	Kings Ct.	
								23		10

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
135445	VCP	102433	102461	12	197	S-78-2.1-3	217	161	Gisler Ave.	
								172		11
								173		
135523	VCP	105503	105540	8	203	S-75-25.10	219	212	Village Creek	
								223		11
135528	VCP	105544	105543	8	203	S-75-25.8	244	234	Bear Creek	
135530	VCP	105453	105495	8	203		162	3		
								14	Bear Creek	11
135562	VCP	104651	104590	8	201		265	233	Wimbledon Way	
								244		11
135576	VCP	104433	104440	8	195		249	225	Wimbledon Way	
								235		10
135581	VCP	104515	104479	8	201	S-78-8.2	151	148	Wimbledon Way	
								156		9
135586	VCP	104432	104512	8	201	S-79-8.4	212	20	Kingston St.	
								29		9
135592	VCP	102695	102694	8	199		354	124	Hyland Ave.	
								132		8
135593	VCP	102706	102697	8	199		253	159	Hyland Ave.	
								169		10
135620	VCP	102865	102827	8	199		136	45	Corporate Dr.	
								63	@ Harbor Gateway	18
135645	VCP	102525	102526	8	199	S-81-7.5B	291	257	Howard Way	
								267		10
135720	VCP	102368	102367	8	198		209	185	Maryland Cir.	

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
								205		20
135923	VCP	104629	104556	8	195	S-77-3.4	324	307	Denns Dr.	
								317		10
135925	VCP	104649	104561	8	195	S-77-2.5	368	15	Danielle Dr.	
								24		9
								81		
								99		18
135935	VCP	104568	104561	8	195		211	168	Deedee Dr.	
								177		9
135936	VCP	104654	104568	8	195	S-77-2.6	338	14	Dana Dr.	
								25		11
135958	VCP	104560	104641	8	195	S-77-2.2	340	321	Debra Dr.	
								330		9
135980	VCP	104491	104476	8	195		204	180	Wimbledon Way	
								189		9
135986	VCP	104373	104368	8	195	S-78-9.5	242	181	Summerset Cir.	
								194		12
135991	VCP	104706	104743	8		S-72-12.3	199	189	Redding Ave.	
136025	VCP	NONE	104612	8	195		46	37	esmnt. between	
								47	Coast Dr. & Tulare Dr.	10
136240	VCP	105723	105763	8	191		202	30	Wingate Bay	
								39		9
136250	VCP	105673	105721	8	191	S-79-4.5	269	39	Wesleyan Bay	
								49		10
								253		

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
								262		9
136257	VCP	105763	105758	8	191		98	70	Loysburg Bay	
								80		9
136260	VCP	105773	105770	8	191		132	110	Loysburg Bay	
								121		10
136265	VCP	105627	105583	8	191	S-77-15.2	273	267	Jennifier Ln.	
								276		9
136269	VCP	105607	105585	8	191	S-77-15.3	175	8	Jeffery Dr.	
								17		9
								147		
								157		10
136274	VCP	105697	105699	8	191		269	135	Roanoke Ln.	
								141		6
136339	VCP	105642	105644	8	191		169	90	Tara	
								108		18
136476	VCP	105480	105469	8	191		140	105	Klondike Ave,	
								114		9
136483	VCP	105490	105438	8	191	S-79-3.3	220	43	Liard Pl.	
								52		9
136899	VCP	102431	102432	10	187	S-78-2.3	270	15	Bermuda Dr.	
								242		
								248		6
137553	VCP	104204	104203	8	180		151	30	Citrus Pl.	
								48		18
								122		

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
								141		18
137670	VCP	105384	105385	8	179	S-70-1.1-2	200	125	Bear St.	
								140		14
137832	VCP	105598	105609	8	178		123	55	Bear St.	
								64		9
138351	VCP	103299	103224	8			342	281	Fair Dr.	60
138466	VCP	104143	115588	8	169	S-57-10.4	327	284	Princeton Dr.	
								294		9
138480	VCP	104171	104125	8	169	S-79-5.3	167	12	Purdue Dr.	
								23		11
138617	VCP	104813	104814	10	168		218	14	esmnt. at	
								226	Fair Dr.	212
138618	VCP	104812	104813	10	168		262	6	esmnt at	
								63	Fair Dr.	57
138682	VCP	105920	105901	8	165		261	73	Bristol St.	
								100		27
								151		110
138746	VCP	101583	101552	8			248	232	Modjeska Cir.	
								241		9
138833	VCP	101471	101460	8			109	22	Westward Ln.	
								33		11
138849	VCP	102268	102306	8	157	S-63-18.1-2	348	333	Joann St.	15
139182	VCP	101595	101539	8	154	S-53-5.24	331	316	19th. St.	
								330		14
139221	VCP	101930	101984	8	154		170	128	Material Change, Remark: DIP	

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
								139	Material Change, Remark: VCP	10
139395	VCP	102388	102392	8	152	S-53-2.34	289	171	Pomona Ave.	
								179		9
139420	VCP	102886	102887	8	150	S-53-2.12	244	36	esmnt	
								102	e/o Park Dr, s/o 18th. St.	66
139437	VCP	102981	102982	8	150	S-53-2.11	247	202	Park Ave.	
								212		10
139560	VCP	102949	103050	8	148		342	122	Bernard St.	
								127		5
139580	VCP	103045	103076	8	148		146	6	Hamilton St.	
								27		22
139581	VCP	103001	103045	8	148		126	85	Hamilton St.	
								93		8
139583	VCP	102992	103078	10	148	S-53-2.13	302	118	Hamilton St.	
								126		8
139663	VCP	102688	102758	8	147		294	11	Hamilton St.	
								16		5
139796	VCP	103189	103186	8	145	S-55-16.1	312	256	Harbor Blvd.	
								284		28
139828	VCP	103166	103167	8	145		318	273	Harbor Blvd.	
								287		14
139854	VCP	103152	103164	8	145		39	20	Victoria St.	
								34		14
								10		
								20		11

DIP EVALUATION

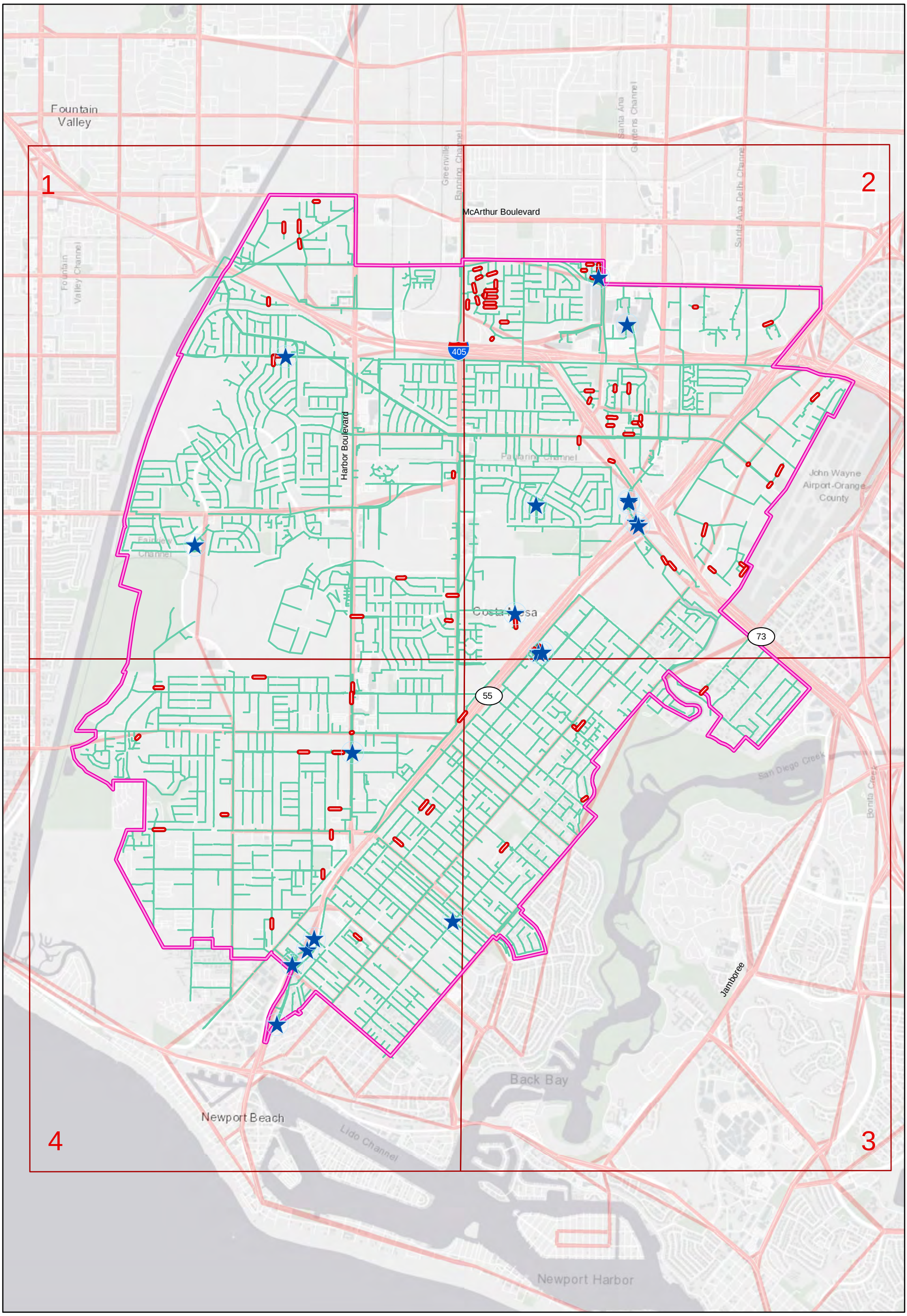
Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
139955	VCP	104306	104347	8	143	S-59-26.1-9	351	190	Newport Blvd.	161
140180	VCP	105057	105042	8	163		44	4	Eucalyptus Ln.	
								49		44
140184	VCP	104995	105016	8	163	S-78-10.7	132	98	Sycamore Ln.	
								108		10
140187	VCP	105027	105017	8	163		61	7	Aspen Ln.	
								48		40
140191	VCP	104974	105003	8	163		106	3	Eucalyptus Ln.	
								22		19
140312	VCP	105356	105330	8	162	S-79-6.1-3	154	76	Campbell Ln.	
								93		17
140313	VCP	105432	105356	8	162		326	146	esmnt.	
								163	n/o Campbell Ln., w/o De Cannes	18
140416	VCP	105442	105410	8	162		154	134	Heather Ln.	20
140713	VCP	103951	103997	8	142	S-72-13.1	287	266	Laurie Ln.	
								272		6
140726	VCP	103882	103945	8	142		333	283	Fullerton Ave.	
								293		10
140749	VCP	103703	103626	8	142		304	4	Costa Mesa St.	
								10		7
140942	VCP	103264	103305	8	140	S-53-2.20	225	68	Sparks St.	
								81		13
141041	PVC	104707	104738	8		S-97-	301	3	esmnt.	
								38	e/o Garden Ln., s/o 21st St.	35
141198	VCP	106240	106237	8	165-B	S-81-6.1-3	335	127	Airway Ave.	

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
								138		10
141200	VCP	106224	106228	8	165-B	S-69-8.8	135	106	Airway Ave.	28
141256	VCP	106221	106234	15	192-B	S-87-5.5	248	134	Anton Blvd.	
								143		9
141291	VCP	105986	105999	10	192-A		84	8	Town Center Dr,	
								31		23
141491	VCP	106041	106016	8		S-99-1.1-4	247	228	Acacia St.	
								237		9
141519	VCP	106280	106285	8	165-C		255	70	esmnt.	
								90	e/o Airway Ave., Airport Loop Dr.	20
141585	VCP	106147	106164	8	165-A		312	207	esmnt.	
								226	e/o Airport Loop, n/o Clinton St.	19
141596	VCP	106046	106061	8	165-A	S-85-2.1	205	47	Clinton St.	
								65		18
								97		
								115		18
150300	VCP	101191	106057	8	165-A		350	5	esmt.	
								16	s/o Bristol St., w/o OCFCF channel	11
149671	VCP	106185	106193	8	165-B		18	309	Baker St.	
								327		18
135540	DI	105423	105447	8	202	S-75-25.12	134	118	Pinebrook Cir.	
								132		14
137989	DI	103715	103667	8	174	S-84-15.1	247	236	Hanover Dr.	
								243		7

DIP EVALUATION

Facility ID	Pipe Material	Upstream Manhole ID	Downstream Manhole ID	Pipe Dia.	Map Page	Source Document	Full Pipe Segment Length	(Distance)	Location of Observation / Observation Made	Length of CCTV'd pipe observed to be DIP
141584	DI	106164	106143	8	165-A	S-78-7.1-4	222	0	e/o Airway Ave.	
								20		20
								202		
								220		18
138686	DI	105884	105894	8	165	S-88-7.1-2	210		siphon at Bristol St.	



Costa Mesa Sanitary District

Ductile Iron Pipe Location Map

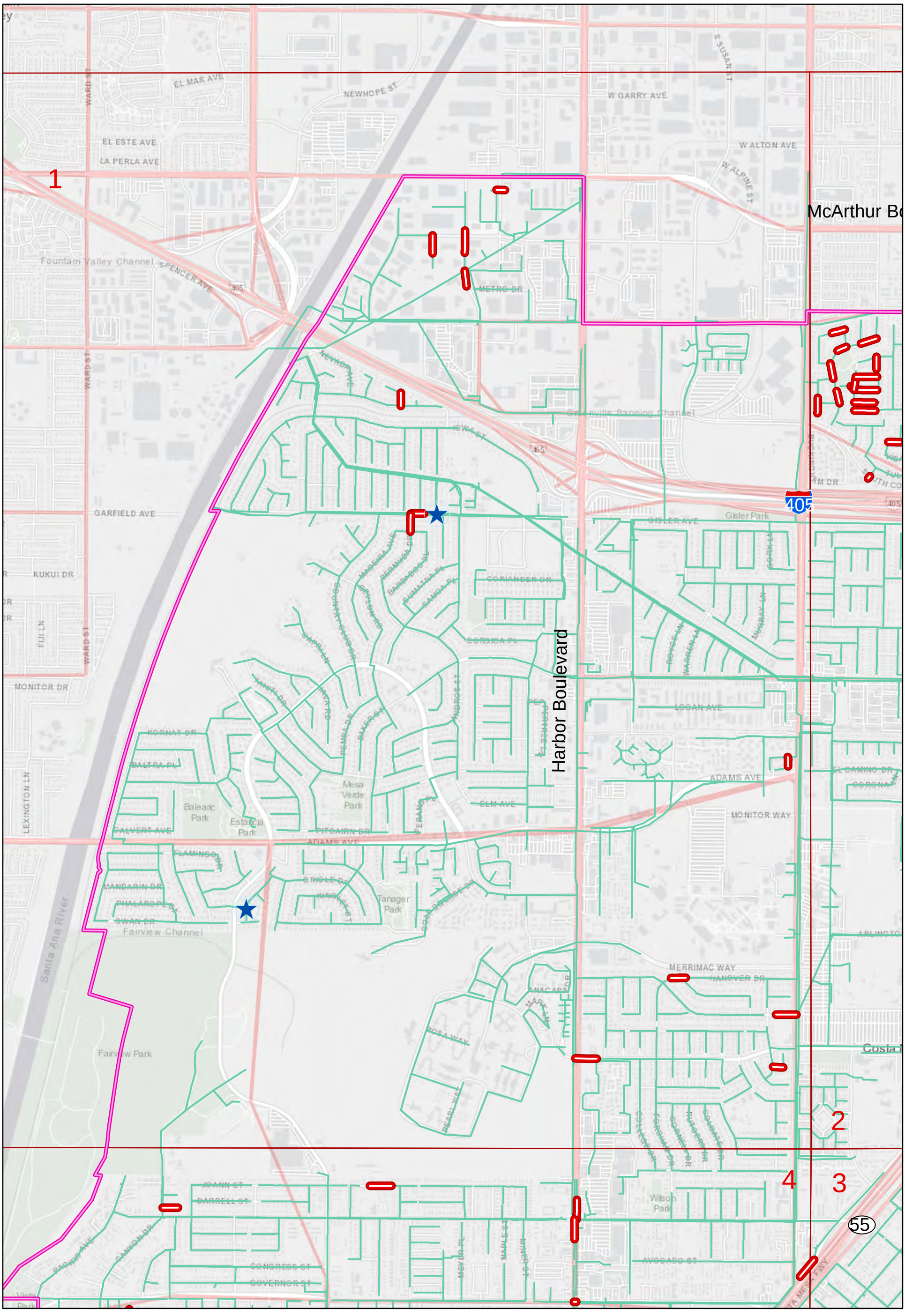
LEGEND

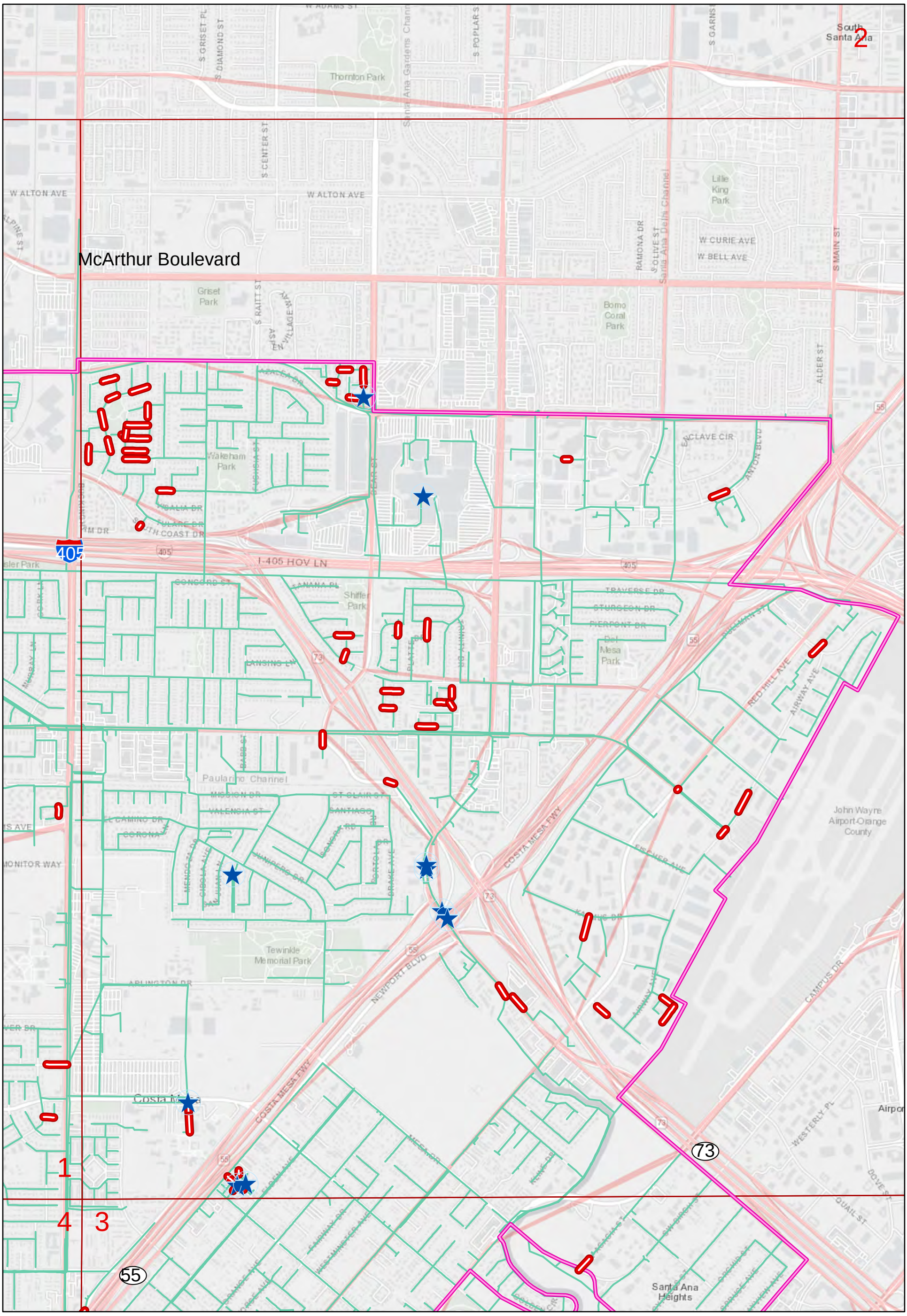
- Costa Mesa Sanitary District (CMSD) Boundary
- CMSD Gravity Mains
- Ductile Iron Pipe (Partial Length)
- Ductile Iron Pipe (Full Length)

N W E S

0 0.3 0.6 1.2

Miles


1
2
3
4
McArthur Bo
Harbor Boulevard
EL MAR AVE
NEWHOPE ST
W GARRY AVE
S SUSAN ST
W ALTON AVE
W ALPINE ST
EL ESTE AVE
LA PERLA AVE
WARD ST
Fountain Valley Channel
SPENCER AVE
405
METRO DR
NEVADA AVE
Costa Mesa Banning Channel
IOWA ST
GARFIELD AVE
KUKUI DR
FIJI LN
MONITOR DR
LEXINGTON LN
CORIANDER DR
CORSICA PL
LOGAN AVE
KORNAT DR
BALTRA PL
CALVERT AVE
Balearic Park
Estancia Park
Mesa Verde Park
PITCAIRN DR
ADAMS AVE
ELM AVE
MONITOR WAY
FLAMINGO DR
MANDARIN DR
PHALAROPE ST
SWAN DR
Fairview Channel
Tanager Park
Fairview Park
Santa Ana River
Gisler Park
GISLER AVE
MERRIMAC WAY
HANOVER DR
ROSA WAY
PEARL WAY
JOANN ST
DARRELL ST
CONGRESS ST
GOVERNOR ST
AVOCADO ST
Wilson Park
55
Costa Mesa Sanitary District
Ductile Iron Pipe Location Map Quadrant I
LEGEND
Costa Mesa Sanitary District (CMSD) Boundary
CMSD Gravity Mains
Ductile Iron Pipe (Partial Length)
Ductile Iron Pipe (Full Length)
N
W
E
S
0
0.125
0.25
0.5
Miles



Costa Mesa Sanitary District

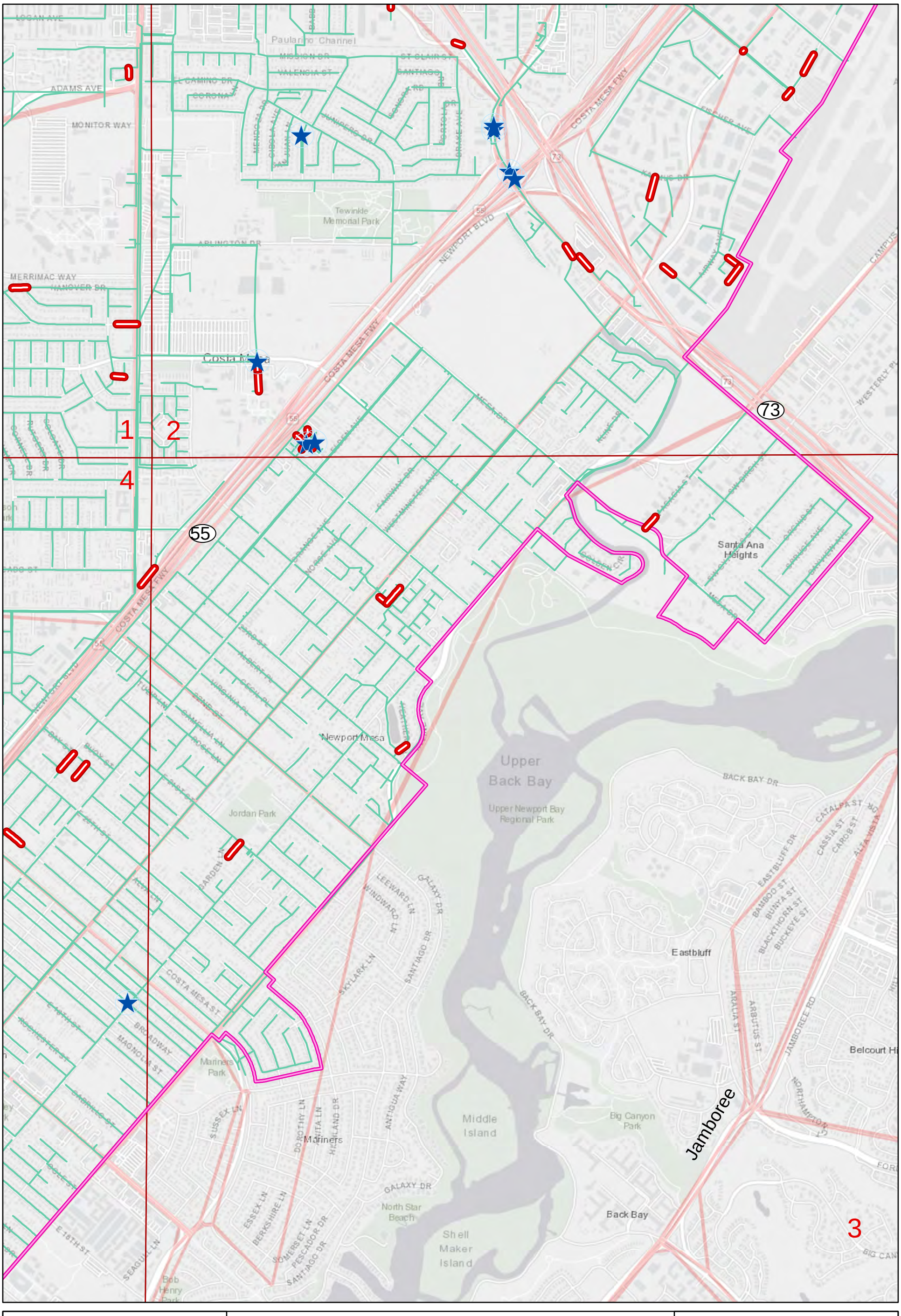
Ductile Iron Pipe
Location Map
Quadrant II

LEGEND

- Costa Mesa Sanitary District (CMSD) Boundary
- CMSD Gravity Mains
- Ductile Iron Pipe (Partial Length)
- Ductile Iron Pipe (Full Length)

N
W E
S

0 0.125 0.25 0.5
Miles



Costa Mesa Sanitary District

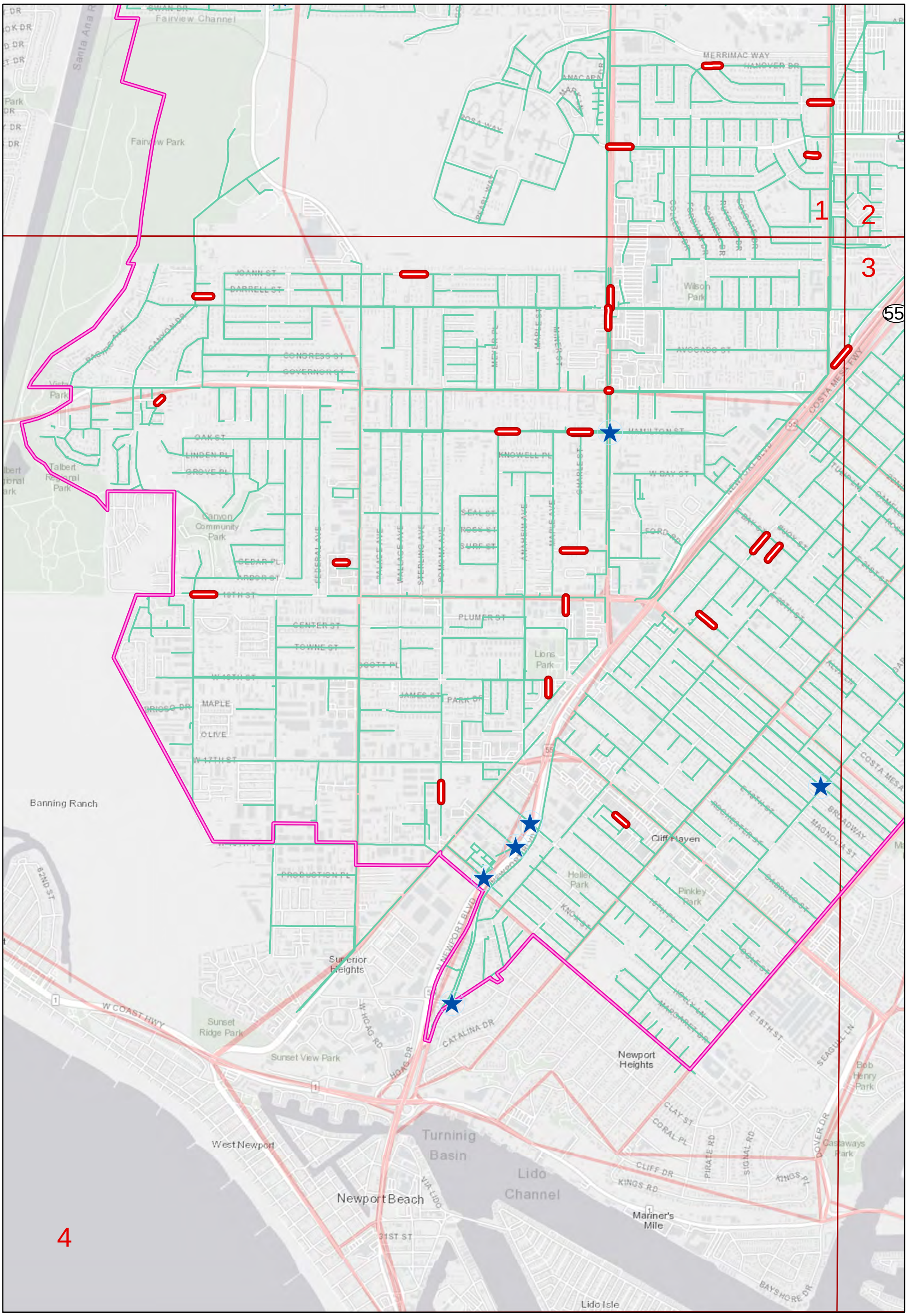
Ductile Iron Pipe
Location Map
Quadrant III

LEGEND

- Costa Mesa Sanitary District (CMSD) Boundary
- CMSD Gravity Mains
- Ductile Iron Pipe (Partial Length)
- Ductile Iron Pipe (Full Length)

N
W E
S

0 0.125 0.25 0.5
Miles



Costa Mesa Sanitary District

Ductile Iron Pipe Location Map Quadrant IV

LEGEND

- Costa Mesa Sanitary District (CMSD) Boundary
- CMSD Gravity Mains
- Ductile Iron Pipe (Partial Length)
- Ductile Iron Pipe (Full Length)

N W E S

0 0.125 0.25 0.5 Miles

Apppendix: H: Project #149 Sinking Fund for Future Sewer Replacement

COSTA MESA SANITARY DISTRICT

Costa Mesa Recycles

DIRECTORS
James Ferryman
Arthur Perry
Arlene Schafer
Dan Worthington
Nate Reade

Sinking Fund for Future Sewer Replacement

Project #149

SERIES REPORT #1
DECEMBER 1998

REGISTERED PROFESSIONAL ENGINEER
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CIVIL
STATE OF CALIFORNIA

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Table of Contents

I. Purpose of Study

The Costa Mesa Sanitary District serves a population of approximately 107,000 people throughout a territory that includes the entire City of Costa Mesa, portions of Newport Beach, and portions of unincorporated areas of Orange County. The major component of the District's sewer facilities is the gravity sewer system that serves each and every residence and business within the District's boundaries.

Current industry thinking places a 100 year life expectancy on the type of gravity sewer system used by the District. Since the District owns a total of 325 miles of sewer lines primarily consisting of gravity sewers, it is prudent to establish a long range plan for sewer rehabilitation and replacement.

This study will focus on the following areas:

- researching the life expectancy of sewers, including southern California and throughout the United States and other parts of the world
- researching other agencies' plans for long term sewer replacements
- charting out the District's sewer system by year of construction
- reviewing the District's current program of televising and maintenance of sewer lines
- investigating and reporting on the various methods of pipeline rehabilitation other than excavate and replace, including slip-lining, insituform, swegelining, link-pipe, etc.
- reviewing the financial implications of establishing an adequate sinking fund
- determining a replacement schedule

II. Overview of District's System

The Sanitary District has a sewer system consisting of 20 pumping stations and 325 miles of sewer lines made up of gravity sewers, pressurized sewers, and manholes. The largest portion of the system are the gravity sewers which are virtually all vitrified clay pipe (VCP). The only instances where a different pipe material was used for a gravity sewer was where structural considerations necessitated a stronger pipe material such as ductile iron pipe be used. This generally occurs where another utility is crossing the sewer line or the sewer is very shallow.

In addition to the gravity sewers, each of the District's 20 pumping stations has a pressurized sewer main (force main) that transmits the sewage uphill to the nearest high point where it can again flow by gravity. The force mains are of various materials with the currently preferred material being ductile iron pipe (DIP). Vitrified clay pipe is not available for force main use. Due to the continuing pressurized flow in the force mains, their life expectancy is much less than VCP gravity sewers. Consequently, force mains and pumping stations are monitored continuously for wear and tear. The rate at which a force main wears out is dependent on a number of factors, the biggest being the type of pipe material and the rate of flow through the pipe. The District has 24,813 feet of force mains ranging from a 4" diameter flowing at 100 gallons per minute to an 18" diameter flowing at 3,500 gallons per minute. Several of the force mains have been replaced due to wear and tear and the majority of the pumping stations have either been rehabilitated or upgraded.

Of the District's 20 pumping stations, the majority are submersible stations with the remainder being wet well-dry well. The District converted most of the older wet well-dry well stations to submersible as they began to deteriorate to standardize them with the newer submersible stations. The standardized submersible stations provide excellent worker safety since the daily maintenance is done at street level rather than underground at the bottom of the station. The standardized station also allows easier compliance with OSHA requirements for work in confined spaces.

The other major component of the system are the 4,522 sewer manholes. Older manholes were constructed of brick until precast concrete manhole sections were developed. Since then, all manholes have been constructed from precast manhole sections. The condition of the manholes is monitored regularly since the cleaning crews use the manholes as access to clean the sewer lines. When manholes need rehabilitation a capital project is proposed and the appropriate work completed.

Since pumping stations, force mains, and manholes are monitored, rehabilitated, repaired, or replaced on a regular basis they are not the focus of this study. Rather, the life expectancy and long term plans for the 320 mile vitrified clay pipe gravity system - the largest asset owned by the District - is considered as the basis for the study.

Attached as Exhibit "A" is a sewer inventory recap showing the year by year quantity of sewer facilities installed in the District.

III. History and Benefits of using Vitrified Clay Pipe (VCP)

Of the many different pipe materials available, vitrified clay pipe stands out as possibly the best choice for use in a gravity sewer system. Vitrified clay pipe is manufactured from clays and shales, natural end products occurring from the weathering of the earth. Clay pipe's most important features are its longevity and its ability to withstand corrosion and abrasion. Vitrified clay is an inert material and therefore naturally resistant to corrosion. Only extreme concentrations of acids at high temperatures - conditions not associated with normal sewer use - will cause any harm.

Clay pipe was used as far back as the Romans who used it for constructing aqueducts and public baths. A number of these pipelines are still in good condition today. In the United States at least 50 cities have vitrified clay pipe lines that are over 150 years old and still in operation. As part of this study, 11 of those municipalities were contacted to ascertain information relating to their experience with clay pipe.

In 1988 the U.S. Army Corps of Engineers published Technical Report GL-88-2, Life Cycle Cost for Drainage Structures. The report made reference to a 1982 National Clay Pipe Institute list of over 50 clay pipe systems which were still functioning after up to 170 years, which support a 150 year service life. However, since most of these systems are just over 100 years old, and in light of the uncertainty in long term land use, the Corps chose to use a design service life of vitrified clay pipe of 100 years. Attached as Exhibit "B" is the reference list of municipalities with extended life VCP sewer systems.

Clay pipe has the following benefits:

- long term life expectancy
- natural resistance to corrosion
- good flow characteristics
- high resistance to abrasion

The District was fortunate to have begun sewer installation in the early to mid 1950's when compression joints - the interlocking of two sewer sections together by the installation of a spigot end pipe into a bell end pipe with a seal - were first introduced. Over the years compression joints have been improved, however, it is still the most reliable joint for clay pipe. Prior to compression jointing, cement mortar or hot-pour compounds were used to seal two sections of plain end pipe. Very few instances of cement mortar or hot-pour joints have been found in the Costa Mesa Sanitary District, and when they are uncovered they are usually replaced with a new joint.

Although there are various other pipe materials available for use in gravity sewers, engineers are very comfortable selecting vitrified clay pipe since it has proven itself at least as good, if not better, than any other material.

IV. Overview of Systems throughout the United States

As part of the study, contacts have been made with cities and agencies where sewer lines have been in service for over 100 years. The list of cities includes Boston, Chicago, Clinton, Dallas, Denver, Henderson, Los Angeles, Philadelphia, Portland, and Washington D.C.

The District is also fortunate to have begun its sewer installation in an era when separate sanitary sewer lines were constructed. The previous era used combined storm water/sanitary sewer lines that captured both sewer flows and storm water flows. The method of treatment consisted of diluting the sewage with storm water then letting this flow into the nearest waterway or ocean. Many municipalities with old sewer installations, such as San Francisco, still have combined sewers. San Francisco is particularly troubled since increased development has caused the sewage flow to match the capacity of the pipe lines, thereby leaving no room for storm water. When rains from even a five-year storm occur, the lines overflow causing a significant health hazard. Since the treatment plants can only handle the sewage flow plus a small amount of rain water, when a large storm occurs the effluent flows untreated into the bay or ocean. Additionally, some of their large older lines are constructed from brick and mortar and frequently fall into disrepair. The city has a backlog of structurally damaged sewers needing immediate attention. Consequently, San Francisco is constantly faced with emergency situations and their focus is trying to upgrade their system to a level where basic health and safety are achieved.

City of Boston
Boston Water & Sewer Commission

The sewer system consists of 1,350 miles of sewer lines (75%-clay pipes, 20%- concrete, 5%-PVC). The sewer lines are televised and repaired during street reconstruction projects. 90% of all pipe problems are related to construction practices. The agency's main goal is to separate sewer and storm drain water. A rehabilitation program includes insituform ($90-100/l.f.) and microtunneling, and to a less degree removal and reconstruction because of prohibitive costs ($200/l.f.).

City of Chicago

The sewer system consists of 4,300 miles of sewer lines. The majority of the sewer system consists of VCP lines less then 24" diameter. The City has televised 200 miles of sewer lines and assumes a 100 year life. The City does not have any special replacement programs.

City of Clinton, Iowa

The population of Clinton is approximately 29,000 people. The sewer system consists of 170 miles of sewer lines and 47 miles of storm drain lines. Although the vitrified clay pipe system was installed as early as 1850 the City has no special programs and repairs the lines on an as-needed basis.

City of Dallas

The sewer system consists of 4,000 miles of sewer lines. The city does have a capital improvement fund but will rely on bonds if the cost of the required improvements exceeds the available funds.

City of Denver

The sewer system consists of 1,500 miles of sewer lines, the major portion of which is 8"clay lines. The city does not have any special long term capital replacement programs.

City of Henderson, NV

The city's sewer system is approximately 50 years old, consisting of 400 miles of sewer lines. The majority of the lines are polyvinyl chloride (PVC), with some reinforced concrete pipe (RCP). The maintenance program includes televising the sewer lines and annual cleaning but no sinking fund.

City of Los Angeles

The sewer system consists of 6,500 miles of sewer lines of which 130 miles are cement pipes. The city regularly uses FEMA funds to replace sewer lines but has no sinking fund.

City of Philadelphia

The sewer system consists of 2,950 miles of sewer lines. The majority of the system consists of brick pipes, however, there are some VCP and RCP lines. The city replaces the sewer lines concurrently with street repair projects.

City of Portland, OR

The majority of the sewer lines are over 100 years old. The system consists of 2,200 miles of lines, the majority of which are concrete pipes. Most of the problems are occurring in old brick pipes (4-8' dia.). The repairs are done based on the results of a televising program. A capital replacement fund is in place and was created based on the average replacement cost for the lines.

City of San Francisco

The sewer system consists of 730 miles of sewer lines, averaging 75 years old. Most of the old lines are clay pipes. The city continues to visually inspect and televise their system as part of their on-going maintenance program. The city has a three year moratorium on cutting through new pavement which necessitates concurrent repair of deteriorating sewers. The city's current replacement program consists of 4 to 6 miles per year. The city allocates approximately $7 million per year for future repair and replacement. Their priorities are providing additional capacity in their combined sewer/storm drain system which cannot handle simultaneous sewer and storm water flows plus repairing a significant amount of structurally damaged sewers. The city uses bonds as a financing method.

City of Washington, DC

The sewer system consists of 2,400 miles of sewer lines the major part being clay pipe. The smaller size lines are mostly clay and the larger size are mostly brick or concrete. The majority of the small size pipes (8"-10" dia.) are in good condition. The city has no special replacement programs nor funds established for this purpose.

V. Ongoing Televising, Maintenance, and Rehabilitation Programs

In 1989 the District began a concentrated effort to step up its regular maintenance and rehabilitation program for the gravity sewer system. Up until that time, the Capital Improvement Program was centered around two other areas: As the older pumping stations began requiring major work they were converted from wet well - dry well to submersible to standardize them with newer stations, and secondly, providing additional sewer capacity in various areas in the District where new or increased development occurred or was expected.

The District has historically cleaned its gravity sewer lines once per year, as is common practice with other agencies and considered the industry standard. However, without the benefit of actually viewing the inside of the sewer lines, no information was available regarding the condition of the system. Therefore, it was decided to begin a televising program where a remote, self propelled, video camera would travel through the lines and televise the interior.

The first portion of the televising program began in 1989 and consisted of four yearly televising projects, each put out to bid, where a total of one million feet of sewer main line was televised. The contractor was required to provide both a written report and a video tape of each line. Included in the written reports was a severity rating schedule where each type of problem such as cracked pipe, missing pipe, light, medium, or heavy roots, cracked joints, offset joints, hole in pipe, collapsed pipe, sags, etc., were given an arbitrary number that reflected how severe the problem was. Another report was then generated for the lines with the highest total severity ratings to identify which lines required immediate attention.

The four yearly televising programs were followed by small yearly programs that provided for rechecking areas and to have a televising contractor on call in the case of an emergency or in the event a homeowner claims the main line, rather than their lateral, was causing a backup.

One of the results of the televising program was to begin a root treatment program. The incidence of roots in the main lines was small compared to the size of the total system, however, enough 'heavy root' areas were found to warrant attention. In addition to root cutting, the District also contracted out a foaming project whereby a root killing agent was flooded into the lines. The agent kills the roots protruding into the main line as well as the roots protruding from a homeowner's lateral into the main line. The District also has a project scheduled to review video tapes in order to notify residents that roots in their laterals can be seen from the main line.

The District's yearly Capital Improvement Program typically includes a small televising project, a joint or main line rehabilitation project, a pump station and/or force main rehabilitation project, and periodically, a manhole rehabilitation project.

VI. Trenchless or "No-Dig" Technology

No-dig technology refers to pipe rehabilitation done without excavating the ground surface to access the pipe line. The rehabilitation is done by inserting into the line through a manhole a liner that will adhere itself to the inside of the pipe essentially creating a pipe within a pipe. Many of the methods are now included in the Standard Specifications for Public Works Construction (Green Book).

The inserted liner bonds itself to the inside pipe wall and can act both structurally and to prevent infiltration and exfiltration. Existing lateral connections to the main line can be re-opened using a robotic cutter and camera.

The cost of using a no-dig method depends on the size and length of the line, the number of existing lateral connections, and the selected no-dig method. The benefits of no-dig begin to outweigh the conventional excavate and replace method when circumstances such as disruption of major traffic patterns, very deep sewers, expensive surface improvements or limited access are present.

The Costa Mesa Sanitary District completed one project where two no-dig methods were bid as alternatives. The cost for the excavate and replace method was the lowest since the line was located in a parkway under the grass strip.

Many local agencies have completed trial no-dig projects along with monitoring and observing no-dig projects in other areas. Agencies faced with high excavation costs readily look to the no-dig alternative.

VII. Financial Considerations

As a financial analysis was being conceptualized, many unanswerable questions arose:

- How long will the existing system last? 100 yrs.?, 150 yrs.?, 200 yrs.?
- When the system does need repair, will it be the joints, the inside pipe wall, the outside pipe wall, or some other component that wears out first?
- How much of the system will need rehabilitating at one time? Consider that 89% of the gravity system was constructed in a 20 year period from 1952-1972.
- What will be the accepted and lowest cost rehabilitation method when the rehabilitation period begins?
- What will be the cost in future dollars to perform the rehabilitation?

Nevertheless, a standard financial analysis has been prepared and attached as Exhibit "C" that attempts to calculate the required yearly deposit needed to establish a sinking fund to accumulate the replacement value of the sewer system assuming a 100 year service life. The table was prepared assuming replacement of the existing sewer mains and without the laterals or manholes. Maintenance of the laterals is the property owner's responsibility.

As can be seen from the financial calculations, a yearly deposit of $1,836,535 would be required to provide full replacement value.

VIII. Necessity for a Sinking Fund

Results of the investigation into the life of vitrfied clay pipe gravity sewers do not provide a definitive life expectancy. Rather, factors such as the original installation methods, type of jointing system used, and monitoring and care of the system, outweigh the life expectancy of the pipe material itself. Since vitrified clay is inert and previous installations show very little signs of wear, the life of the clay pipe may not be the controlling factor.

An example of poor construction methods is evidenced when sections of District line have been found to have continuous cracking, which indicates uneven and improper trench backfill compaction methods. Pipe lines in this condition either have to be replaced through excavation or repaired from inside the line using a no-dig rehabilitation method.

Many of the agencies contacted do not have a dedicated fund for long term sewer rehabilitation. There are generally two schools of thought, the first being a 'pay as you go' plan where problems are fixed as they occur. In the future when large portions of the system need rehabilitation the agency will issue bonds to fund the improvements. Probably because the life expectancy of sewers is long enough that it doesn't present an immediate problem to the public officials during their tenure, there is no urgency in planning for future sewer improvements.

Other agencies believe prudent long term planning includes funding for major infrastructure improvements to avoid large capital costs through special assessments or issuing debt instruments.

When this project was first proposed in 1995-96, a sinking fund with an initial deposit of $100,000 was established. Since then yearly deposits each in the amount of $200,000 have been made for fiscal years 96-97, 97-98, and 98-99 making a total capital deposit of $700,000. The Board of Directors believe that creating a sinking fund is sound fiscal policy and part of their responsibility to the rate payers.

IX. Recommendations

An overall analysis of the system suggests that the following factors play a part in planning for long term sewer service in the District:

- The District's sewer system is approximately 50 years old. The life expectancy of the pipelines is at least 100 years. Therefore, no replacement, other than for damaged pipe, is warranted at this time.
- The District's on-going commitment to proper cleaning, televising, repair of problem areas, and aggressive maintenance will maximize the useful life of the system.
- Establishment of the sinking fund and continued yearly contributions thereto will keep the District in an advantageous position to handle future maintenance or replacement. This is clearly a better position than those municipalities who are taking no action until their system fails and then incurring debt to fund the rehabilitation. Funding of the District's sinking fund has been accomplished without an increase in sewer rates which is attractive to the Board and the rate payers.
- The financial analysis suggests a yearly contribution of $1,836,535, however, this number is unrealistically high and does not account for the strong possibly that a less expensive method of pipe line rehabilitation will be available. Therefore, it is recommended that yearly deposits be made, in amounts that will not cause an increase in sewer rates, until at least $5 million is in the fund. At that time, a review of the fund can be the basis for the next report in this series.
- Rehabilitation of sewer lines from within, known as no-dig or trenchless technology, is quickly evolving with new methods continuously being developed and introduced. In the next 50 years additional significant discoveries may be made that vastly simplify and lower costs for sewer rehabilitation. A District program of continued research, monitoring, and observation of existing and new trenchless technologies will keep the District in position to utilize all possible alternatives for rehabilitation now and in the future.

- Due to the above described dynamics of the situation, rather than making a definitive statement as to what scenario will actually present itself 50 years from now and what ultimate level of funding is needed, a more flexible position that can readily adapt to new developments is warranted. The District's sewer system is in excellent shape, has a lengthy remaining life expectancy, there is an established sinking fund, there is an aggressive yearly maintenance and repair program, all of which give the District the most flexibility when looking forward.
- This report is titled Series Report #1 since for such an ever changing situation future reports at appropriate intervals should be completed that incorporate and analyze new information.
- Therefore, a continuous monitoring, updating, and reporting position is recommended along with deposits into the sinking fund.

COSTA MESA SANITARY DISTRICT
SEWER INVENTORY RECAP 1952-1971

DATE	GRAVITY SEWER-VCP										PRESSURE MAIN								MANHOLE	LAMPHOLE	PUMP STA.	GRAVITY SEWER-DIP								GRAVITY S	TOTAL GRAVITY	TOTAL PRESSURE	TOTAL MILES
	4" VCP	6" VCP	8" VCP	10" VCP	12" VCP	15" VCP	18" VCP	21" VCP	24" VCP	30" VCP	4"	5"	6"	8"	10"	12"	14"	16"	MH	LH	PS	4"	6"	8"	10"	12"	15"	18"	21"	24"				
06/30/52	270	1,065	1,327	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	0	0	0	0	0	0			
	270	1,065	1,327	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	0	0	0	0	0	0	2,662	0	0.55
extra			8500		1000	1000	1300																											
10/53	0	43,890	192,669	16,224	4,222	7,136	331	0	0	0	0	0	0	0	0	0	0	0	617	12	0	0	0	0	0	0	0	0	0	0	0	234,533		
	270	45,015	202,715	16,224	5,222	8,136	1,631	0	0	0	0	0	0	0	0	0	0	0	626	13	0	0	0	0	0	0	0	0	0	0	0	249,215	0	47.20
extra			8500				1300																											
06/30/54	0	6,106	9,844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	1	0	0	0	0	0	0	0	0	0	0	0	15,952		
	270	21,123	221,059	16,224	5,222	8,136	2,931	0	0	0	0	0	0	0	0	0	0	0	668	14	0	0	0	0	0	0	0	0	0	0	0	274,967	0	52.08
extra																																		
06/30/55	0	13,907	40,946	3,436	0	0	0	0	0	0	0	0	0	0	0	0	0	0	183	3	0	0	0	0	0	0	0	0	0	0	0	58,289		
	270	35,030	262,005	19,660	5,222	8,136	2,931	0	0	0	0	0	0	0	0	0	0	0	1,051	17	0	0	0	0	0	0	0	0	0	0	0	333,356	0	63.12
extra			6300		600	600	1700																											
06/30/56	0	36,248	184,271	8,979	4,334	1,760	1,961	0	0	0	0	0	0	30	0	0	0	0	776	26	0	0	0	0	0	0	0	0	0	0	0	239,576		
	270	71,278	452,656	28,639	12,176	10,496	6,613	0	0	0	0	0	0	30	0	0	0	0	1,827	43	0	0	0	0	0	0	0	0	0	0	0	582,132	30	110.28
extra			4250																															
06/30/57	0	23,614	30,155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	12	0	0	0	0	0	0	0	0	0	0	0	53,769		
	270	94,892	487,061	28,639	12,176	10,496	6,613	0	0	0	0	0	0	30	0	0	0	0	1,944	55	0	0	0	0	0	0	0	0	0	0	0	640,151	30	121.25
extra			23616	722	1400	1620	3750																											
06/30/58	0	12,158	48,391	2,503	2,463	0	0	0	0	0	0	0	0	0	0	0	0	0	221	7	0	0	0	0	0	0	0	0	0	0	0	65,535		
	270	107,050	559,068	31,864	16,059	12,116	10,365	0	0	0	0	0	0	30	0	0	0	0	2,165	62	0	0	0	0	0	0	0	0	0	0	0	736,794	30	139.55
extra			10400		576		1840																											
06/30/59	0	34,680	59,230	286	0	0	0	0	0	0	165	0	0	0	0	0	0	0	231	10	2	0	0	0	0	0	0	0	0	0	0	90,196		
	270	141,730	624,696	32,150	16,637	12,116	12,205	0	0	0	165	0	0	30	0	0	0	0	2,396	72	2	0	0	0	0	0	0	0	0	0	0	839,909	195	159.09
06/30/60	0	30,080	43,148	0	0	0	0	0	0	0	0	0	1,101	0	0	0	0	0	186	9	1	0	0	0	0	0	0	0	0	0	0	73,228		
	270	171,810	667,844	32,150	16,637	12,116	12,205	0	0	0	165	0	1,101	30	0	0	0	0	2,582	81	2	0	0	0	0	0	0	0	0	0	0	913,036	1,356	173.18
06/30/61	0	32,581	49,402	160	0	0	60	0	0	0	0	0	0	0	0	0	0	0	203	12	0	0	0	0	0	0	0	0	0	0	0	82,203		
	270	204,391	717,248	32,310	16,637	12,116	12,265	0	0	0	165	0	1,101	30	0	0	0	0	2,785	93	2	0	0	0	0	0	0	0	0	0	0	995,239	1,356	186.75
06/30/62	0	32,585	39,976	801	0	4,038	0	0	0	0	0	0	0	0	0	0	0	0	169	5	0	0	0	0	0	0	0	0	0	0	0	77,400		
	270	236,976	757,224	33,111	16,637	16,156	12,265	0	0	0	165	0	1,101	30	0	0	0	0	2,954	98	2	0	0	0	0	0	0	0	0	0	0	1,072,639	1,356	203.41
06/30/63	0	19,896	25,602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124	1	0	0	0	0	4,325	19	0	0	0	0	0	46,839		
	270	253,872	782,826	33,111	16,637	16,156	12,265	0	0	0	165	0	1,101	30	0	0	0	0	3,078	99	2	0	0	0	4,325	19	0	0	0	0	0	1,119,478	1,356	212.28
06/30/64	447	7,013	10,114	1,308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	8	0	0	0	0	0	120	0	0	0	0	0	19,002		
	717	260,885	792,940	34,419	16,637	16,156	12,265	0	0	0	165	0	1,101	30	0	0	0	0	3,130	106	2	0	0	0	4,325	139	0	0	0	0	0	1,138,480	1,356	215.88
06/30/65	0	10,569	22,725	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	97	17	0	0	0	0	0	0	0	0	0	0	0	33,348		
	717	271,454	815,665	34,419	16,689	16,156	12,265	0	0	0	165	0	1,101	30	0	0	0	0	3,227	123	2	0	0	0	4,325	139	0	0	0	0	0	1,171,826	1,356	222.19
06/30/66	0	807	3,714	0	1,729	944	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	9,294		
	717	272,261	821,379	34,419	18,418	17,100	12,265	0	0	0	165	0	1,101	30	0	0	0	0	3,254	123	2	0	0	0	4,325	139	0	0	0	0	0	1,181,110	1,356	223.95
06/30/67	210	8,500	9,822	1,640	0	2,281	0	0	0	0	0	0	1,096	0	0	0	0	0	58	3	0	0	0	0	0	0	0	0	0	0	0	22,553		
	927	280,851	831,201	36,059	18,418	19,481	12,265	0	0	0	165	0	2,247	30	0	0	0	0	3,312	126	2	0	0	0	4,325	139	0	0	0	0	0	1,203,663	2,442	228.43
06/30/68	0	4,309	4,902	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	1	0	0	0	0	0	0	0	0	0	0	0	9,211		
	927	285,160	836,103	36,059	18,418	19,481	12,265	0	0	0	165	0	2,247	30	0	0	0	0	3,333	127	2	0	0	0	4,325	139	0	0	0	0	0	1,212,874	2,442	230.17
69	0	10,820	16,633	700	30	2,217	1,700	0	1,892	0	0	0	61	0	490	26	0	0	106	0	1	0	0	0	0	0	0	0	0	0	0	33,712		
	927	293,980	852,736	36,759	18,448	21,698	13,965	0	1,892	0	165	0	2,308	30	490	26	0	0	3,441	131	4	0	0	0	4,325	139	0	0	0	0	0	1,246,586	3,019	236.67
06/30/70	0	4,002	9,182	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	41	3	1	0	0	0	0	0	0	0	0	0	0	13,184		
	927	299,982	861,918	36,759	18,448	21,698	13,965	0	1,892	0	199	0	2,308	30	490	26	0	0	3,482	134	5	0	0	0	4,325	139	0	0	0	0	0	1,259,770	3,053	239.17
06/30/71	0	5,890	19,251	33	830	17	170	0	0	0	0	0	0	1,872	0	0	0	0	64	36	0	0	0	0	0	318	0	0	0	0	0	0		
	927	305,572	877,169	36,792	19,278	21,715	14,135	0	1,892	0	199	0	2,308	1,902	490	26	0	0	3,546	170	5	0	0	0	4,325	454	0	0	0	0	0	1,282,299	4,925	243.79

COSTA MESA SANITARY DISTRICT
SEWER INVENTORY RECAP 1972-1998

DATE	GRAVITY SEWER-VCP										PRESSURE MAIN								MANHOLES	LAMPHOLE	PUMP STA.	GRAVITY SEWER-DIP									GRAVITY S	TOTAL GRAVITY	TOTAL PRESSURE	TOTAL MILES
	4" VCP	6" VCP	8" VCP	10" VCP	12" VCP	15" VCP	18" VCP	21" VCP	24" VCP	30" VCP	4"	5"	6"	8"	10"	12"	14"	16"	MH	LH	PS	4"	6"	8"	10"	12"	15"	18"	21"	24"	8" PVC			
06/30/71		508,348	877,189	36,792	19,318	21,715	14,135		1,893		880		4,017	3,629	490	3,165			3,709	59	15											1,479,365	14,191	282.87
06/		9,195	12,974	2,649	1,340	0	0		0		851		0	0	0	0			75	1	2											1,505,565	13,042	287.99
		517,543	890,163	39,461	20,658	21,715	14,135		1,893		1,731		4,017	3,629	490	3,165			3,784	60	17													
3		9,626	17,059	18	0	1,894	0		0		0		0	0	0	0			86	3	0											1,534,162	13,042	293.41
		527,169	907,222	39,479	20,658	23,609	14,135		1,893		1,731		4,017	3,629	490	3,165			3,870	63	17													
06/30/74		7,181	10,175	0	2,539	0	0		0		0		0	0	0	0			56	5	0											1,554,057	13,042	297.18
		534,350	917,397	39,479	23,197	23,609	14,135		1,893		1,731		4,017	3,629	490	3,185			3,926	68	17													
06/30/75		3,415	13,060	2,006	2,835	0	10		0		218		0	0	0	(1,035)	2,884	3,243	151	4	1											1,575,384	20,352	302.22
		537,765	930,437	41,485	26,032	23,609	14,145		1,893		1,949		4,017	3,629	490	2,150	2,884	3,243	4,079	72	18													
06/30/76		1,066	8,112	1,432	853	1,505	0		0		0		0	1,965	0	0	0	0	52	1	0											1,588,354	22,317	303.05
		538,830	938,549	42,917	26,885	25,114	14,145		1,893		1,949		4,017	7,604	490	2,150	2,884	3,243	4,131	73	18													
06/30/77	271	3,442	9,957	0	0	0	0		0		0		0	0	0	0	90	0	57	0	0											1,604,024	22,407	306.04
	271	544,273	948,506	42,917	26,885	25,114	14,145		1,893		1,949		4,017	7,604	490	2,150	2,974	3,243	4,188	73	18													
06/30/78	0	2,446	4,030	0	0	0	0		0		0	300	0	0	0	292	0	0	34	0	1		140						30			1,610,671	22,999	309.41
	271	546,721	952,536	42,917	26,885	25,114	14,145		1,893		1,949	300	4,017	7,604	490	2,422	2,974	3,243	4,222	73	19		140						30					
06/30/79	756	6,146	15,628	319	2,998	1,662	0		0		0	0	0	0	0	0	0	0	106	0	0		249	546	20	91			0			1,639,288	22,999	314.83
	1,029	552,867	968,164	43,436	29,883	26,776	14,145		1,893		1,949	300	4,017	7,604	490	2,422	2,974	3,243	4,328	73	19		389	546	20	91			30					
06/30/80	0	3,218	5,049	0	0	0	0		0		0	0	0	0	0	61	0	0	44	0	1		410	774	0	0			0			1,646,740	23,049	316.63
	1,029	556,085	973,213	43,436	29,883	26,776	14,145		1,893		1,949	300	4,017	7,604	490	2,483	2,974	3,243	4,372	73	20		799	1,320	20	91			30					
06/30/81	0	72	1,405	0	1,930	0	1,847	2,861	0		0	0	0	0	0	0	0	0	30	0	0	1,146	151	180	0	0			0			1,638,332	23,049	318.45
	1,029	556,157	974,618	43,436	31,833	26,776	15,992	2,861	1,893		1,949	300	4,017	7,604	490	2,483	2,974	3,243	4,402	73	20	1,146	950	1,500	20	91			30					
06/30/82	0	900	8,621	0	29	0	0	0	0		0	0	0	0	0	0	0	0	39	0	0	0	5	30	0	0			0			1,667,937	23,049	320.26
	1,029	557,057	983,239	43,436	31,862	26,776	15,992	2,861	1,893		1,949	300	4,017	7,604	490	2,483	2,974	3,243	4,444	73	20	1,146	955	1,530	20	91			30					
06/30/83	0	105	(295)	0	(16)	96	0	0	0		0	0	0	0	49	0	0	0	1	(1)	0	0	0	19	0	0			0	8		1,667,847	23,069	320.25
	1,029	557,162	982,944	43,436	31,846	26,874	15,992	2,861	1,893		1,949	300	4,017	7,604	539	2,483	2,974	3,243	4,445	72	20	1,146	955	1,549	20	91			30	8				
06/30/84	0	1,785	(11,897)	417	(1,950)	0	0	322	0		30	0	0	0	0	0	0	0	(42)	0	0	0	0	1,081	10	0			0	0		1,657,615	23,139	318.32
	1,029	558,947	971,047	43,853	29,896	26,874	15,992	3,183	1,893		1,999	300	4,017	7,604	539	2,483	2,974	3,243	4,403	72	20	1,146	955	2,621	30	91			30	8				
06/30/85	0	600	1,261	427	1,043	2,116	796	1,302	657	59	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0			0	8	13	30	1,665,921	23,139	319.90
	1,029	559,547	972,308	44,280	30,939	28,990	16,790	4,485	2,550	59	1,999	300	4,017	7,604	539	2,483	2,974	3,243	4,437	72	20	1,146	955	2,621	30	91			30	8	13	30			
06/30/86	0	1,160	(636)	1,464	0	(41)	517	1,085	0	0	0	0	0	0	0	0	0	0	13	0	0	0	179	181	0	4			0	8	13	30	1,669,834	23,139	320.64
	1,029	560,707	971,672	45,744	30,939	28,949	17,307	5,570	2,550	59	1,999	300	4,017	7,604	539	2,483	2,974	3,243	4,450	72	20	1,146	1,134	2,802	30	95			30	8	13	30			
06/30/87	0	555	(322)	9	46	0	1,810	653	0	0	0	0	40	0	0	0	0	0	11	0	1	0	(81)	439	0	0			0	8	13	30	1,672,564	23,179	321.16
	1,029	561,262	971,350	45,753	30,985	28,948	18,917	6,223	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,461	72	21	1,146	1,053	3,241	30	95			30	8	13	30			
06/30/88	0	(20)	(317)	0	(1,731)	82	14	3,159	0	0	0	0	0	0	0	0	0	0	7	0	0	0	(109)	580	0	0	20		0	8	13	30	1,674,242	23,179	321.48
	1,029	561,242	970,833	45,753	29,254	29,031	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,468	72	21	1,146	944	3,841	30	95	20		30	8	13	30			
06/30/89	0	1,125	803	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	20		0	8	13	30	1,676,170	23,179	321.85
	1,029	562,367	971,636	45,753	29,254	29,031	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,470	72	21	1,146	944	3,841	30	95	20		30	8	13	30			
06/3	0	(4)	(1,351)	1,852	0	2,506	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	(66)	72	0	0		0	8	13	30	1,678,981	23,179	322.38
	1,029	562,363	970,285	47,605	29,254	31,539	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,483	72	21	1,146	944	3,775	102	95	20		30	8	13	30			
	0	(154)	(1,079)	(568)	60	16	0	0	0	0	0	0	0	0	0	0	0	0	(3)	(1)	1	0	0	0	420	0	0		0	8	13	30	1,677,707	23,179	322.14
	1,029	562,209	969,206	46,837	29,314	31,555	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,476	71	22	1,146	944	3,775	522	95	20		30	8	13	30			
06/30/92	0	200	2,117	0	3,252	116	0	0	0	0	0	0	0	0	0	0	0	0	22	0	(1)	0	0	0	0	0	0		0	0	0	0	1,683,391	23,179	323.21
	1,029	562,409	971,323	46,837	32,566	31,671	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,498	71	21	1,146	944	3,775	522	95	20		30	8	13	30			
06/30/93	0	120	(1,576)	0	0	676	0	0	0	0	0	0	0	0	0	0	0	0	(3)	0	0	0	0	0	0	0	0		0	0	0	0	1,682,811	23,179	323.10
	1,029	562,529	969,747	46,837	32,566	32,547	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	3,243	4,493	71	21	1,146	944	3,775	522	95	20		30	8	13	30			
06/30/94	0	130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,125	0	0	0	0	0	0	0	0	0		0	0	0	0	1,682,961	24,304	323.35
	1,029	562,679	969,747	46,837	32,566	32,547	18,931	9,382	2,550	59	1,999	300	4,057	7,604	539	2,483	2,974	4,368	4,493	71	21	1,146	944	3,775	522	95	20		30	8	13	30			
06/30/95	0	150	(818)	880	0	0	76	0	46	0	0	0	0	0	0	0	0	1,020	4	0	0	0	0	0	0	0	0		0	0	0	0	1,683,290	25,397	323.62
	1,029	562,829	968,929	47,717	32,566	32,547	19,007	9,382	2,596	59	1,999	300	4,057	7,604	539	2,483	2,974	5,481	4,497	71	21	1,146	944	3,775	522	95	20		30	8	13	30			
06/30/96	0	1,850	3,043	0	0	1,813	0	0	0	0	(564)	0	0	0	0	0	0	0	24	0	(1)	0	200	0	0	0	0		0	0	0	0	1,690,200	24,813	324.81
	1,029	564,679	971,972	47,717	32,566	34,360	19,007	9,382	2,596	59	1,415	300	4,057	7,604	539	2,483	2,974	5,481	4,521	71	20	1,146	1,144	3,775	522	95	20		30	8	13	30			
06/30/97	0	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	1,690,290	24,813	324.83
	1,029	564,769	971,972	47,717	32,566	34,360	19,007	9,382	2,596	59	1,415	300	4,057	7,604	539	2,483	2,974	5,481	4,521	71	20	1,146	1,144	3,775	522	95	20		30	8	13	30			
06/30/98	0	0	(216)	216	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		0	0	0	0	1,690,298	24,813	324.83
	1,029	564,769	971,756	47,933	32,604	34,360	19,007	9,382	2,596	59	1,415	300	4,057	7,604	539	2,483	2,974	5,481	4,522	71	20	1,146	1,144	3,775	522	95	20		30	8	13	30			

EXHIBIT B

Old Clay Pipe Installations Still in Service*

	City	Date Installed		City	Date Installed
1.	Washington, DC.	1815	27.	Baltimore, Md.	1875
2.	Philadelphia, Pa.	1829	28.	Portland, Maine	1875
3.	Boston, Mass.	1829	29.	San Francisco, Calif.	1876
4.	Sydney, N.S. Wales	1832	30.	Jacksonville, Fla.	1876
5.	Manchester, England	1845	31.	Albany, Ga.	1876
6.	Liverpool, England	1846	32.	St. Joseph, Mo.	1876
7.	London, England	1848	33.	Davenport, Iowa	1877
8.	Clinton, Iowa	1850	34.	Kansas City, Mo.	1877
9.	Edinburgh, Scotland	1850	35.	New Bedford, Mass.	1877
10.	Rigby, England	1851	36.	Bucyrus, Ohio	1877
11.	Croydon, England	1851	37.	Omaha, Nebr.	1878
12.	Darlington, England	1852	38.	Camden, N.J.	1879
13.	Chicago, Ill.	1856	39.	Memphis, Tenn.	1879
14.	Cleveland, Ohio	1861	40.	Parkersburg, W. Va.	1879
15.	New York, N.Y.	1866	41.	Providence, R.I.	1879
16.	Erie, Pa.	1868	42.	Nashville, Tenn.	1879
17.	Grand Rapids, Mich.	1869	43.	Rome, Ga.	1880
18.	St. Louis, Mo.	1869	44.	Rockford, Ill.	1880
19.	Hartford, Conn.	1870	45.	Terre Haute, Ind.	1880
20.	Indianapolis, Ind.	1872	46.	Sioux City, Iowa	1880
21.	Los Angeles, Calif.	1873	47.	Red Wing, Minn.	1880
22.	New Haven, Conn.	1873	48.	Reno, Nev.	1880
23.	St. Paul, Minn.	1873	49.	Fargo, N. Dak.	1880
24.	Portland, Oreg.	1873	50.	Dallas, Tex.	1880
25.	Raleigh, N.C.	1873	51.	Denver, Colo.	1880
26.	Lawrence, Kans.	1874			

* From National Clay Pipe Institute 1982.

EXHIBIT 'C'

SINKING FUND CALCULATION TABLE

Table assumes today's replacement values are needed in full, as increased by the annual inflation rate, at the time the sewer reaches its life expectancy. Depreciation is not included. Negative values indicate sewer lines were removed from service. Deposits are assumed to receive 5% interest per year.

Assumptions:

Annual Inflation Rate = 3%
Annual Interest Rate = 5%
Life Expectancy = 100 years.

Annual deposit calculated assuming today's replacement values are as follows:

8" VCP - $100/l.f.	18" VCP - $170/l.f.
10" VCP - $110/l.f.	21" VCP - $200/l.f.
12" VCP - $120/l.f.	24" VCP - $220/l.f.
15" VCP - $140/l.f.	30" VCP - $260/l.f.

Annual deposit calculated using standard compound amount formula and sinking fund formula

A= P*i * (1+j) ^n / ((1+i)^n-1),

where A -annual deposit, P -present cost of replacement, j -inflation rate, i - interest rate, n- years before replacement needed.

Results of table show annual contribution to sinking fund under this assumption to be:

$1,681,551+$154,984=$1,836,535 per year

EXHIBIT 'C'

SINKING FUND TABLE - ANNUAL DEPOSITS BEGINNING 1999
FOR SEWER INSTALLED IN 1952-1971

	8" VCP	10" VCP	12" VCP	15" VCP	18" VCP	21" VCP	24" VCP	30" VCP	TOTAL
PRICE/L.	100	110	120	140	170	200	220	260	
1952	$2,912	$0	$0	$0	$0	$0	$0	$0	$2,912
1953	$374,925	$33,258	$11,678	$21,232	$5,167	$0	$0	$0	$446,259
1954	$33,417	$0	$0	$0	$4,026	$0	$0	$0	$37,443
1955	$72,929	$6,732	$0	$0	$0	$0	$0	$0	$79,661
1956	$332,055	$17,202	$14,534	$5,755	$10,908	$0	$0	$0	$380,454
1957	$58,606	$0	$0	$0	$0	$0	$0	$0	$58,606
1958	$119,982	$5,911	$7,764	$3,779	$10,622	$0	$0	$0	$148,059
1959	$106,985	$513	$1,131	$0	$5,099	$0	$0	$0	$113,728
1960	$68,821	$0	$0	$0	$0	$0	$0	$0	$68,821
1961	$77,108	$275	$0	$0	$159	$0	$0	$0	$77,542
1962	$61,066	$1,346	$0	$8,636	$0	$0	$0	$0	$71,047
1963	$38,280	$0	$0	$0	$0	$0	$0	$0	$38,280
1964	$14,803	$2,106	$0	$0	$0	$0	$0	$0	$16,909
1965	$32,563	$0	$89	$0	$0	$0	$0	$0	$32,653
1966	$8,017	$0	$2,911	$1,854	$0	$0	$0	$0	$12,782
1967	$13,494	$2,478	$0	$4,579	$0	$0	$0	$0	$20,551
1968	$6,595	$0	$0	$0	$0	$0	$0	$0	$6,595
1969	$21,916	$1,015	$79	$4,090	$3,808	$0	$5,484	$0	$36,391
1970	$11,850	$0	$0	$0	$0	$0	$0	$0	$11,850
1971	$19,279	$46	$1,289	$30	$365	$0	$0	$0	$21,009
TOTAL									$1,681,551

EXHIBIT 'C'
SINKING FUND TABLE-ANNUAL DEPOSITS BEGINNING 1999
FOR SEWER INSTALLED IN 1972-1998

PRICE/L.	8" VCP 100	10" VCP 110	12" VCP 120	15" VCP 140	18" VCP 170	21" VCP 200	24" VCP 220	30" VCP 260	TOTAL
1972	$16,066	$3,305	$1,659	$0	$0	$0	$0	$0	$21,030
1973	$20,694	$22	$0	$2,298	$0	$0	$0	$0	$23,014
1974	$12,093	$0	$3,018	$0	$0	$0	$0	$0	$15,110
1975	$15,208	$2,336	$3,301	$0	$12	$0	$0	$0	$20,857
1976	$9,256	$1,634	$973	$1,717	$0	$0	$0	$0	$13,580
1977	$11,132	$0	$0	$0	$0	$0	$0	$0	$11,132
1978	$4,415	$0	$0	$0	$0	$0	$0	$0	$4,415
1979	$16,780	$557	$3,219	$1,784	$0	$0	$0	$0	$22,340
1980	$5,313	$0	$0	$0	$0	$0	$0	$0	$5,313
1981	$1,449	$0	$2,011	$0	$1,905	$2,951	$0	$0	$8,315
1982	$8,714	$0	$29	$0	$0	$0	$0	$0	$8,743
1983	($292)	$0	($16)	$97	$0	$0	$0	$0	($211)
1984	($11,554)	$405	($1,894)	$0	$0	$313	$0	$0	($12,73
1985	$1,200	$406	$993	$2,014	$760	$1,239	$625	$56	$7,29
1986	($593)	$1,366	$0	($38)	$482	$1,012	$0	$0	$2,229
1987	($478)	$8	$42	$0	$1,473	$597	$0	$0	$1,643
1988	($284)	$0	($1,552)	$74	$13	$2,833	$0	$0	$1,082
1989	$706	$0	$0	$0	$0	$0	$0	$0	$706
1990	($1,165)	$1,424	$0	$2,162	$0	$0	$0	$0	$2,421
1991	($912)	($480)	$76	$14	$0	$0	$0	$0	($1,302)
1992	$1,754	$0	$2,694	$96	$0	$0	$0	$0	$4,545
1993	($1,280)	$0	$0	$712	$0	$0	$0	$0	($569)
1994	$0	$0	$0	$0	$0	$0	$0	$0	$0
1995	($639)	$687	$0	$0	$59	$0	$36	$0	$144
1996	$2,330	$0	$0	$1,388	$0	$0	$0	$0	$3,719
1997	$0	$0	$0	$0	$0	$0	$0	$0	$0
1998	($159)	$159	$6	$0	$0	$0	$0	$0	$6
TOTAL	$107,748	$10,984	$11,860	$10,121	$4,644	$8,946	$625	$56	$154,984

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Service Area: 200

137692

Mendoza Dr.
Pump Station 1

137693

Service Area: 201

Elden Ave.
Pump Station 10

Mendoza Dr
Babb St
Milbrot St
Post Rd
Fairview Rd
Monterey Ave
Adams Ave
Salvador St
Monitor Way
Mission Dr
Valencia St
El Camino Dr
La Salle Ave
Sonora Rd
Magellan St
Juniper Dr
Coronado Dr
Lorenzo Ave
Cibola Ave
De Soto Ave
Presidio Dr
Presidio Sq
Saint Clair St
Santiago Rd
Loreto Ave
Portola Dr
Drake Ave
Cortez St
Bear St
Baker St
Randolph Ave
Bristol St
State Hwy 73
Joaquin Hills Transit Corridor
Paularino Channel
Costa Mesa High School
Twinkle Memorial Park
Arlington Dr
Fair Dr
Hanover Dr
Columbia Dr
Fairgrounds
Mesa Dr
Newport Blvd
State Hwy 55
Costa Mesa Fwy
Santa Ana Country Club
Star West Inn & Suites Western US-Costa Mesa
Civic Center Park
Pizza Hut
Stater Bros
Pep Boys The Lab
The Gypsy Den
Costa Mesa

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
200	137692	HDR	2.04
201	137693	F	69.83
		GC	0.01
		HDR	15.35
		LDR	135.85
		MDR	7.04
		NC	0.67
		PI	72.59

Costa Mesa Sanitary District

Pump Station Map
Mendoza Pump Station (#1)

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
202	149523	LDR	7.75
203	137040	LDR	41.66

Costa Mesa Sanitary District

Pump Station Map
Gisler Ave Pump Station (# 2)

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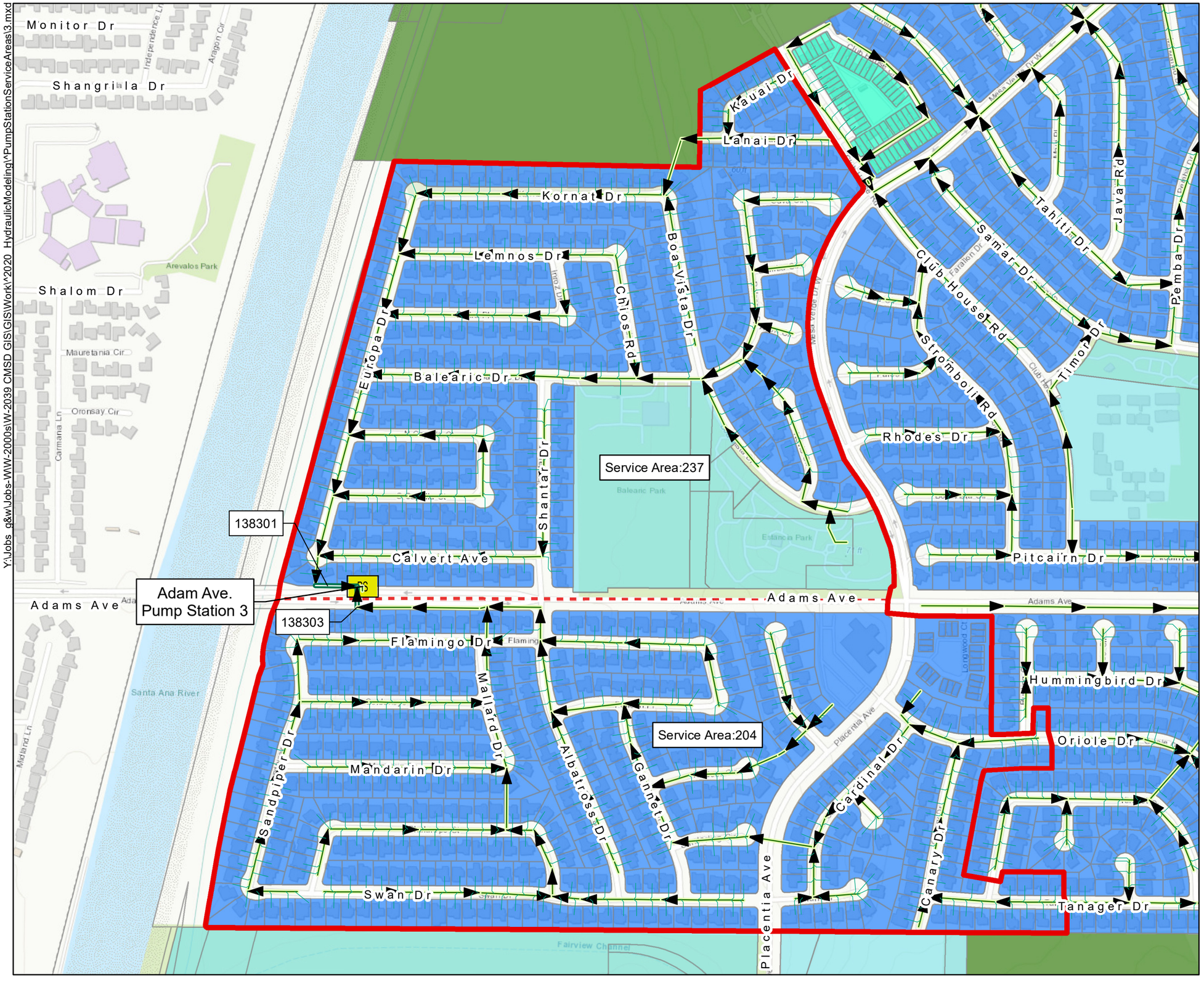

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
204	138303	LDR	76.89
		PI	0.0035
237	138301	LDR	55.95
		PI	19.29

Costa Mesa Sanitary District

Pump Station Map
Adam Ave. Pump Station (# 3)

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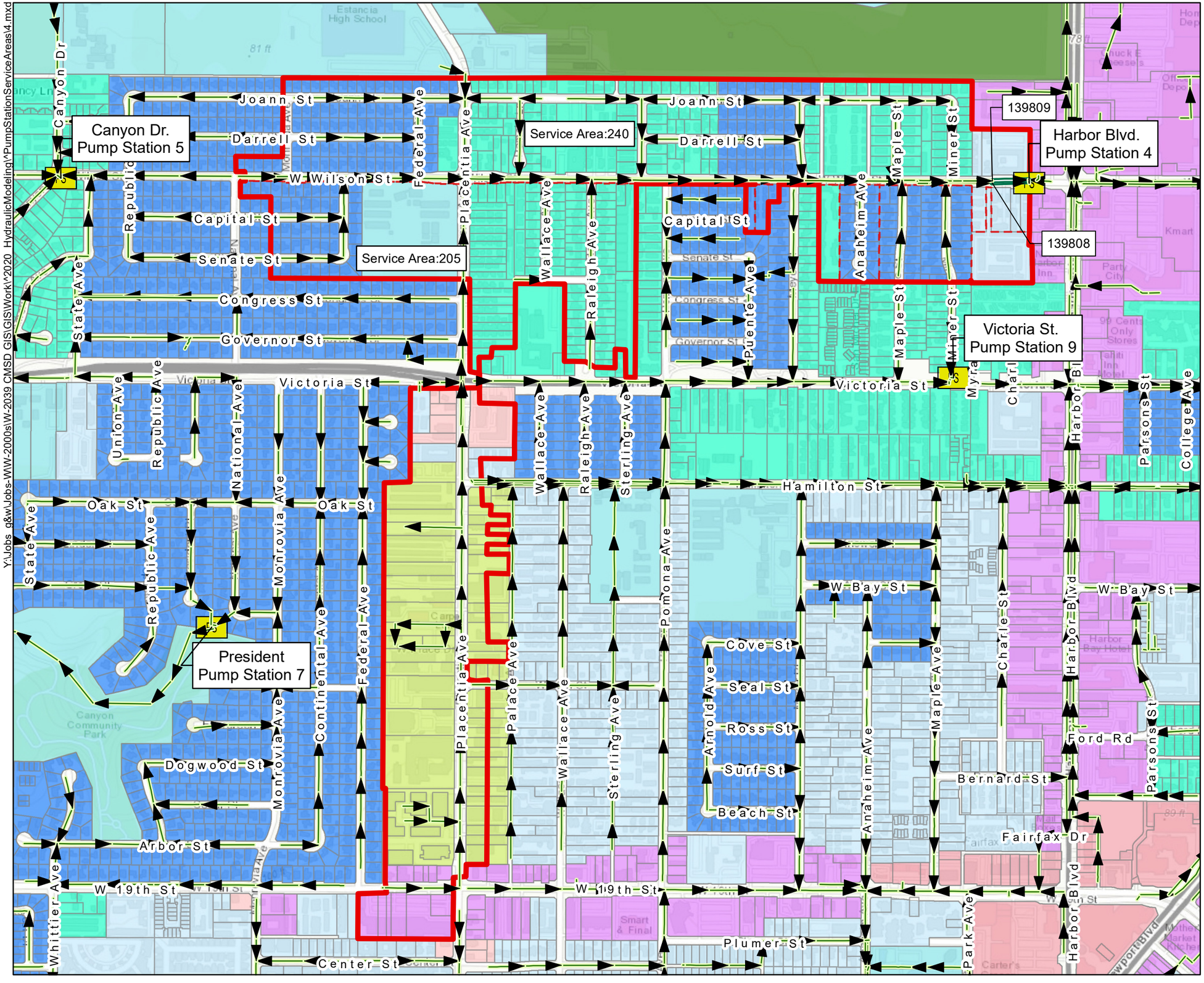

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
205	139808	GC	5.19
		HDR	5.62
		LDR	10.40
		LI	35.24
		MDR	21.93
		NC	3.69
		PI	8.90
240	139809	GC	0.02
		HDR	4.85
		LDR	25.81
		MDR	33.36

Costa Mesa Sanitary District

Pump Station Map
Harbor Blvd, Pump Station (# 4)

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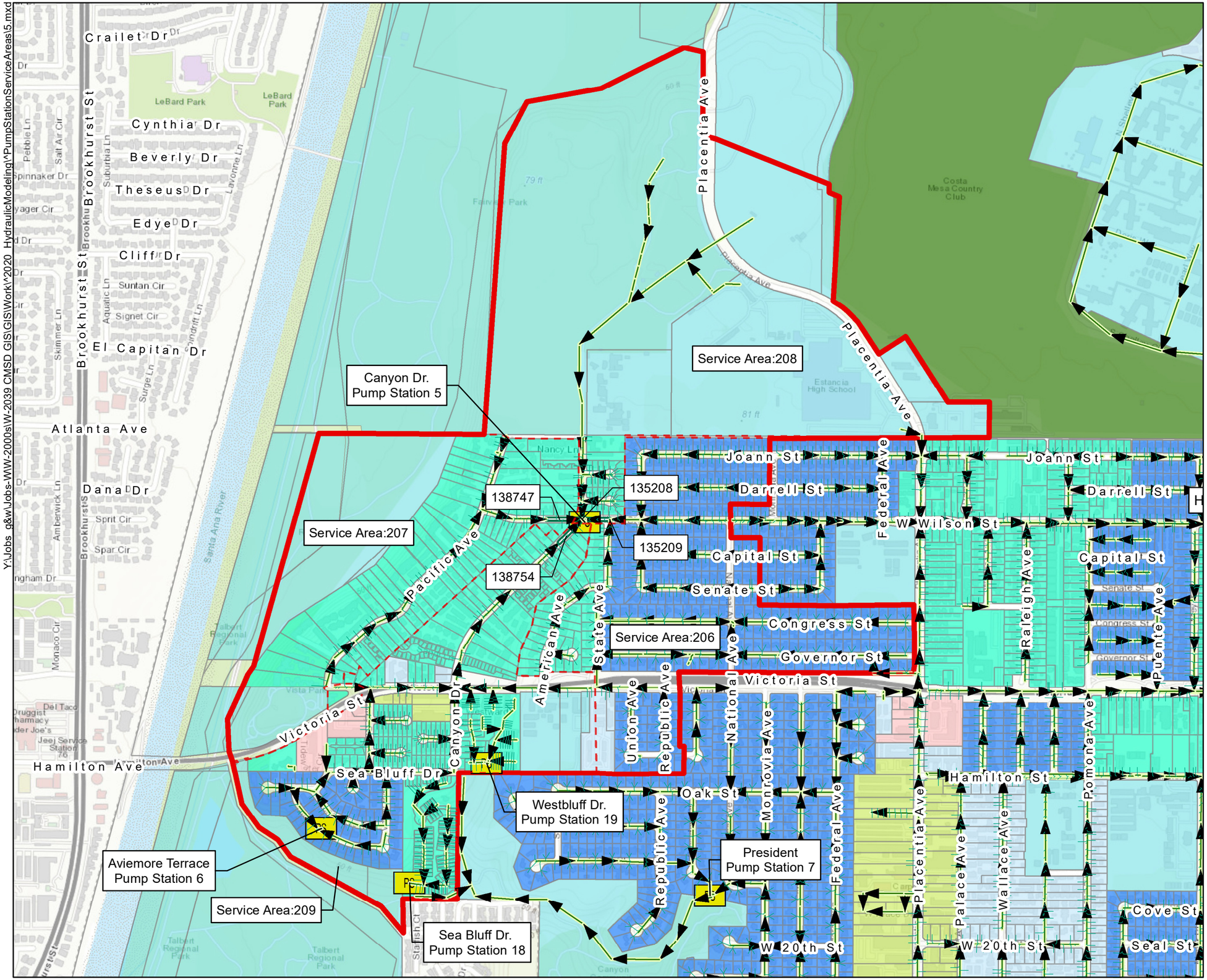

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
206	135209	HDR	2.18
		LDR	53.66
		MDR	8.13
		PI	0.09
207	138747	MDR	41.47
		PI	34.10
208	135208	G	0.44
		MDR	3.68
		PI	163.44
209	138754	HDR	2.33
		LDR	11.58
		LI	2.00
		MDR	43.29
		NC	3.36
		PI	14.45

Costa Mesa Sanitary District

Pump Station Map
Canyon Dr, Pump Station (# 5)

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Victoria St
VICTORIA ST
Victoria Park
Valley Cir
Valley Rd
Glen Cir
Ridgecrest Cir
Sea Bluff Dr
Balmoral Pl
Gleneagles Ter
Service Area:210
138790
Aviemore Terrace
Pump Station 6
PS
138794
Aviemore Ter
4WD Road
Service Area:213
Stone Brook Ln
Sea Cove Ln
Sea Bluff Dr.
Pump Station 18
Starfish Ct
Walkabout Cir

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
210	138790	LDR	2.83
		MDR	1.39
		PI	2.67
213	138794	LDR	2.33
		PI	4.43

Costa Mesa Sanitary District

Pump Station Map
Aviemore Terrace Pump Station (# 6)

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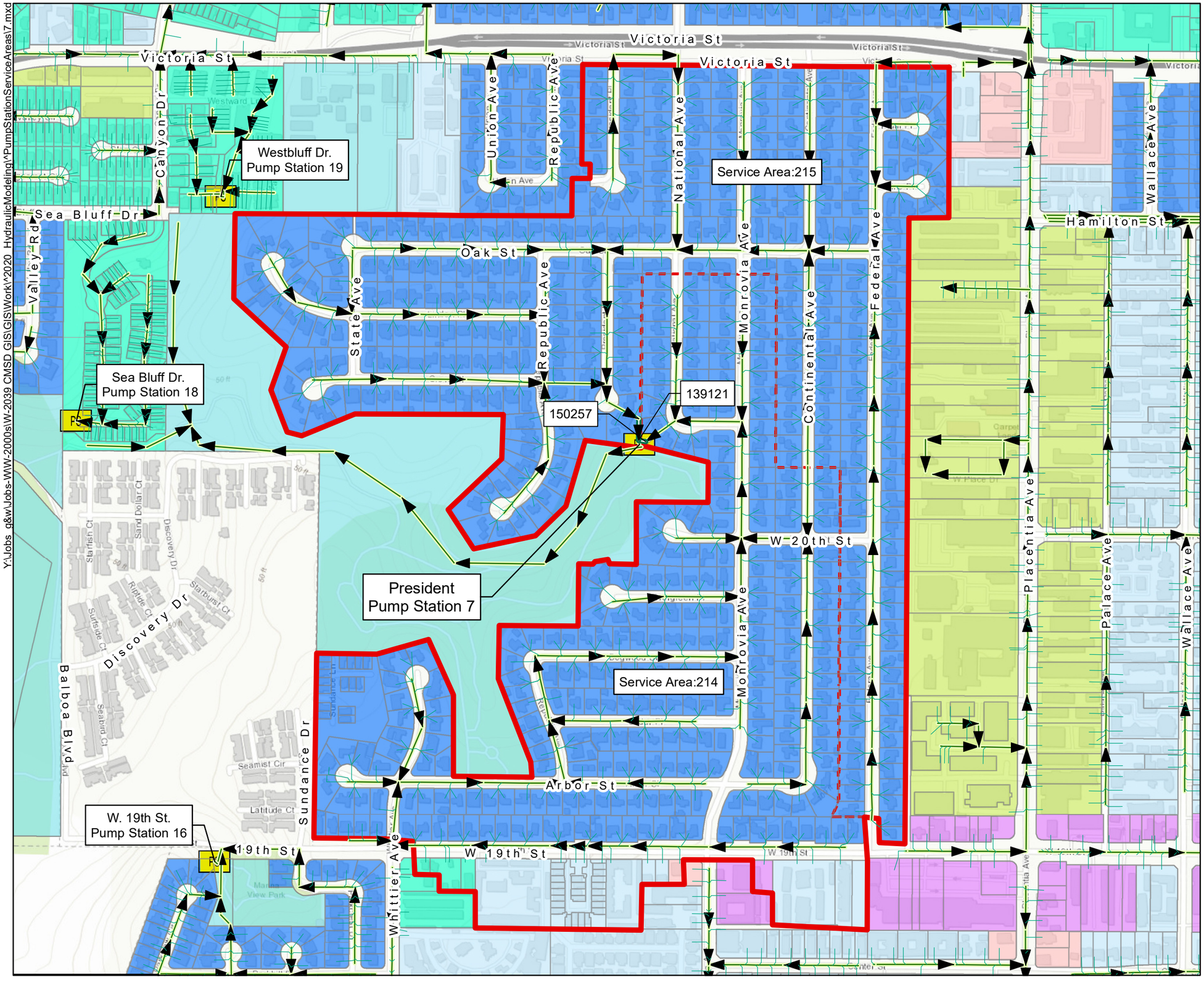

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
214	150257	GC	0.26
		HDR	7.39
		LDR	50.59
		MDR	0.65
		NC	0.15
215	139121	HDR	0.01
		LDR	66.23
		LI	0.000007
		MDR	0.01
		PI	0.06

Costa Mesa Sanitary District

Pump Station Map
President Pump Station (# 7)

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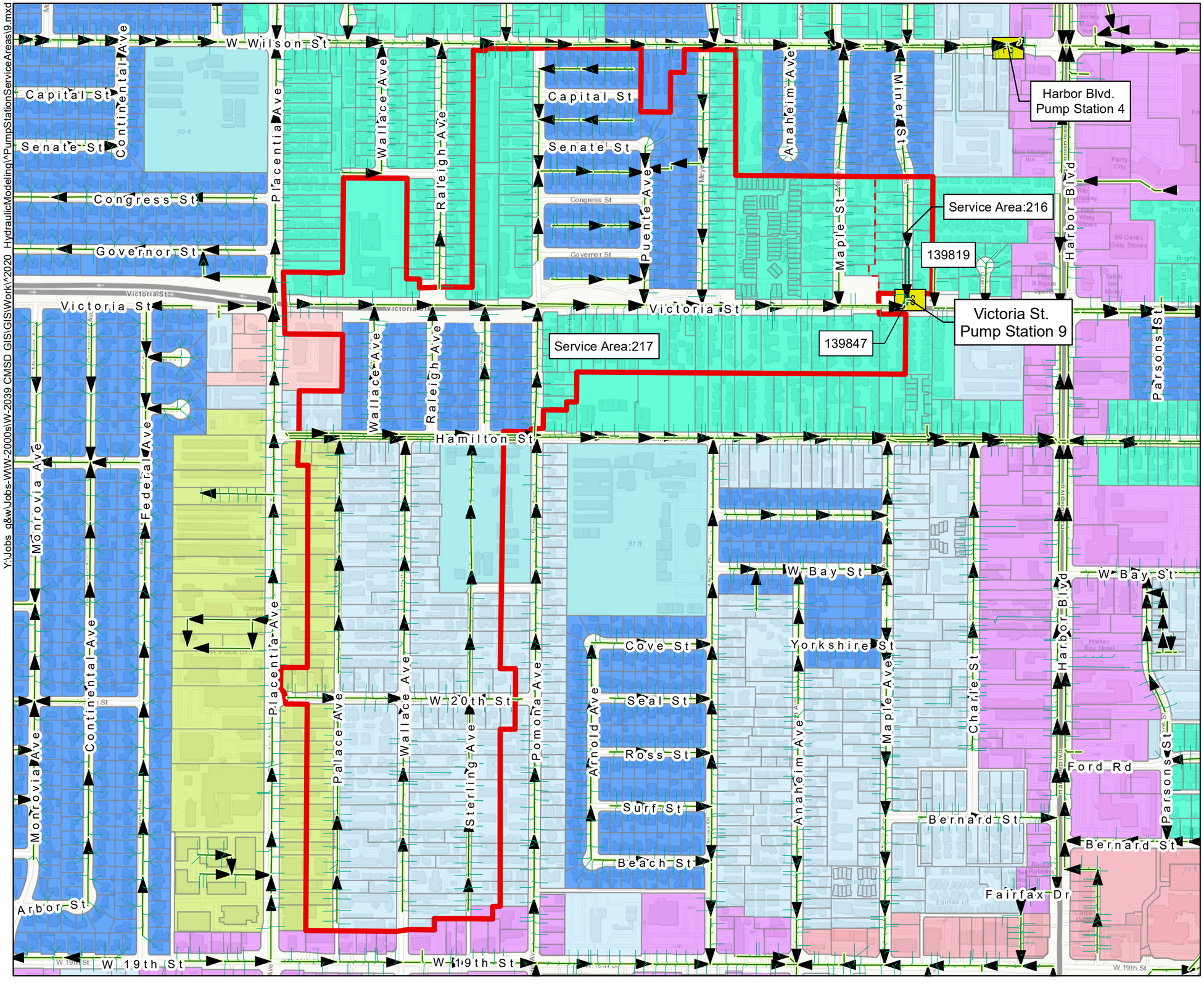

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
216	139819	LDR	0.0048
		MDR	3.21
217	139847	GC	0.15
		HDR	35.46
		LDR	25.78
		LI	8.11
		MDR	39.37
		NC	0.72
		PI	5.24

Costa Mesa Sanitary District

Pump Station Map
Victoria St. Pump Station (# 9)

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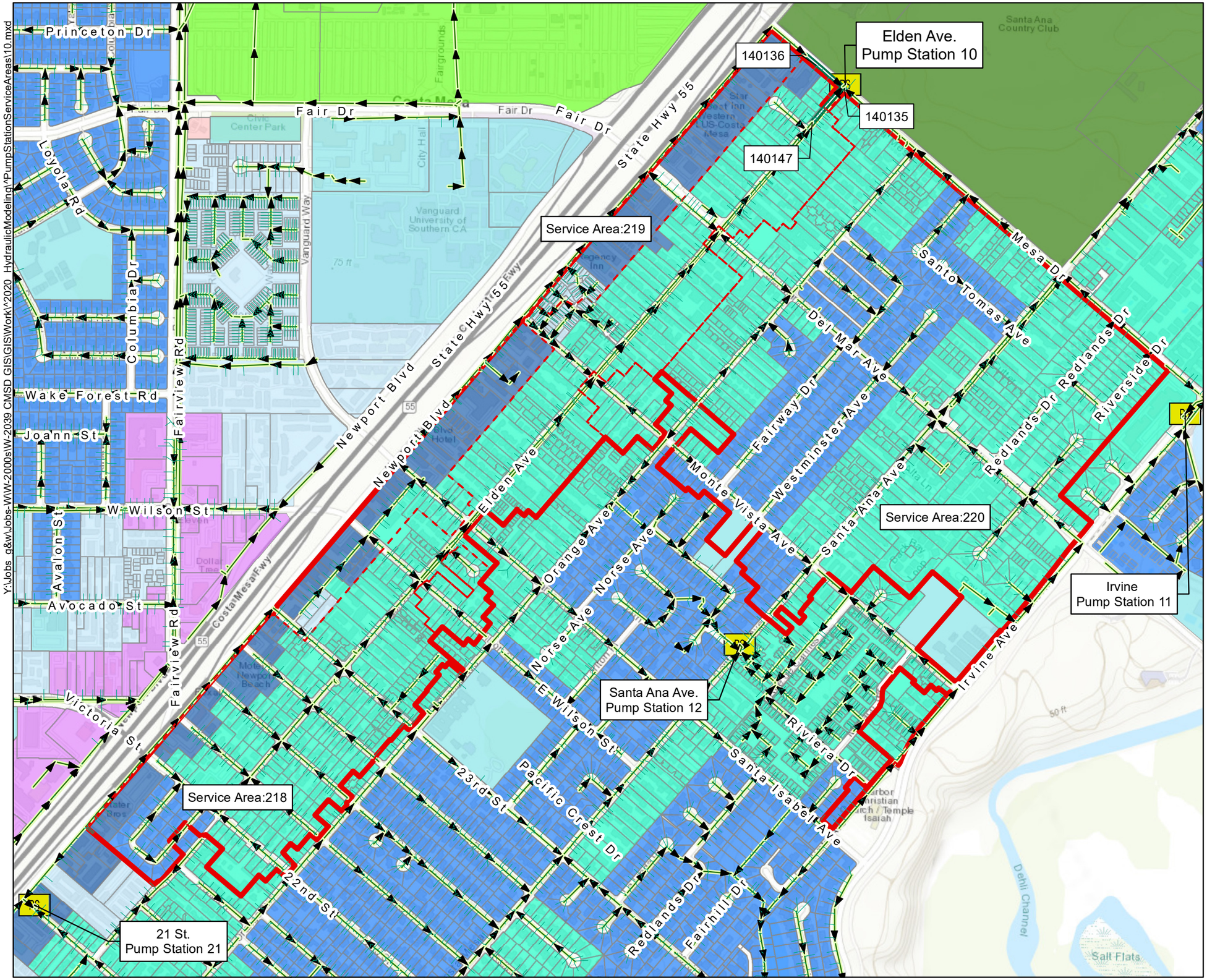

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
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S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
218	140147	CR	9.737127
		HDR	1.134274
		LDR	4.684663
		MDR	83.58161
219	140136	CR	27.1548
		HDR	2.502028
		MDR	3.467152
220	140135	LDR	41.12437
		MDR	111.426
		PI	4.984751

Costa Mesa Sanitary District

Pump Station Map
Elden Ave. Pump Station (# 10)

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Mendoza Dr. Pump Station 1

Elden Ave. Pump Station 10

Irvine Pump Station 11

Santa Ana Ave. Pump Station 12

Service Area:221

140015

Baker St
Mendoza Dr
Post Rd
Mission Dr
Valencia St
Santiago Rd
Sonora Rd
Magellan St
Coronado Dr
Junipero Dr
Loreto Ave
Drake Ave
Lorenzo Ave
Cibola Ave
Presidio Dr
Fairview Rd
Arlington Dr
Bear St
Bristol St
State Hwy 73
Pullman St
Briggs Ave
Red Hill Ave
Airway Ave
Fischer Ave
Ike Jones Rd
Kalmus Dr
Lear Ave
Clinton St
Campus Dr
Birch St
Scott Dr
Dove St
Quail St
Newport Blvd
State Hwy 55
Fair Dr
Columbia Dr
W Wilson St
E Wilson St
Del Mar Ave
Mesa Dr
Elden Ave
Orange Ave
Fairway Dr
Santa Isabel Ave
Brentwood St
Monte Vista Ave
University Dr
Irvine Ave
Riviera Dr
23rd St
22nd St
Santa Ana Ave
Orchard Dr
Pegasus St
Indus St
SW Acacia St
SW Birch St
SW Cypress St
Orchid St
Spruce Ave
Bayview Ave
SE Bristol St
Quail St
Dove St

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
221	140015	F	1.29
		G	43.15
		GC	114.82
		HDR	2.60
		LDR	133.02
		MDR	38.46
		PI	24.23

Costa Mesa Sanitary District

Pump Station Map
Irvine Pump Station (# 11)

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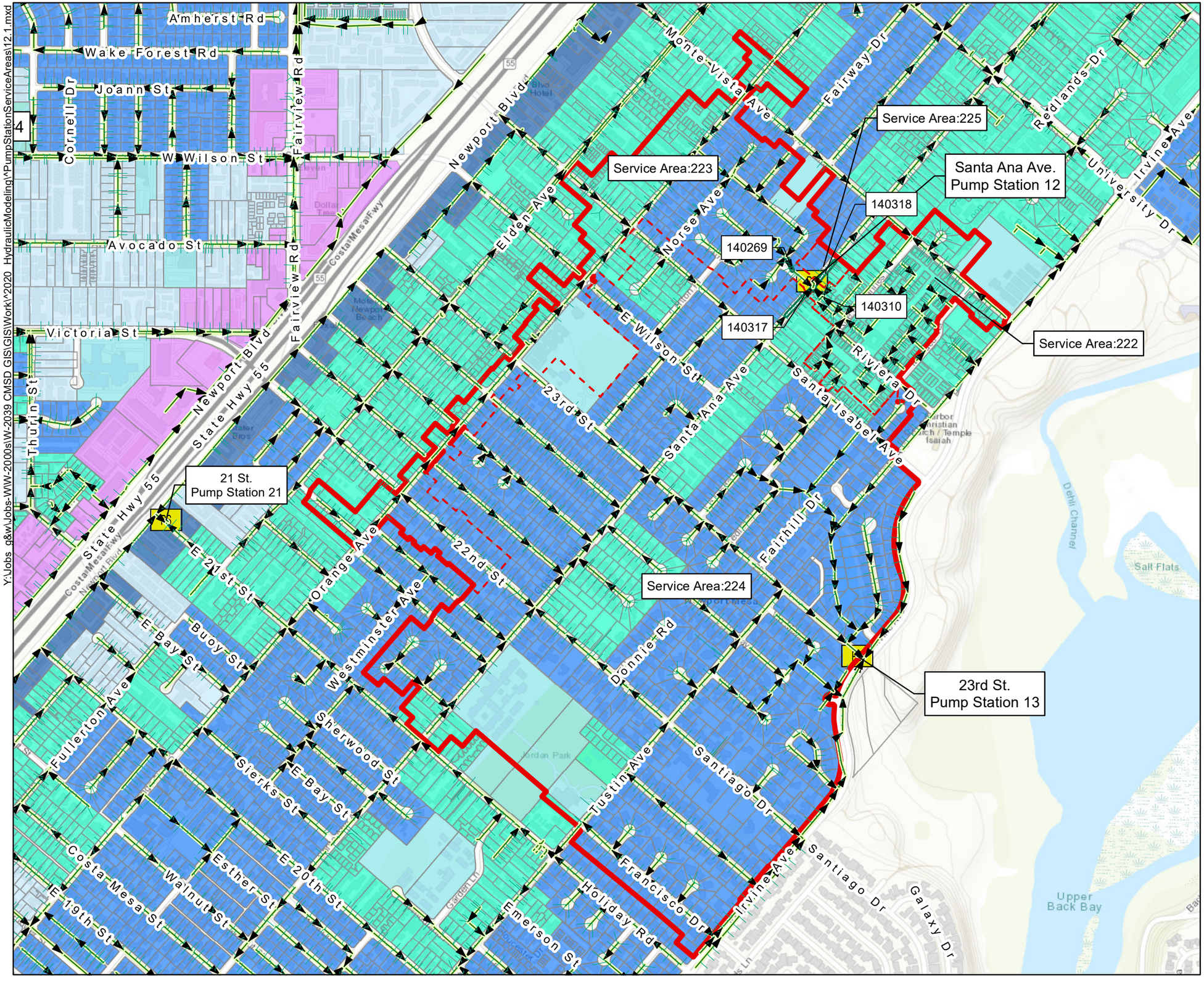

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
222	140310	LDR	0.15
		MDR	21.55
		PI	0.56
223	140269	LDR	26.95
		MDR	21.00
		PI	8.72
224	140317	LDR	180.18
		MDR	34.86
		PI	18.20
225	140318	LDR	0.84
		MDR	0.50

Costa Mesa Sanitary District

Pump Station Map
Santa Ana Ave Pump Station (# 12)

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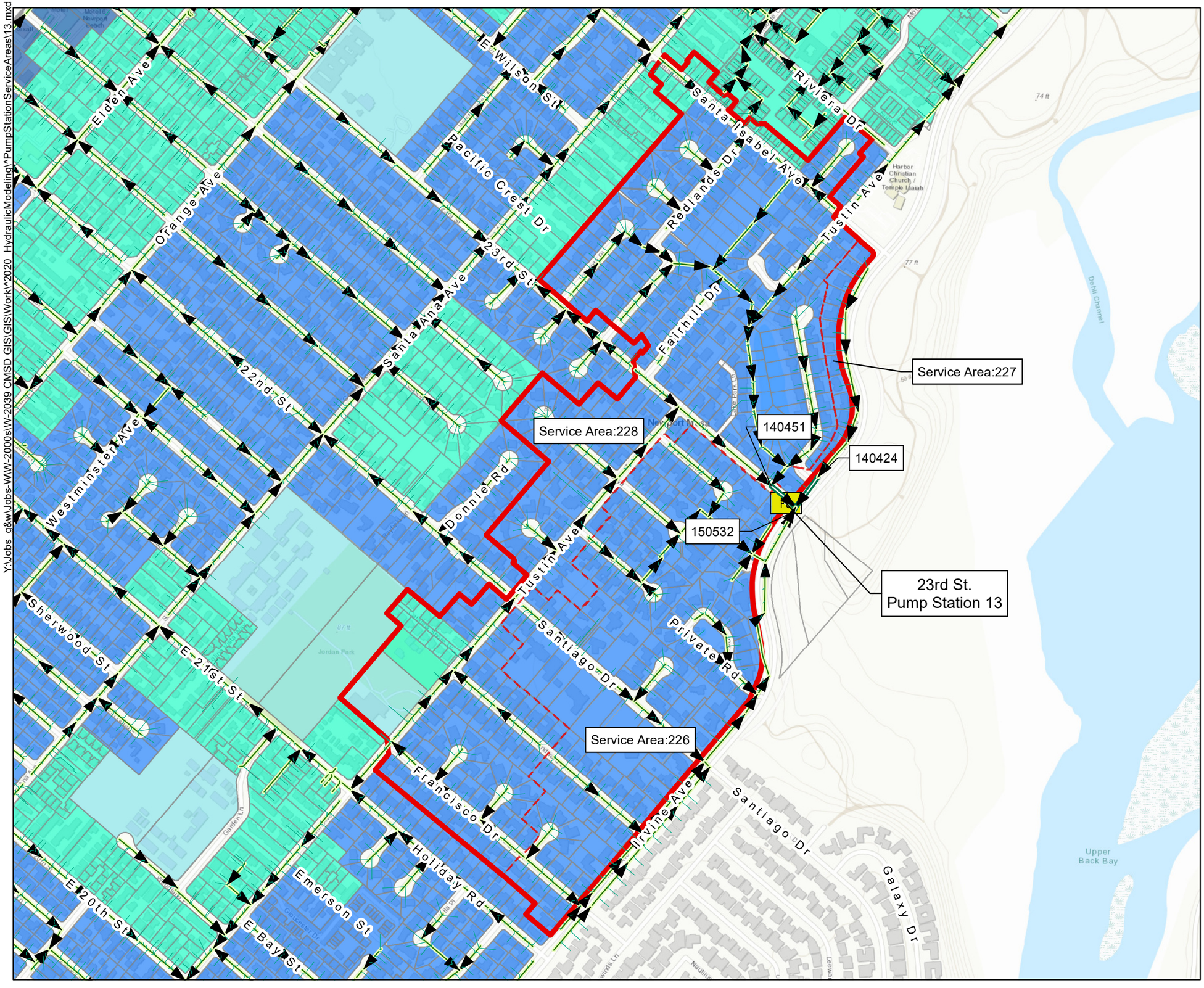

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
226	150532	LDR	40.45
227	140424	LDR	2.94
228	140451	LDR	59.49
		MDR	4.80
		PI	2.50

Costa Mesa Sanitary District

Pump Station Map
23rd St. Pump Station (# 13)

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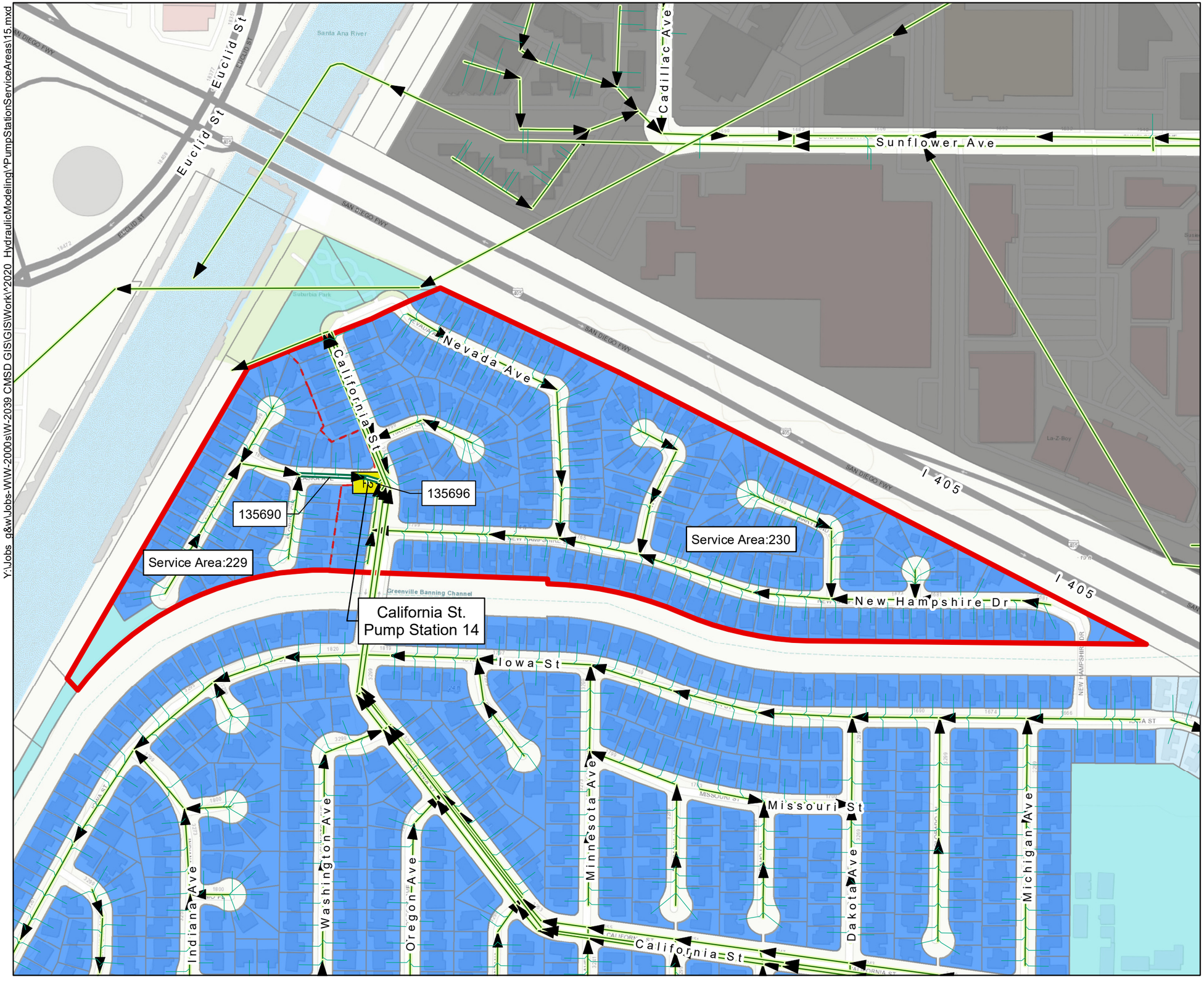

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
229	135690	LDR	5.26
		PI	0.51
230	135696	LDR	21.89
		PI	0.01

Costa Mesa Sanitary District

Pump Station Map
California St. Pump Station (# 14)

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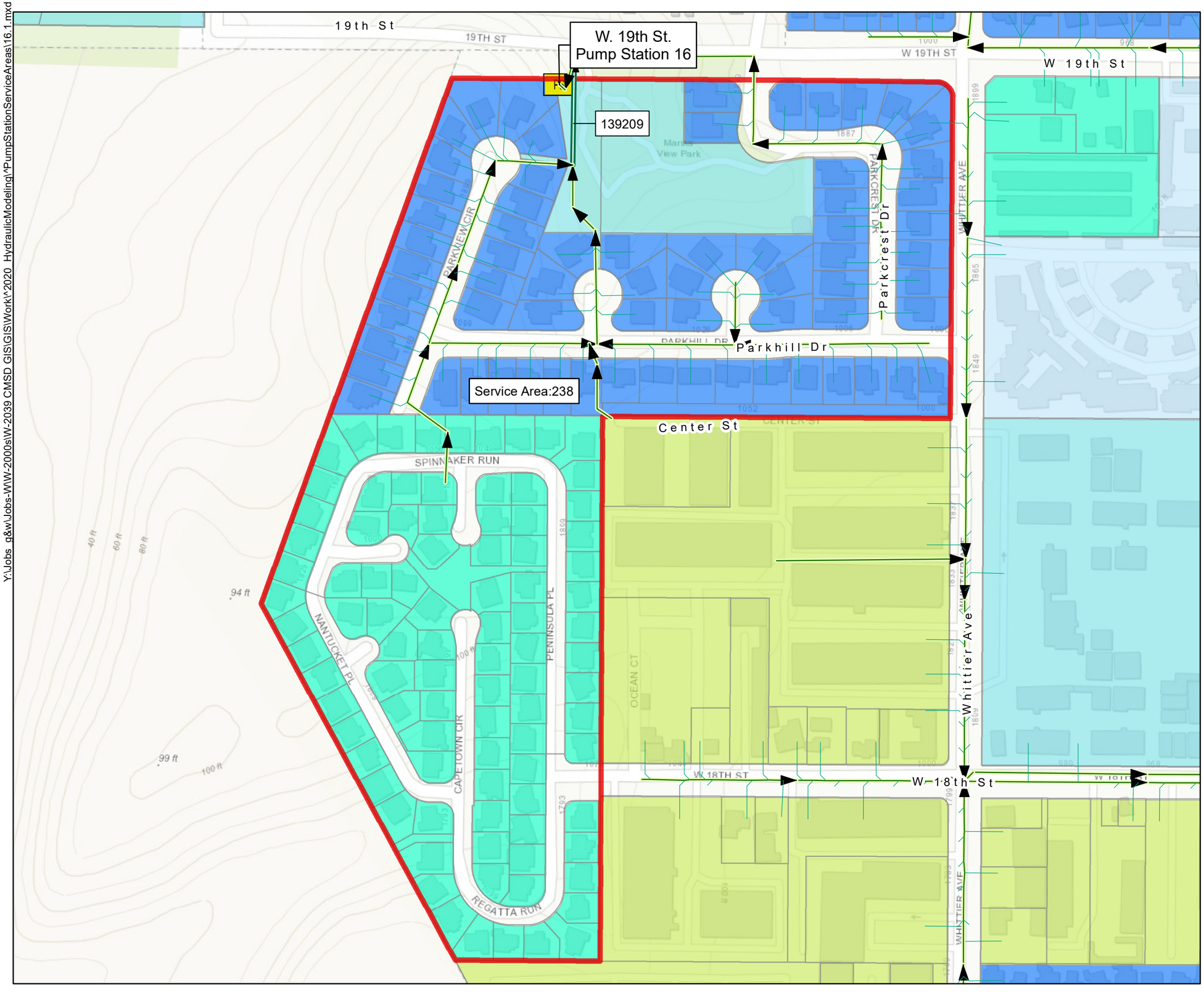

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
238	139209	LDR	8.98
		MDR	8.47
		PI	2.29

Costa Mesa Sanitary District

Pump Station Map
W 19th St. Pump Station (# 16)

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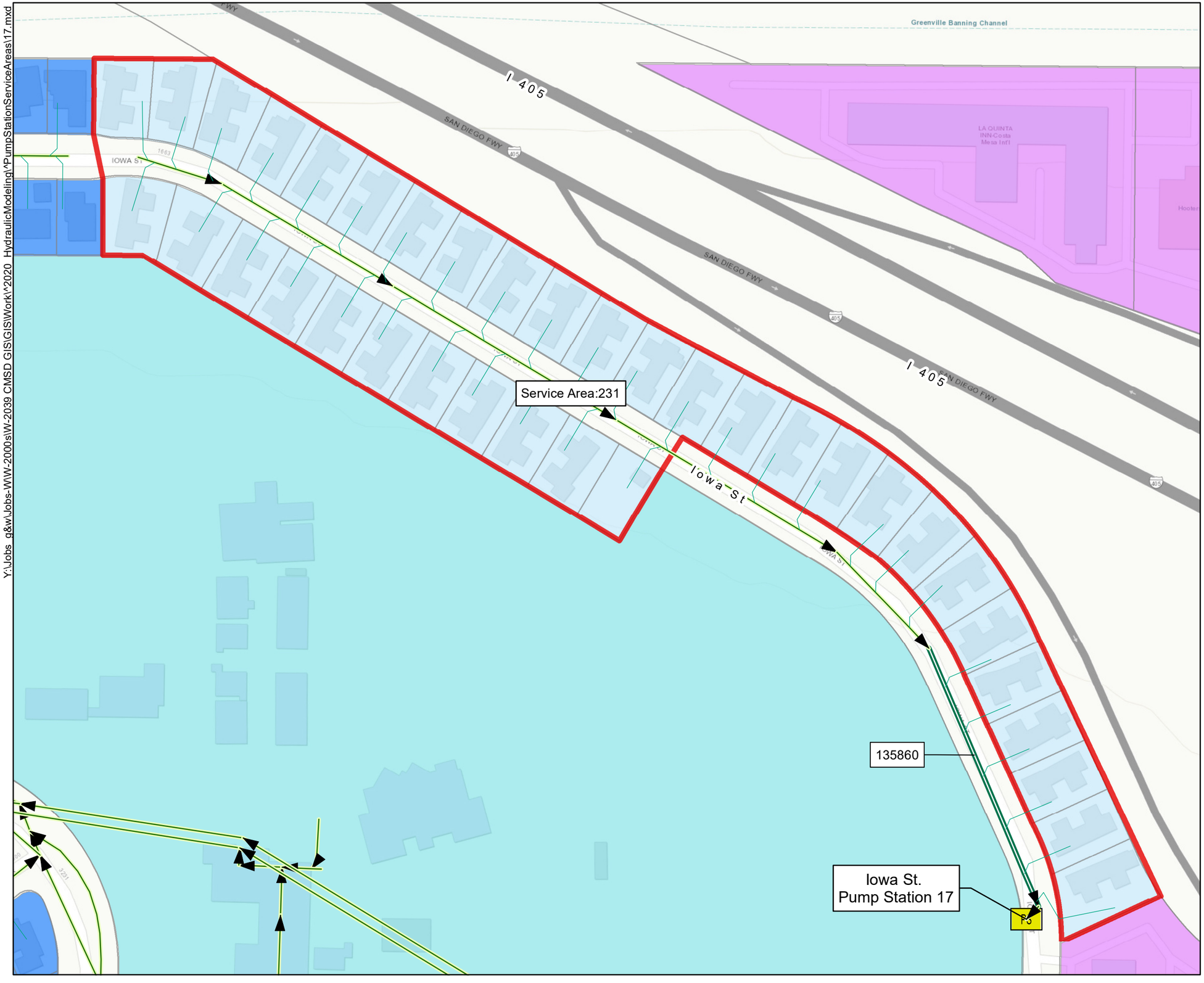

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
231	135860	HDR	6.48
		LDR	0.01
		PI	0.91

Costa Mesa Sanitary District

Pump Station Map
Iowa St. Pump Station (# 17)

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Valley Rd

Sea Bluff Dr

Canyon Dr

Westward Way

Westbluff Dr.
Pump Station 19

Balmoral Pl

Valley Rd

Sea Cove Ln

Service Area:232

Gleneagles Ter

Aviemore Ter

Sea Cove Ln

Meadow View Ln

Sea Bluff Dr.
Pump Station 18

PS

138811

4WD Road

4WD Road

Discovery Dr

DISCOVERY DR

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
232	138811	MDR	7.27

Costa Mesa Sanitary District

Pump Station Map
Sea Bluff Dr. Pump Station (# 18)

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
233	149414	MDR	5.51

Costa Mesa Sanitary District

Pump Station Map
Westbluff Dr. Pump Station (# 19)

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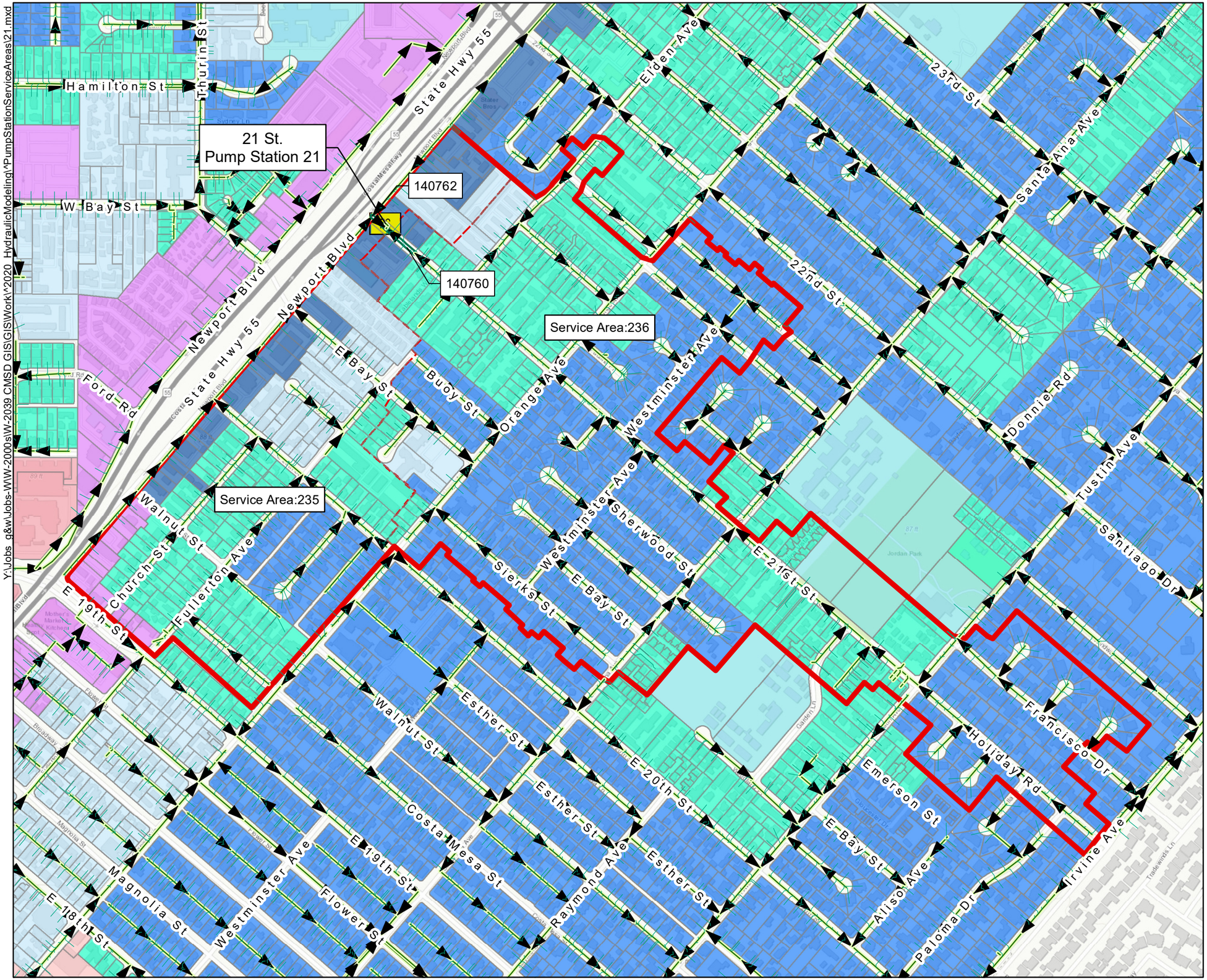

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Pump Station Service Area
- Gravity Main Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Service Area	Pipe ID	Land Use Code	Land Use Area (Acres)
235	140762	CR	9.37
		GC	2.99
		HDR	11.37
		LDR	7.28
		MDR	20.08
236	140760	CR	1.53
		HDR	3.92
		LDR	61.96
		MDR	33.70
		PI	3.91

Costa Mesa Sanitary District

Pump Station Map
21st St. Pump Station (# 21)

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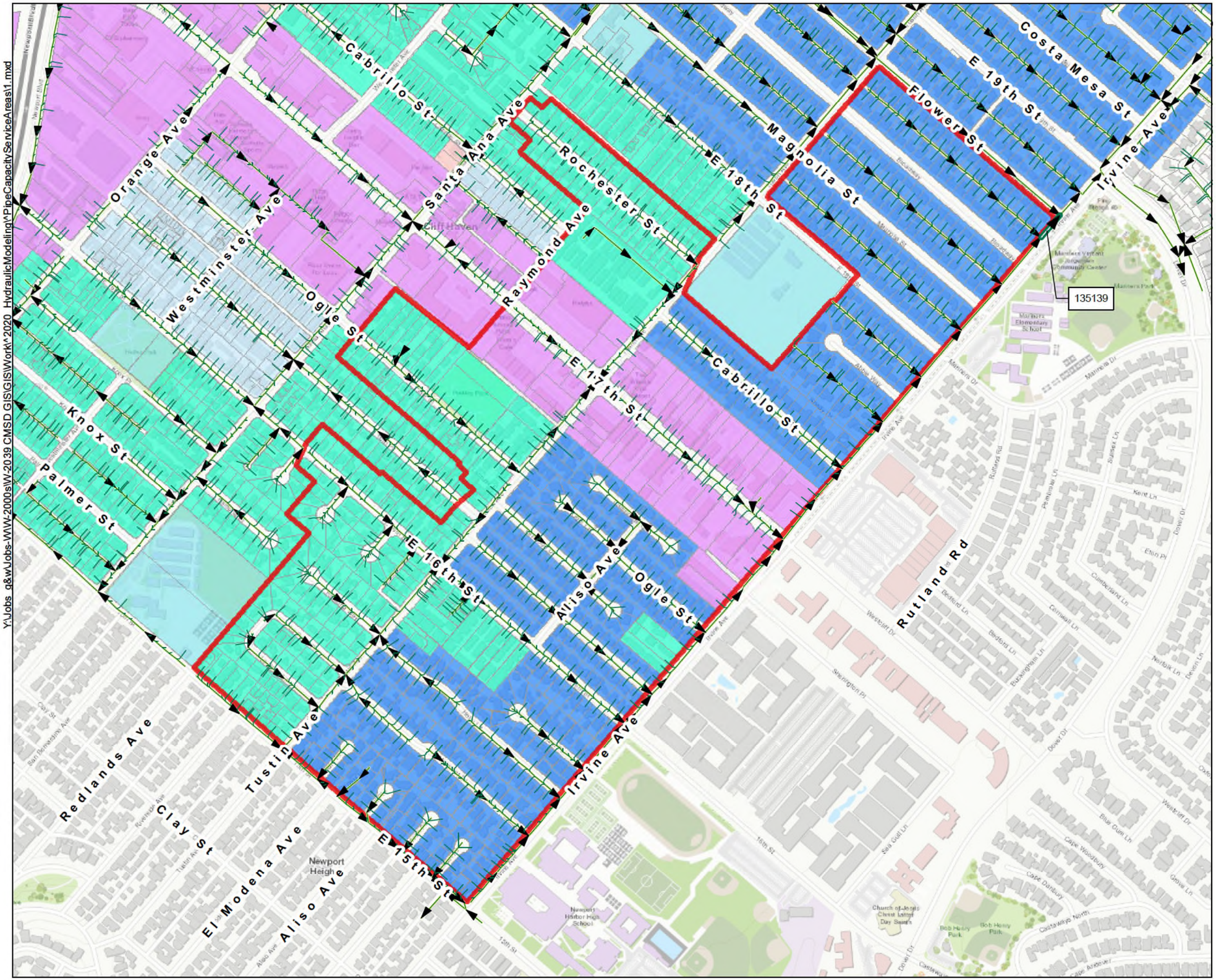

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135139	GC	25.42
	LDR	83.15
	MDR	49.96
	PI	0.01

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 1

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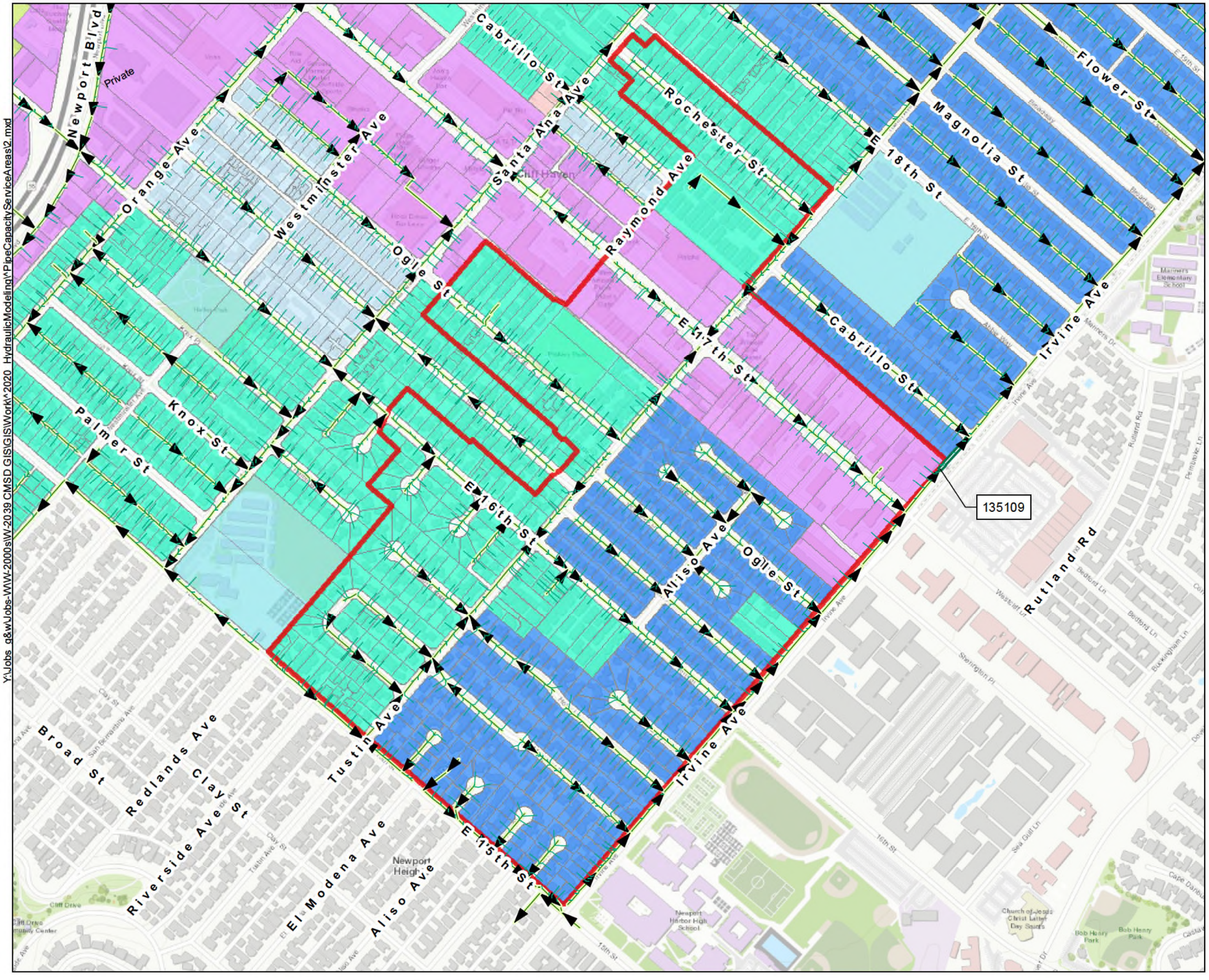

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135109	GC	25.43
	LDR	45.86
	MDR	49.82
	PI	0.00

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 2

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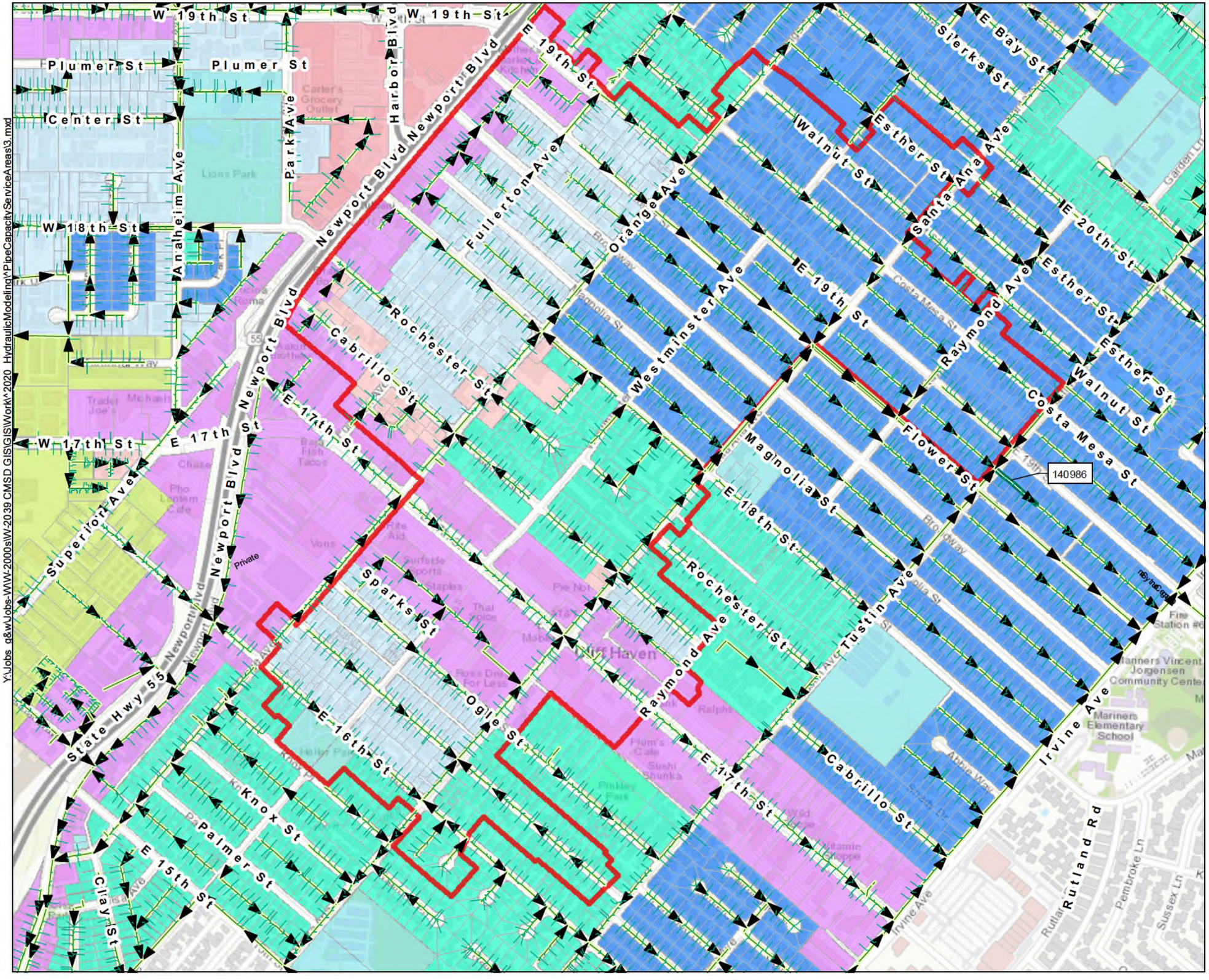

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140986	GC	47.70
	HDR	51.62
	LDR	69.89
	MDR	39.07
	NC	6.97
	PI	2.59

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 3

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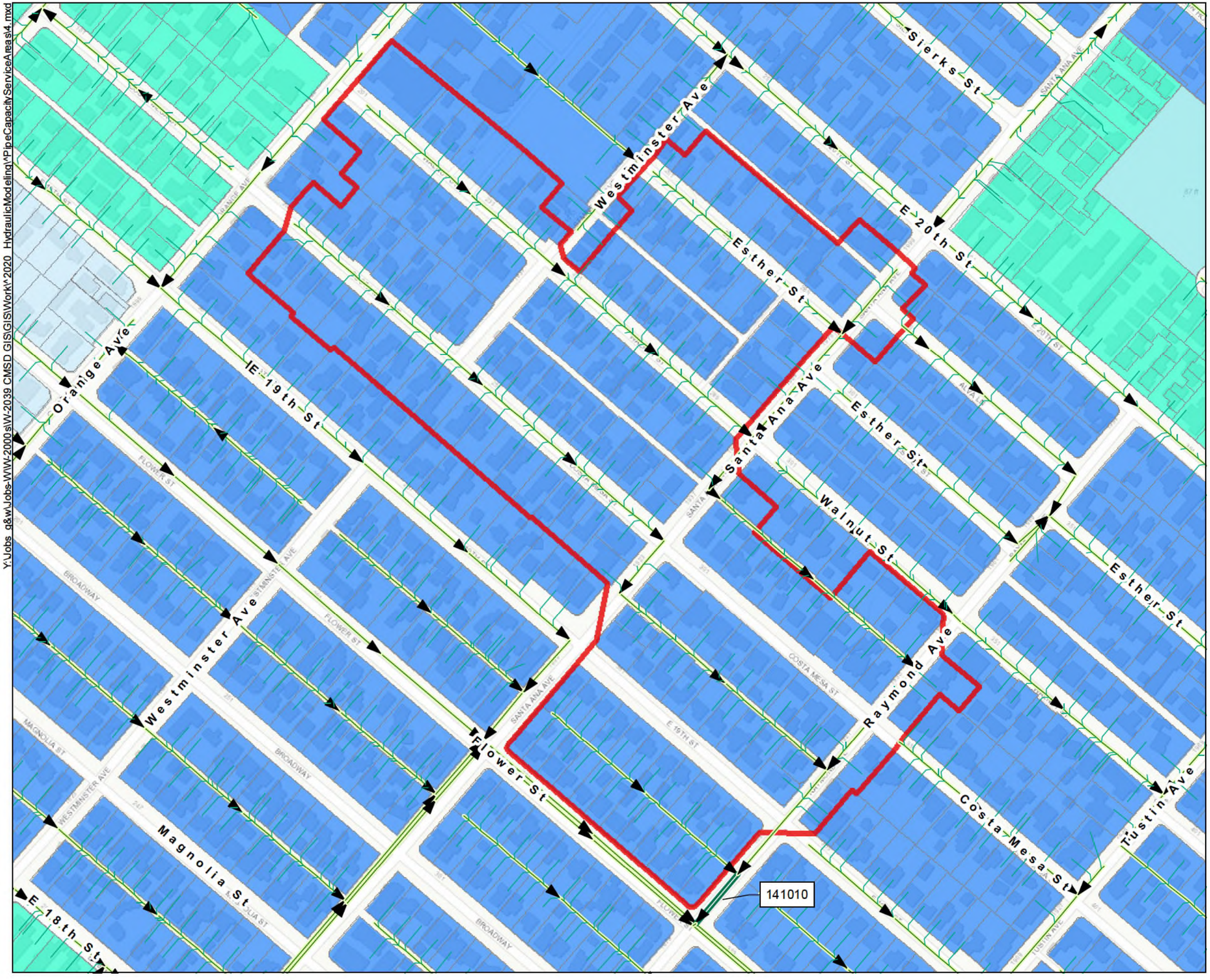

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
141010	LDR	28.23

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 4

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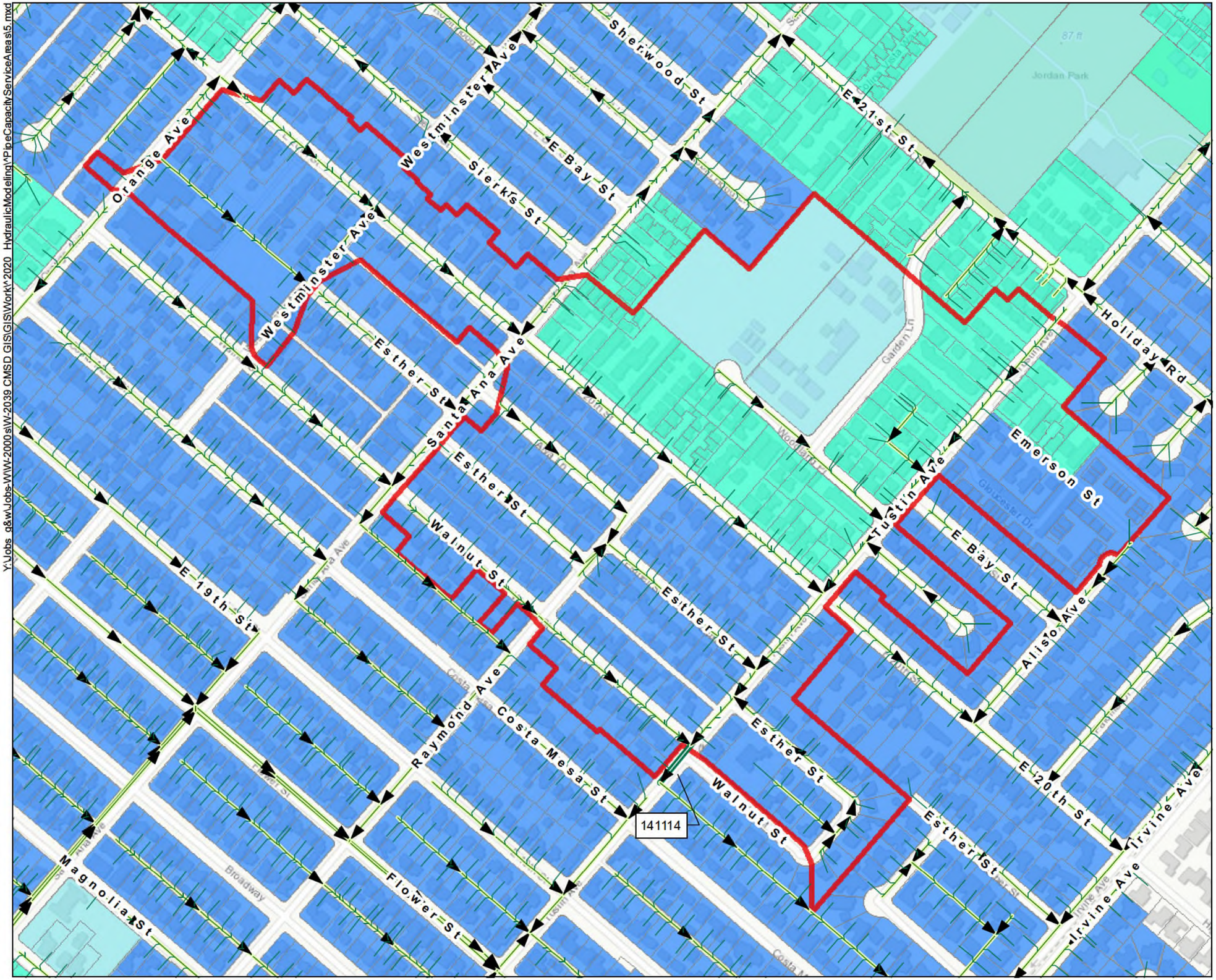

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
141114	LDR	42.07
	MDR	14.77
	PI	8.81

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 5

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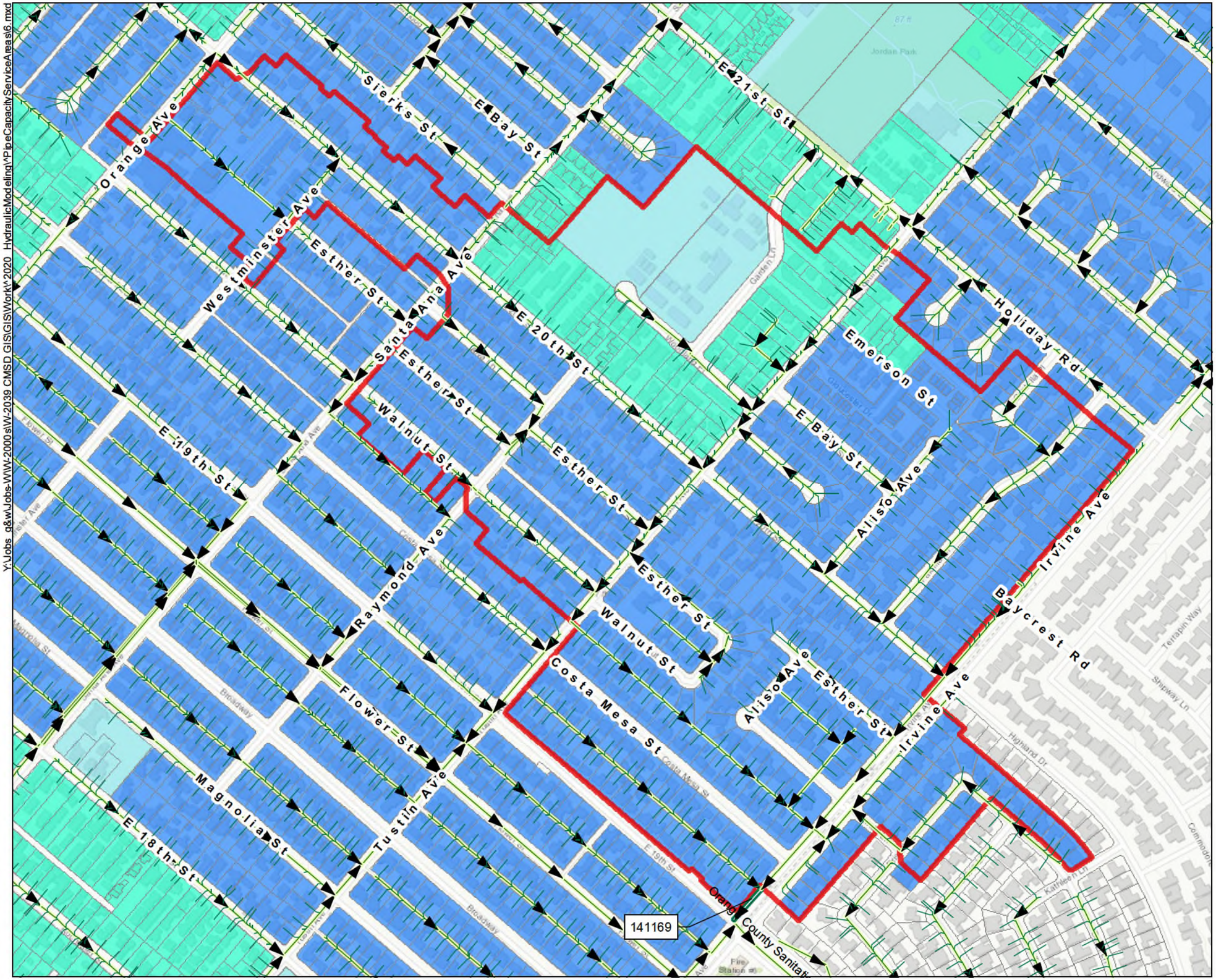


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

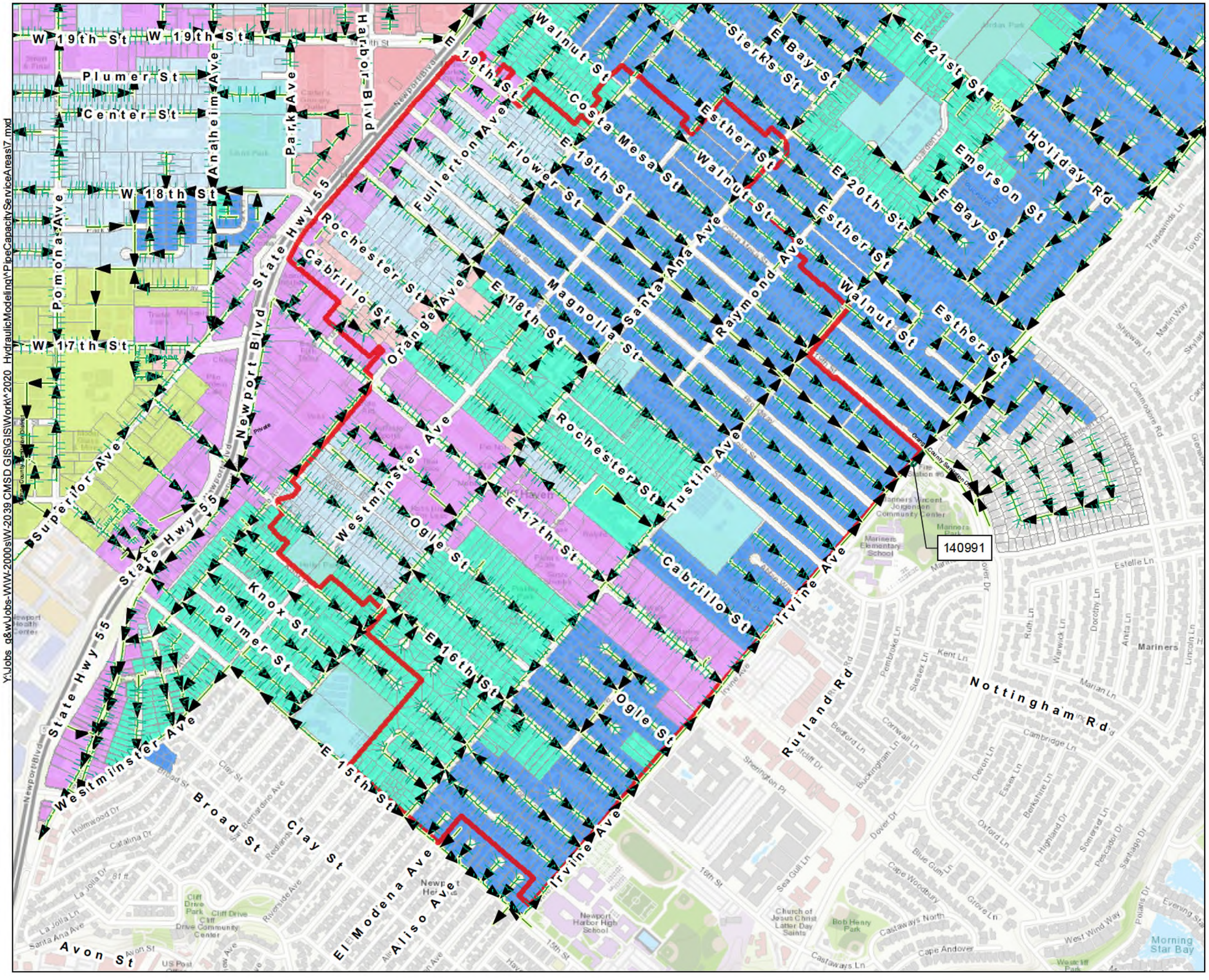
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
141169	LDR	92.62
	MDR	14.77
	PI	8.81

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 6



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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140991	GC	71.68
	HDR	51.33
	LDR	181.45
	MDR	97.28
	NC	6.97
	PI	13.68

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 7

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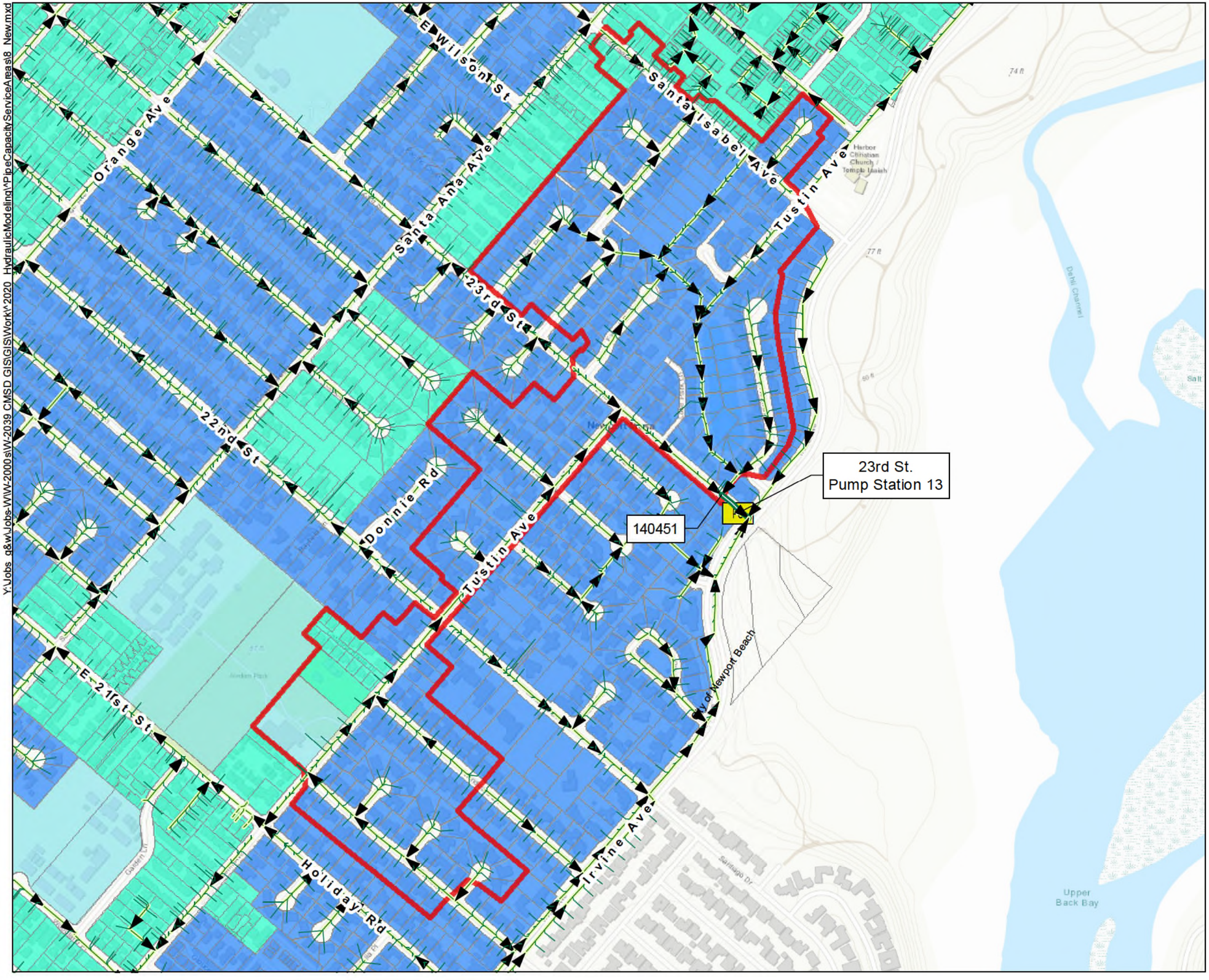


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

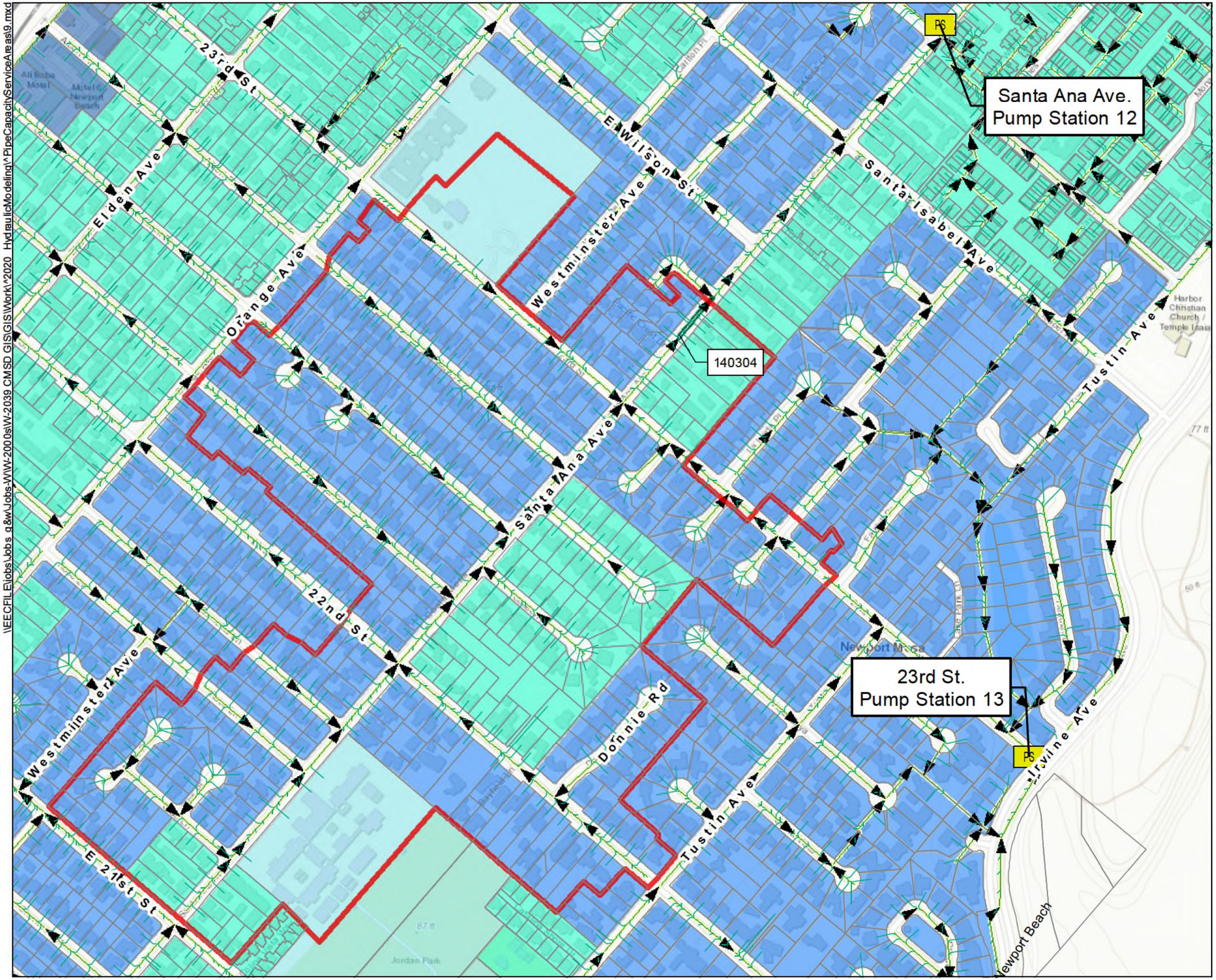
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140451	LDR	58.94
	MDR	4.80
	PI	2.50

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 8



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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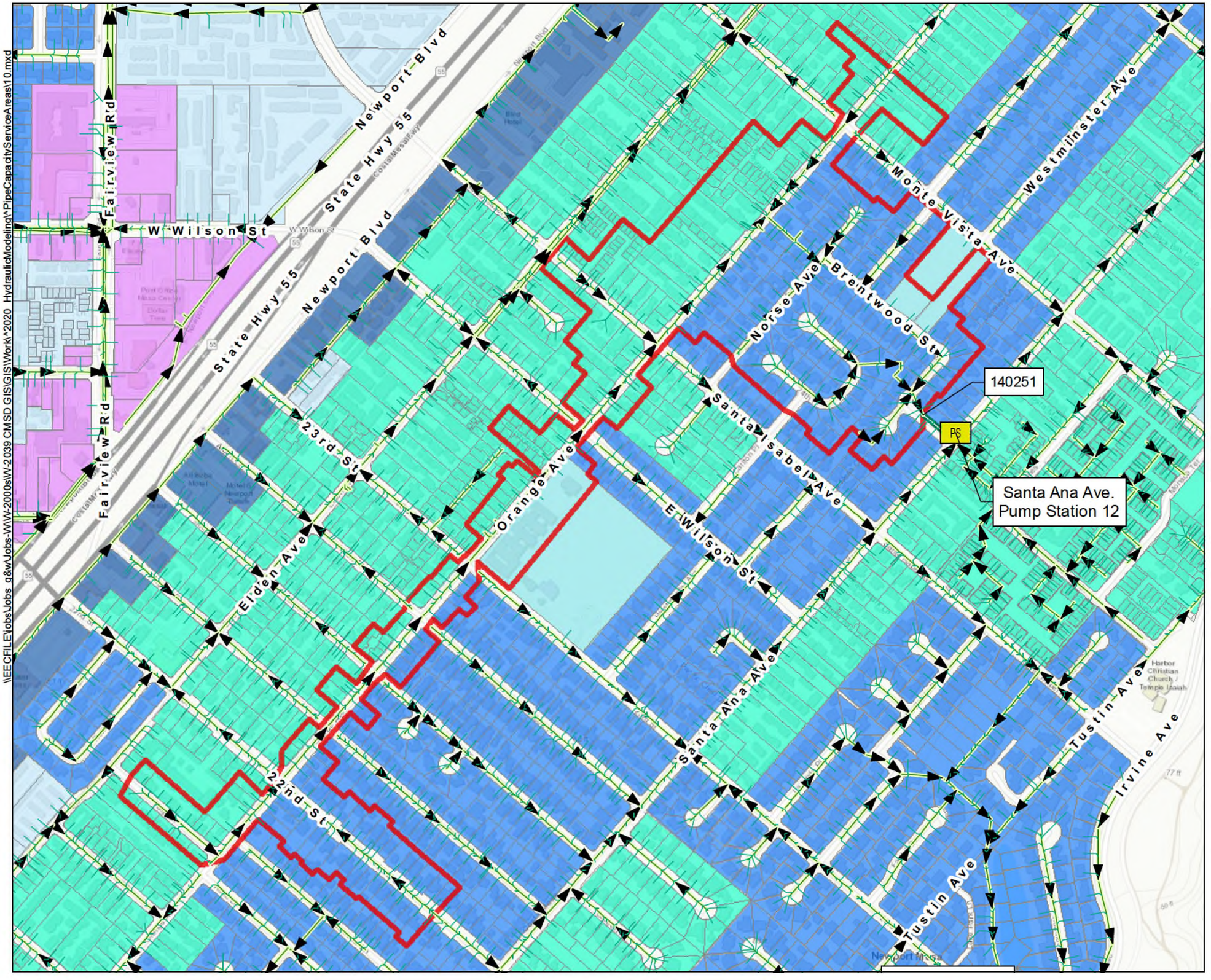
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140304	LDR	59.31
	MDR	18.77
	PI	10.91

Costa Mesa Sanitary District

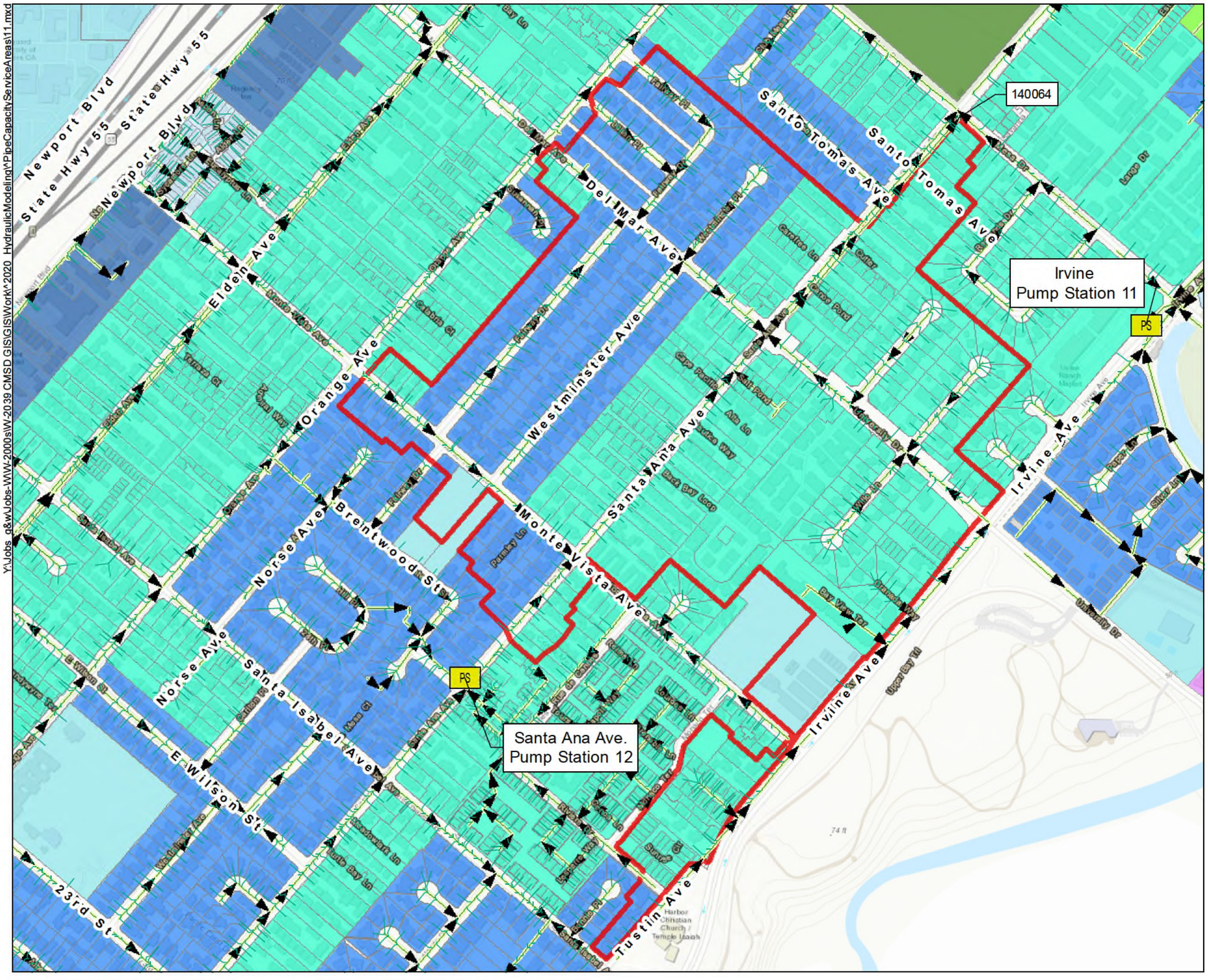
Pipe Capacity Service Area Map
Service Area # 9



Pipe ID	Land Use Code	Land Use Area (Acres)
140251	LDR	26.78
	MDR	20.72
	PI	4.04

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 10



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140064	LDR	31.43
	MDR	64.15
	PI	4.45

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 11

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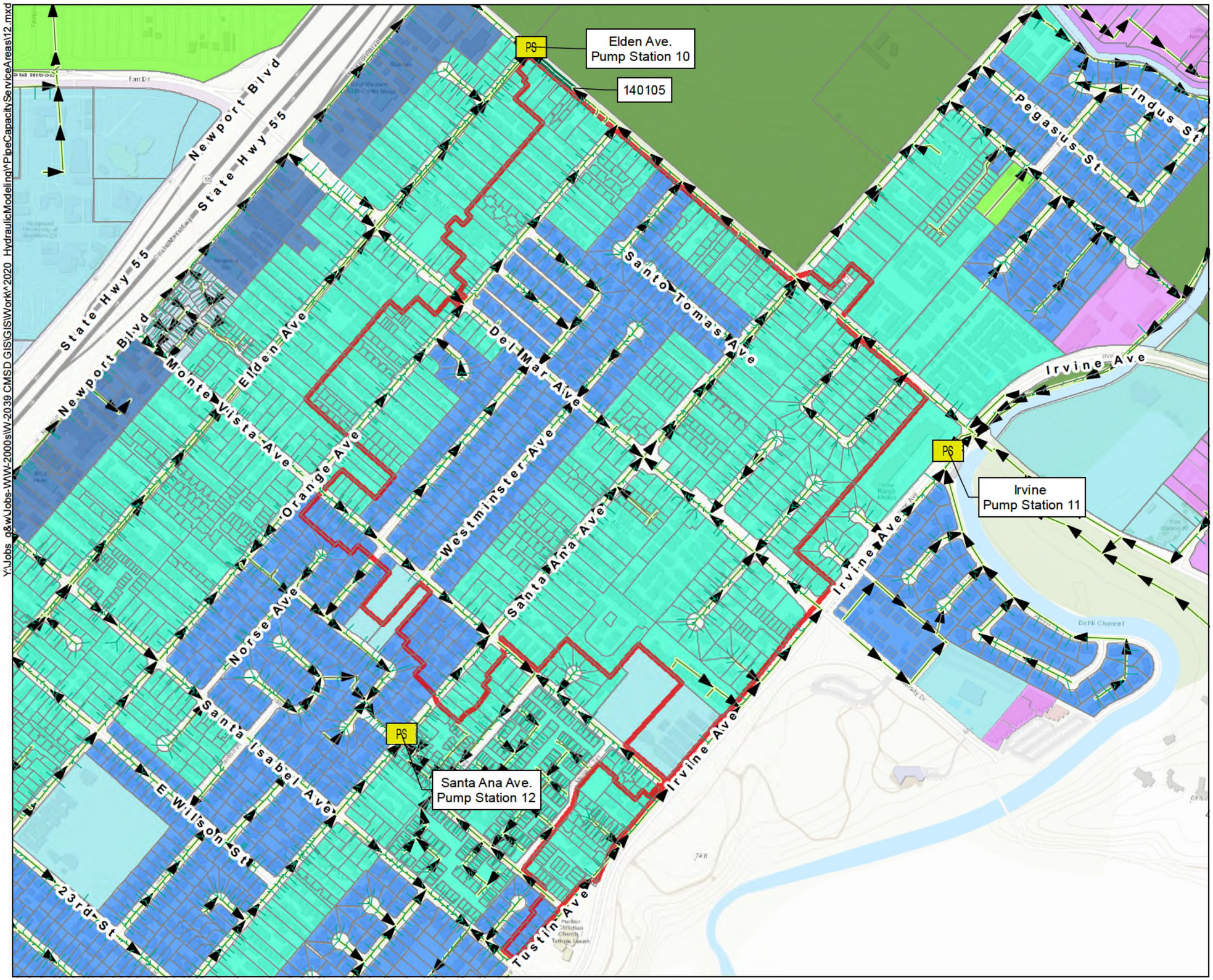

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
140105	LDR	40.96
	MDR	102.21
	PI	4.45

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 12

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
150522	G	11.55
	GC	38.22
	LDR	70.57
	PI	0.02

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 14

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
141486	F	1.29
	G	6.56
	GC	17.07
	LDR	25.78
	MDR	19.46

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 15

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Mendoza Dr.
Pump Station 1

Elden Ave.
Pump Station 10

Irvine
Pump Station 11

Santa Ana Ave.
Pump Station 12

150530

Baker St
Bristol St
Bear St
State Hwy 55
State Hwy 73
Newport Blvd
Monterey Ave
Lorenzo Ave
Cibola Ave
De Soto Ave
Sonora Rd
Magellan St
Loreto Ave
Drake Ave
Pullman St
Red Hill Ave
Airway Ave
Fischer Ave
Lear Ave
Clinton St
Fairview Rd
L St
Fair Dr
W Wilson St
Orange Ave
Del Mar Ave
Santa Ana Ave
Irvine Ave
Elden Ave
22nd St
23rd St
SW Acacia St
SW Birch St
Birch St
SE Bristol St
Irvine Ave
SW Cypress St
Orchid St
Spruce Ave
Bayview Ave
Dove St
Quail St
Campus Dr
Bayview Cir
Bayview Park
Upper Back Bay
John Wayne Airport-Orange County

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
150530	F	1.29
	G	154.27
	GC	113.86
	HDR	2.58
	LDR	116.39
	MDR	32.91
	PI	20.17

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 16

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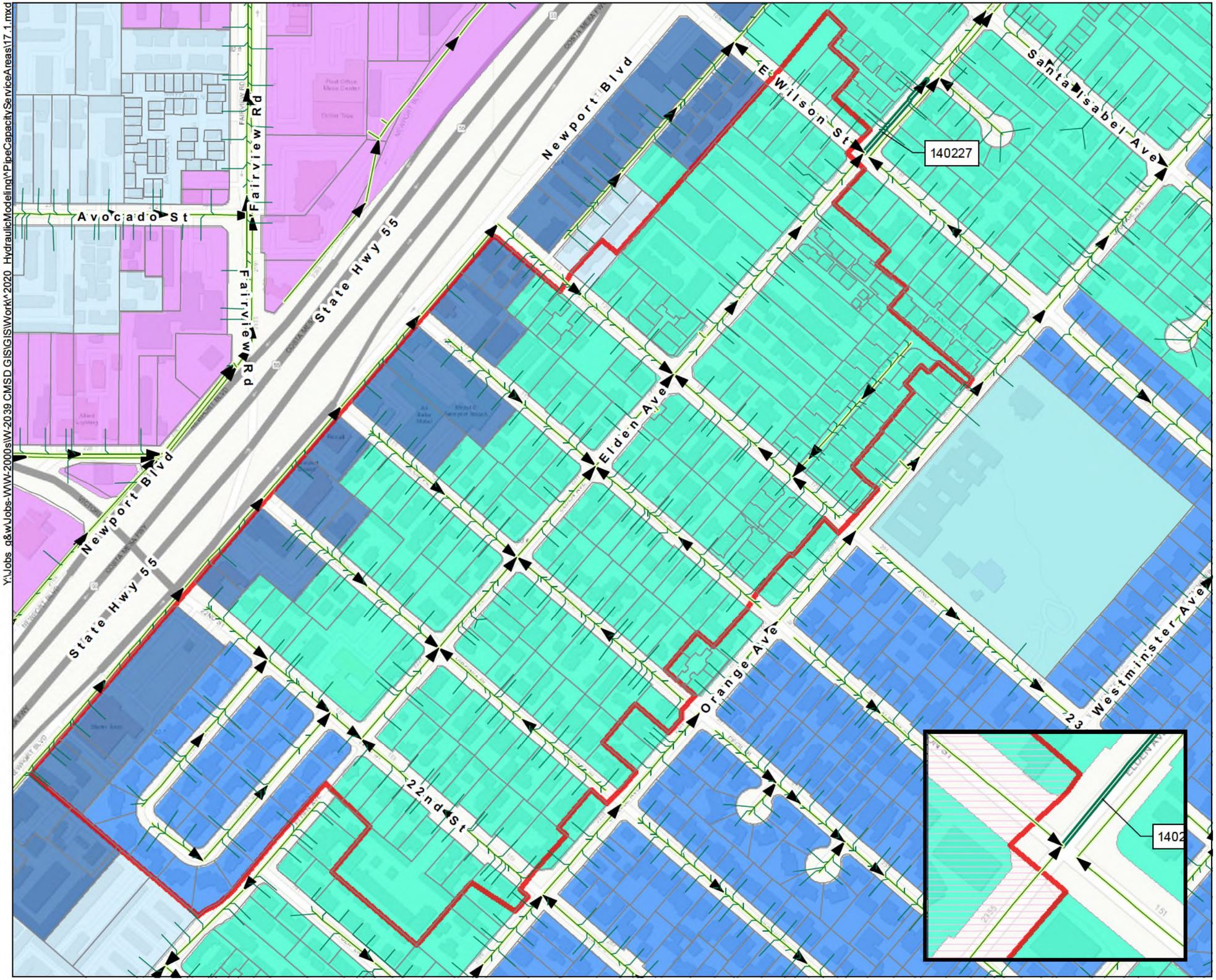

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140227	CR	8.31
	HDR	0.22
	LDR	5.04
	MDR	38.46

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 17

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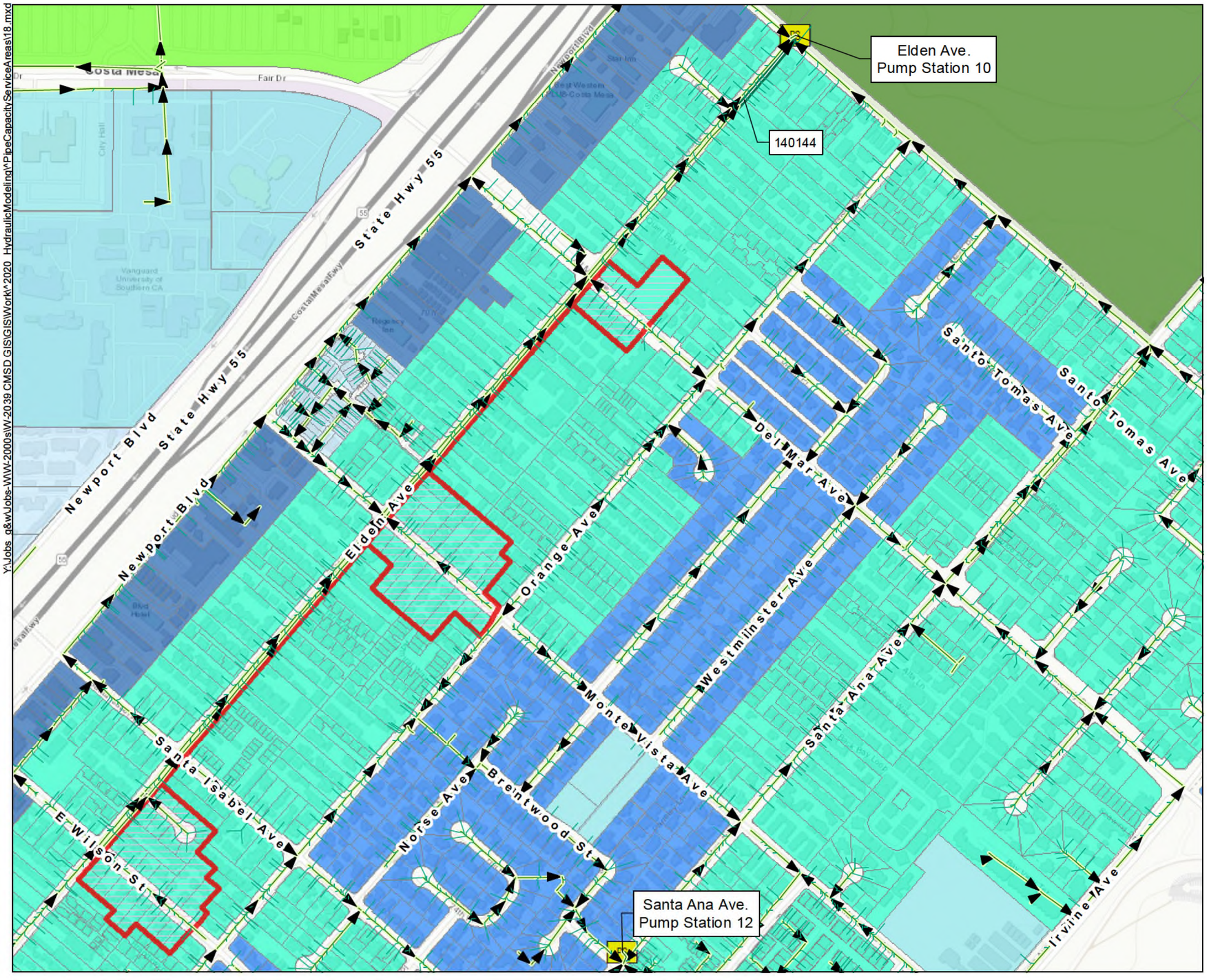

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140144	MDR	11.16

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 18

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

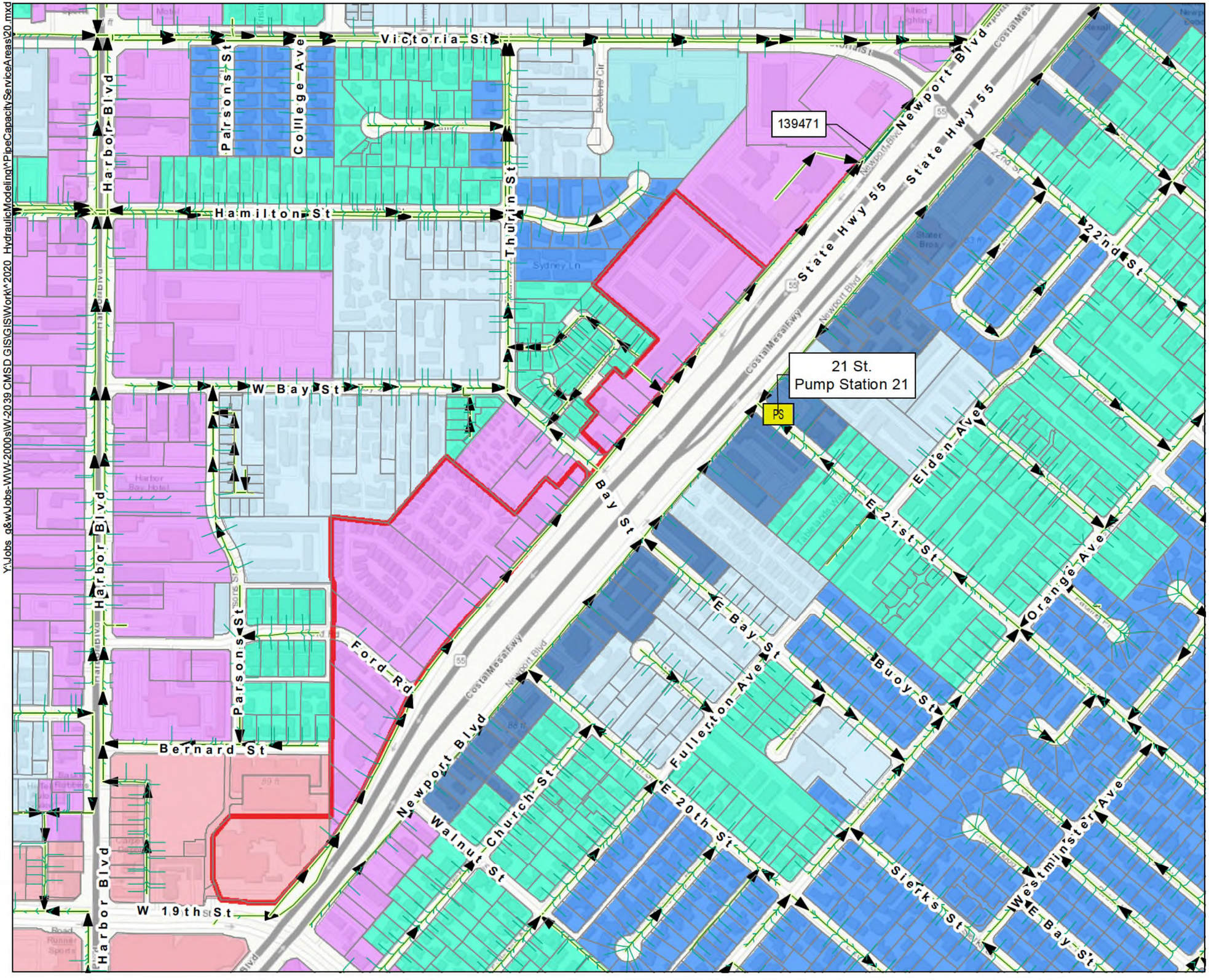
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140147	CR	9.74
	HDR	1.13
	LDR	4.68
	MDR	83.57

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 19



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139471	CC	2.67
	GC	18.27
	HDR	0.03
	LDR	0.01
	MDR	0.03

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 20

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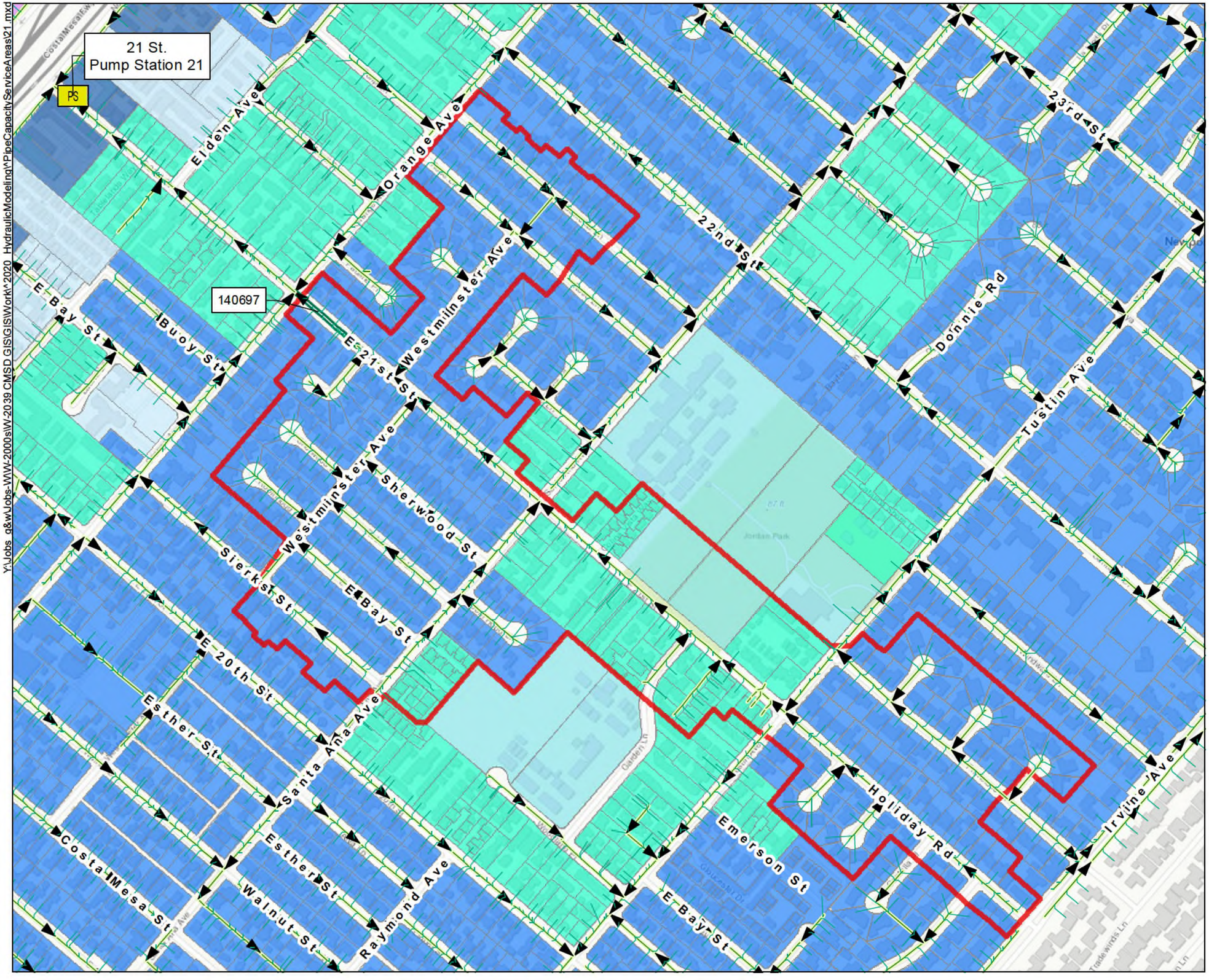

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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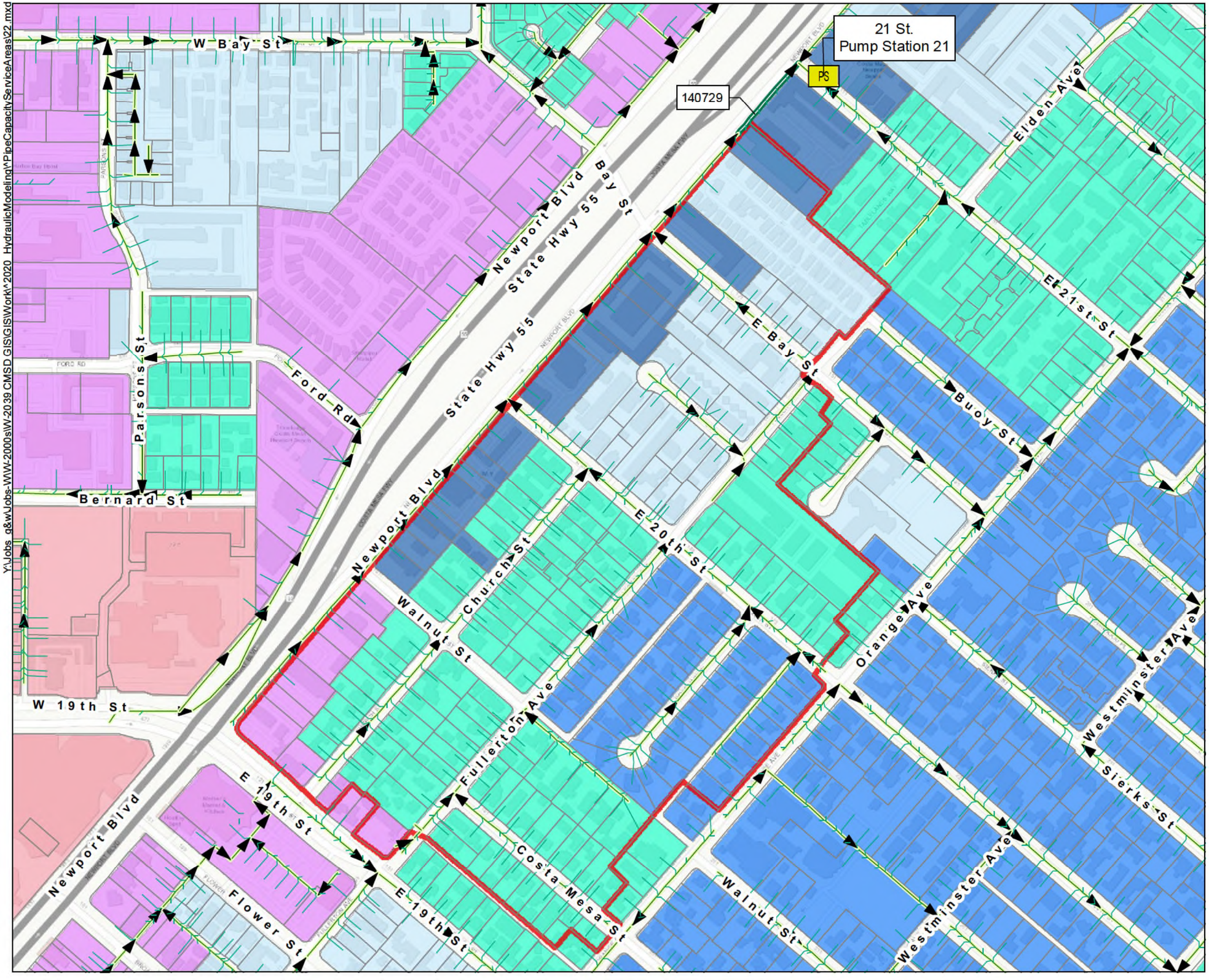
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140697	LDR	49.34
	MDR	12.78
	PI	3.92

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 21



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

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S

Pipe ID	Land Use Code	Land Use Area (Acres)
140729	CR	6.01
	GC	2.74
	HDR	8.94
	LDR	7.00
	MDR	19.25

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 22

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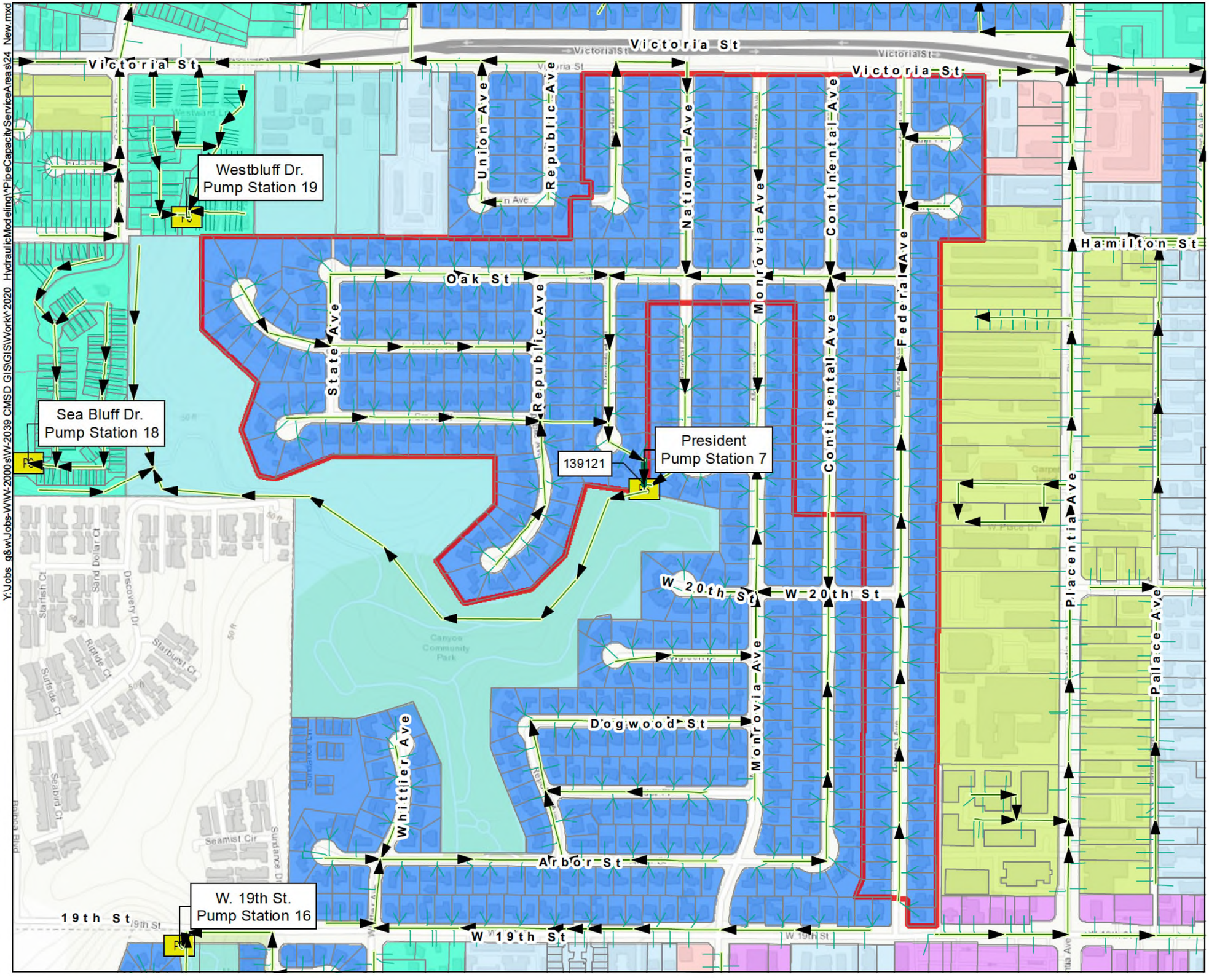


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

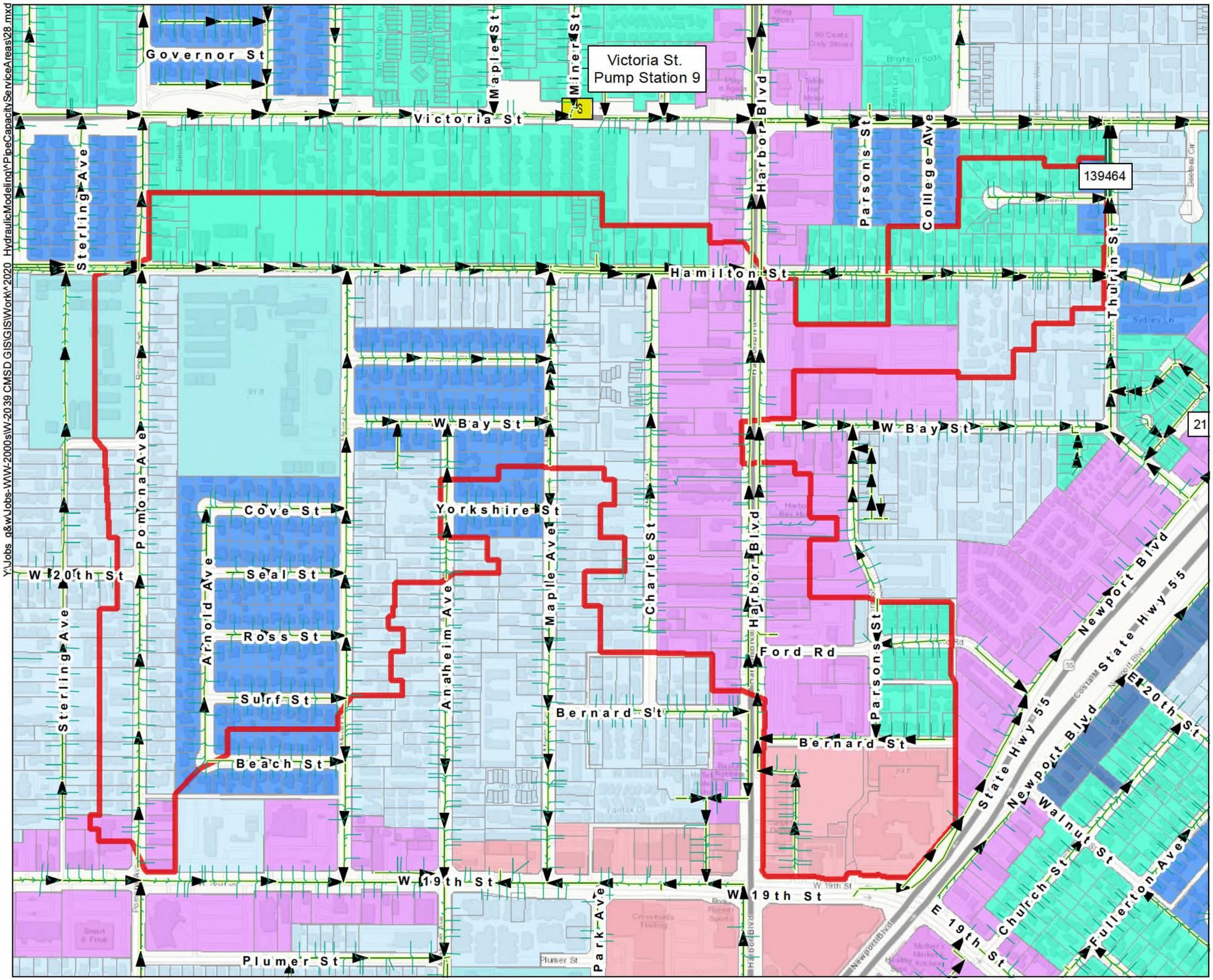
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139121	HDR	0.01
	LDR	66.23
	LI	0.00
	MDR	0.01
	PI	0.06

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 24



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139464	CC	9.78
	GC	28.38
	HDR	36.76
	LDR	23.33
	MDR	26.75
	PI	16.66

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 28

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Victoria St.
Pump Station 9

139848

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139848	GC	0.15
	HDR	34.34
	LDR	9.49
	LI	7.42
	MDR	27.54
	NC	0.59
	PI	5.06

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 30

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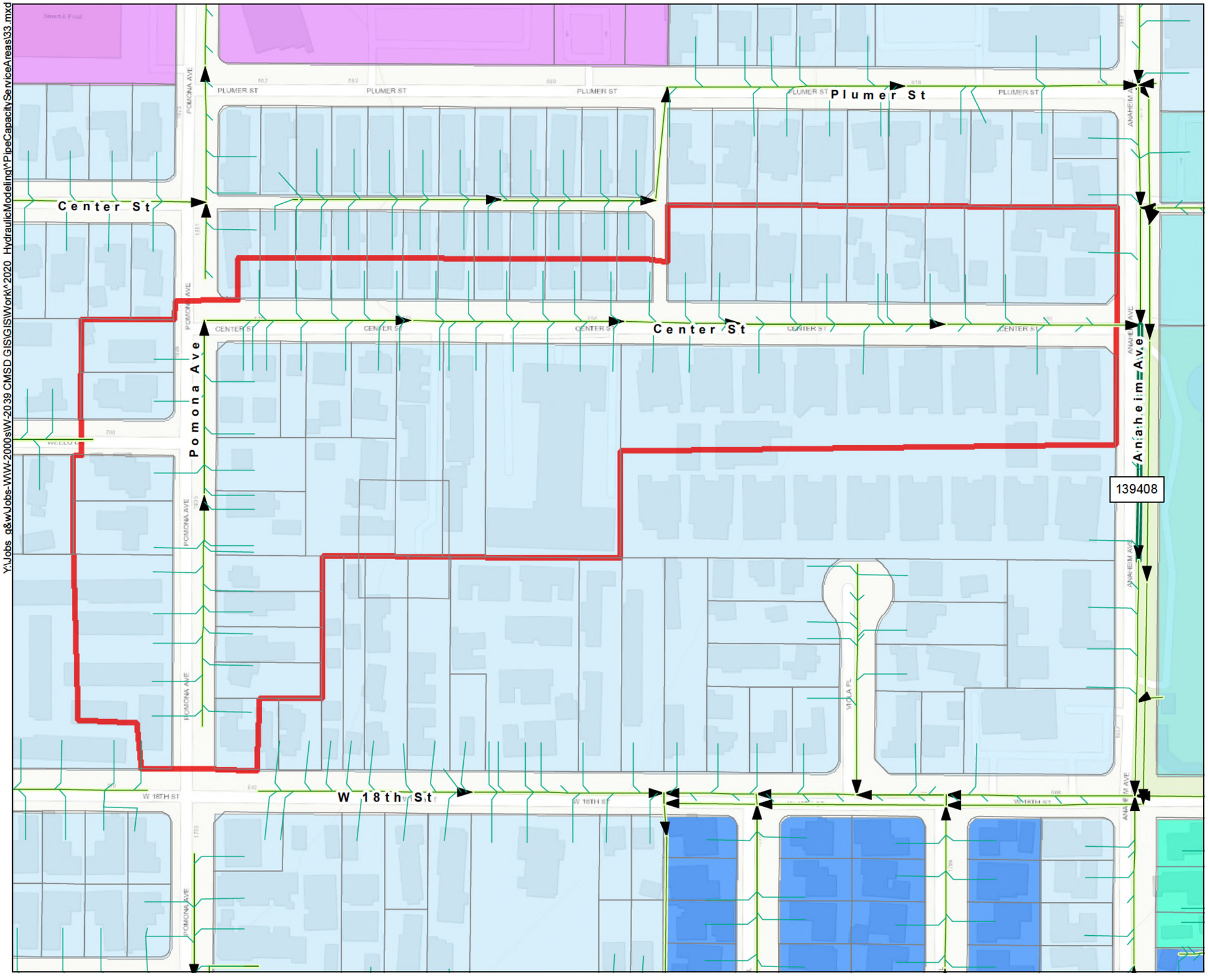

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139408	HDR	11.39

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 33

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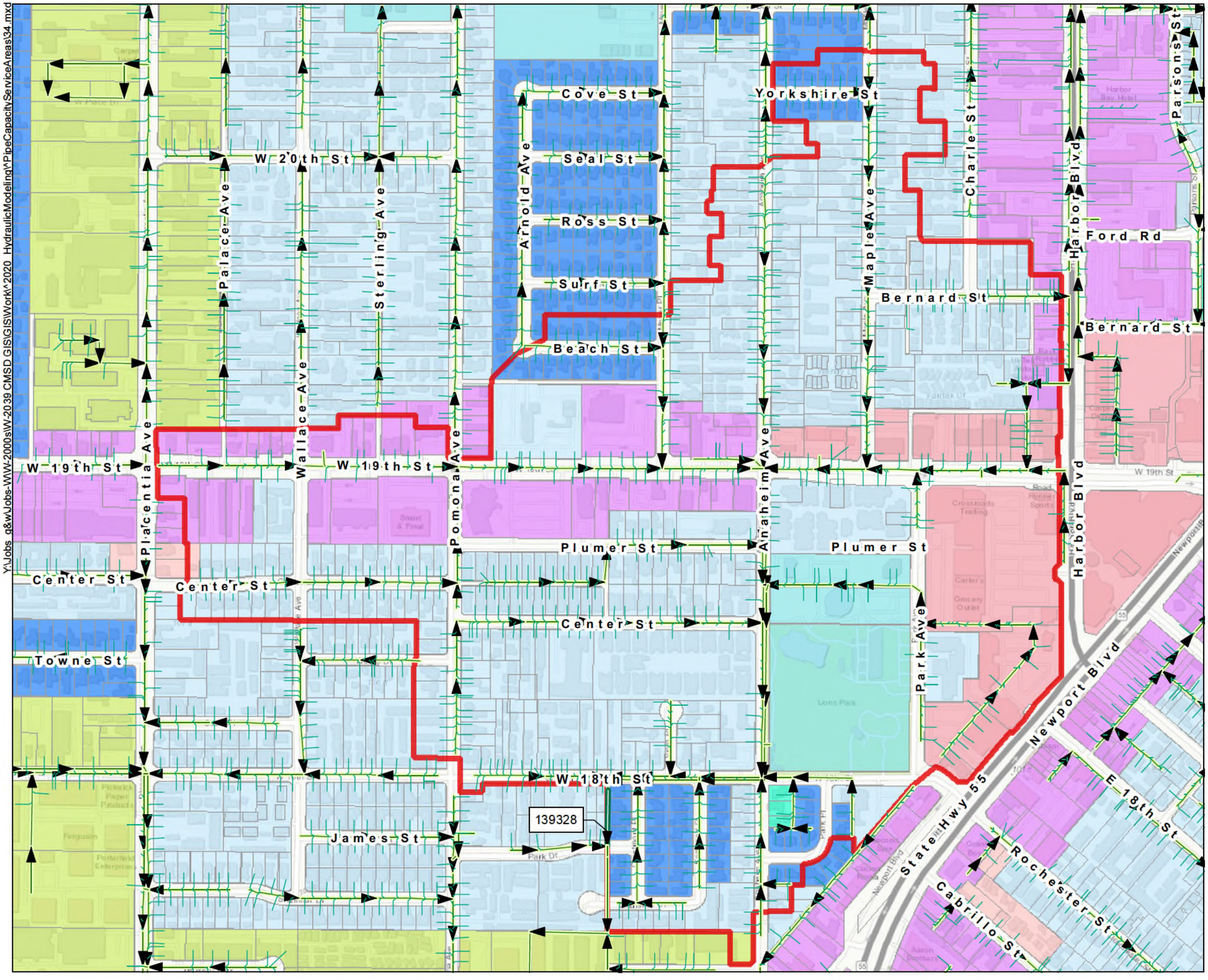

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139328	CC	17.78
	GC	20.73
	HDR	78.38
	LDR	10.70
	LI	0.32
	MDR	0.43
	NC	0.18
	PI	12.61

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 34

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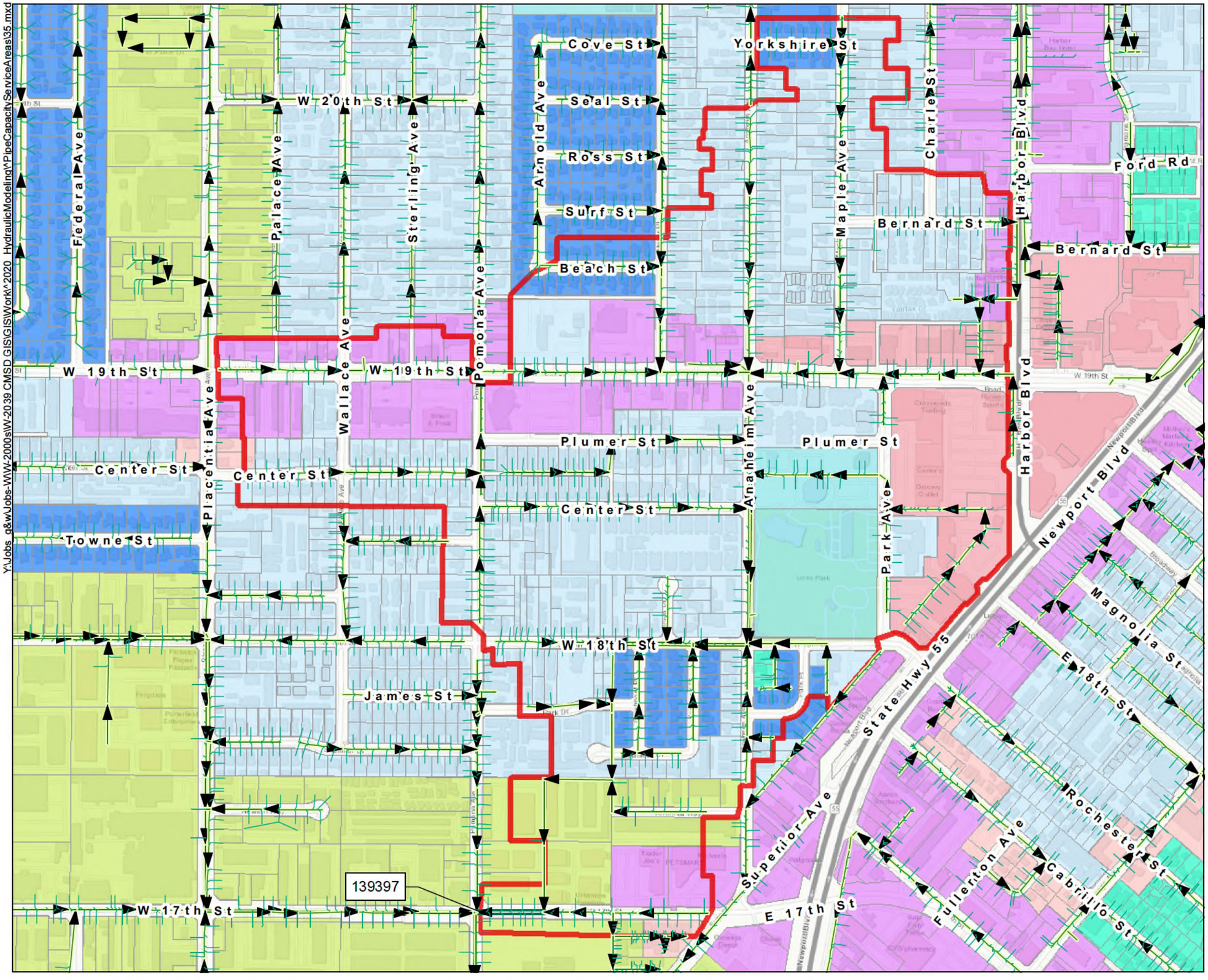

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139397	CC	17.78
	GC	24.12
	HDR	82.94
	LDR	10.45
	LI	11.26
	MDR	0.43
	NC	0.68
	PI	12.61

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 35

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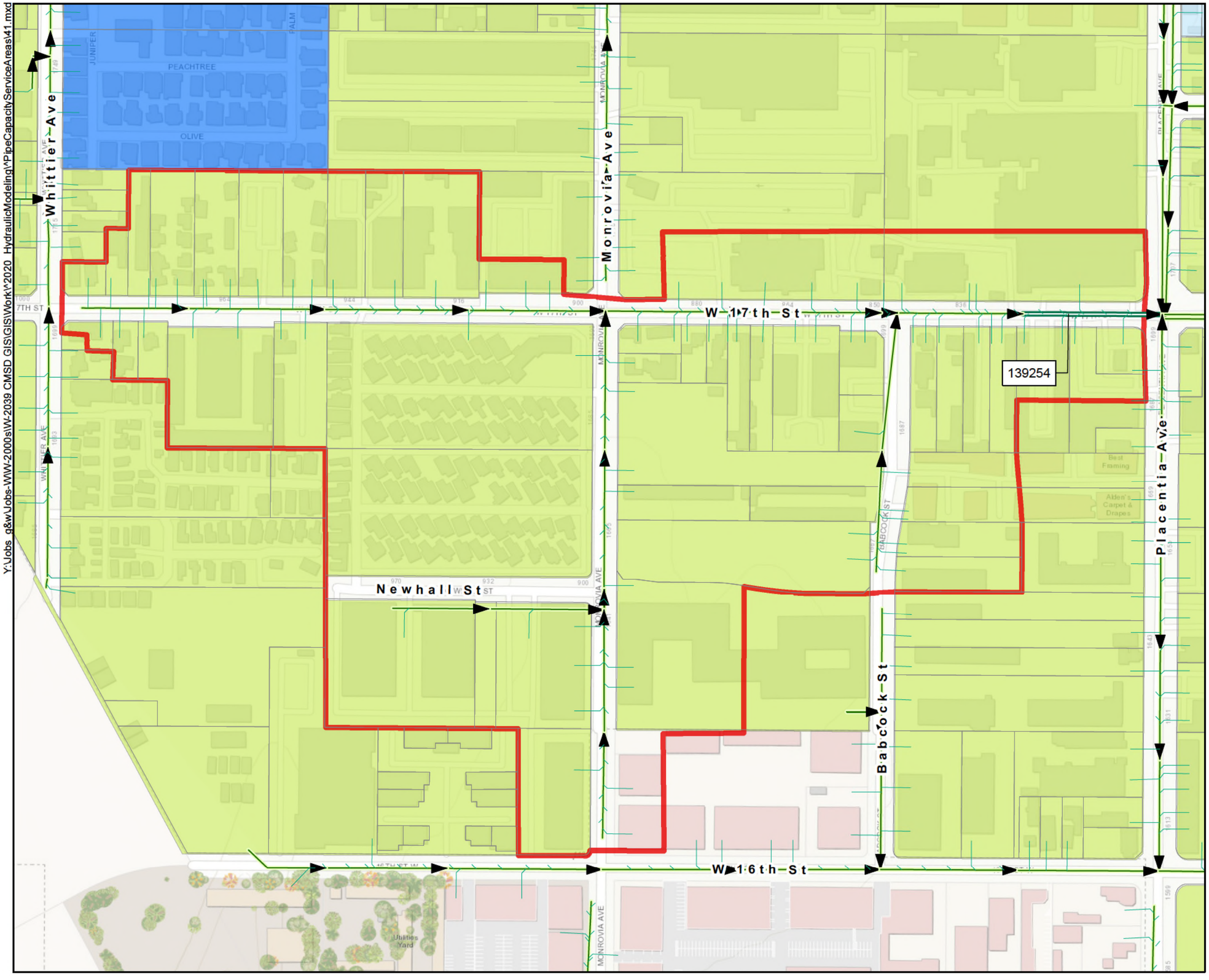


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

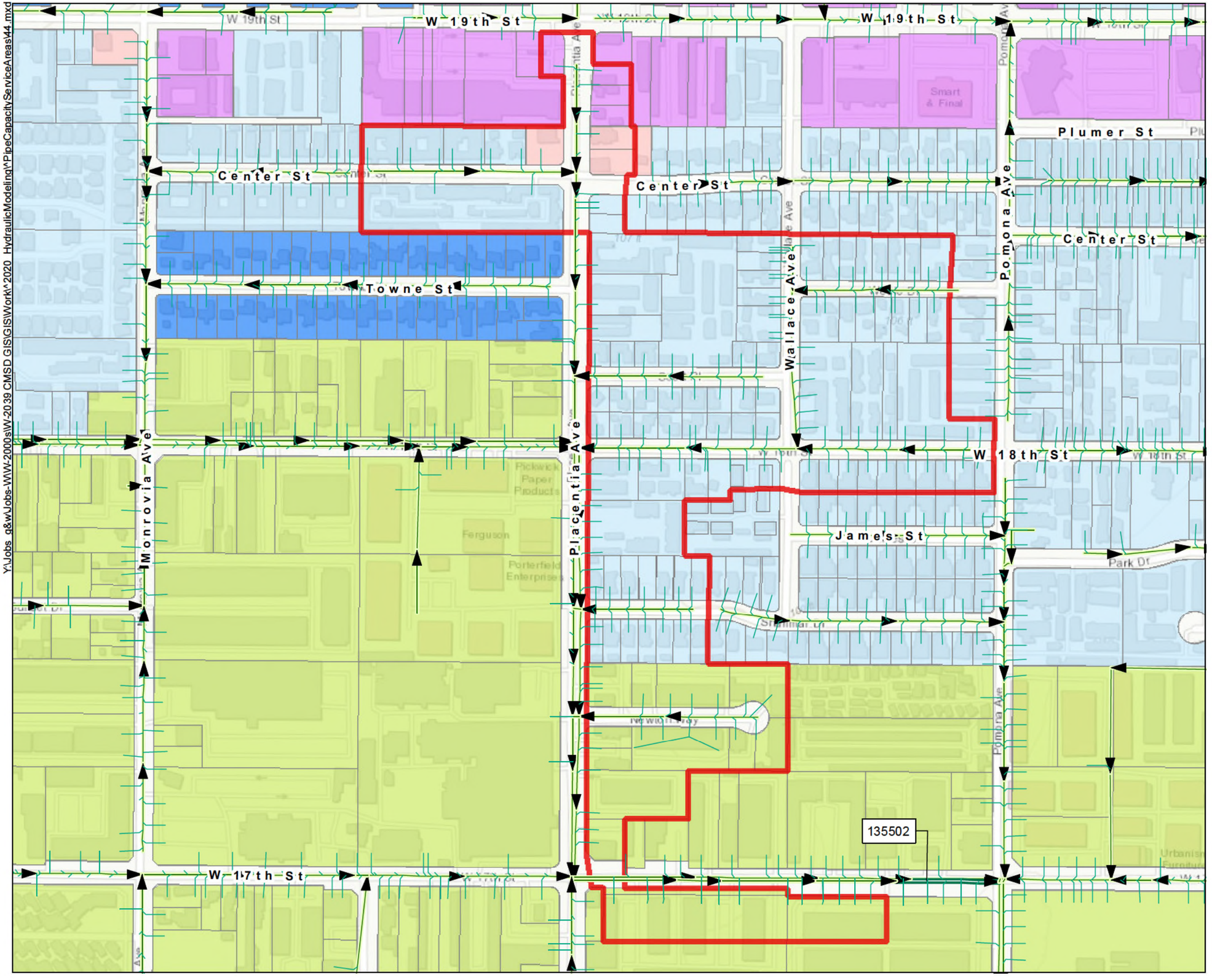
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139254	LI	44.43

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 41



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135502	GC	0.78
	HDR	24.42
	LI	8.35
	NC	0.79

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 44

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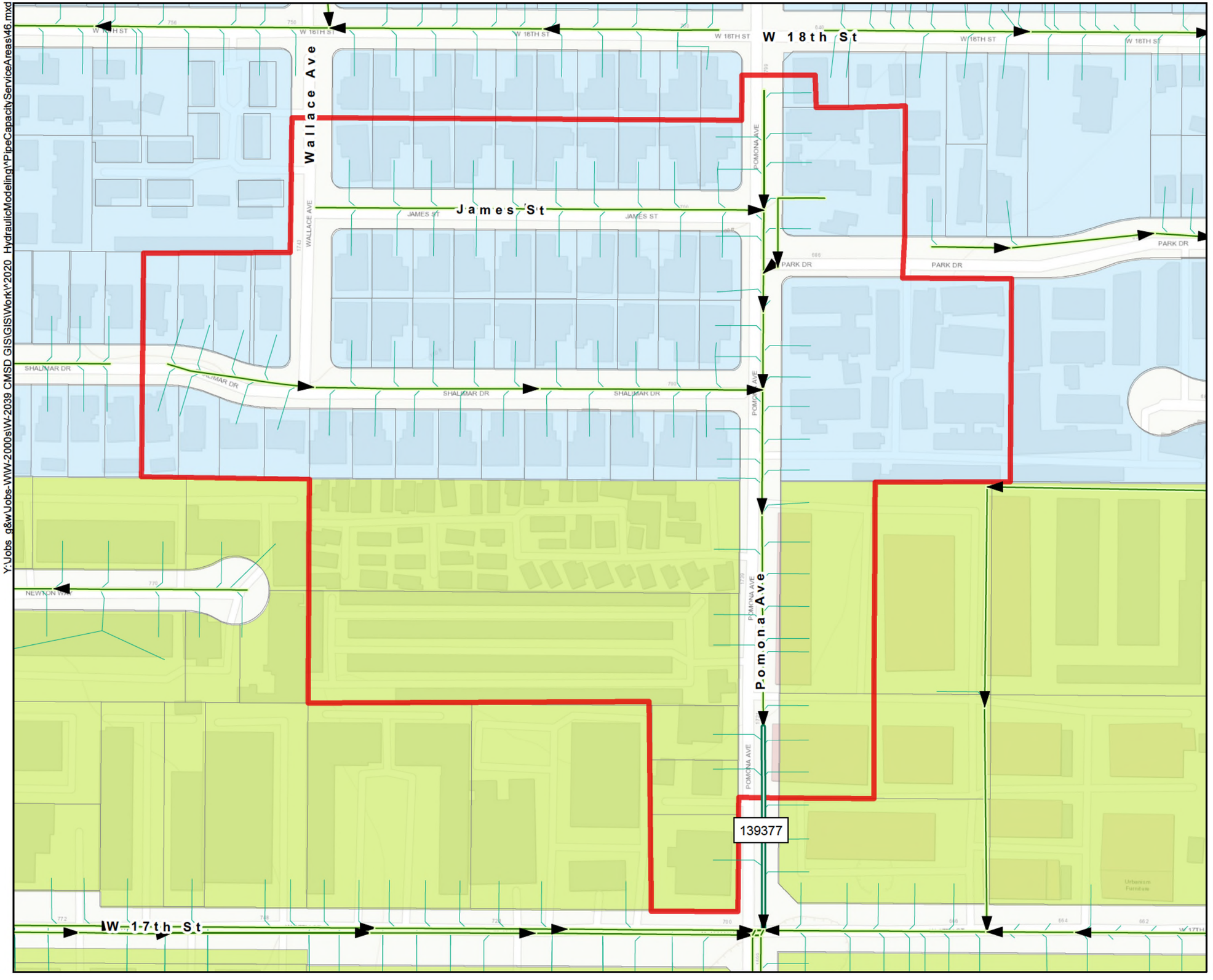

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

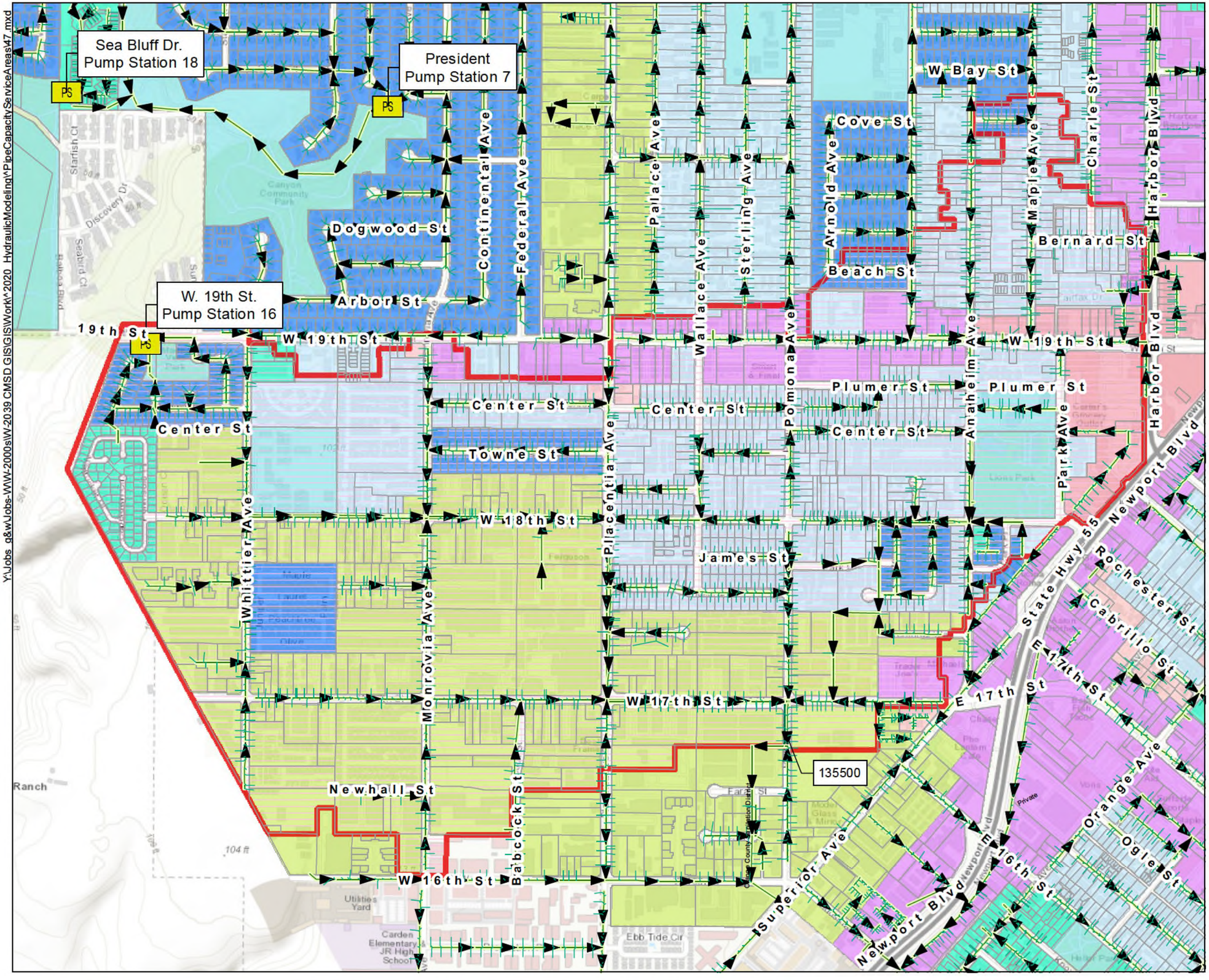
N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
139377	HDR	10.26
	LI	7.09

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 46

Y:\Jobs_q&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas\47.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

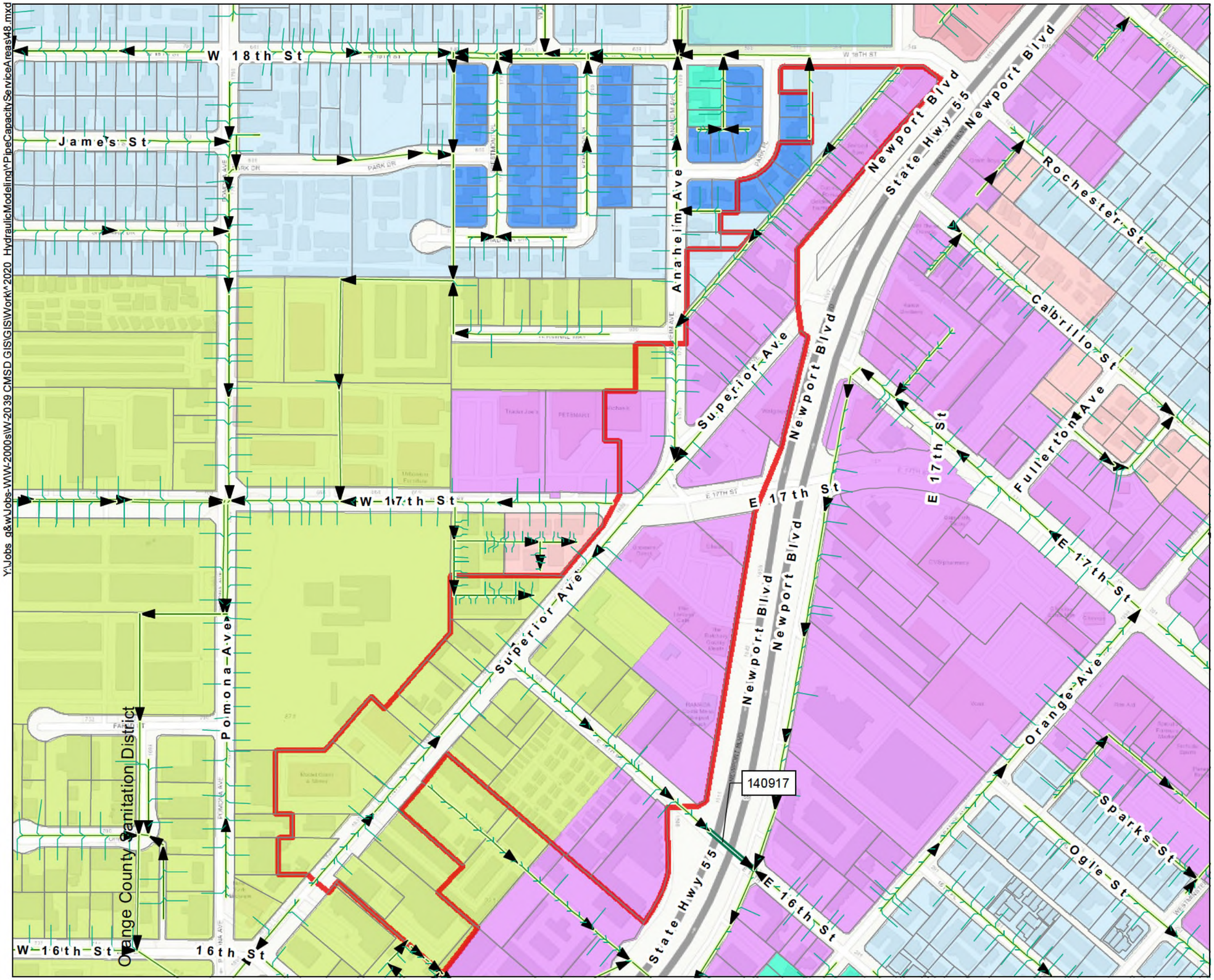
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135500	CC	17.04
	GC	27.15
	HDR	143.89
	LDR	37.52
	LI	196.98
	MDR	10.67
	NC	2.30
	PI	24.01

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 47

Y:\Jobs q&w\Jobs-WWW-2000s\WW-2039 CMSD GIS\GIS\Work\^2020 HydraulicModeling\PipeCapacityServiceAreas48.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

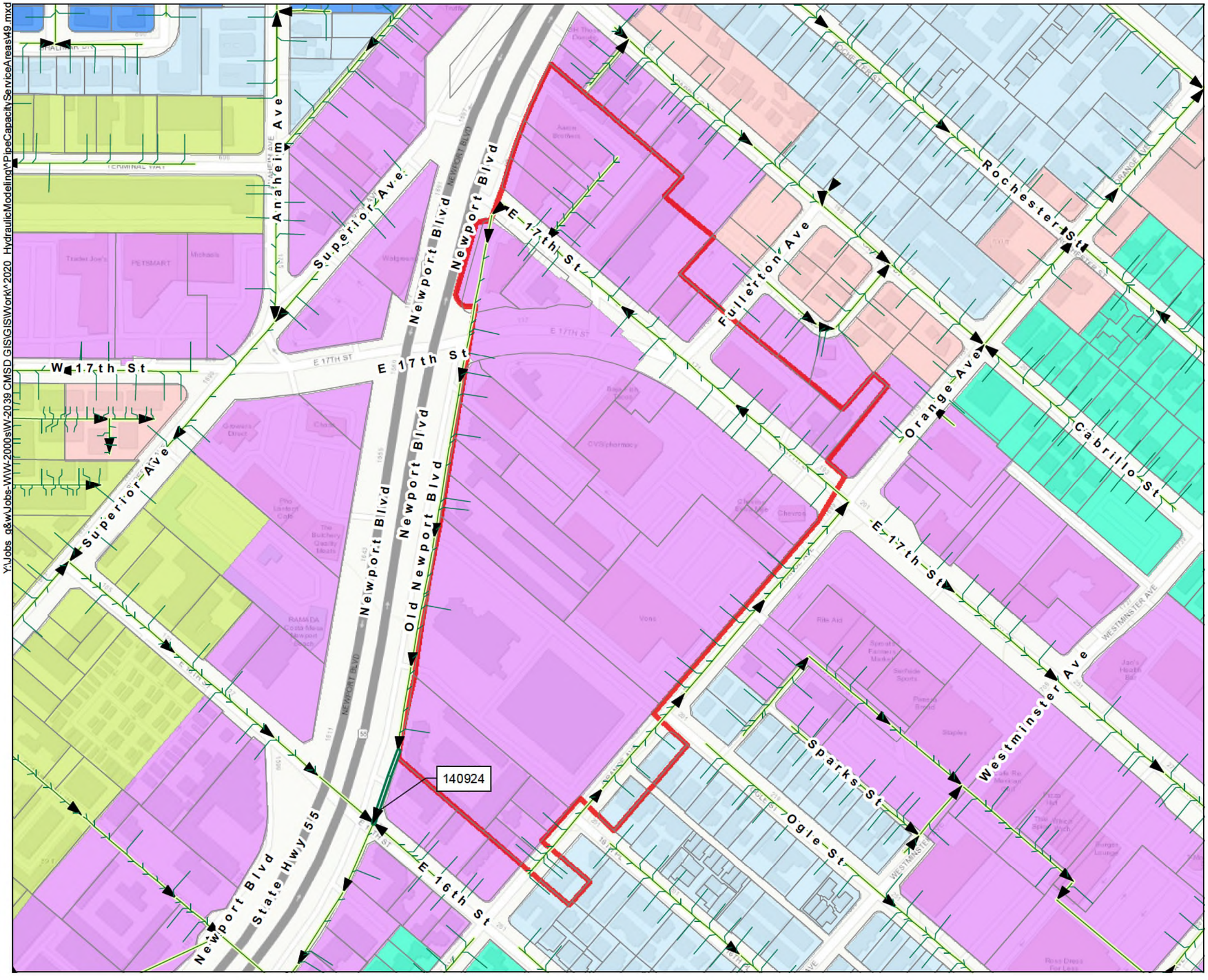
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140917	GC	13.18
	HDR	1.49
	LDR	0.62
	LI	12.56
	NC	0.01

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 48

Y:\Jobs_q&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\PipeCapacityServiceAreas\49.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

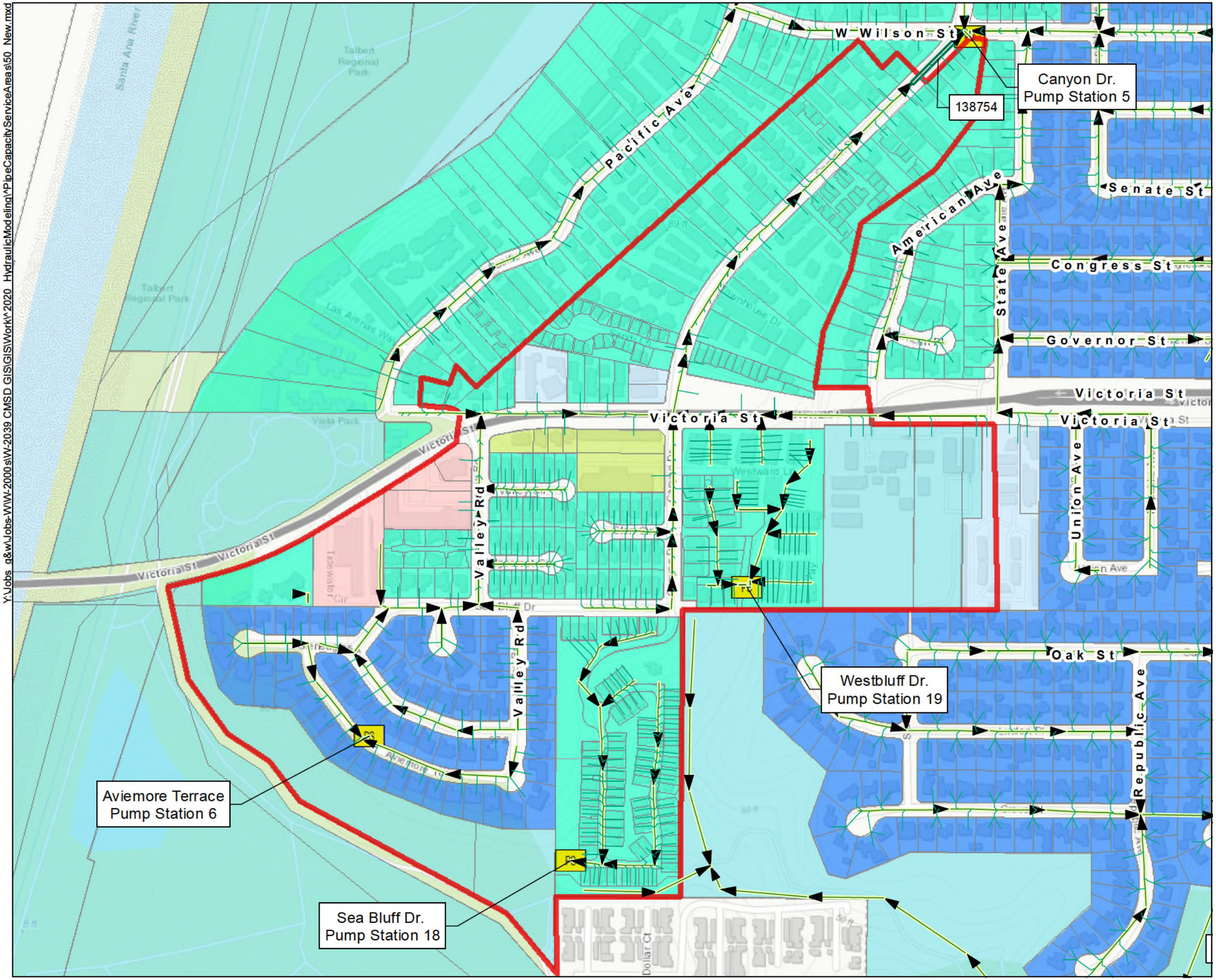
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140924	GC	23.20
	HDR	0.45

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 49

Y:\Jobs_g&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas\50_New.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

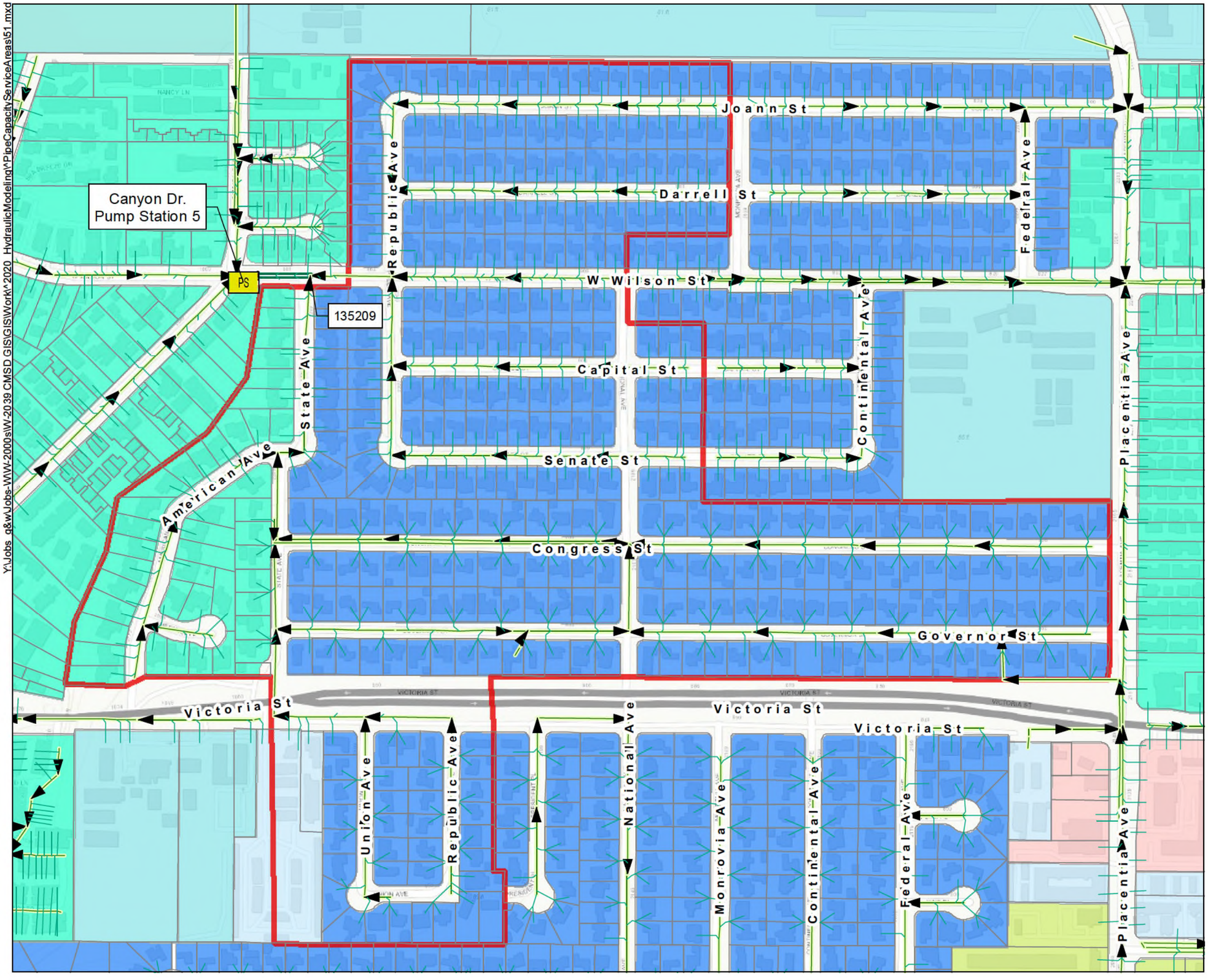
N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
138754	HDR	2.32
	LDR	11.58
	LI	2.00
	MDR	43.28
	NC	3.36
	PI	14.45

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 50

Y:\Jobs_q&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas51.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

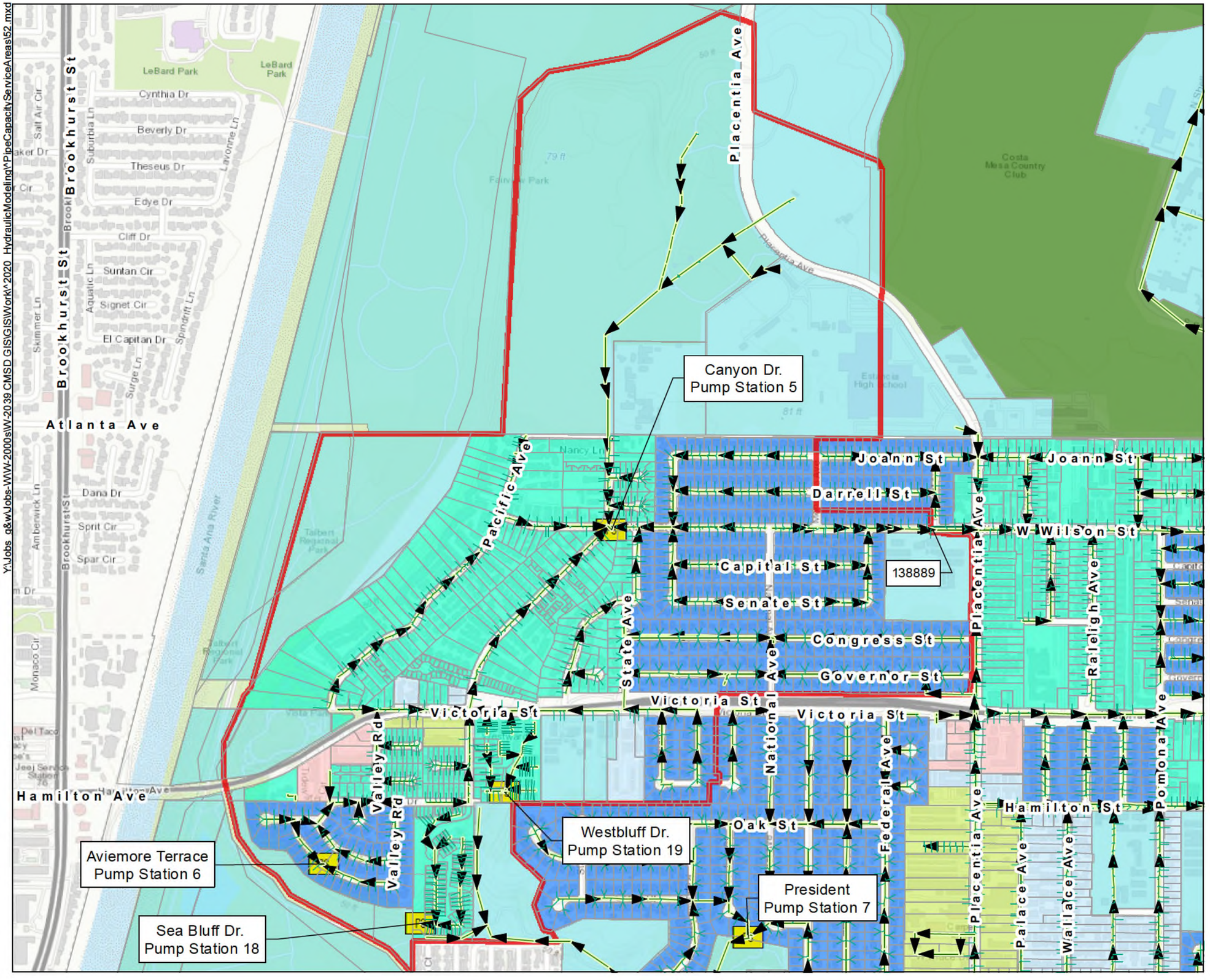
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135209	HDR	2.18
	LDR	53.66
	MDR	8.12
	PI	0.09

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 51

Y:\Jobs_q&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\PipeCapacityServiceAreas\52.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

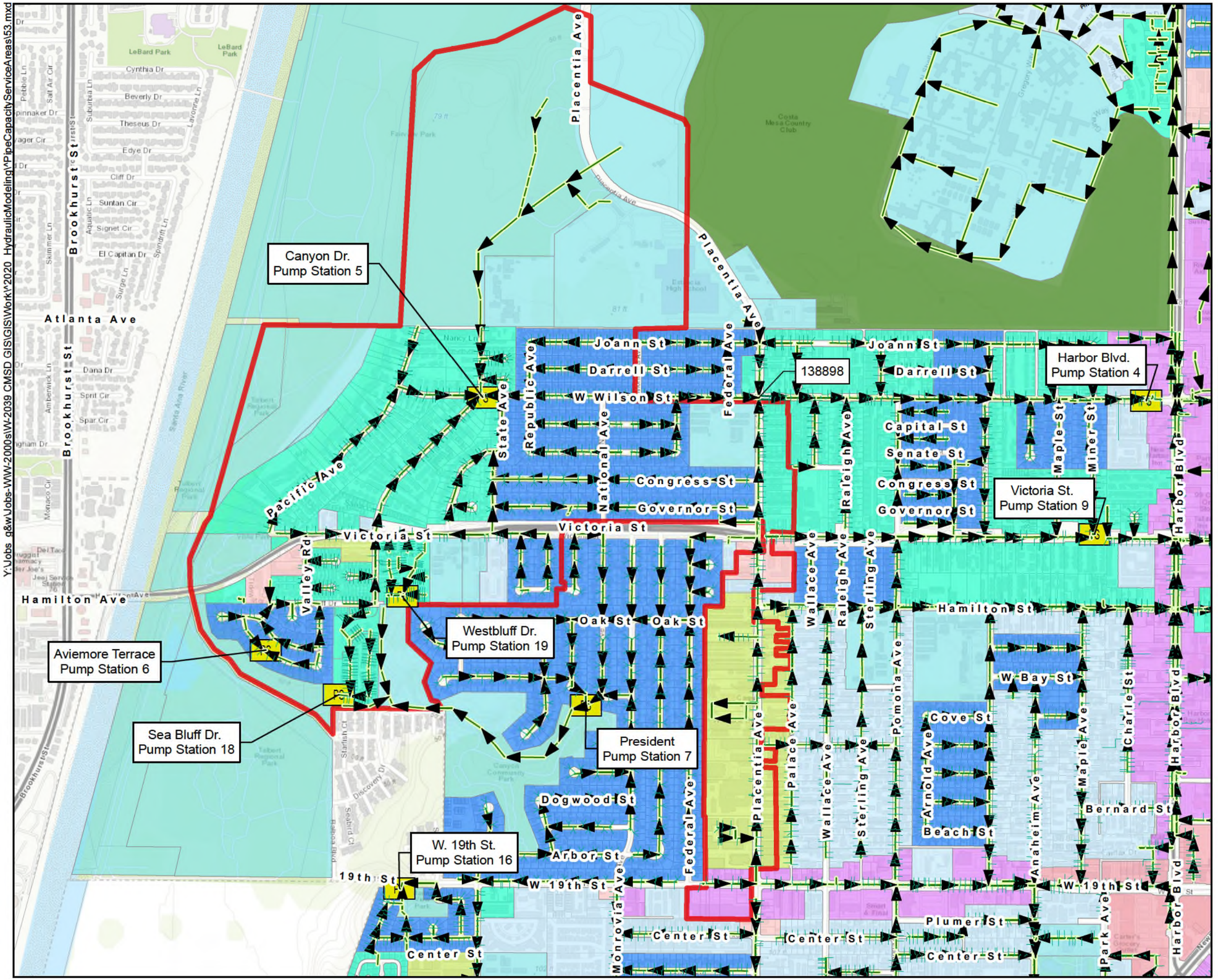
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138889	G	0.03
	HDR	4.49
	LDR	74.57
	LI	2.00
	MDR	97.02
	NC	3.36
	PI	216.30

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 52

Y:\Jobs_g&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas\53.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138898	G	0.03
	GC	5.19
	HDR	5.82
	LDR	72.69
	LI	37.33
	MDR	104.56
	NC	6.66
	PI	216.25

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 53

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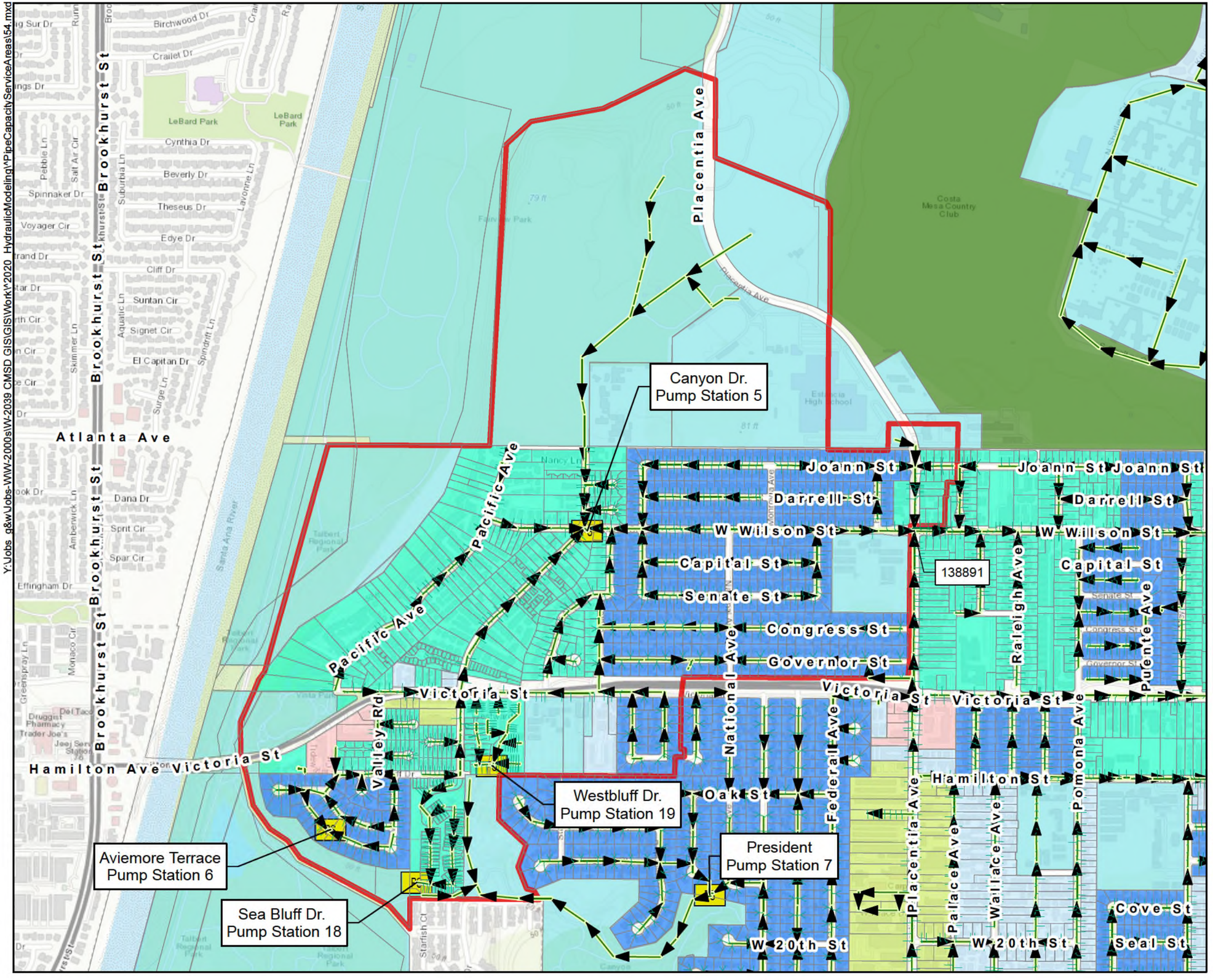


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

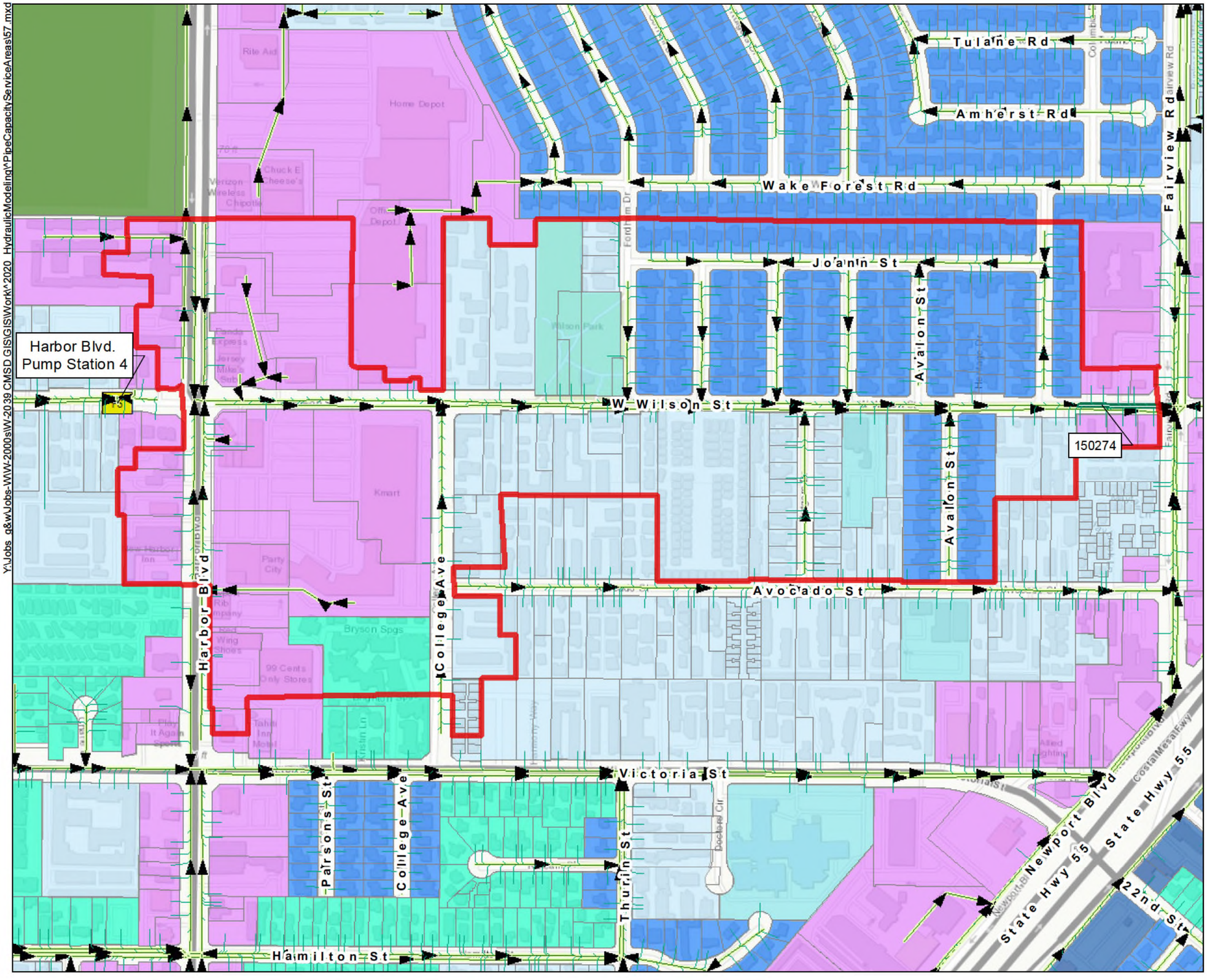
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138891	G	0.03
	HDR	4.49
	LDR	83.90
	LI	2.00
	MDR	101.03
	NC	3.36
	PI	218.48

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 54

Y:\Jobs_q&wJobs-WW-2000s\W-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\^PipeCapacityServiceAreas\57.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
150274	GC	29.21
	HDR	24.78
	LDR	21.41
	MDR	2.73
	PI	5.01

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 57

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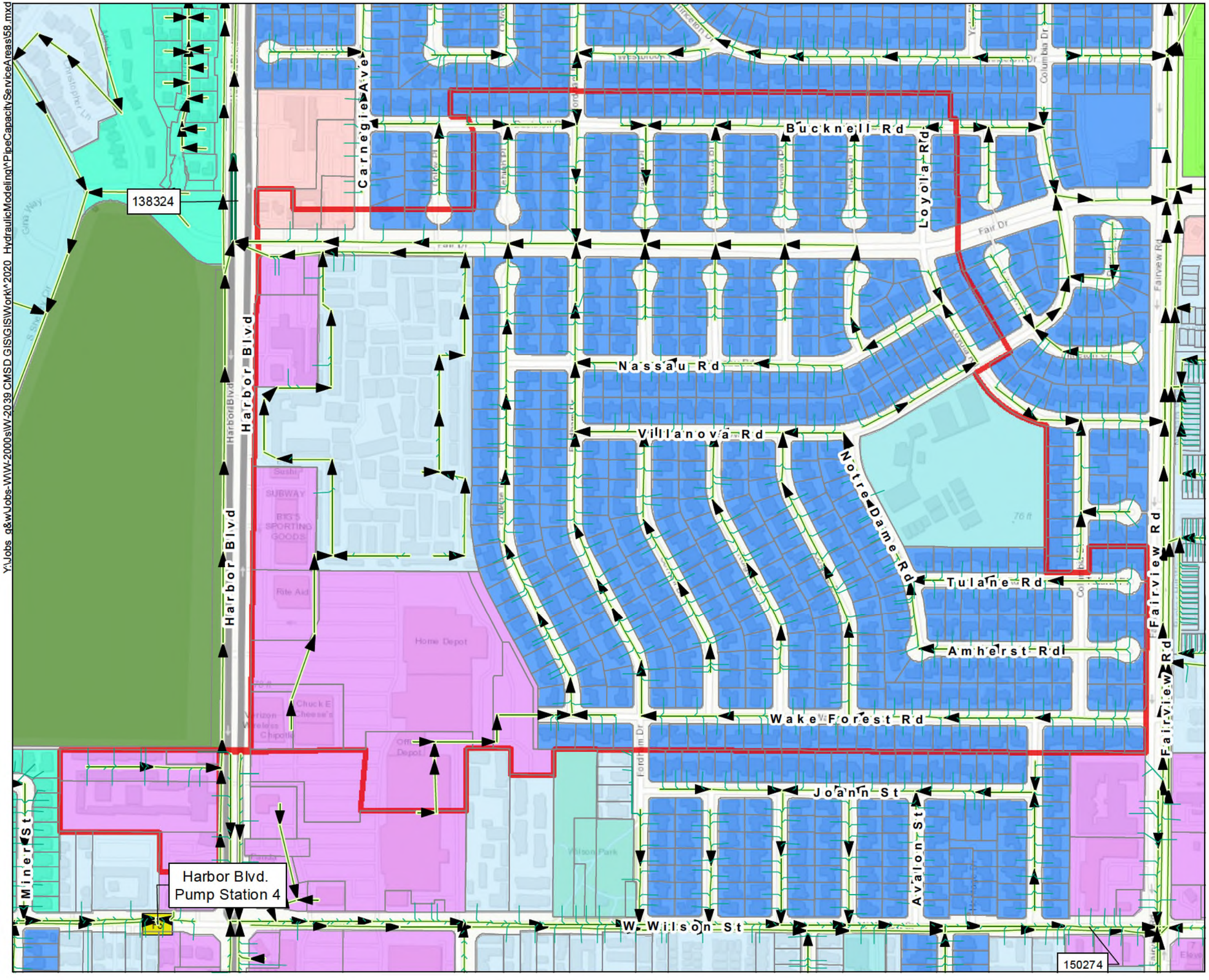

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
138324	GC	28.00
	HDR	17.70
	LDR	77.92
	NC	0.89
	PI	7.97

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 58

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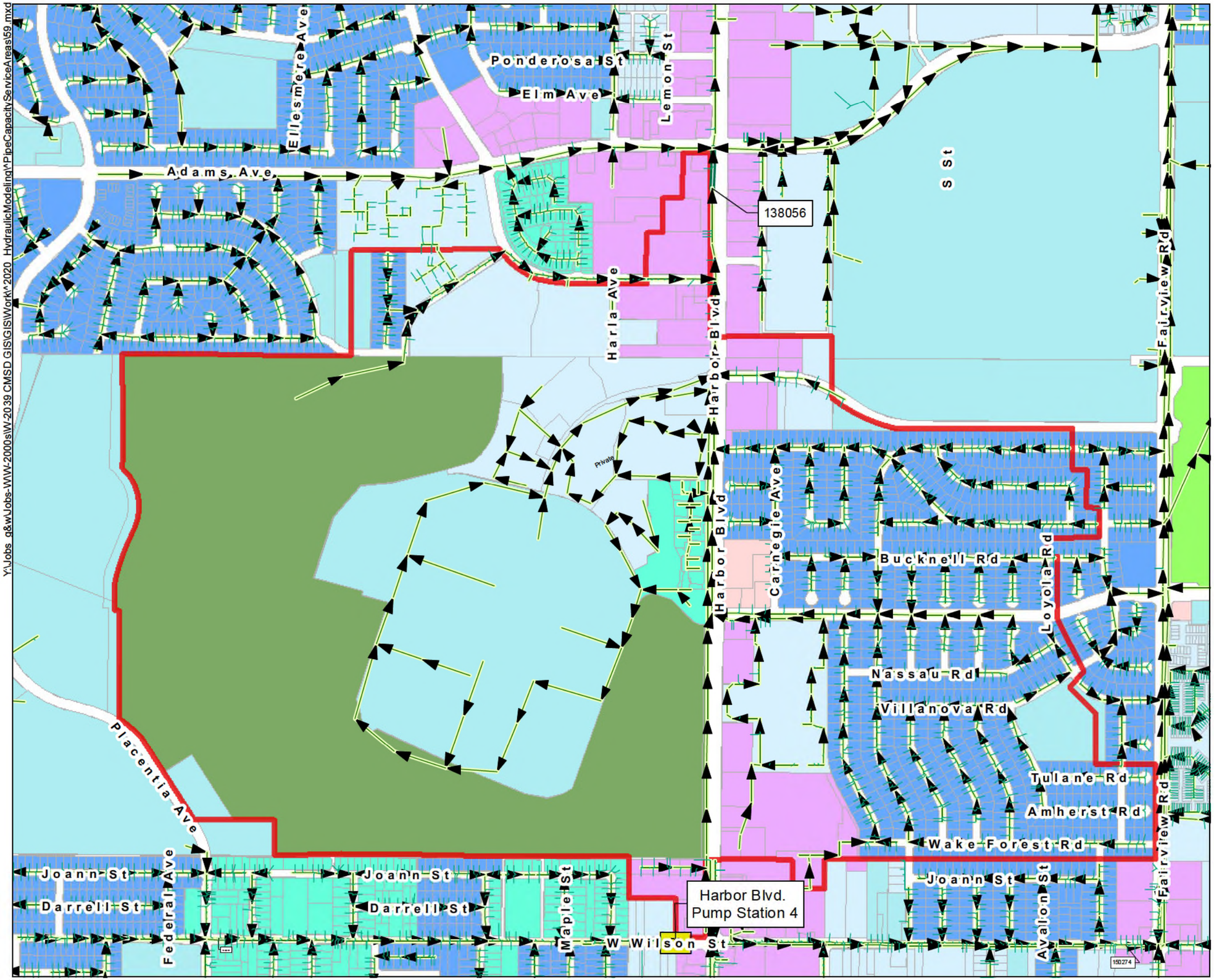

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138056	G	235.96
	GC	51.07
	HDR	93.73
	LDR	125.03
	MDR	11.17
	NC	4.50
	PI	116.45

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 59

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138301	G	0.01
	LDR	55.93
	PI	19.29

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 60

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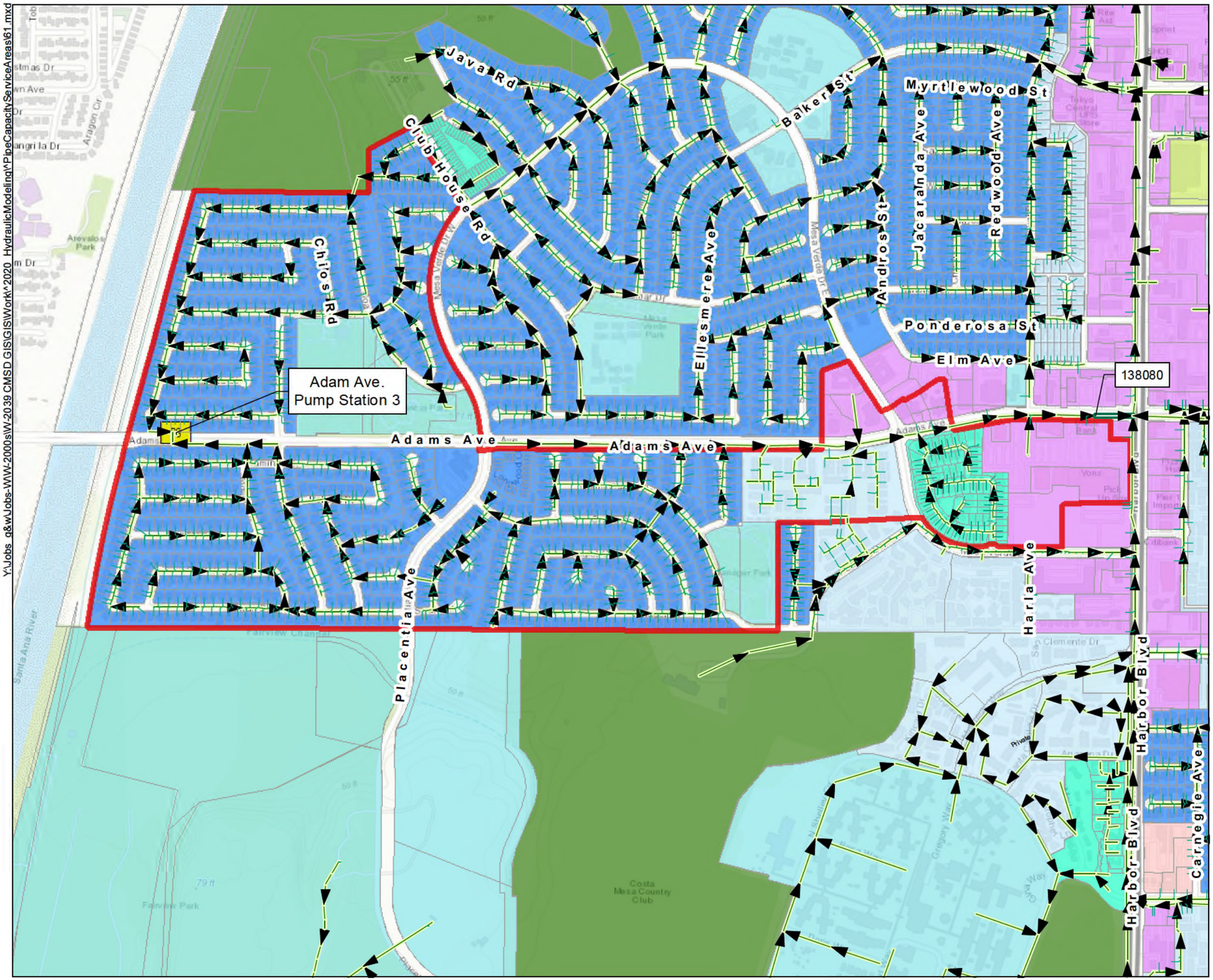

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138080	G	0.05
	GC	24.24
	HDR	15.07
	LDR	165.15
	MDR	24.02
	PI	26.67

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 61

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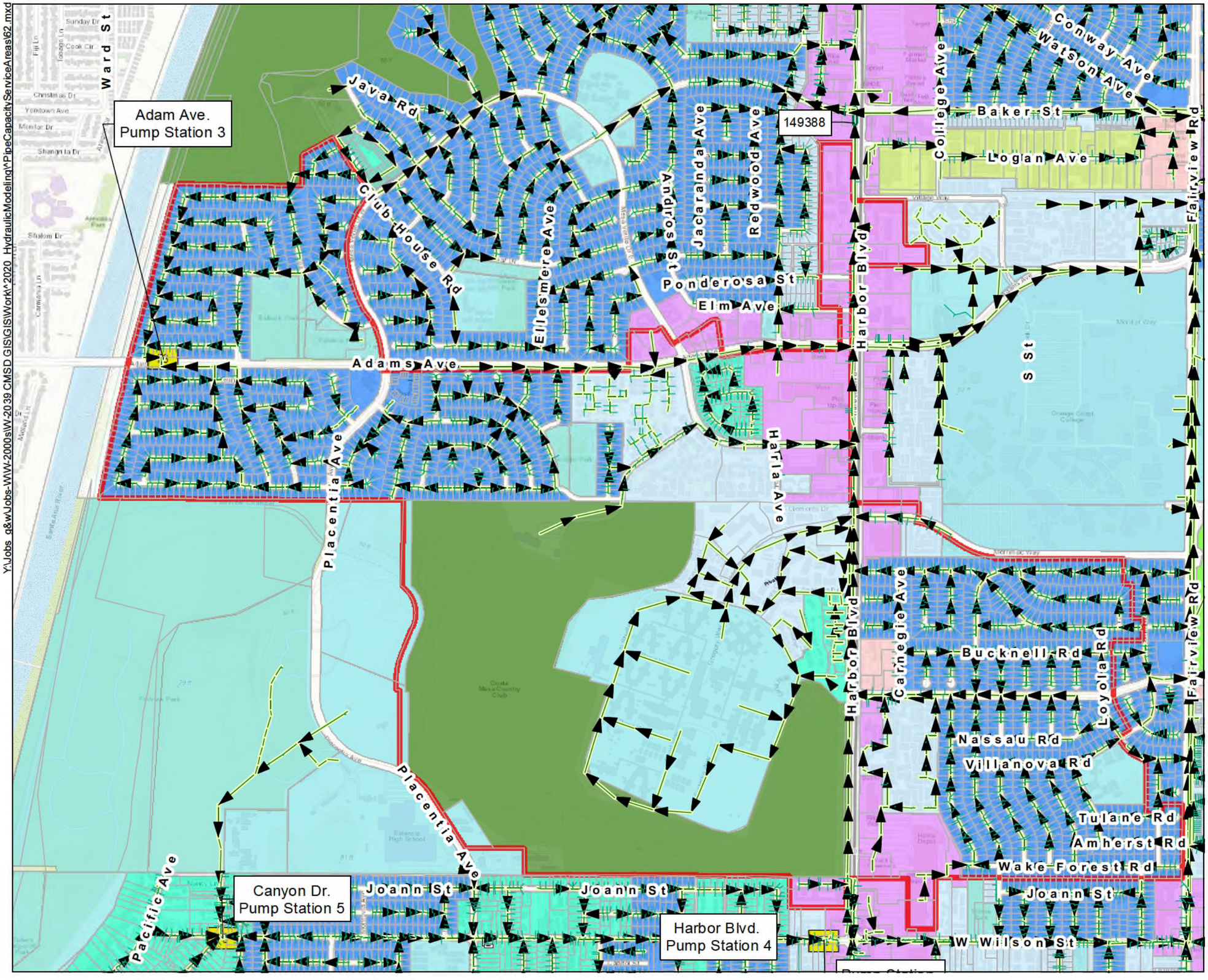

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
149388	G	236.16
	GC	90.53
	HDR	107.17
	LDR	291.78
	MDR	35.24
	NC	4.50
	PI	147.56

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 62

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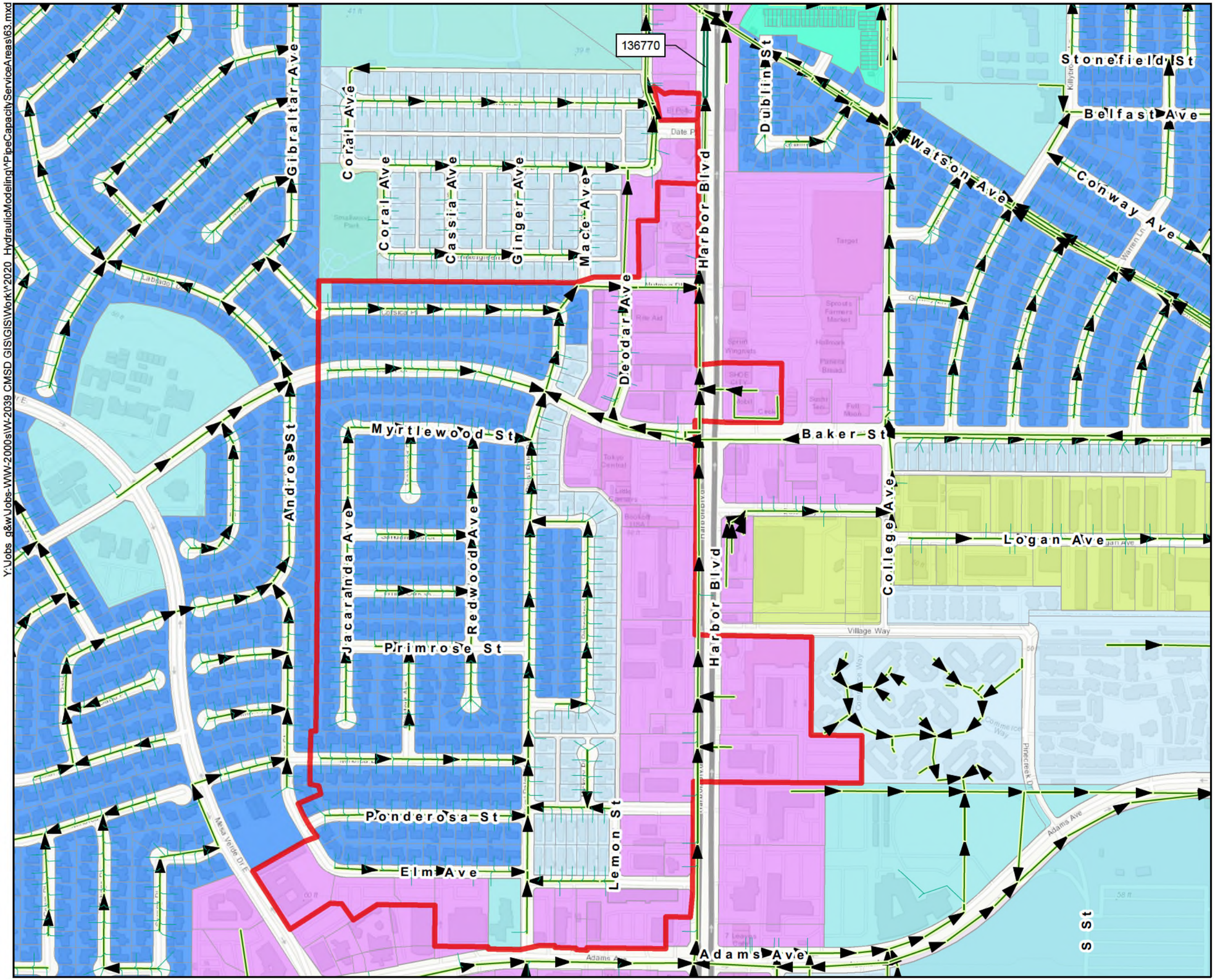

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
136770	GC	45.53
	HDR	9.78
	LDR	51.44
	PI	1.28

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 63

Y:\Jobs_q&w\Jobs-WW-2000s\W-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas\64_New.mxd

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

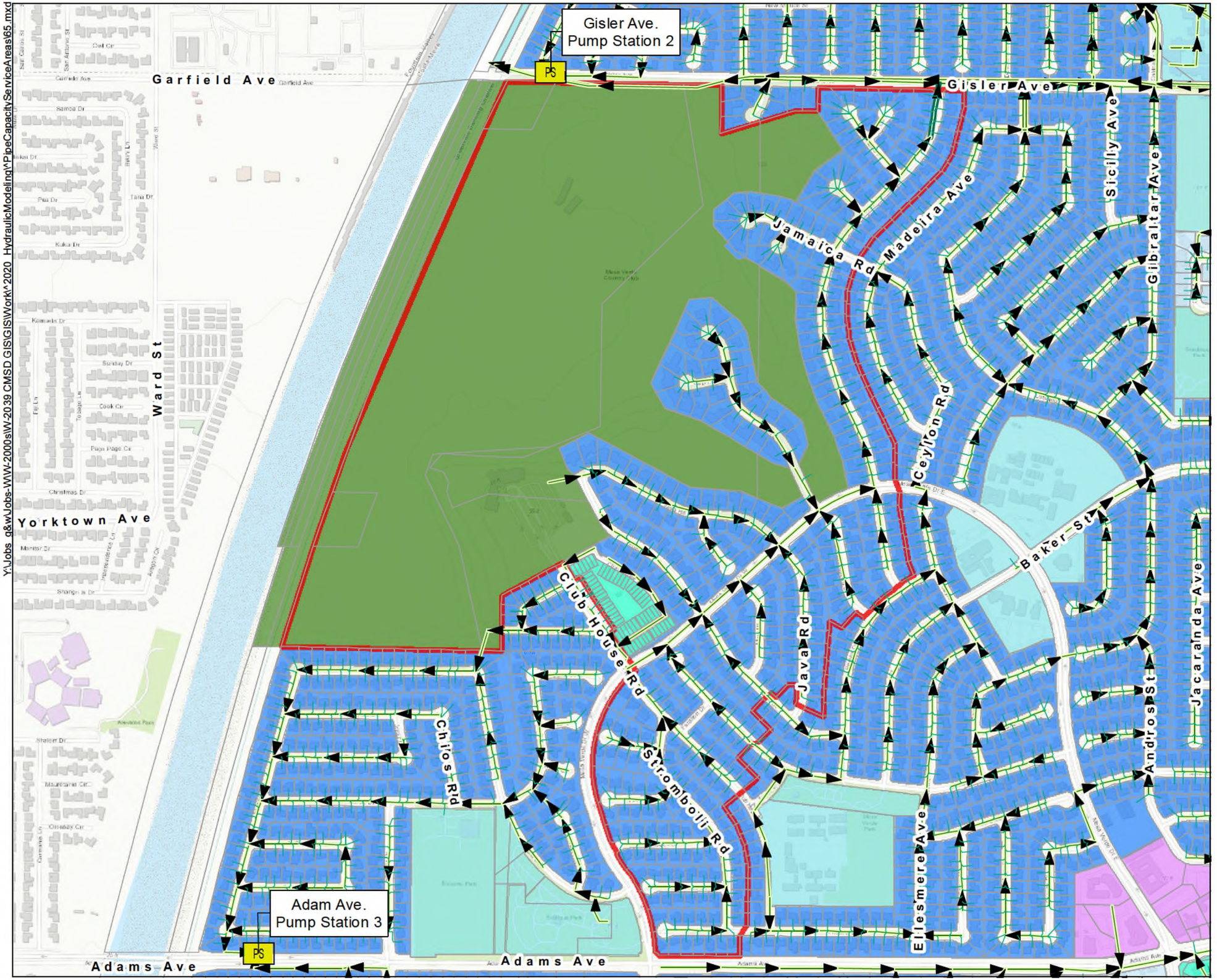
N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
137040	LDR	41.66

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 64

Y:\Jobs q&w\Jobs-WWW-2000s\WW-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\^PipeCapacityServiceAreas\65.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

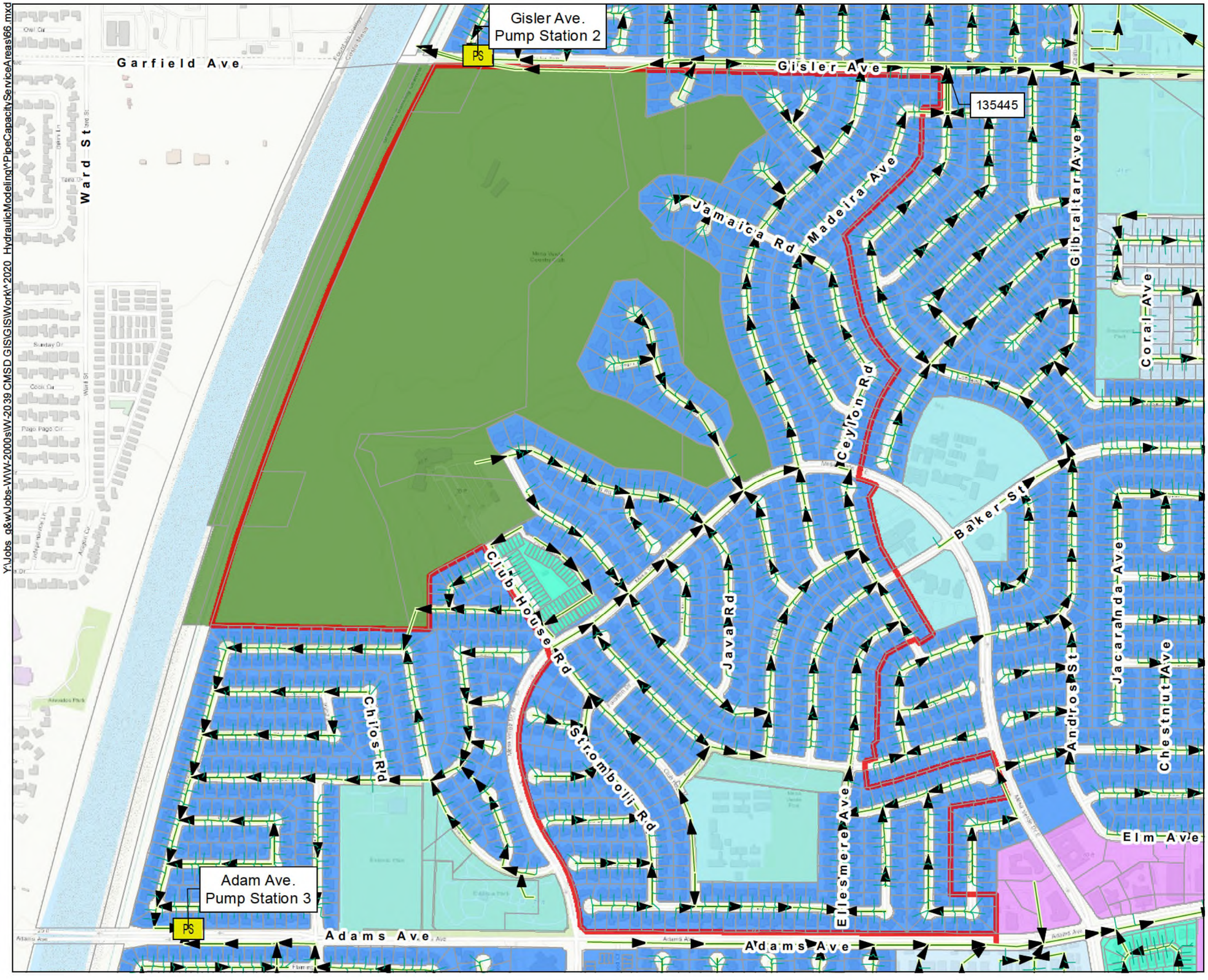
N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
136915	G	142.26
	LDR	84.27
	MDR	3.58

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 65

Y:\Jobs_q&w\Jobs-WW-2000s\W-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\^PipeCapacityServiceAreas\66.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135445	G	144.30
	LDR	146.17
	MDR	3.58
	PI	13.10

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 66

Y:\Jobs_q&w\Jobs-WW-2000s\WW-2039 CMSD GIS\GIS\Work\^2020_HydraulicModeling\^PipeCapacityServiceAreas\67.mxd

PS

Gisler Ave.
Pump Station 2

136779

Gisler Ave
Sicily Ave
Gibraltar Ave
Madeira Ave
Jamaica Rd
Ceylon Rd
Java Rd
Club House Rd
Stromboli Rd
Ellesmere Ave
Androsa St
Coral Ave
Cassia Ave
Ginger Ave
Mace Ave
Cinnamon Ave
Harbor Blvd
Dublin St
Myrtlewood St
Jacaranda Ave
Chestnut Ave
Redwood Ave
Ponderosa St
Elm Ave
Lemon St
Adams Ave
Baker St

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
136779	GC	2.03
	HDR	0.02
	LDR	79.32
	PI	17.30

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 67

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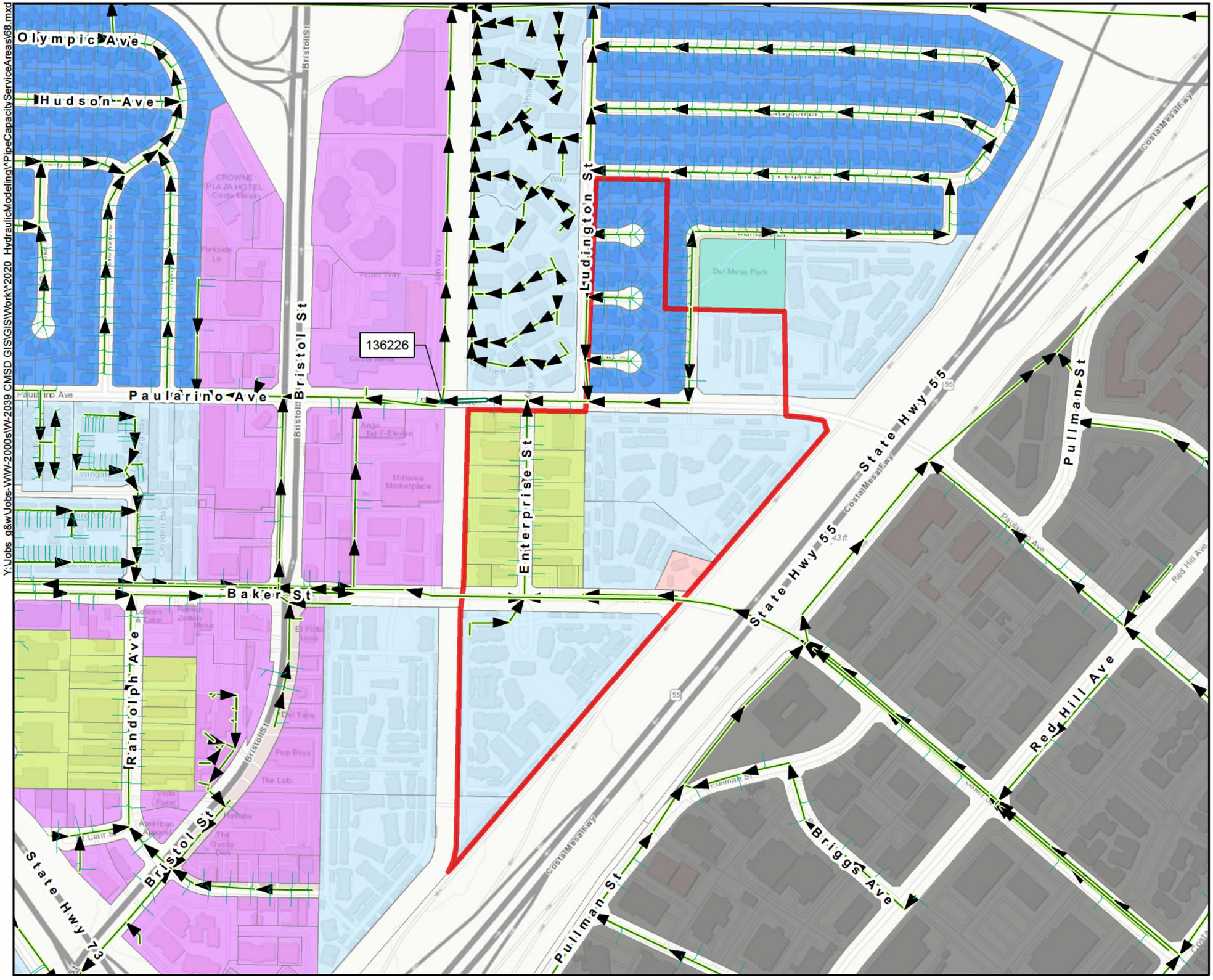

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
136226	HDR	25.65
	LDR	5.932341
	LI	7.3579162
	NC	0.5669142
	PI	0.019072

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 68

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
137693	F	69.83
	GC	0.01
	HDR	15.35
	LDR	135.85
	MDR	7.04
	NC	0.67
	PI	72.59

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 69

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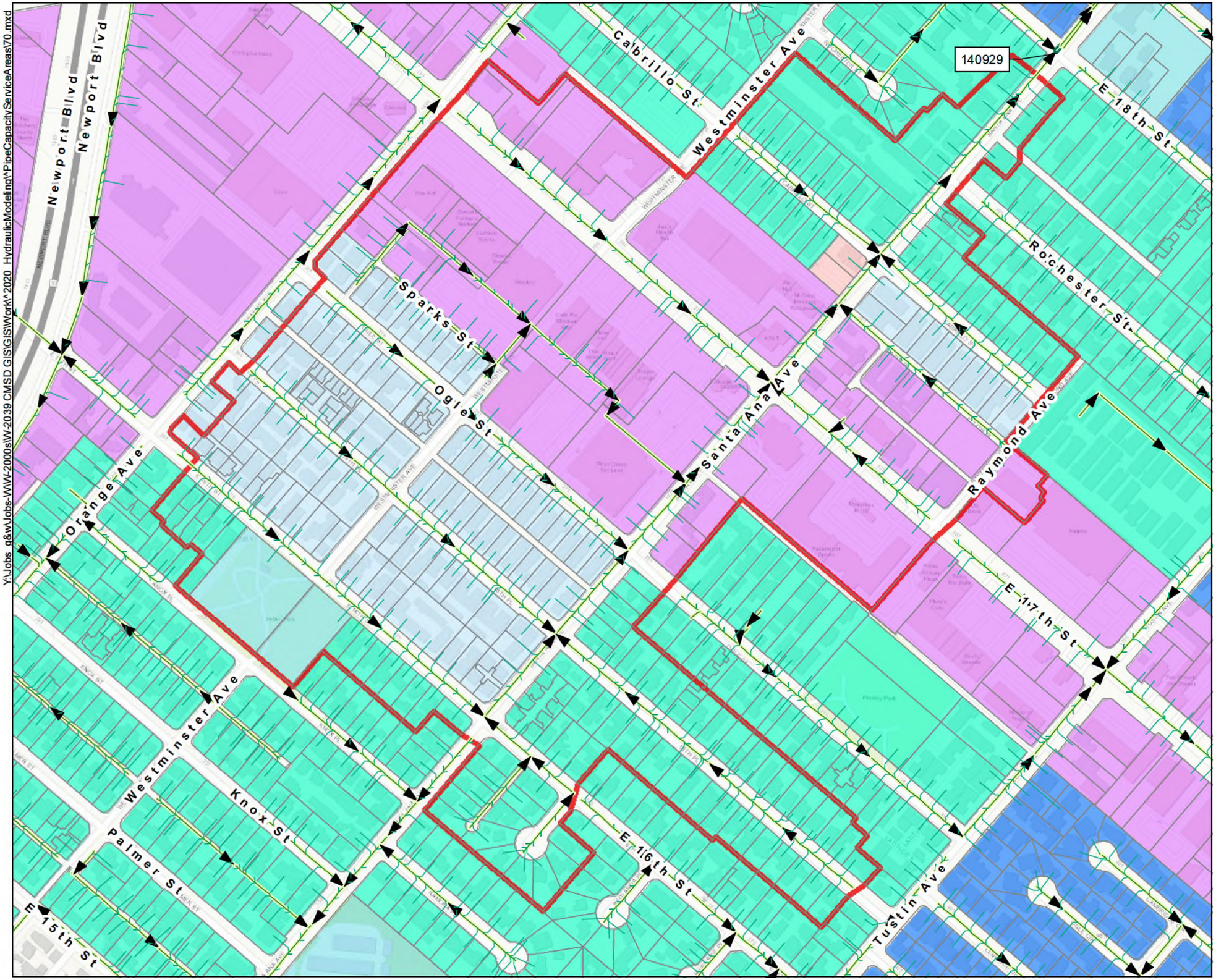

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Golf Course (G)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140929	GC	29.76
	HDR	17.62
	MDR	21.91
	NC	0.38
	PI	2.60

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 70

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

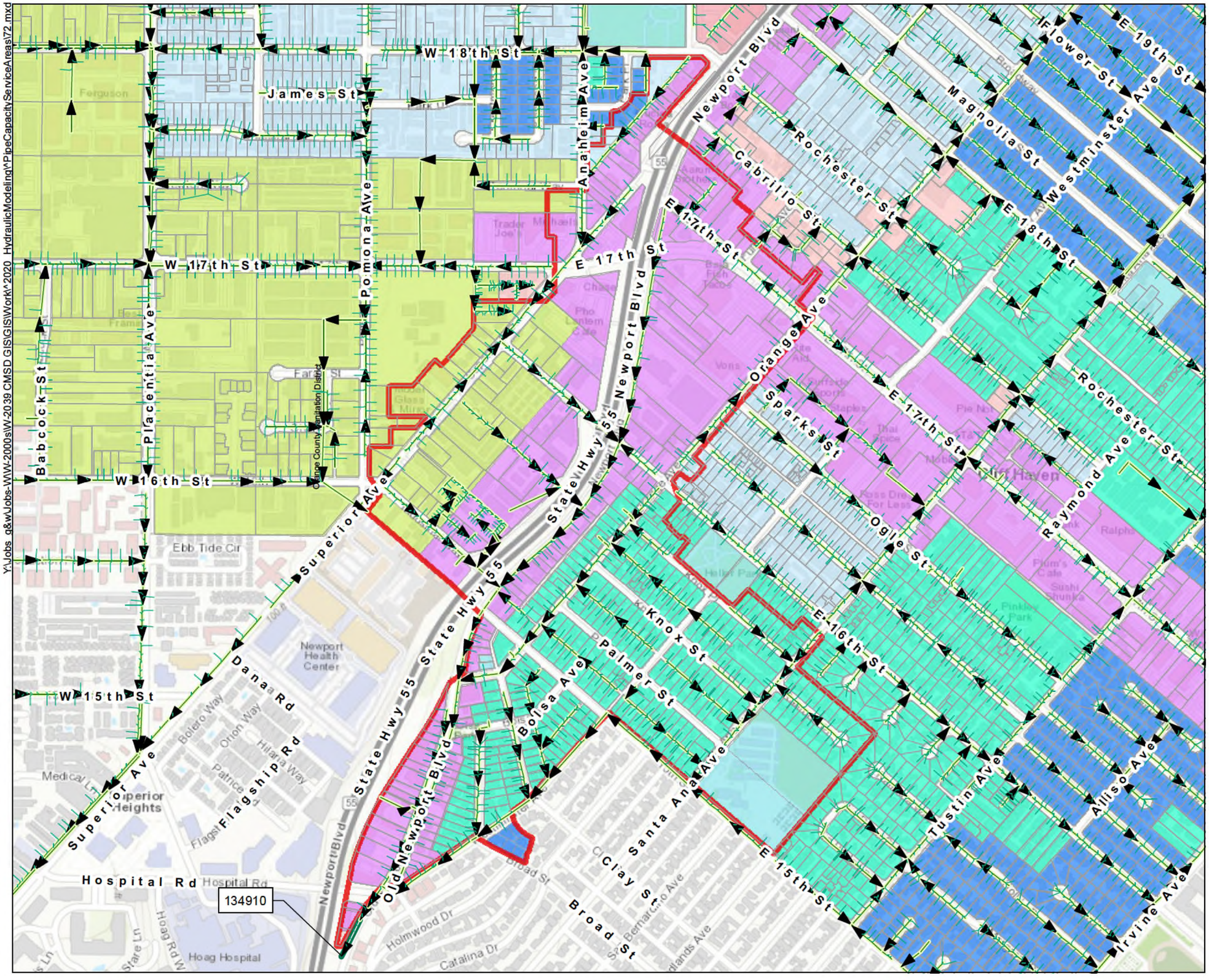
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140999	GC	46.34
	HDR	51.33
	LDR	33.07
	MDR	39.23
	NC	6.97
	PI	2.59

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 71



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
134910	GC	57.63
	HDR	1.67
	LDR	1.45
	LI	19.74
	MDR	42.83
	NC	0.01
	PI	9.26

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 72

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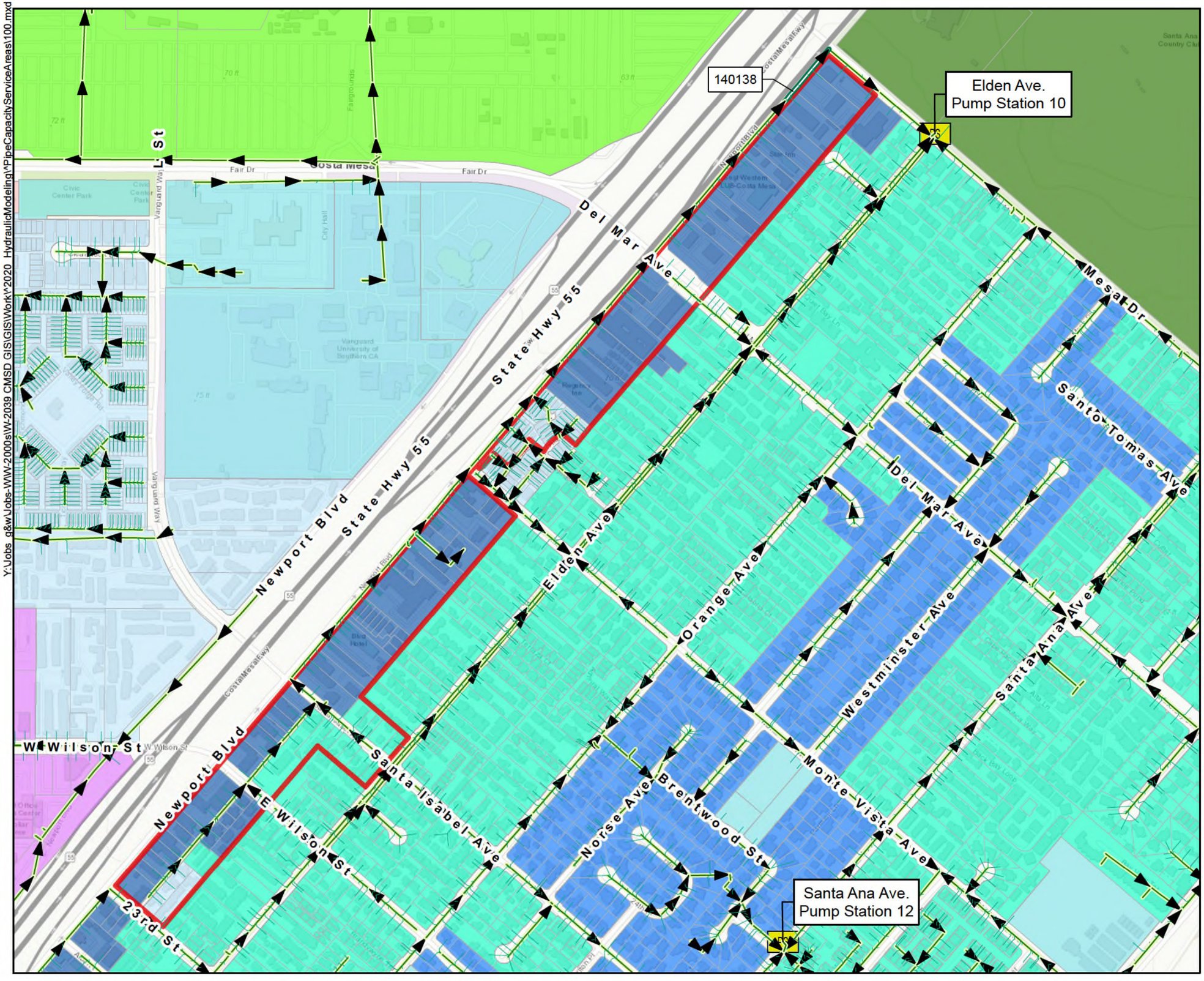

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
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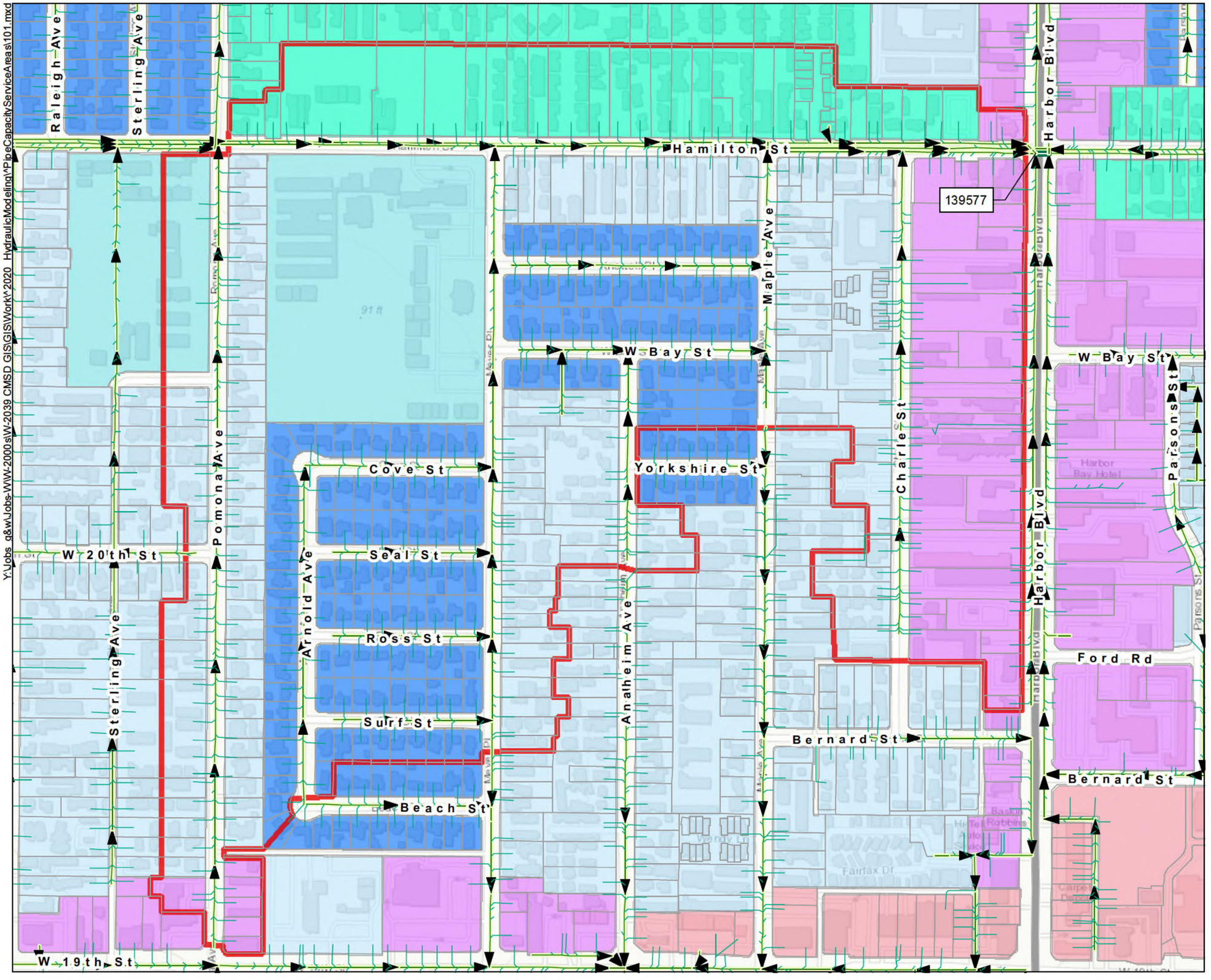
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140138	CR	27.17
	HDR	2.47
	MDR	3.56

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 100



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
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- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139577	GC	15.43
	HDR	33.64
	LDR	22.82
	MDR	14.55
	PI	16.32

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 101

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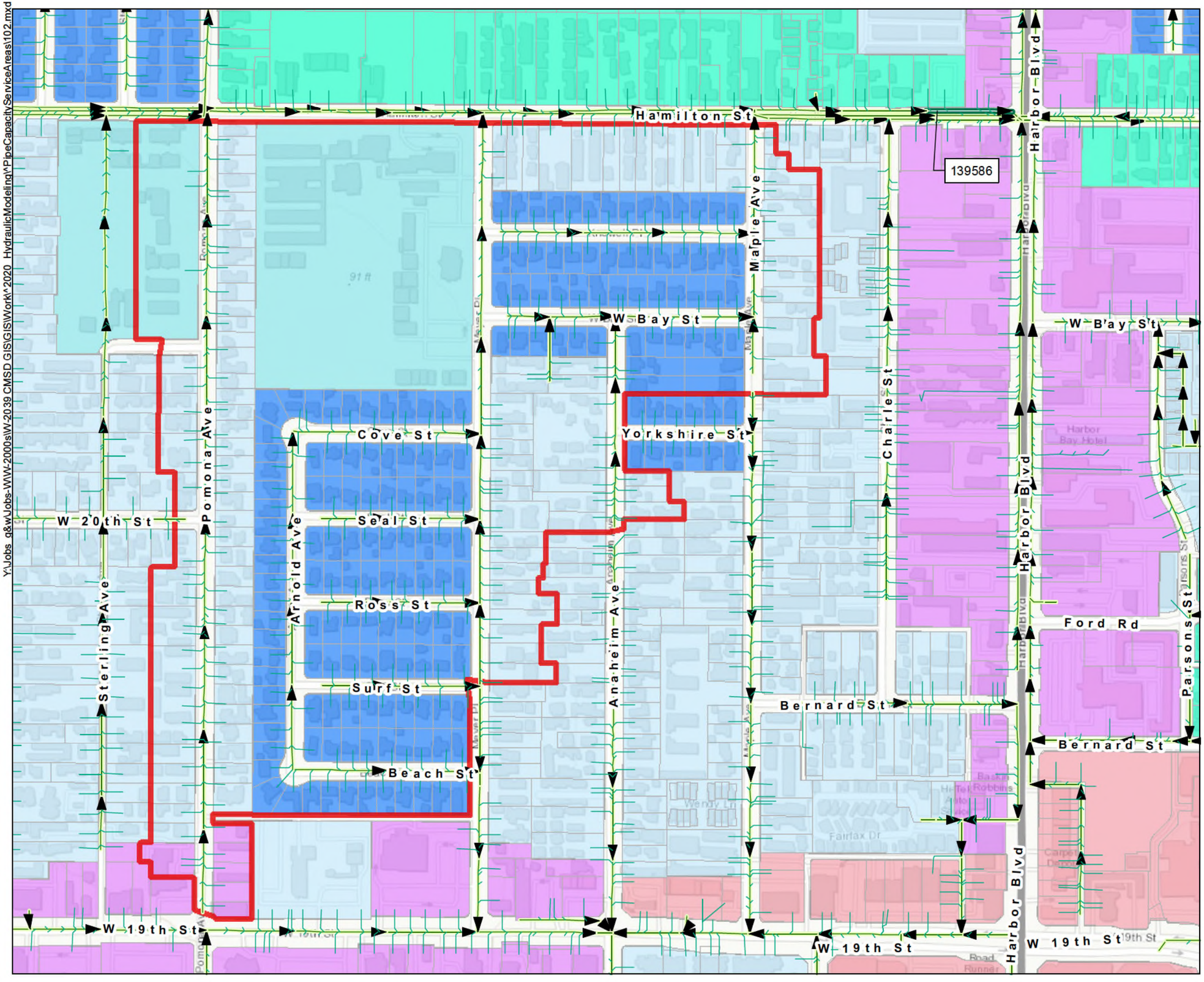

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Golf Course (G)
- Industrial Park (IP)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139586	GC	1.29
	HDR	25.61
	LDR	25.65
	PI	17.15

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 102

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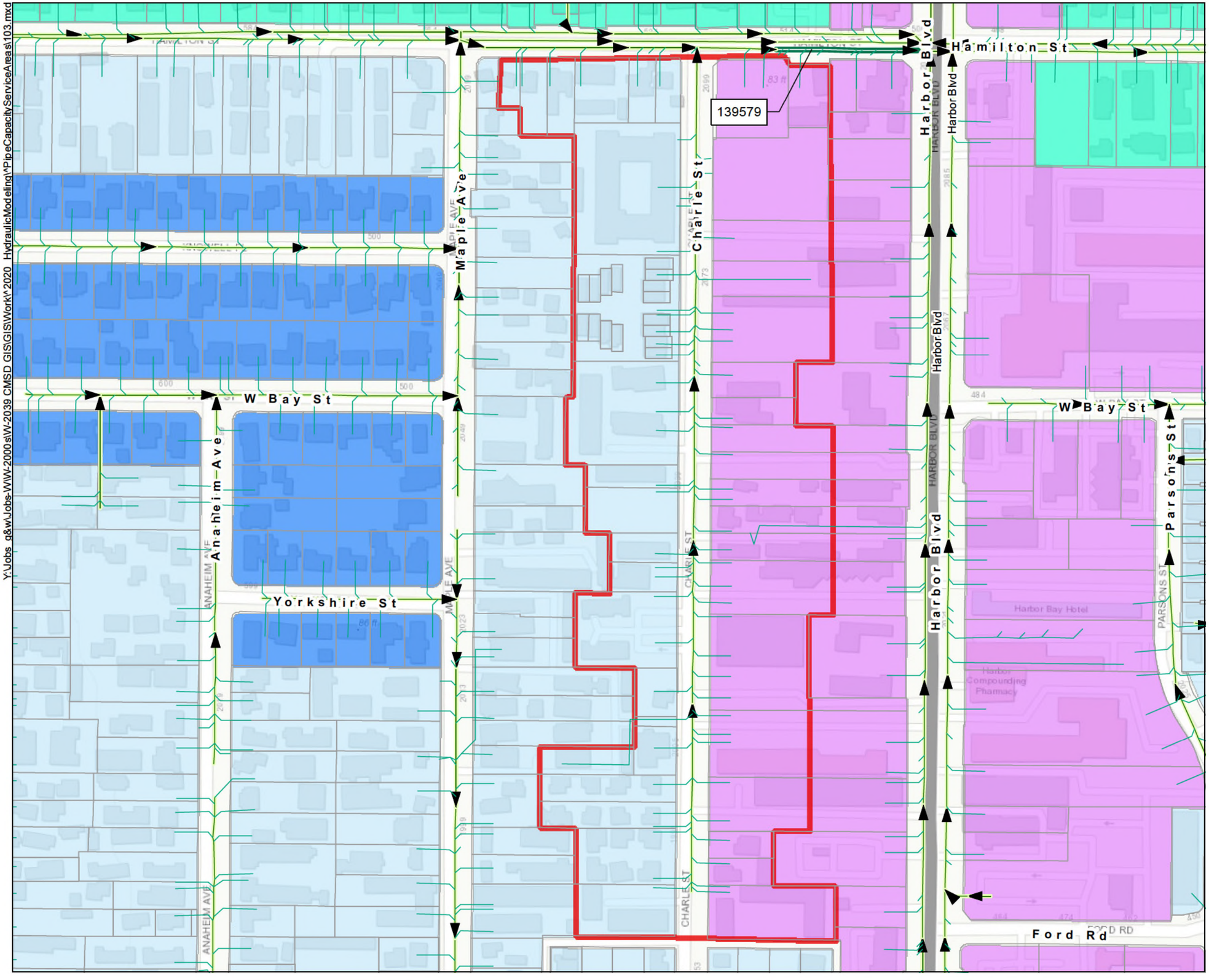

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
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- Urban Center Commercial (UCC)
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- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139579	GC	7.38
	HDR	7.15

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 103

Victoria St. Pump Station 9

PS

139506

Governor St
Victoria St
Raleigh Ave
Sterling Ave
Hamjilton St
Maple St
Harbor Blvd
W Bay St
Cove St
Seal St
Ross St
Surf St
Beach St
Yorkshire St
Bernard St
Wallace Ave
W 20th St
Pomona Ave
Arnold Ave
Anaheim Ave
Charlie St
Parsons St
Ford Rd
State Hwy 55
Newport Blvd
W 19th St

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
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- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139506	CC	9.74
	GC	25.52
	HDR	33.11
	LDR	22.66
	MDR	18.12
	PI	16.24

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 104

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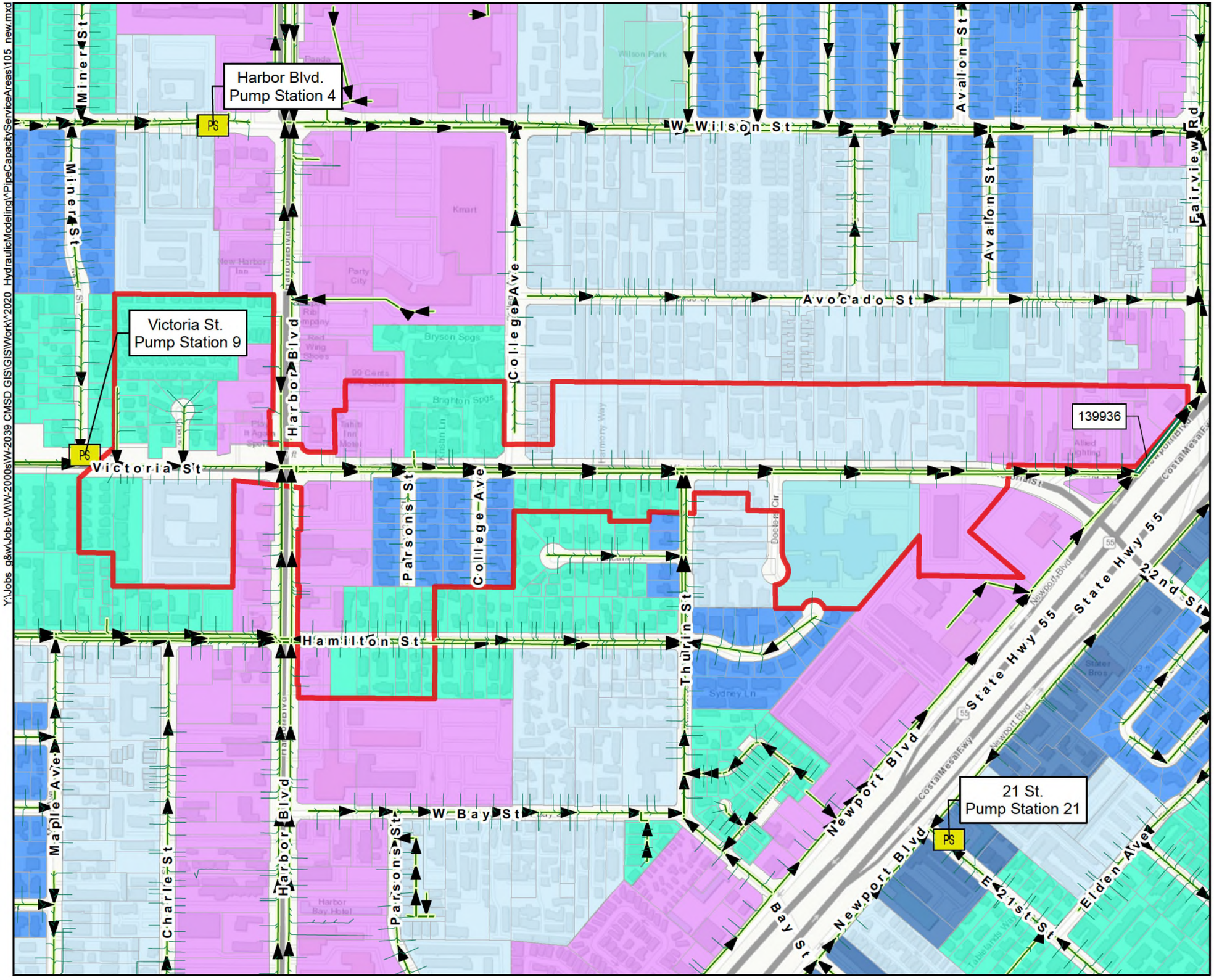

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
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- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N

Pipe ID	Land Use Code	Land Use Area (Acres)
139936	GC	14.60
	HDR	14.86
	LDR	4.02
	MDR	15.87
	PI	5.12

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 105

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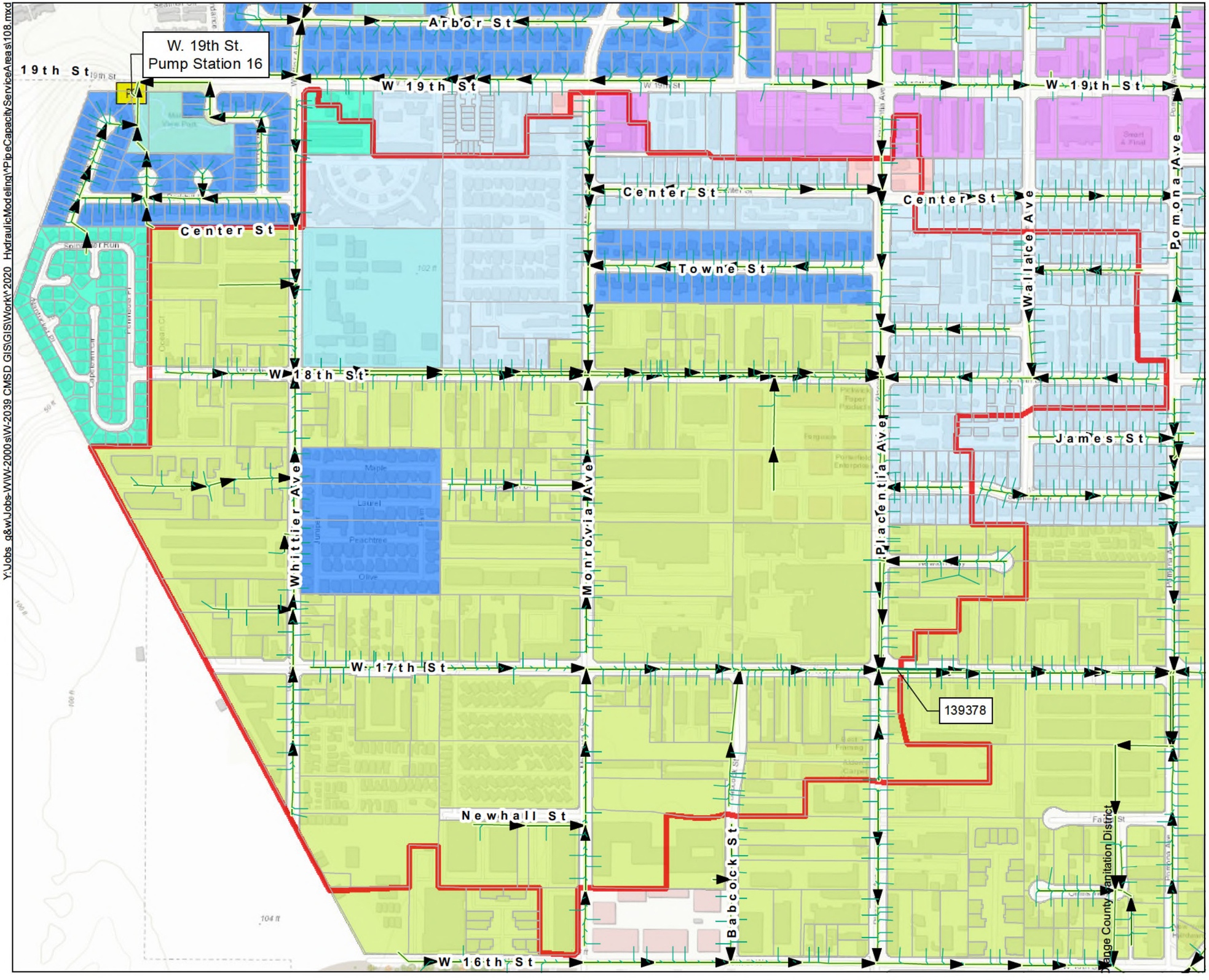

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139378	GC	1.71
	HDR	47.81
	LDR	17.31
	LI	154.00
	MDR	1.44
	NC	0.94
	PI	9.11

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 108

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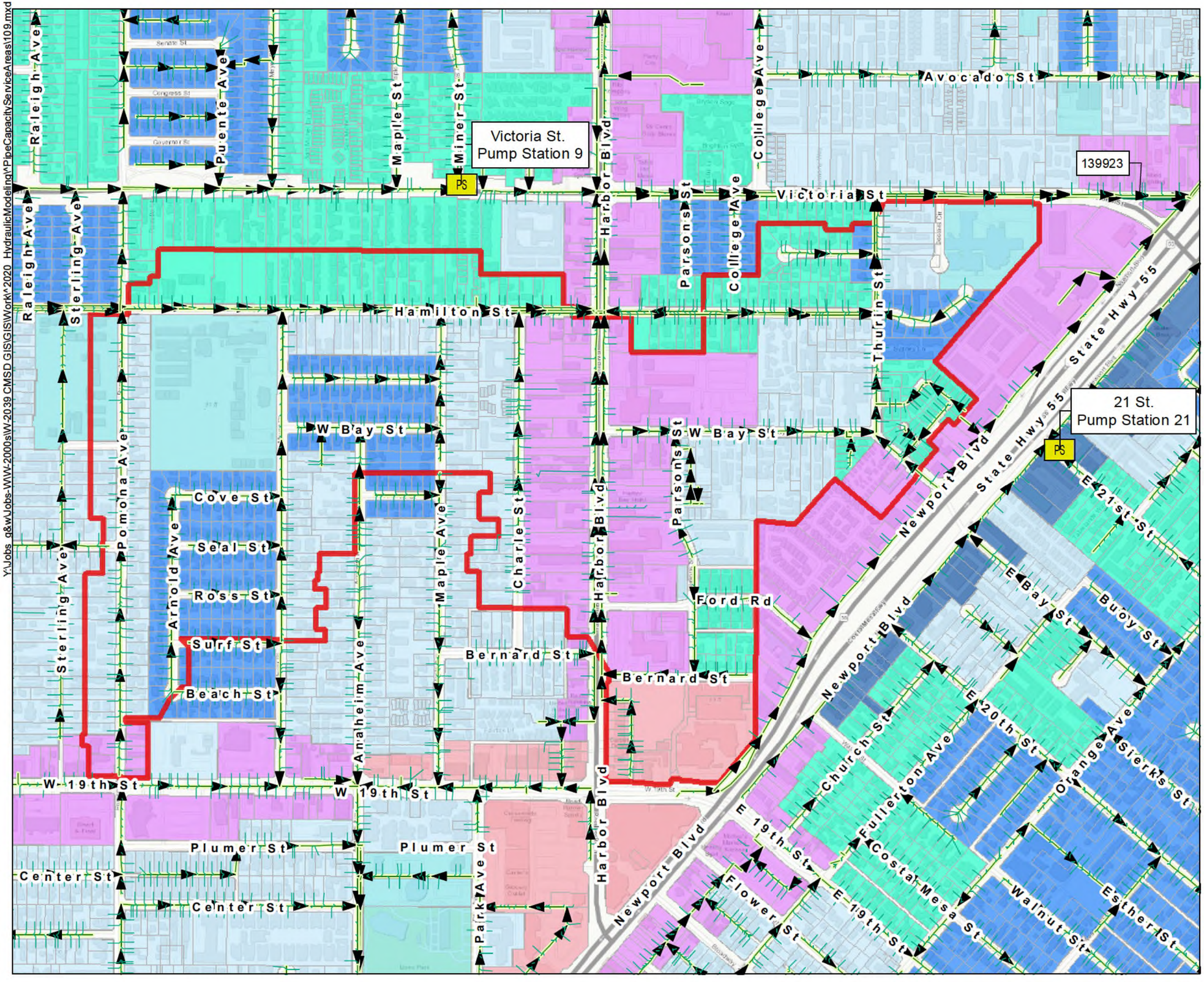

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139923	CC	9.77
	GC	37.16
	HDR	55.85
	LDR	25.89
	MDR	30.63
	PI	21.40

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 109

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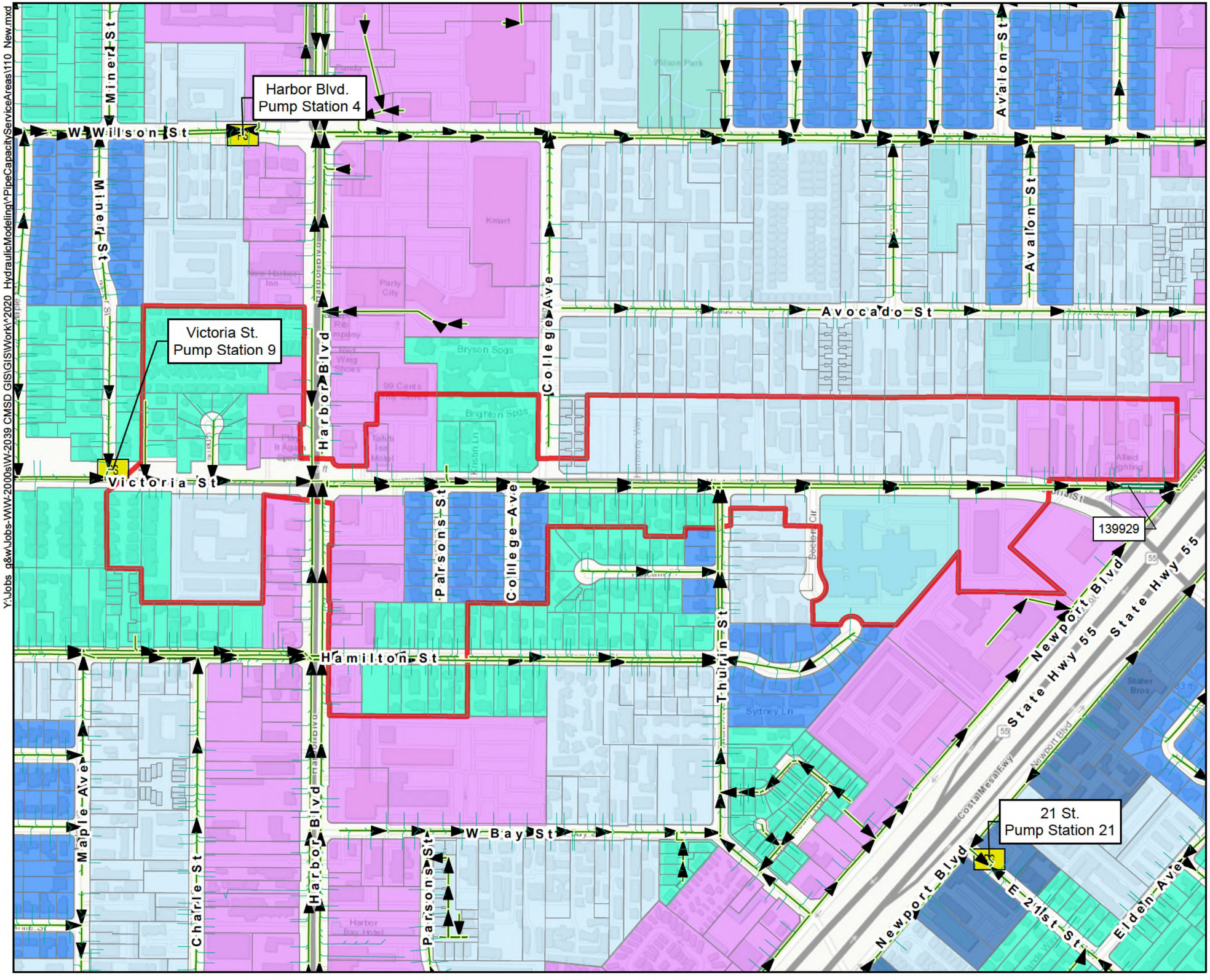

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
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- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139929	GC	13.67
	HDR	14.87
	LDR	4.02
	MDR	15.89
	PI	5.12

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 110

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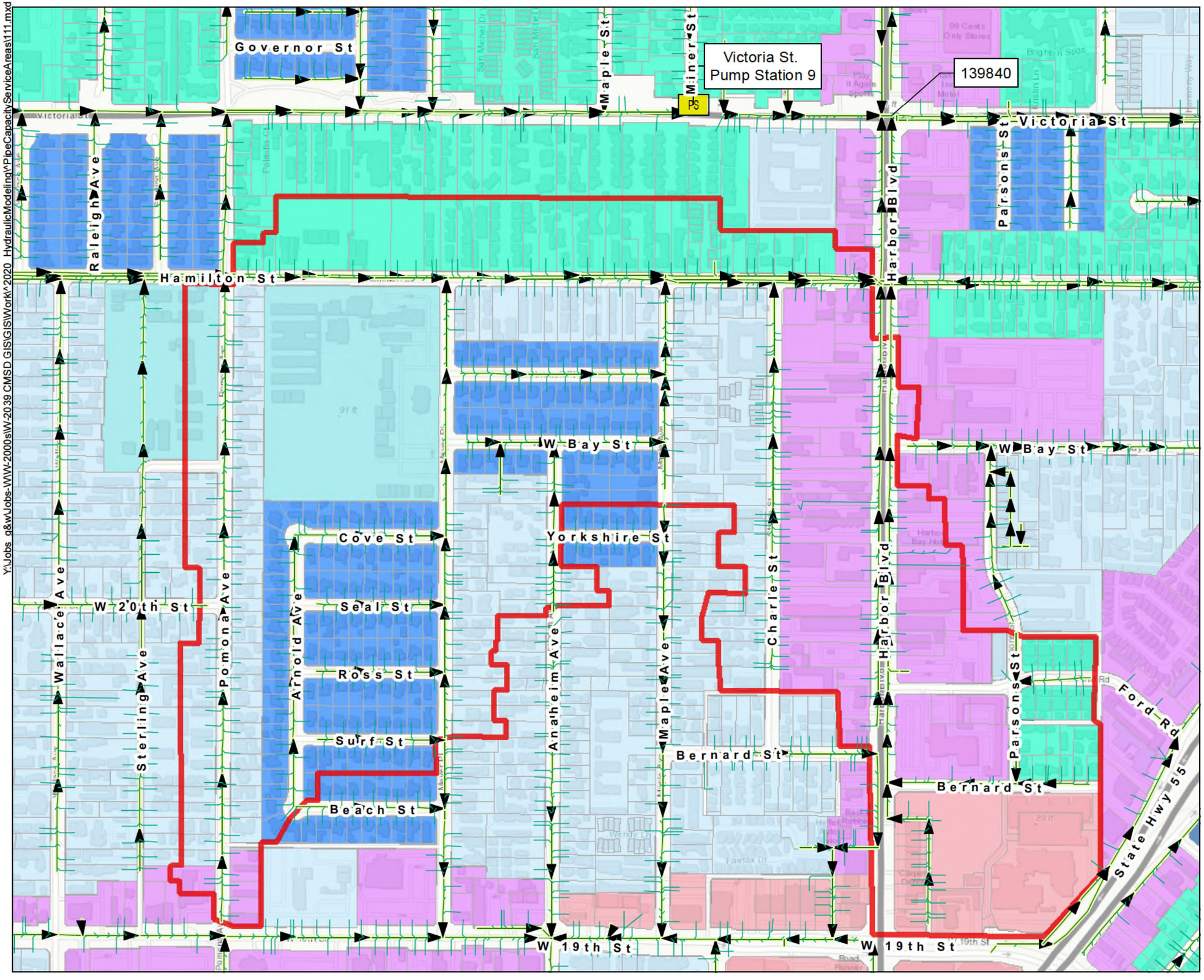

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139840	CC	9.76
	GC	24.36
	HDR	33.16
	LDR	22.90
	MDR	18.07
	PI	16.05

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 111

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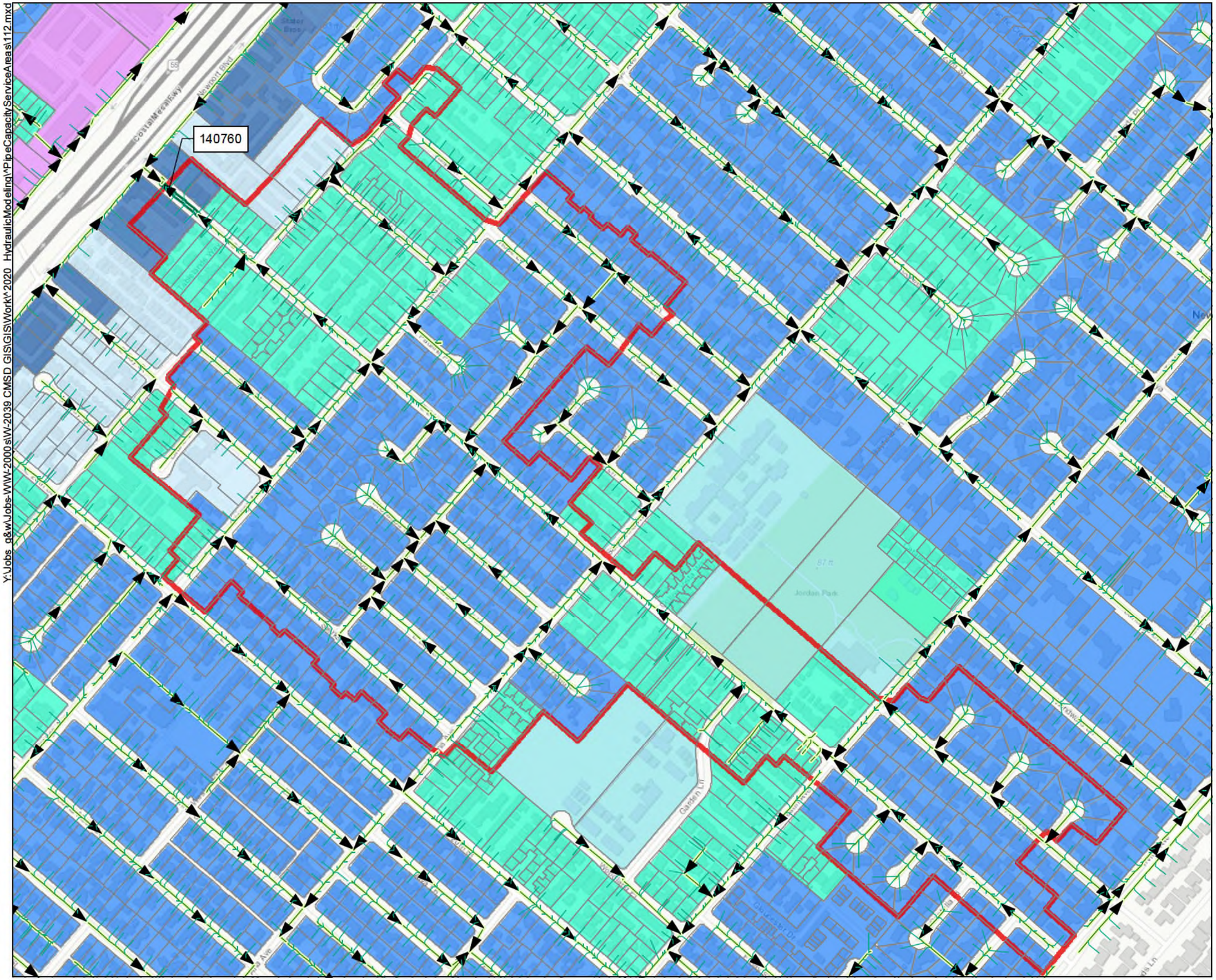

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
140760	CR	1.53
	HDR	3.92
	LDR	61.96
	MDR	33.70
	PI	3.91

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 112

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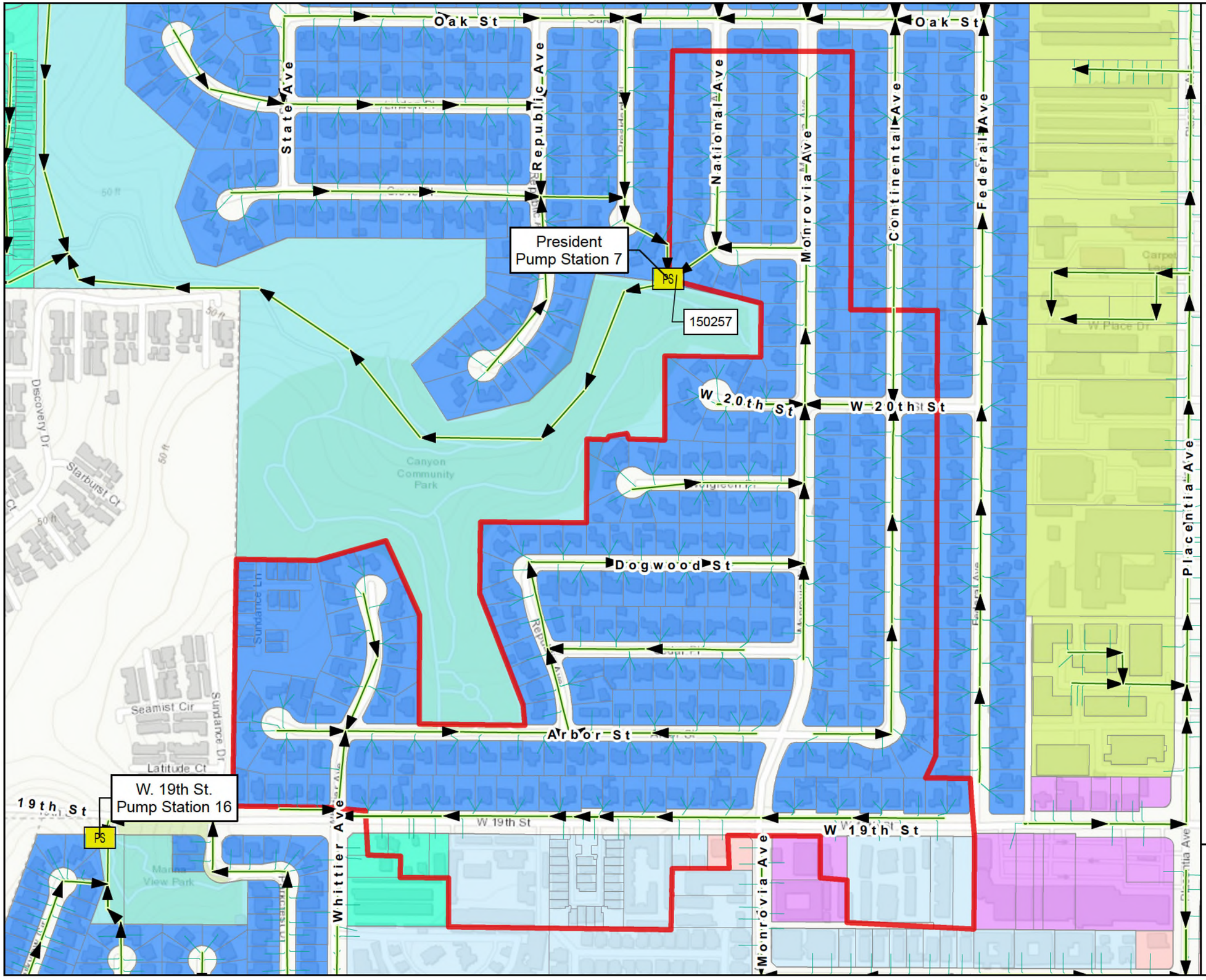

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
150257	GC	0.26
	HDR	7.39
	LDR	50.59
	MDR	0.65
	NC	0.15
	PI	0.06

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 113

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
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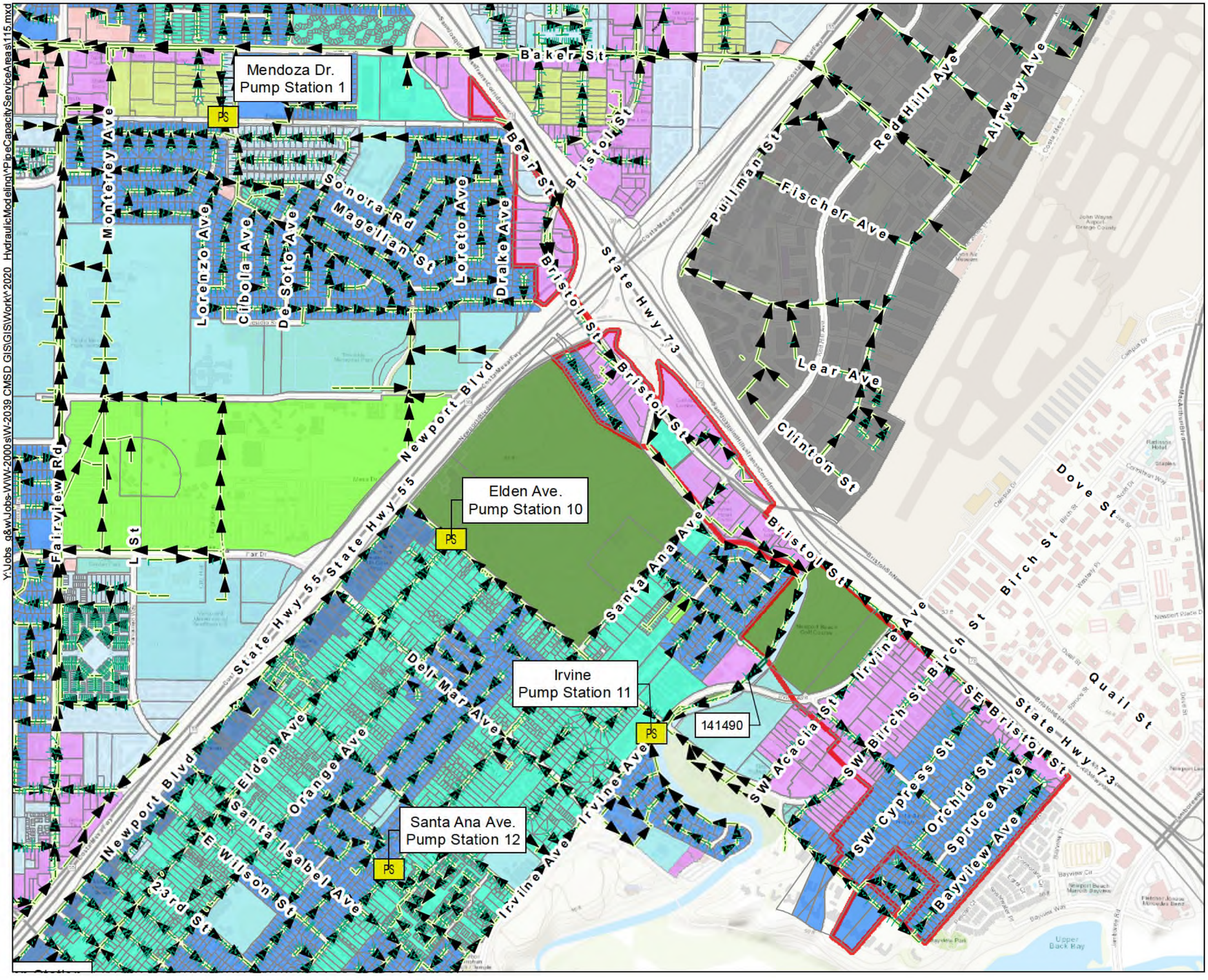
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140997	GC	46.93
	HDR	51.17
	LDR	33.03
	MDR	38.50
	NC	6.97
	PI	2.60

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 114



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

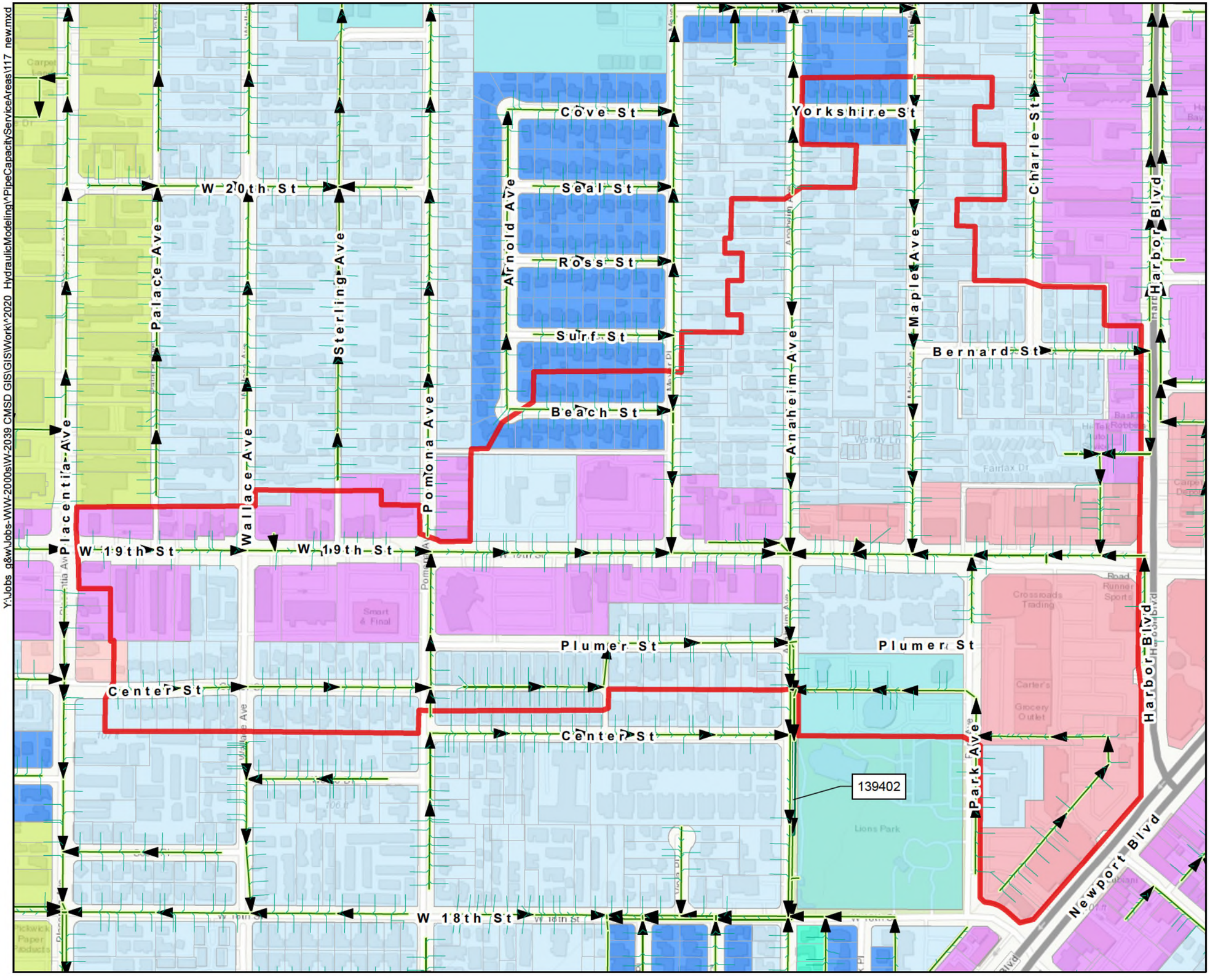
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
141490	G	32.86
	GC	88.24
	HDR	2.59
	LDR	75.93
	MDR	4.02
	PI	0.59

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 115



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139402	CC	17.77
	GC	20.74
	HDR	52.85
	LDR	4.52
	LI	0.01
	NC	0.18
	PI	3.90
	LDR	40.89

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 117

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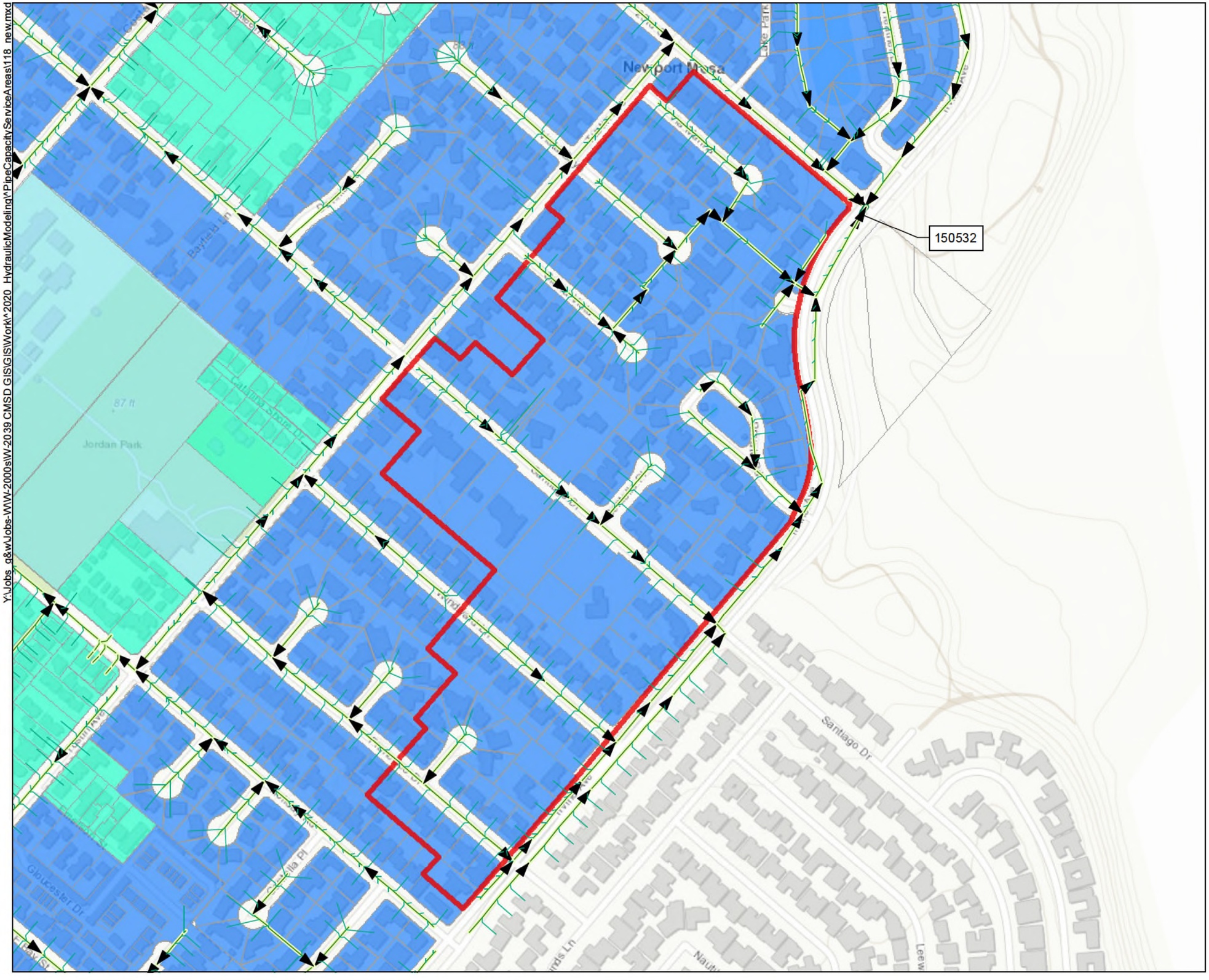


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

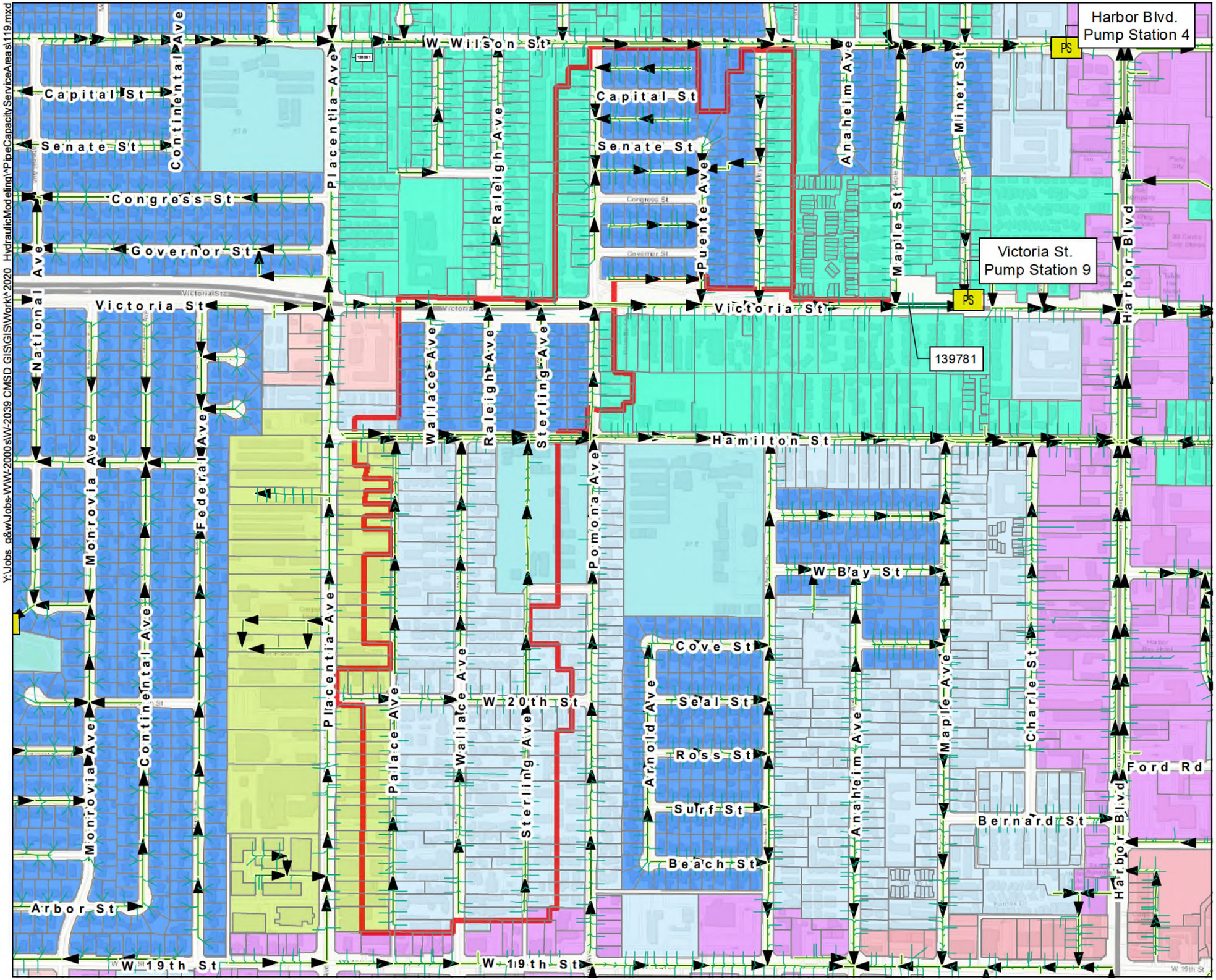
N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
150532	LDR	40.89

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 118

Y:\Jobs_q&w\Jobs-WW-2000sWW-2039 CMSD GIS\GIS\Work\2020_HydraulicModeling\PipeCapacityServiceAreas\119.mxd



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
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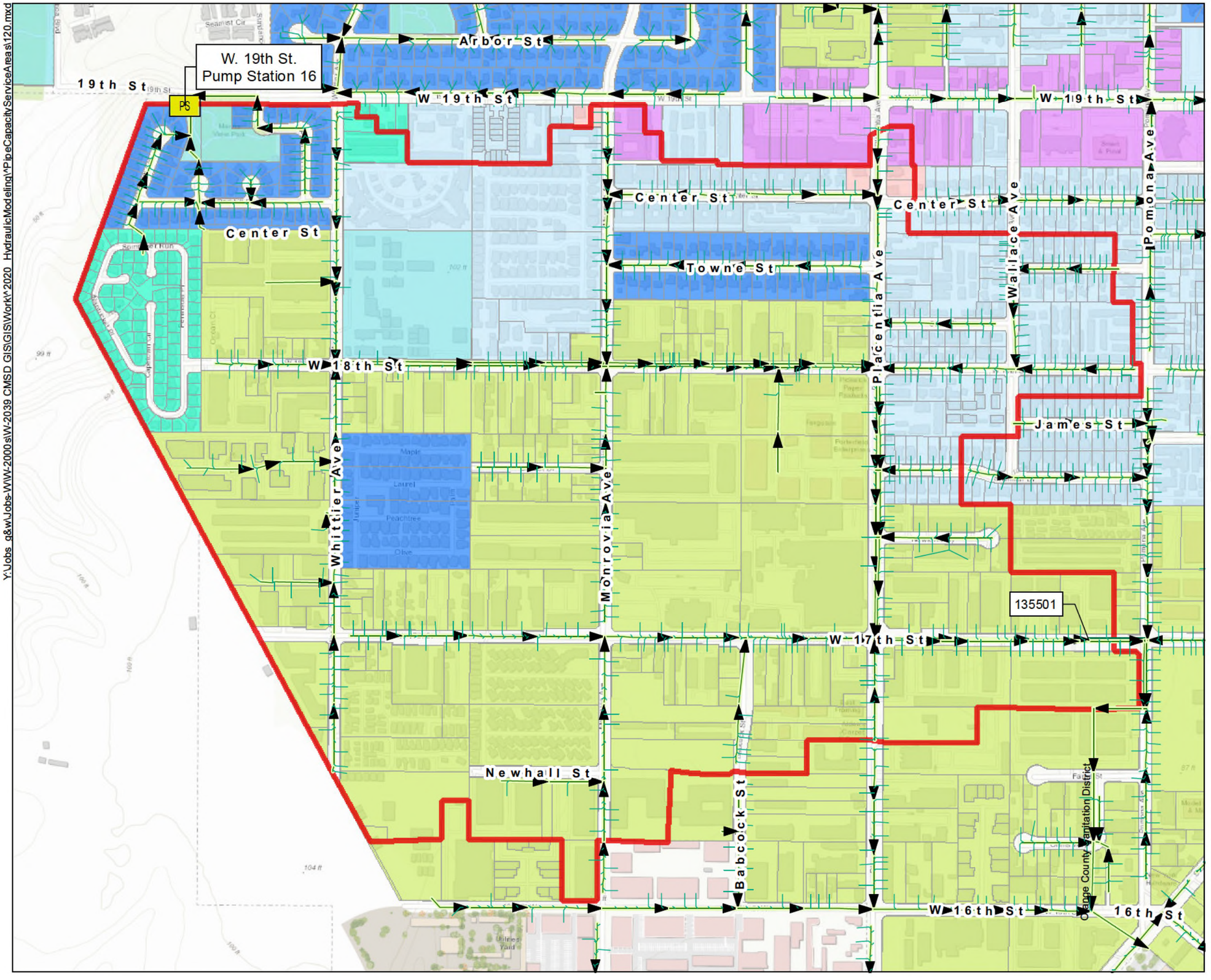
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139781	GC	0.15
	HDR	34.01
	LDR	25.72
	LI	6.86
	MDR	9.25
	NC	0.01
	PI	5.12

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 119



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
135501	GC	1.74
	HDR	49.42
	LDR	26.28
	LI	167.62
	MDR	9.94
	NC	0.93
	PI	11.39

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 120

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

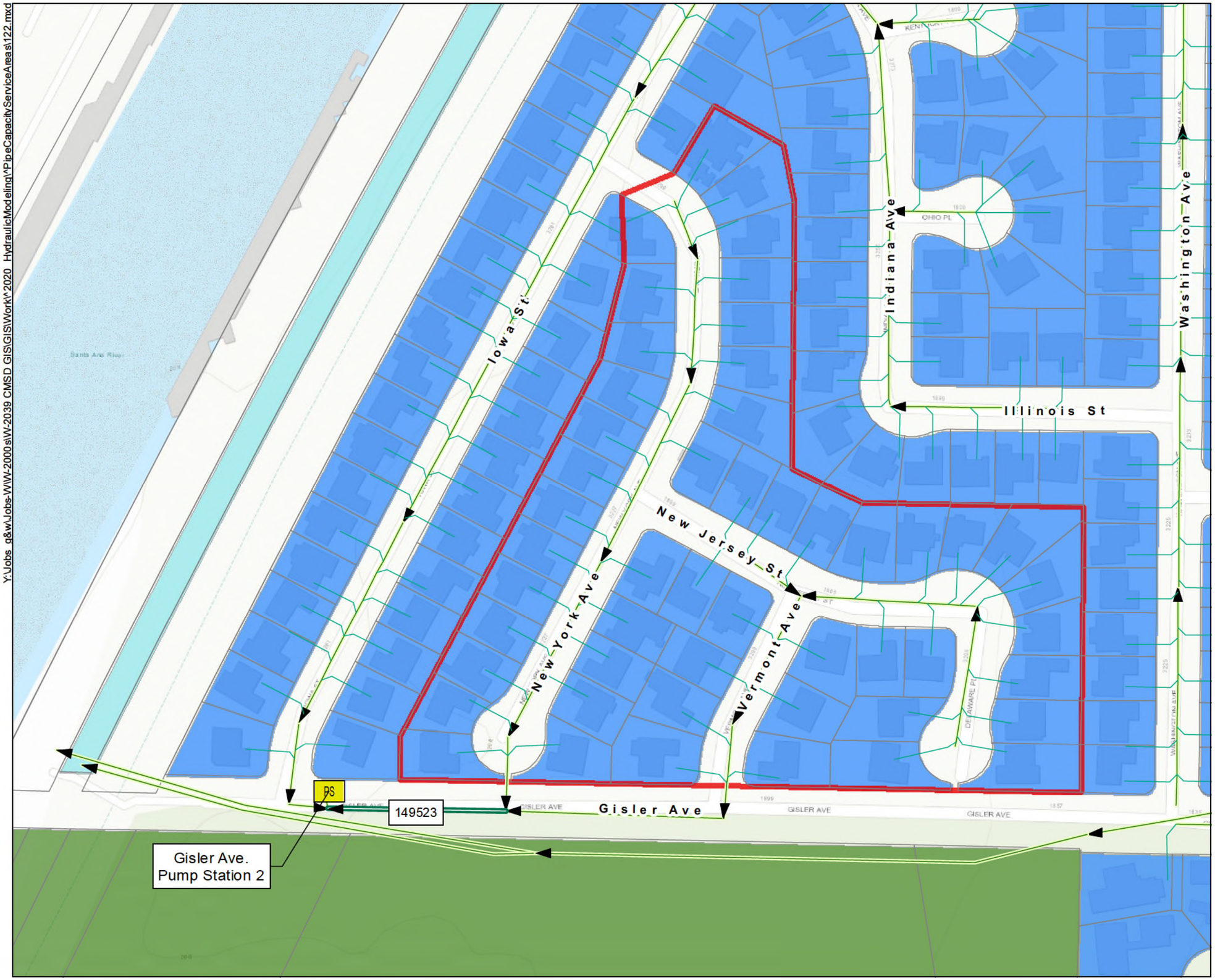
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
149363	GC	1.04
	HDR	8.06
	LDR	27.09
	MDR	36.92
	PI	8.91

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 121



LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
149523	LDR	7.75

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 122

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Canyon Dr.
Pump Station 5

Westbluff Dr.
Pump Station 19

Aviemore Terrace
Pump Station 6

President
Pump Station 7

Sea Bluff Dr.
Pump Station 18

138899

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138899	G	0.01
	HDR	4.50
	LDR	72.07
	LI	2.00
	MDR	97.01
	NC	3.36
	PI	187.29

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 123

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140934	GC	29.61
	HDR	17.74
	MDR	27.65
	NC	0.38
	PI	2.59

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 124

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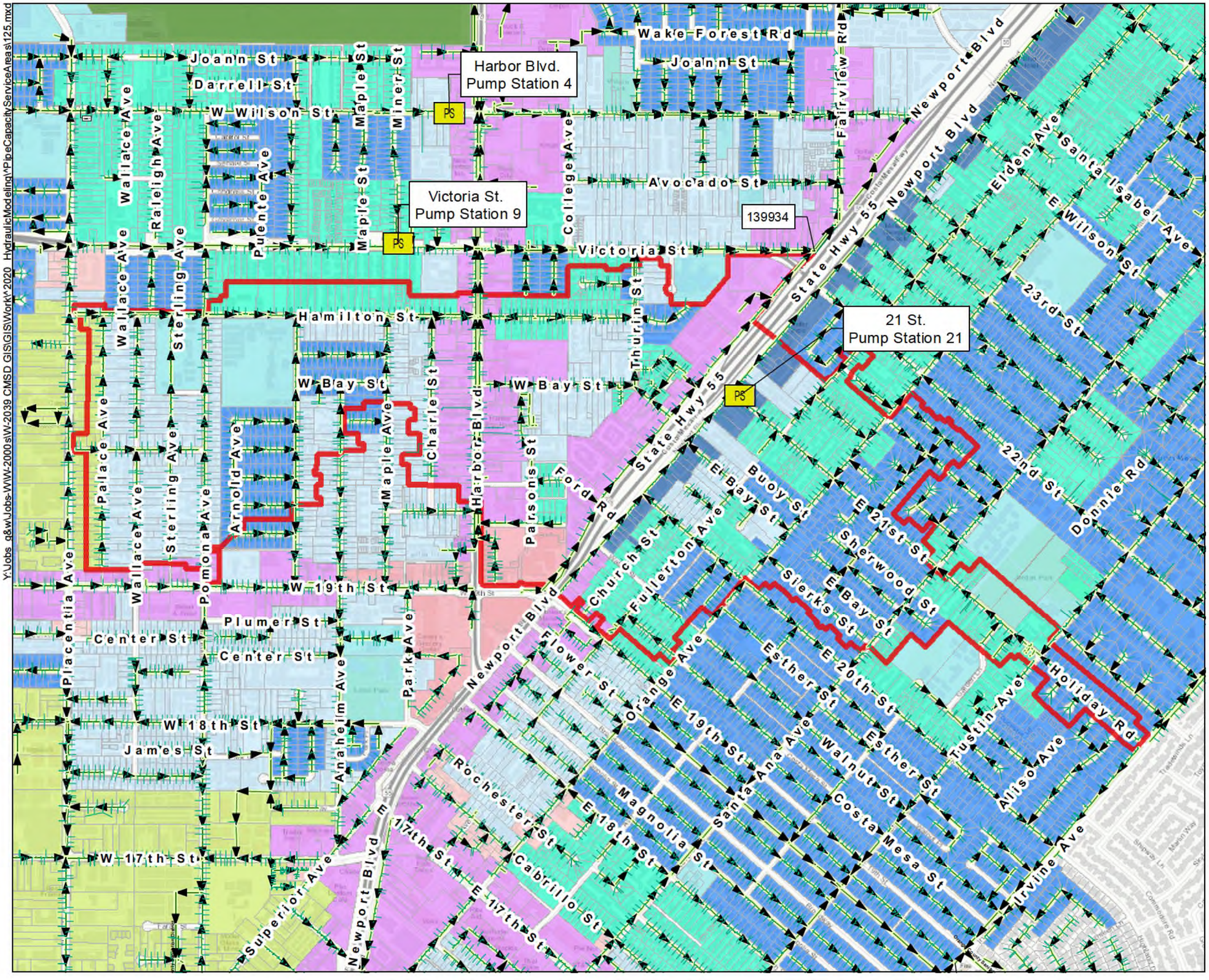

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139934	CC	9.79
	CR	10.93
	GC	68.67
	HDR	104.95
	LDR	87.90
	LI	7.97
	MDR	86.74
	PI	25.34

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 125

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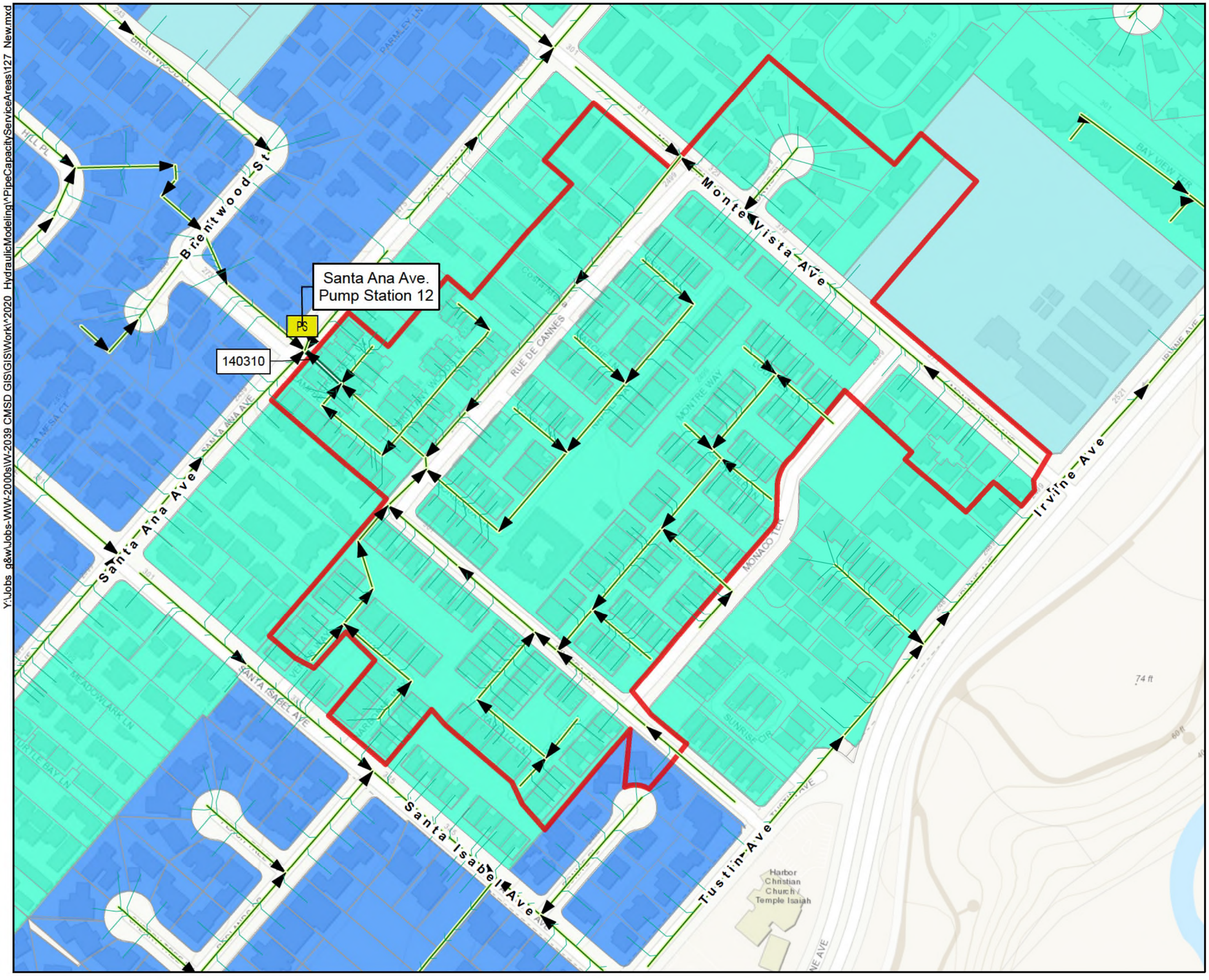

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
140310	LDR	0.15
	MDR	21.52
	PI	0.56

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 127

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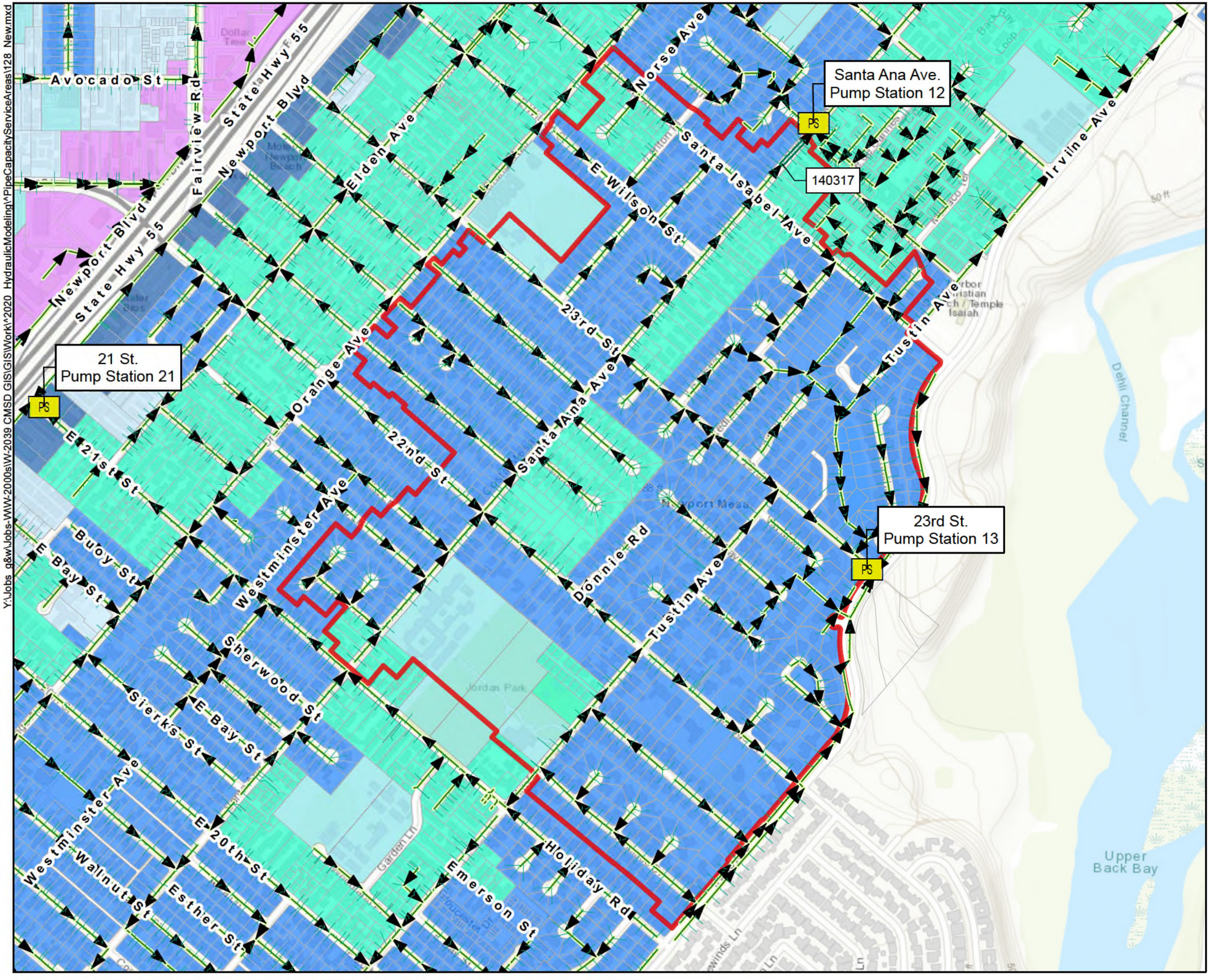


LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS — Pump Station
- Service Area

Land Use Codes

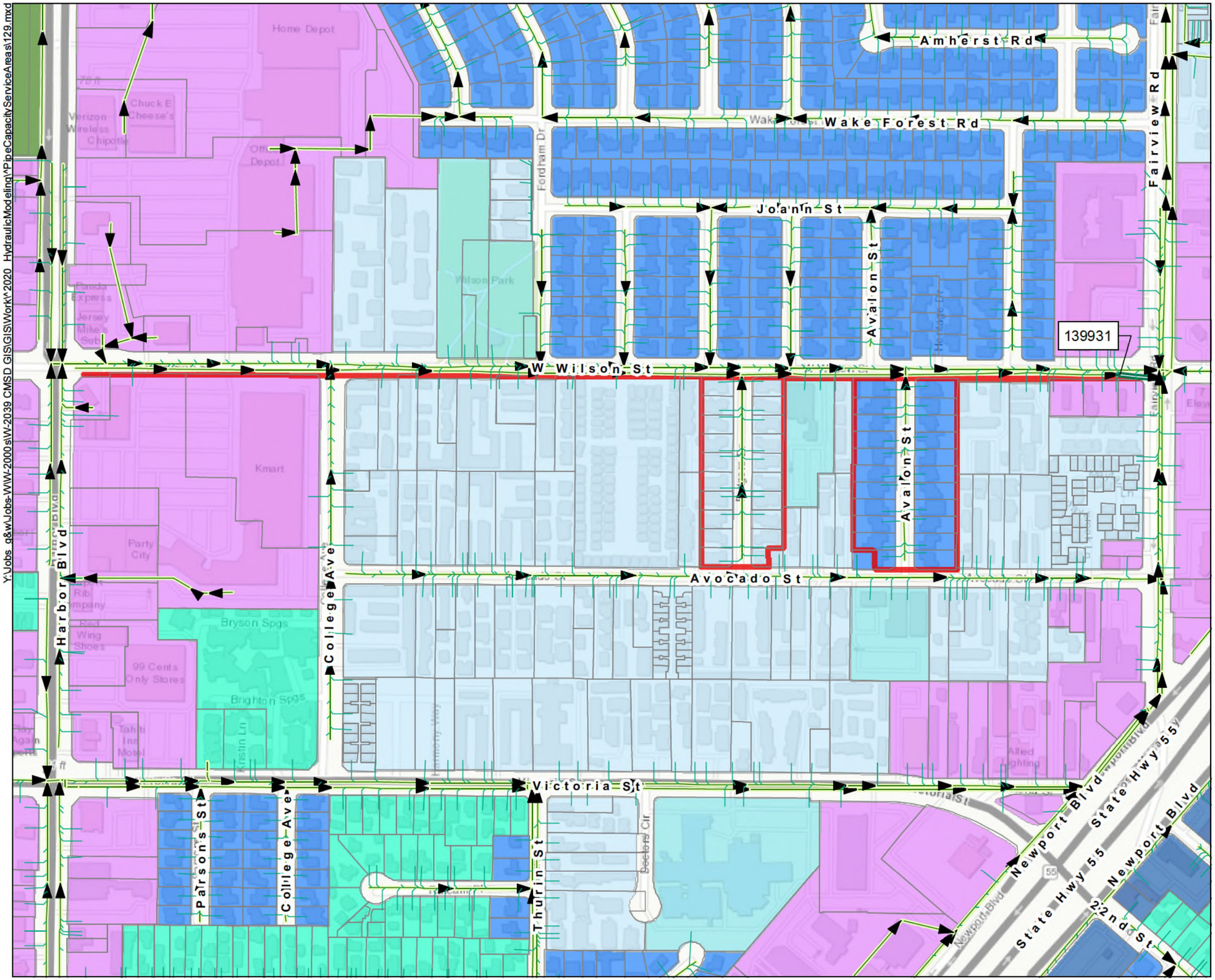
- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
140317	LDR	180.07
	MDR	34.50
	PI	18.20

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 128



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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N
W E
S

Pipe ID	Land Use Code	Land Use Area (Acres)
139931	HDR	2.70
	LDR	3.63

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 129

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139808	GC	5.19
	HDR	5.62
	LDR	10.40
	LI	35.24
	MDR	21.93
	NC	3.69
	PI	8.90

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 130

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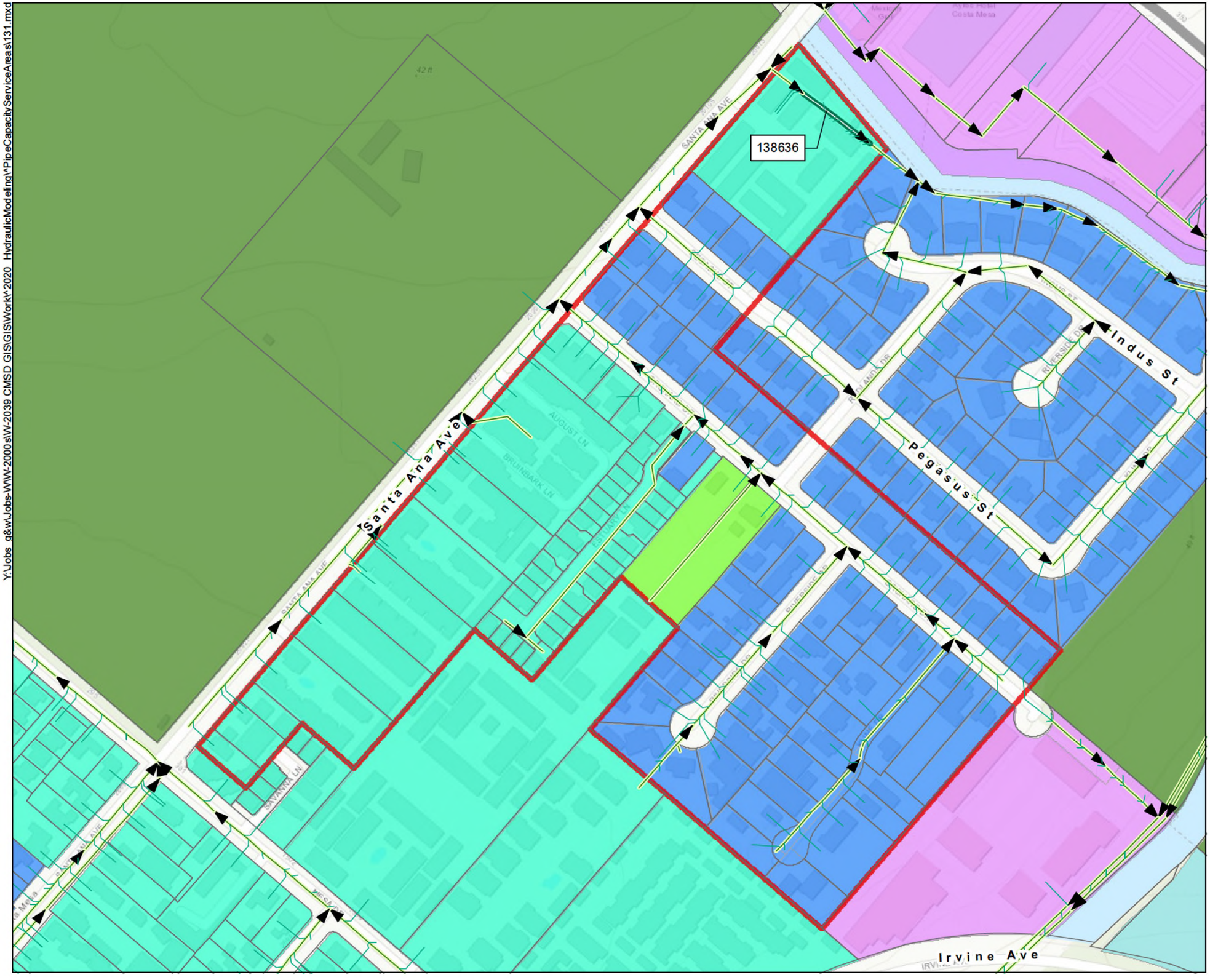

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
138636	F	1.29
	LDR	13.23
	MDR	11.89

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 131

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LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
- Golf Course (G)
- Industrial Park (IP)
- Public/Institutional (PI)
- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
139472	CC	0.00
	GC	24.84
	HDR	0.02
	LDR	0.02
	MDR	0.03
	PI	0.00

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 132

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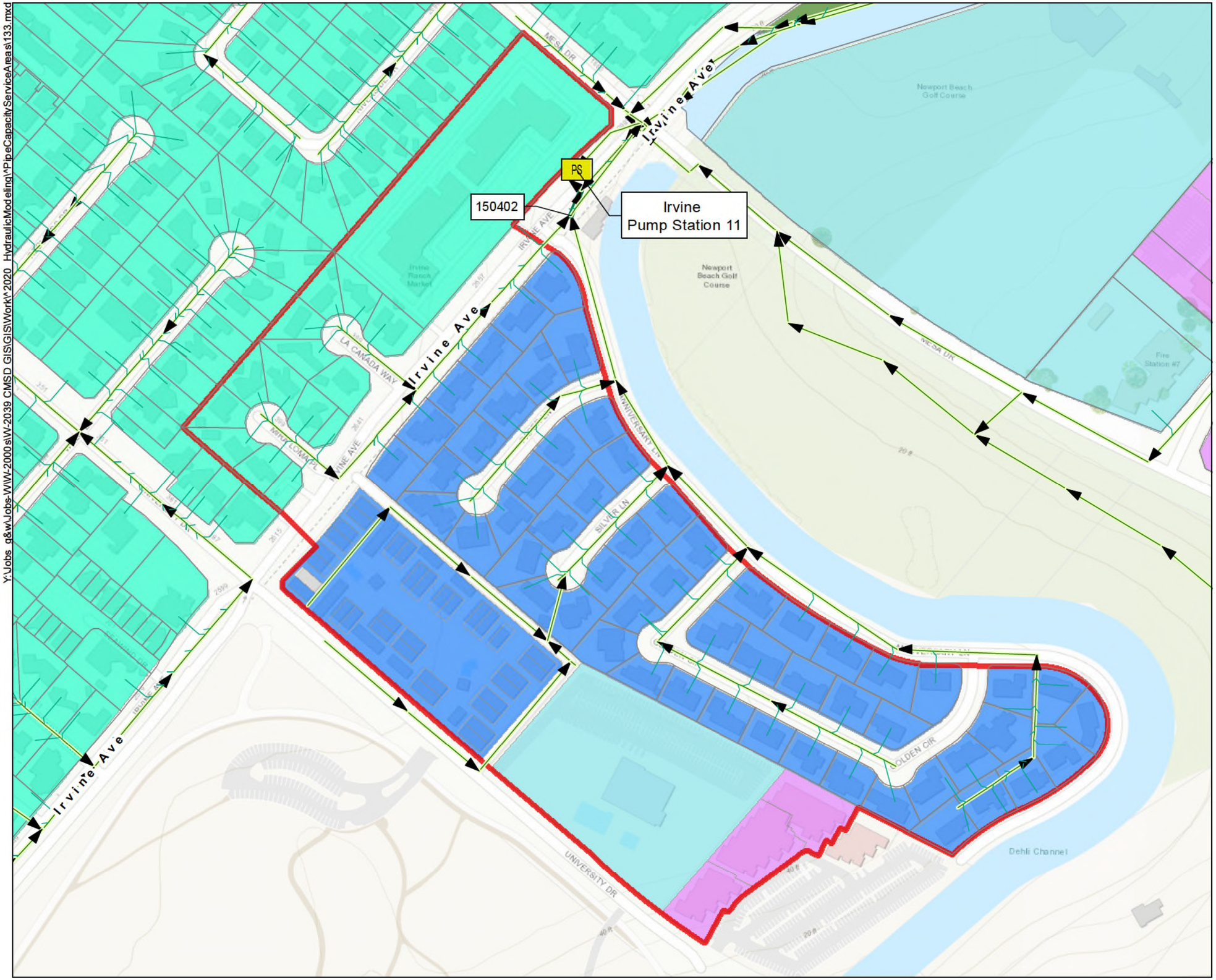

LEGEND

- Lateral Line
- Gravity Main & Flow Direction
- PS Pump Station
- Service Area

Land Use Codes

- High Density Residential (HDR)
- Low Density Residential (LDR)
- Medum Density Residential (MDR)
- Commercial Residential (CR)
- Fairgrounds (F)
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- Regional Commercial (RC)
- Urban Center Commercial (UCC)
- Light Industrial (LI)
- Neighborhood Commercial (NC)
- General Comemercial (GC)
- Cultural Arts Center (CAC)
- Commercial Center (CC)

N W E S

Pipe ID	Land Use Code	Land Use Area (Acres)
150402	GC	1.34
	LDR	16.57
	MDR	6.36
	PI	4.03

Costa Mesa Sanitary District

Pipe Capacity Service Area Map
Service Area # 133