5.0 WATER USE

It is important to analyze various historical water production and consumption data in the City service area to plan for City's water use for the future. Historical water use, seasonal variations, population growth and development plans are used to project future water demands.

5.1 HISTORICAL WATER TRENDS

Historical water production and consumption data was analyzed to understand water use trends in the City. Most recent bi-monthly billing data was used to estimate water duty factors for each land use category, since the billing data provided water use per land use. The City provided daily water production and consumption data for fiscal years (FY) 2013 to 2019 and most recent billing data from November 2019 to October 2020, which was the available data this Master Plan.

5.1.1 Water Production

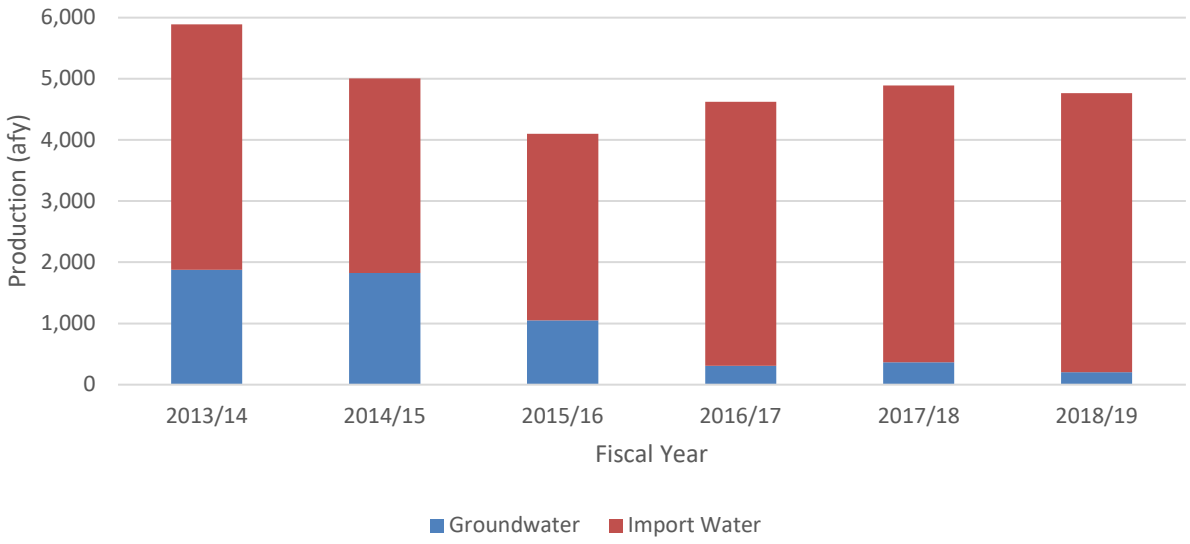
The City has increased its imported water supply from 68 percent to 96 percent in the last 6 years, while reducing groundwater use from 32 percent to about 4 percent. The reduction in groundwater production is due to pumping limitations and operational concerns. Per Table 5-1, the historical average annual water production is 4,876 afy, with a high-water production of 5,885 afy in FY 2013/14 and a low-water production of 4,096 afy in FY 2015/16. The low water production reflects the water conservation efforts in response to the drought conditions in 2015.

Table 5-1 – Historical Annual Water Production

FY July to June	Groundwater (afy)				Imported (afy)		Total		
	Well 11A	Well 15	Total Groundwater	% Groundwater	MWD	% MWD	afy	mgd	gpm
2013/14	278	1,597	1,875	32	4,010	68	5,885	5.3	3,648
2014/15	17	1,809	1,826	36	3,178	64	5,004	4.5	3,102
2015/16	0	1,048	1,048	26	3,048	74	4,096	3.7	2,539
2016/17	0	309	309	7	4,314	93	4,623	4.1	2,866
2017/18	39	327	366	7	4,520	93	4,886	4.4	3,029
2018/19	64	138	202	4	4,562	96	4,764	4.3	2,953
Average	**66**	**871**	**938**	**19**	**3,939**	**81**	**4,876**	**4.4**	**3,023**

As shown in Figure 5-1, the City has been relying heavily on imported water in the last few years.

Figure 5-1 – Historical Annual Water Production



5.1.2 Non-Revenue Water

Total water production includes water consumption by customers plus water loss, which is the amount of drinking water that does not reach customers. The water loss is known as non-revenue. Non-revenue water can be attributed to real system losses, such as leaking mains and service lines; unbilled authorized consumption, such as hydrant flushing and fire-fighting; or apparent losses, including unauthorized consumption, monthly billing estimates, significant quantities of water going into or out of reservoir storage, and metering inaccuracies. Non-revenue water was also evaluated for years the consumption data was available. A comparison of supply and consumption, as well as the non-revenue water loss percentage (unaccounted for water), is shown in Table 5-2.

Table 5-2 – Annual Water Consumption vs. Water Production

FY July to June	Consumption (afy)	Production (afy)	Percent Unaccounted for Water [a]
2013/14	5,130	5,885	12.8
2014/15	4,950	5,004	1.1
2015/16	4,313	4,096	-5.3
2016/17	4,378	4,623	5.3
2017/18	4,718	4,886	3.4
2018/19	4,614	4,764	3.1
Average	**4,684**	**4,876**	**5.2**

a) Average percent unaccounted for water excludes FY 2015/16 since there is an error in the data which resulted in a negative water loss

The water system has had approximately 1 to 13 percent of unaccounted-for water between FYs 2013/14 and 2018/19. The highest apparent water loss was in FY 2013/14, at about 13 percent. Based on

information provided by the City, average water loss equates to 5.2 percent. In recent years, a lower loss of approximately 3 percent water is observed, which is beneficial for the City.

5.1.3 Average Demands and Per Capita Consumption

Available City historical daily water production data was used to calculate annual water production for year 2013 to 2019, as shown in Table 5-3. Using historical water production and population data, per capita water use was estimated.

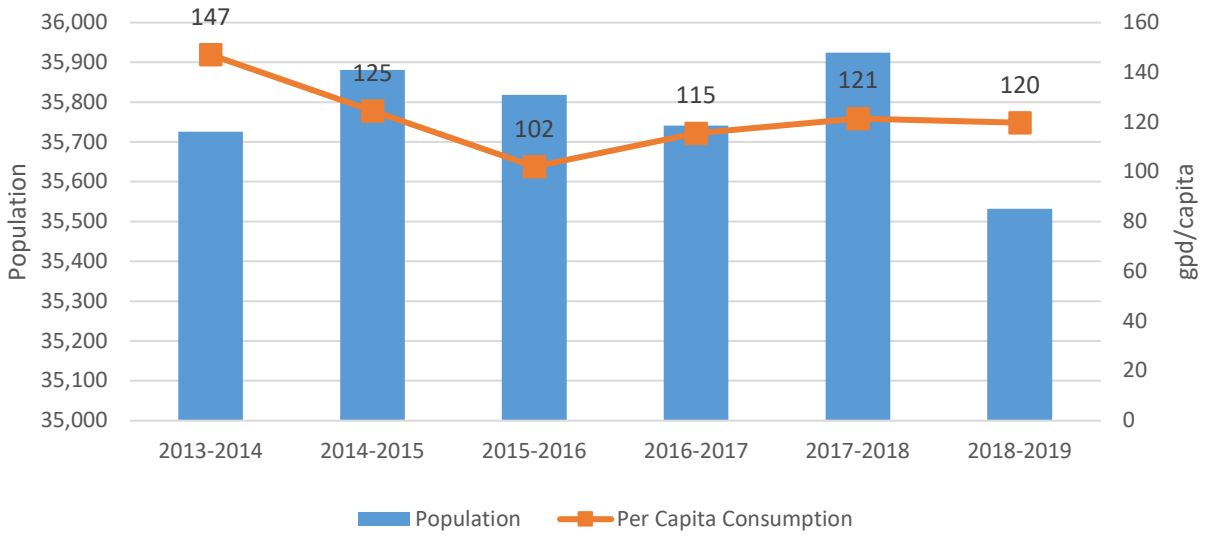
Table 5-3 – Historical Annual Water Production

FY	Average Demand [a]		Population	Per Capita (gpd/capita)
	Annual (afy)	Daily (mgd)		
2013/14	5,885	5.3	35,726	147
2014/15	5,004	4.5	35,881	125
2015/16	4,096	3.7	35,818	102
2016/17	4,623	4.1	35,741	115
2017/18	4,886	4.4	35,924	121
2018/19	4,764	4.3	35,532	120
Annual Average	**4,900**	**4.4**	**35,770**	**122**

a) Includes non-revenue water; average demands based on production data

The historical water production and per capita water use trends are shown in Figure 5-2. In 2013, the City had the highest per capita water use, with a decline in water use till 2016 due to water conservation efforts during the significant drought years. Since 2016, water consumption per capita has rebounded, but remains approximately around 120 gpd/capita, lower than the 147 gpd/capita. The average water use per capita since 2013 is 122 gpd/capita and is the more conservative option. Therefore, 122 gpd/capita was used to project future demands in this Master Plan.

Figure 5-2 – Historical Population and Per Capita Water Use



5.1.4 Seasonal Demand Variation

There is moderate seasonal variation in demand mainly due to the City's proximity to the Pacific Ocean. The period of July through October typically has the highest water demands. Lower demand months typically occur during the winter months, when it is rainy and cold, and outdoor water demand declines. December through April have the lower demands as shown in Figure 5-3. The seasonal demand data reflects the most recent daily water production data available.

Figure 5-3 – Seasonal Demand Variation

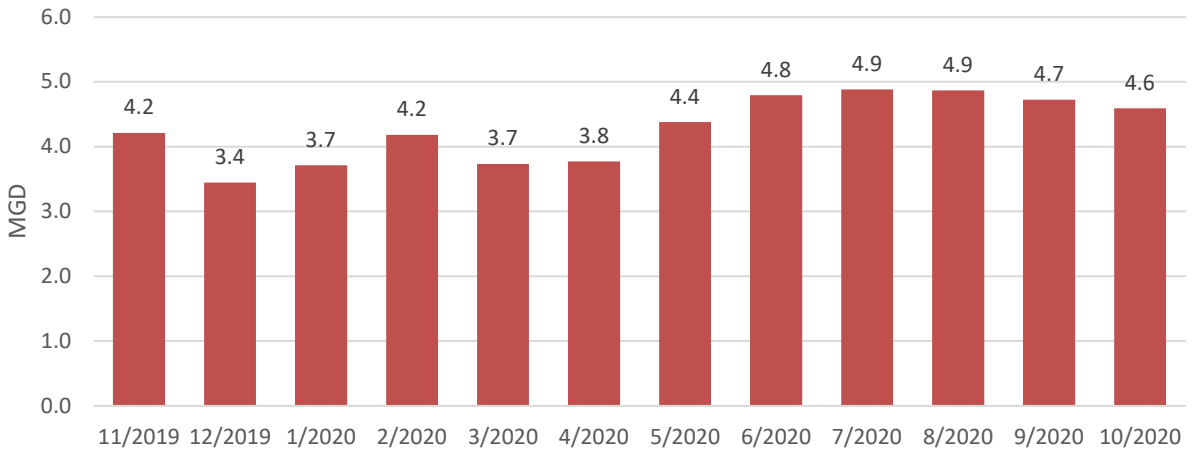


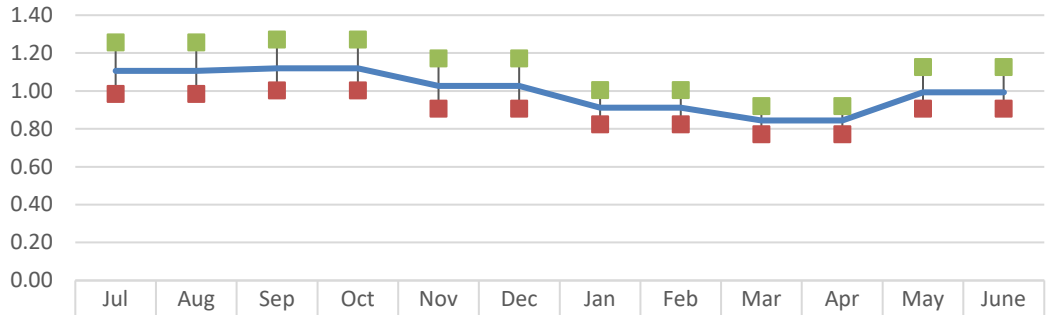
Table 5-4 shows historical monthly average water consumption for the past six FYs.

Table 5-4 – Monthly Water Consumption Per Fiscal Year

Month	Monthly Water Consumption					
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
July	210	206	159	167	180	162
August	111	109	92	98	100	100
September	164	209	161	180	186	184
October	105	105	87	89	93	97
November	198	175	147	154	165	172
December	102	91	84	87	96	100
January	157	150	147	136	147	146
February	100	89	85	74	82	84
March	150	139	131	118	145	121
April	89	89	81	82	88	83
May	180	163	144	147	157	159
June	107	88	88	93	97	96
Average Monthly Demand (MG)	**139**	**134**	**117**	**119**	**128**	**125**
Annual Demand (MG)	**1,672**	**1,613**	**1,406**	**1,426**	**1,537**	**1,503**

Monthly average water consumption data was used **to** graphically depict the distribution system on a month-to-month basis, showing respective monthly average and standard deviation for a typical historical average year. Figure 5-4 shows the graph which was derived using monthly water demand consumption data of the last six FYs. Over that period, most maximum demand months occurred in September and October.

Figure 5-4 – Water System Monthly Consumption Variation



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Average	1.11	1.11	1.12	1.12	1.03	1.03	0.91	0.91	0.84	0.84	0.99	0.99
Minimum	0.98	0.98	1.00	1.00	0.91	0.91	0.82	0.82	0.77	0.77	0.91	0.91
Maximum	1.26	1.26	1.27	1.27	1.17	1.17	1.00	1.00	0.92	0.92	1.13	1.13

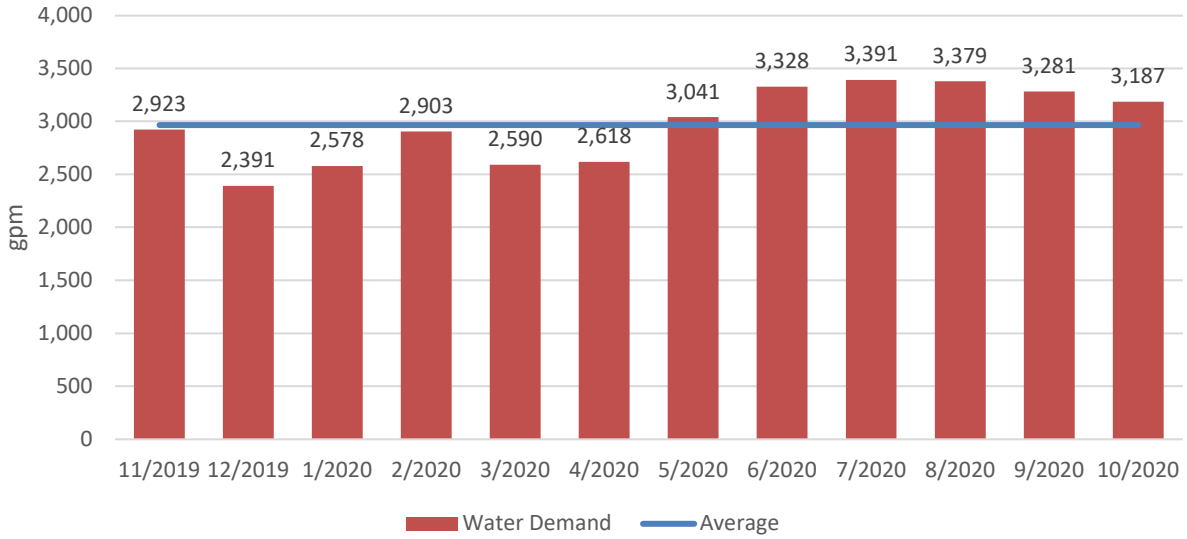
5.2 EXISTING SYSTEM DEMANDS

It is useful from a facility planning and hydraulic modeling standpoint to determine water demand variations to account for seasonal, daily, and hourly diurnal changes in demand. Adequate water supply must be available during maximum demand periods, as well as under emergency conditions, such as a fire. Fire flow requirements vary based on type of structure(s) to be protected. As such, calculating peaking factors should also help evaluate the ability of supply, storage, and distribution facilities to provide uninterrupted water service.

5.2.1 Existing Demands and Peaking Factors

The most recent daily water production data available for this Master Plan was from November 2019 to October 2020, as shown previously in Figure 5-3. Hourly data was not available. Existing water demands in the City service area were calculated by averaging the daily water production from November 2019 to October 2020, which equates to 2,968 gallons per minute (gpm) as shown in Figure 5-5. The average day demand (ADD) from the last Master Plan was 5.68 mgd. Since then, the City's ADD has been reduced by approximately 24 percent, which is typical due to increased conservation efforts since 2015 in response to the drought.

Figure 5-5 – Water Production



The maximum day demand (MDD) occurred on September 4, 2020, which was 4,451 gpm as shown in Table 5-5. A max day peaking factor of 1.5 was calculated, which is the same as the previous Master Plan. Since hourly data was not available, a peaking factor of 2.31 was used from the previous Master Plan to calculate the peak hour demand. The peaking factors are multiplied by ADDs. These demands were used in the model to analyze the existing system conditions.

Table 5-5 – Existing System-Wide Demands and Factors

Demand Description	gpm	mgd	afy	Peaking Factor	Notes
Average Day	2,968	4.27	4,787	1.00	-
Maximum Month	3,383	4.87	5,470	1.14	Occurred in July 2020
Maximum Week	3,561	5.12	5,729	1.20	Occurred the week of 9/4/2020
Maximum Day	4,451	6.41	7,084	1.50	Occurred on Friday 9/4/2020
Peak Hour	6,855	9.86	11,057	2.31	-

5.3 FUTURE DEMAND PROJECTIONS

Historical water trends are analyzed to project future water demands to assess the water system's ability to meet service demands and reliability standards. For this Master Plan, future planning horizons include years 2025 and 2030. In this Master Plan, planning year 2025 is referred to as the near-term planning year and 2030 as the ultimate planning year. The water distribution system was evaluated for both planning horizons. Future demands can be projected based on land use or population methods, or a combination of methods depending on available information.

5.3.1 Near-Term Planning Horizon

The City's water system demand projections for near-term planning horizon are estimated using the land use method, since the City's Community Development Department has development projects to be completed by 2025.

Duty Factors

Existing water demands and available existing water billing data was used to estimate water duty factors. The most recent bi-monthly water billing data available for the City was from November 2019 to October 2020 and provided average daily demands for each land use. Duty factors for commercial, industrial and institutional land use designation were calculated using the existing service area acreage and average water demand from billing data as shown in Table 5-6. To consider actual property area for commercial and industrial land use, duty factor is multiplied by a maximum floor area factor (FAF). The FAF for the City was 1.5, which was provided in the City's Housing Element. There is planned to be an update to the City's Housing Element; however, the update was not available at the time of this writing and, as such, information from the City's most current Housing Element was used.

Table 5-6 – Water Duty Factors per Land Use

Master Plan Land Use Designation	Existing Area (acres)	Average Demand				
		Annual (afy)	Daily (gpd)	Duty Factor	FAF	du/ac
Commercial	292	718	640,562	2,197 gpd/ac	1.5	
Industrial	73	244	217,601	2,995 gpd/ac	1.5	
Institutional	135	462	412,086	3,049 gpd/ac		
Open Space	67	-	-	-		
Multi-Family Residential	357	358	319,685	41 gpd/du		22
Single Family Residential	1,095	3,213	2,868,029	306 gpd/du		8.1

In addition, for residential land use, residential density range was used from the City's Housing Element. Low density residential uses provide for single family residences within a density range of 5.8 dwelling unit per acre (du/ac) to 16.1 du/ac; and for multi-family, 11.6 du/ac to 32.3 du/ac, depending on the location of the residence within the four districts. For this Master Plan, an average of the ranges was used for each residential category to calculate the gallons per day per dwelling unit (gpd/du), resulting in 306 gpd/du and 341 gpd/du for single and multi-family duty factors, respectively.

Water Demands

Demand projections for near term planning horizon was projected using the established duty factors from Table 5-6, and land use acreage for the City's development projects listed below and provided in a map in Figure 5-6:

A. **Kinecta Credit Union & Multi Retail Complex –** (1) A new commercial building with a Personal Improvement Service Use and a Restaurant with Beer and Wine Service on a 13,168 square-foot lot at 1100 North Sepulveda Boulevard. (2) A new commercial building with a Credit Union and a

Restaurant with Beer and Wine Service on a 24,494 square-foot lot at 1120 North Sepulveda Boulevard.

B. **Sunrise Senior Living –** Single Family Residential project at 250 to 400 North Sepulveda Boulevard. The assisted living facility includes 115 beds in 95 units and would employ 77 full-time and 30 part-time employees. The level of population and employment growth associated with the proposed project would be within regional population projections.

C. **Hotel (previously AC Hotel) –** (1) Hotel Building with 162-rooms, 81,775 square feet, and full alcohol service for hotel patrons located at 600 South Sepulveda Boulevard. (2) Retail and Office Building, 16,268 square feet, with reduced parking for the entire site located at 600 South Sepulveda Boulevard.

D. **Skechers Headquarters Facilities –** Office Building, 37,703 square feet, with two stories 30 feet high over a three-story subterranean parking garage. It would house back office corporate functions with 150 workers.

E. **Manhattan Village Mall –** Remodel expansion of existing shopping center at 2600 to 3600 Sepulveda Boulevard and 1220 Rosecrans Avenue. The expansion area is estimated to be 1.8 acres.

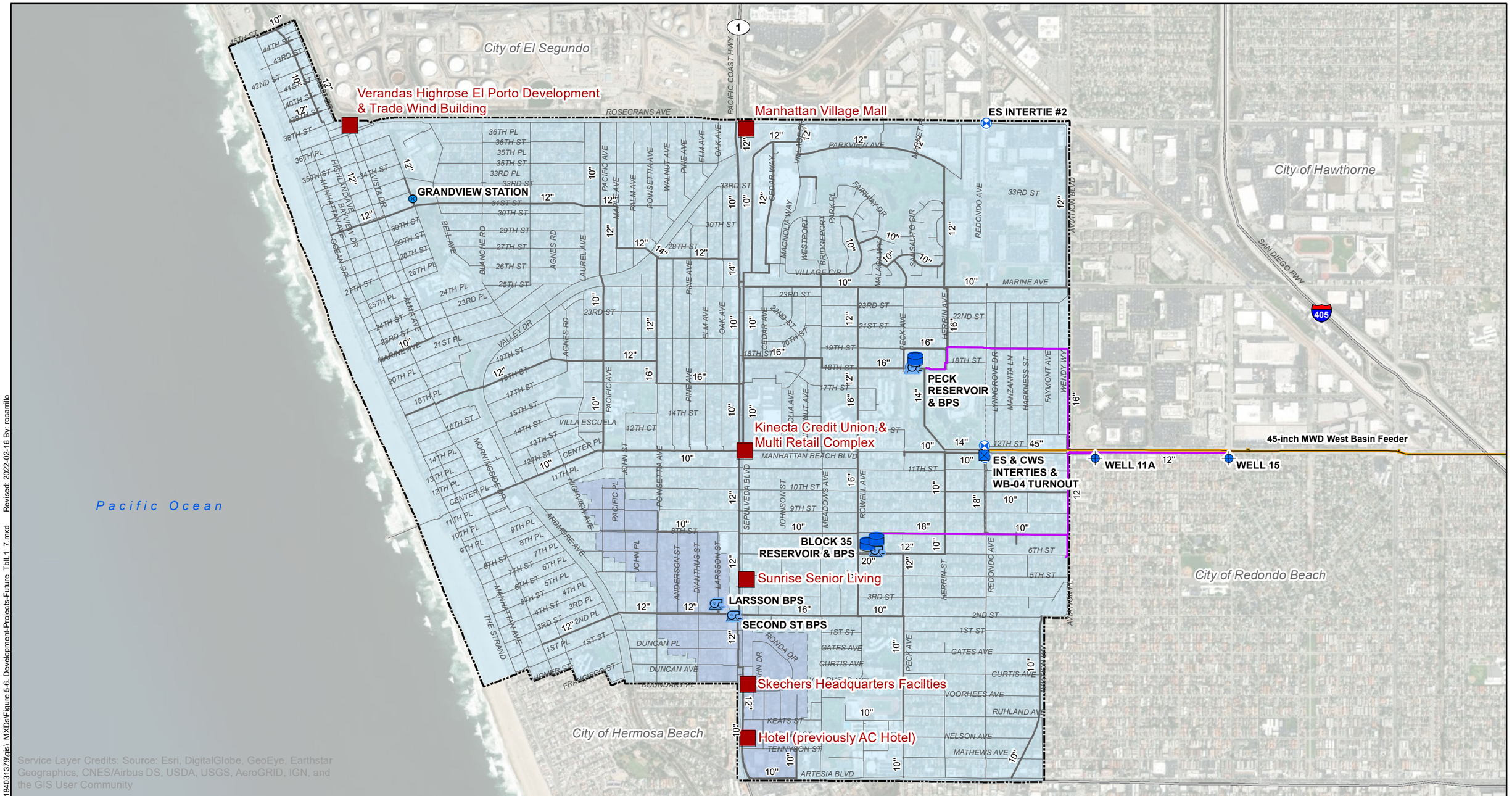
F. **Verandas Highrose El Porto Development & Trade Wind Building –** Redevelopment into Multi-Family and Retail at northeast corner of Rosecrans Avenue and Highland Avenue. The Verandas Highrose El Porto Development project includes a total of 80 multi-family residential units. Breakdown of units includes 22 studio-sized units, 14 one-bedroom units, 39 two-bedroom units, and 5 three-bedroom units.

As calculated in Table 5-7, total water demand of 56 afy is projected from the City's planned development projects for the near-term planning horizon, which is an increase of 1.2 percent in demand from existing year. The total demand for near-term planning horizon is projected to be 4,843 afy.

Table 5-7 – Water Demand for New Development Projects

Future Dev.	Status	Land Use	Dwelling Units (du)	Area [a] (ac)	Duty Factor		Demand	
					gpd/du	gpd/ac	gpd	afy
A	Under construction	Commercial	-	0.45	-	2,197	996	1.1
			-	0.84	-	2,197	1,853	2.1
B	Seeking Development Entitlement	Single Family Residential	95	-	306	-	29,109	32.6
C	Currently being considered by the City Council on appeal	Commercial	-	2.82	-	2,197	6,187	6.9
			-	0.56	-	2,197	1,231	1.4
D	Under construction	Commercial	-	1.30	-	2,197	2,853	3.2
E	Phase III development has not started construction, Phases I and II under construction	Commercial	-	1.8	-	2,197	4,048	4.5
F	Seeking Development Entitlement	Multi- Family Residential	80	-	41	-	3,263	3.7
			Total	**9**	**-**	-	**49,541**	**56**

a) Includes FAF of 1.5 per City's housing plan



\\us0300-ppfss01\workgroup\1840\active\184031379\gis_MXDs\Figure 5-6_Development-Projects-Future_TblL 1_7.mxd Revised: 2022-02-16 By: rocarrillo

Reservoir
Groundwater Well
Import Water Turnout
Interagency Connection (Intertie)
Pressure Monitoring Station
Flow Control Valve
Booster Pump Station (BPS)
Hill Zone
Main Zone
City of Manhattan Beach
Outside Agency Pipeline

Existing Pipelines
Less than 10" Diameter
10" Diameter and Greater
Well Transmission Main
MWD Distribution Main

Future Development Projects

Note:
CWS = California Water Service
ES = City of El Segundo
MWD = Metropolitan Water District

N
1,500 750 0 1,500 Feet
Date: 2/3/2022

TITLE: **Figure 5-6 – Future Development Projects**
PROJECT: City of Manhattan Beach Water Master Plan
COORDINATE SYSTEM: NAD 1983 StatePlane California V FIPS 0405 Feet

Stantec

5.3.2 Ultimate Planning Horizon

For the ultimate planning horizon, population method was used to project future water demands, since the City is built out and there is very little land use change is anticipated from year 2025 to 2030 in the General Plan. Population has a significant impact on water system facility needs and, ultimately, capital expenditures. It is important to evaluate population forecasts to determine consistency and validate trends. Population forecasts also help determine future water demands and ensure the water system is neither over nor under built.

According to the City's Community Development Department, the Southern California Association of Governments (SCAG) forecasts that the population of the City would increase from existing population of 35,991 to approximately 36,546 by 2030. Demand projection was estimated using the City's future population projections and historical per capita water use of 122 gpd/capita estimated in this Master Plan. As shown in Table 5-8, it is estimated that the demands for the ultimate planning horizon will be 5,125 afy, approximately 6.6 percent increase in demand from existing demands.

Table 5-8 – Future Population and Water Demand Per Capita

Year	Population [a]	Demand per Capita per Day (gpd/capita)	Average Demand	
			Daily (mgd)	Annual (afy)
2030	36,546	122	4.58	5,125

Note: The gpd/capita is based on the 2013-20219 water production data provided by the City.
a) Population based on information provided by the City.

5.3.3 Summary of Water Demands

Table 5-9 summarizes the demands and factors used in the hydraulic model for the entire City water distribution system. The projected demands reflect the near-term and ultimate planning year conditions.

Table 5-9 – System-Wide Demands and Factors

Description	Factor	Existing Demand		Near-Term (2025)		Ultimate (2030)	
Average Year	-	4,787	afy	4,843	afy	5,125	afy
Average Day	-	4.27	mgd	4.32	mgd	4.58	mgd
Average Day	-	2,968	gpm	3,002	gpm	3,177	gpm
Maximum Day	1.5	4,451	gpm	4,504	gpm	4,766	gpm
Peak Hour	2.31	6,856	gpm	6,936	gpm	7,339	gpm