Long Beach Water

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Final Draft

URBAN WATER MANAGEMENT PLAN

2020

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ACRONYMS

2020 Target	2020 Urban Water Use Target
ABP	The Alamitos Barrier Project
Act	Urban Water Management Planning Act
AF	Acre-feet
Albert Robles Center	Albert Robles Center for Water Recycling & Environmental Learning
AMI	Advanced Metering Infrastructure
APA	Allowable Pumping Allocation
AWWA	American Water Works Association
CCF	Centum Cubic Feet
CIP	Capital Improvement Program
City	City of Long Beach
COM	Commercial
DOF	California Department of Finance
DRA	Drought Risk Assessment
DWR	Department of Water Resources
GCMs	Global Cimate Models
GPCD	Gallons per Capita per Day
GWTP	Groundwater Treatment Plant
IND	Industrial
IRR	Irrigation
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation Districts
LADWP	Los Angeles Department of Water and Power
LBWD	Long Beach Water Department

ACRONYMS

LBWD Board	City of Long Beach Board of Water Commissioners
LBWRP	Long Beach Water Reclamation Plant
LVL AWTF	Leo J. Vander Lans Advanced Water Treatment Facility
M&I	Municipal and Institutional
Metropolitan Act	Metropolitan Water District Act
MFR	Multi-Family Residential
MGD	Millions of Gallons per Day
MWD	Metropolitan Water District of Southern California
NOAA	National Oceanic and Atmospheric Assocation
POLB	Port of Long Beach
RCPs	Representative Concentration Pathways
SBX7-7	The Water Conservation Act of 2009
SCAG	Southern California Association of Governments
SFR	Single-Family Residential
SJCWRP	San Jose Creek Water Reclamation Plant
SWP	State Water Project
UWMP	Urban Water Management Plan
UWMP Guidebook	Urban Water Management Plans Guidebook 2020
West Coast Basin	The West Coast Sub-Basin of the Coastal Plain of Los Angeles County Groundwater Basin
WRD	Water Replenishment District of Southern California
WRP	Water Resources Plan
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contigency Plan
WSDM	Water Surplus and Drought Management

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DWR UWMP CHECKLIST ARRANGED BY WATER CODE SECTION

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5	Chapter 5 Appendix F
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	Section 5.7.2
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7	Section 5.8
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Sections 5.2 and 5.5.7	N/A
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Chapter 10	Section 10.3
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	N/A
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Section 5.8 Appendix F

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Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(a)	Provide population projections for 2025, 2030,2035, 2040 and optionally 2045.	System Description	Section 3.4	Section 3.8
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	Section 3.9
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Section 3.10
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Section 6.1 Section 6.1.4 Section 6.2 Section 6.3 Section 6.4 Section 6.6 Section 6.8
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Section 6.1
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.2	Section 7.3
10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.1	Sections 6.1.2, 6.1.3 Section 6.2 Section 6.3 Section 6.8
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1	Section 6.6
10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	Section 6.1.2 Section 6.1.3 Attachments

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Section 6.1.1.1 Section 6.1.1.2
10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	Section 6.1.1.1 Section 6.1.1.2 Section 6.1.2 Section 6.1.3 Attachments
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.2.3	N/A
10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	Section 6.1 Section 6.1.4
10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.2	Section 6.6
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.7	Section 6.4.2
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 4.1 Section 4.2 Section 4.4.4 Section 4.4.5

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.3	Section 4.3
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2	Section 4.3 Appendix
10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	Section 9.1 Section 9.2
10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	Section 9.1
10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.8	Section 6.6
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Section 6.4.1
10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 2.5.1	Section 2.5.1 Appendix

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	N/A
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	Chapter 3 Section 4.4.1 Section 4.4.3
10631.2(a)	The UWMP must include energy intensity information as stated in the code.	System Water Use	Section 6.4 and Appendix O	Section 6.5
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Chapter 8 Attachment
10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Section 8.2	Section 8.2
10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Section 8.2	Section 8.2
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3	Section 8.3

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Section 8.3	Section 8.3
10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Section 8.4	Section 8.4.2
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Section 8.4.1
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Section 8.4.3
10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Section 8.4	Section 8.4.4
10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Section 8.4	Section 8.8
10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Section 8.5	Section 8.5
10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Section 8.5, 8.6	Section 8.5
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Section 8.6

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7	Section 8.5
10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Section 8.7	Section 8.5
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Section 8.7
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Section 8.7
10632(a)(8)(C)	Describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought.	Water Shortage Contingency Planning	Section 8.8	Section 8.7
10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Section 8.9	Section 8.8
10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Section 8.10	Section 8.9
10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Section 8.11	Section 8.10

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.2	Section 6.3
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 6.3
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.2	Section 6.3.2.2
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2	Section 6.3 Section 6.6
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.2	Section 6.6
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2	Section 6.6
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Chapter 7	Section 7.1

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Section 7.2 Section 7.3
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3	Section 7.5
10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.3	Section 7.5.1
10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.3	Section 7.5 Section 7.1.1
10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.3	Section 7.5.2
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change condition, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.3	Section 7.5.1
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12, 10.4	Section 8.9.1 Section 10.4 Attachment

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6	Section 2.5 Appendix B
10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Section 10.2.2 Section 10.3 Section 10.5
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.2	Section 10.2.2 Appendix C
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Section 10.3 Appendix G
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 10.4
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 10.4 Appendix B
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	Section 10.4

Water Code Section	Summary as Applies to UWMP	Subject	2020 Guidebook Location	2020 UWMP Location
10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 10.5
10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 10.5

EXECUTIVE SUMMARY AND LAY DESCRIPTION

ES-1 OVERVIEW AND PURPOSE OF PLAN

In 1911, the City of Long Beach (City) acquired all privately-owned water systems serving the City at that time. Shortly thereafter, a change to the City Charter established the Long Beach Water Department (LBWD), to begin operations to regulate and control the use, sale, and distribution of water owned or controlled by the City. The availability of water has been vital to the economic development of the City, growing from a population of approximately 17,800 in 1911 to becoming one of California's most populous cities with nearly 497,000 people in 2020. As a large municipal water retailer, LBWD delivers safe and reliable water service to approximately 94,000 active service connections.

Planning For The Future

LBWD continues to meet increasing future water demands by developing more reliable and resilient water supplies. LBWD plans to increase use of local supplies and reliability by reducing imported water purchases, and continuing to invest in groundwater production, recycled water use and water conservation. One of the main challenges that LBWD faces is increasing local supplies while maintaining aging infrastructure. Ongoing evaluation and planning are key components to address system needs and plan improvements, to coincide with growth, reliability, water efficiency, and of course, aging infrastructure.

Purpose Of Plan

Urban water suppliers are required by California state law to submit an Urban Water Management Plan (UWMP) to the State at designated time periods; roughly once every five years, effective first on January 1, 1984. The Long Beach Water Department (LBWD) is an urban water supplier and therefore must submit a 2020 UWMP.

The Long Beach Water Department (LBWD) 2020 UWMP has two purposes: (1) it serves as a plan for the City's reliable water supply and managing water resources consistent with LBWD's goals and policy objectives, and (2) it fulfills LBWD's obligations under the California's Urban Water Management Planning Act. The LBWD 2020 UWMP reports, describes, and evaluates the following:

- An estimate of the demand for water in its service area for at least 20 years into the future (2020 through 2050), in five-year increments;
- The degree to which, during this time frame, LBWD will be able to meet water demands in a single dry water year, in consecutive multi-year droughts, and during average year conditions;
- The stages of actions LBWD would undertake to address up to and beyond a 50 percent reduction in its water supplies; and
- The reasonable and practical efficient uses of water, recycling, and conservation activities in its service area.

Although UWMPs typically forecast a minimum of 20 years into the future (2020 through 2040), LBWD's 2020 UWMP makes a 30-year forecast. The additional 10 years allow LBWD to reference the 2020 UWMP in future water supply assessments completed between 2020 and the year 2025 when the next UWMP update is expected.

ES-2 WATER USE AND DEMAND PROJECTIONS

During 2014 – 2020, residential water use accounted for about 68% of total water usage, while commercial and institutional water use accounted for about 27% of total water usage, and the remainder belonging to industrial and landscape irrigation.

Total water demand is projected to decline through 2030 as water efficiency continues to increase, then projected to continue to hold steady through 2040 as increasing water demand from population and economic growth are canceled out by reductions from conservation. By 2040, water demand is then projected to begin increasing to approximately 44,000 acre-feet by 2050 as population and economic growth surpasses the reductions in demand from conservation.

Under this forecast, water use across all sectors are projected to remain steady or decline with the exception of irrigation water use, which is anticipated to increase.

Climate Change

Different climate change scenarios were examined to test the sensitivity of demand projections for the year 2050. When a future climate that is hotter and drier is tested, water demands increase by about 11% (5,000AF) than current projections. Under these same stressed conditions, but with increased levels of water conservation, the demand forecast increases to only about 4.5%.

FIGURE ES-1: Historical and Projected Water Use

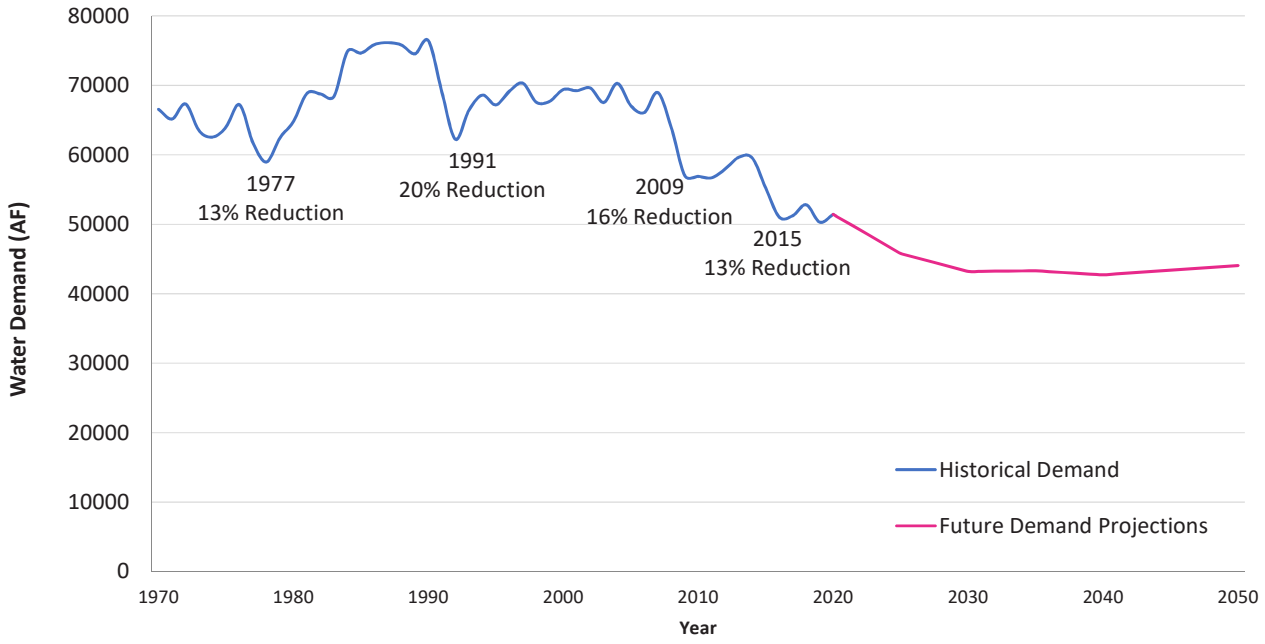

TABLE ES-1: Water Demand Forecast by Sector

Year	Single Family Residential (AFY)	Multi-Family Residential (AFY)	Commercial (AFY)	Industrial (AFY)	Irrigation (AFY)	Total Billed (AFY)	Non-Revenue Water Loss	Total with Losses (AFY)
2020	18,136	14,160	11,084	594	1,820	45,794	4.00%	47,702
2030	16,307	12,987	9,718	574	1,898	41,483	4.00%	43,211
2040	15,916	13,281	9,283	556	1,975	41,012	4.00%	42,721
2050	16,082	13,894	9,735	549	2,049	42,309	4.00%	44,072

ES-3 WATER USE REDUCTION ACHIEVEMENT

The Water Conservation Act of 2009, also known as the SBx7-7, set a statewide goal to reduce urban water use by 20 percent by the year 2020. In order for the State to achieve the 20 percent reduction, each retail urban water suppler is required to calculate its individual water use reduction target for the year 2020, a calculation based on one of the four allowable methods described in CWC §10608.20(b).

Reduction Method

LBWD has used Method 1 to establish its 2020 Target, which is 80 percent of its baseline per capita daily water use; in other words, LBWD intends to reduce its per capita water use 20 percent by the year 2020. LBWD recognizes the essential role that water conservation must play if Southern California is to maintain a reliable supply of water, so LBWD has opted not to use other target-setting methods that would have required less water conservation.

Established Baseline for Reduction

Water suppliers defined a 10-year period from which a baseline average water use is calculated. LBWD's 10-year baseline is the period beginning with the July through June fiscal year 1996 and ending in fiscal year 2005, inclusive. LBWD's average water use during this 10-year baseline period was 134 gallons per capita per day (GPCD). This baseline average water use is then compared to the 2020 Actual Urban Water Use to determine whether the 20 percent reduction has been achieved.

Establishing and Meeting Reduction Targets

Because LBWD has selected Target Method 1, its 2020 Target is 80 percent of the 10-year baseline, or 80 percent of the 134 GPCD, which means that LBWD's 2020 Urban Water Use Target is 107 GPCD.

Water suppliers must then calculate their Actual 2020 Urban Water Use to determine whether or not they have met their 2020 Urban Water Use Target. LBWD per capita water use for 2020 was 93 GPCD, which is less than the 107 GPCD Confirmed 2020 Target. LBWD has therefore met its 2020 Urban Water Use Target.

TABLE ES-2: 20 x 2020 Urban Water Management Achievement

Baseline Start Year	Baseline End Year	Baseline GPCD	2020 Confirmed GPCD Target	2020 Actual GPCD
1996	2005	134	107	97

ES-4 WATER SUPPLIES

LBWD primarily relies upon groundwater extracted locally from the Central Basin to meet customer water demands. LBWD then purchases imported water from MWD to make up the difference between demand and groundwater supplies. LBWD also provides recycled water to an increasing number of customers to replace the use of potable water. In 2020, LBWD utilized 68% of its available supplies to meet demands.

Energy Intensity

A new requirement for the 2020 UWMP is to include an estimate of the amount of energy used to process water supplies, such as energy used to extract, divert, convey, treat, store, and distribute. Energy intensity reporting can be beneficial for water utilities because it identifies associated energy savings for water conservation savings programs. The most energy intensity sources are imported sources from MWD, which imports supplies from the State Water Project via the California Aqueduct and Colorado River via the Colorado River Aqueduct. The next most energy intensive sources are local groundwater and recycled water. Recycled water is estimated to be a more energy intensive source than groundwater, but due to lack of data readily obtainable the energy intensity reported does not capture the energy from treatment processes.

Future Supplies

LBWD identified and evaluated supply options that could be developed to meet LBWD's demands through 2050. LBWD will focus on assessment of its groundwater pumping capacity in both Central and West Coast Basins, followed by expansion in groundwater augmentation and recycled water use. LBWD plans to utilize an adaptive water resources strategy when managing future supplies and impacts from climate change.

TABLE ES-3: 2020 Total Water Use Used by Supply

Water Supply	Supply Used (AF)	Supply Available (AF)
Imported Water	26,840	35,100
Groundwater	24,200	32,693
Recycled Water	4,176	13,495
Total	**55,216**	**81,288**

FIGURE ES-2: 2020 Supplies Used

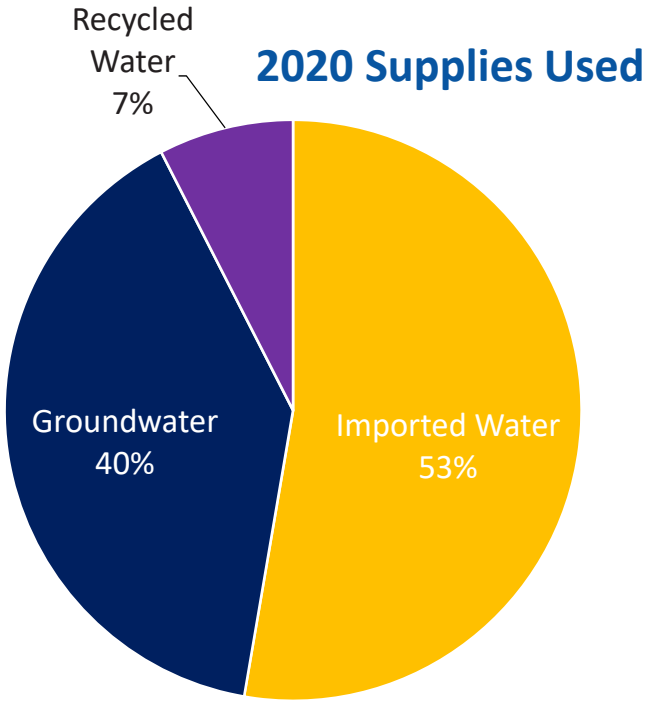

TABLE ES-4: Summarized Energy Intensity Reporting

				All Water Supplies
Water Supplies	Local	Recycled Water[1]	Volume (AF)	4,176
			Energy Consumed (MWh)	1,169
		Groundwater – Extract/Divert [2]	Volume (AF)	24,200
			Energy Consumed (MWh)	16,418
		Groundwater - Treatment	Volume (AF)	25,593
			Energy Consumed (MWh)	9,744
	Imported	MWD	Volume (AF)	27,204
			Energy Consumed (MWh)	54,906
2020 Total Water Volume Delivered (AF) – Recycled, Local, Import				**55,216**
Total Estimated Energy Intensity (kWh/AF) – Recycled Water				**280**
Total Estimated Energy Intensity (kWh/AF) – Groundwater Supplies				**551**
Total Estimated Energy Intensity (kWh/AF) – Imported Supplies [3]				**1,863**
Estimated Total Energy Consumed (MWh)[4]				**82,237**

[1]Recycled water energy consumption only consider discharge/distribution, it does not reflect energy from treatment processes at LBWRP

[2]Information regarding distribution conveyance (i.e booster stations) energy consumption was not readily available and not reflected

[3]MWD treated water energy intensity is the 2013-2018 average including MWD conveyance, treatment, and distribution energy intensities

[4]Total Energy Consumption is estimated; information and data readily available were used but are not comprehensive of entire energy consumption across the LBWD water systems

ES-5 WATER SUPPLY RELIABILITY

LBWD's supplies from groundwater, imported water purchased from MWD, and recycled water are expected to be reliable for at least the next 30 years.

Both the Central Basin and West Coast Basin Judgments' groundwater extraction limitations, multiple on-going basin replenishment projects, adequate funding of the replenishment activities from revenue generated by the replenishment assessment placed on extractions, and sufficient Basin storage will provide LBWD with a very reliable supply of groundwater, even during multiple-dry years.

LBWD does not anticipate any projected constraints of its imported water supply to be impacted for the next 30 years due to the following reasons:

- MWD has indicated reliability of future supplies to meet demands as documented in the MWD 2020 UWMP;
- MWD allocation plan guarantees a minimum 100 gallon per capita per day (which is an amount above LBWD's current and projected water demands); and
- LBWD has a preferential right to MWD supplies in excess of the minimum 100 GPCD guaranteed allocation.

The supply of recycled water is not affected by single or multi-year droughts. The source of supply to the Long Beach Water Reclamation Plant (LBWRP) is fundamentally wastewater from indoor uses such as toilet flushing, showers, clothes washing, wastewater from commercial kitchens, industrial manufacturing. These uses are not, to a large effect, impacted by single or multi-year droughts, but rather attributed to indoor water use efficiencies from plumbing codes and active conservation programs from LBWD.

TABLE ES-5: Projected Water Supplies, Demands, and Relability

	2025	2030	2035	2040	2045	2050
Total Supplies*	+84,752	+84,752	+88,752	+88,752	+88,752	+88,752
Total Demands*	-53,964	-51,861	-51,691	-51,042	-51,653	-52,520
Surplus	+30,788	+32,891	+37,061	+37,710	+37,099	+36,232
*Totals include both potable and recycled water supplies/demands						

ES-6 WATER SHORTAGE CONTINGENCY PLANNING

LBWD has adopted a Water Conservation and Water Supply Shortage Plan (Shortage Plan) to help prevent water supply shortages through aggressive and effective water management programs. The goal of the Shortage Plan is to minimize the impact of a shortage on the City's population and economy, to provide first for public health and fire protection and other essential services, and to ensure that water users who conserve water during normal-year hydrology and wet-year hydrology are not disadvantaged during shortages.

LBWD prides itself in being a leader in water conservation. One of the many LBWD conservation programs is the permanent prohibition on the waste of water and inefficient uses of water, even during wet years when there is no shortage of supply. The Shortage Plan outlines four additional levels of action: Imminent Water Supply Shortage, Stage 1 Water Supply Shortage, Stage 2 Water Supply Shortage, and Stage 3 Water Supply Shortage. Each water supply shortage level is associated with increasingly stringent prohibitions on end uses of water to address increasingly severe levels of water shortage.

LBWD believes that customer education is the most effective and effective means of enforcing the prohibited uses of water. LBWD customers have always been extremely responsive to the water supply challenges facing the region, and over the years our customers have achieved incredible levels of water conservation. As our customers have been such willing and voluntary partners in helping to conserve so much water, LBWD strongly prefers to inform, educate, and assist customers in correcting their water as opposed to relying upon penalties. Enforcement through penalties is used only as a last resort in situations where customers are violating prohibitions after having received ample communication and opportunity to correct their water use.

Six Standard Water Shortage Stages

LBWD has developed and included a cross-reference relating its existing stages of action under the Conservation & Shortage Plan to DWR's six (6) standard water shortage levels. The shortage levels correspond to progressively increasing estimated shortage conditions and align with the response actions LBWD would implement to meet the severity of the impending shortages.

TABLE ES-6: LBWD Shortage Stage and Contingency Planning Level Crosswalk

2015 UWMP Shortage Stage	2020 WSCP Level	2020 Shortage Level
1- Non-Shortage Conditions	1	≤ 10%
2- Imminent Water Supply Shortage	2	Up to 20%
3- Stage 1 Shortage		
4- Stage 2 Shortage	3	Up to 30%
	4	Up to 40%
5- Stage 3 Shortage	5	Up to 50%
	6	>50%

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CHAPTER 1: INTRODUCTION AND OVERVIEW

1.1 Overview

In 1911, the City of Long Beach (City) voters approved to proceed with the purchase of two privately owned water systems serving the City at that time. Shortly thereafter, a change to the City Charter established the Long Beach Water Department (LBWD), to begin operations to regulate and control the use, sale, and distribution of water owned or controlled by the City.

Then in 1931, City voters approved the City's membership in Metropolitan Water District of Southern California (MWD), establishing Long Beach as one of the founding member agencies in what is now the largest urban water agency in the United States. As a wholesaler, MWD sells supplemental water to its 26 member agencies. LBWD is exclusively a retailer and has historically purchased supplemental imported supplies from MWD to meet demands. LBWD aims to help improve regional supply reliability by reducing its dependence on purchased imported water through the development of local supplies.

The availability of water has been vital to the economic development of the City, growing from a population of approximately 17,800 in 1911 to becoming one of California's most populous city with nearly 497,000 people in 2020. As a large municipal water retailer, LBWD delivers safe and reliable water service to approximately 94,000 active service connections.

1.2 Urban Water Management Planning Act of 1983

Urban water suppliers are required by California state law to submit an Urban Water Management Plan (UWMP) to the State at designated time periods; roughly once every five years. Sections 10610 through 10656 of California's Urban Water Management Planning Act (Act) were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. The Act requires that "every urban water supplier [as defined] shall prepare and adopt an urban water management plan". The UWMP is a comprehensive planning document whose content is largely dictated by the Act.

The Long Beach Water Department (LBWD) is an urban water supplier as defined by the Act and therefore must submit an UWMP in compliance with the prescribed timetable. In its 2020 UWMP, the LBWD is required to report, describe, and evaluate, among other things:

- An estimate of the demand for water in its service area for at least 20 years into the future (2020 through 2040), in five-year increments;
- The degree to which, during this time frame, LBWD will be able to meet water demands in a single dry water year, in consecutive multi-year droughts, and during average year conditions;
- The stages of actions LBWD would undertake to address up to and beyond a 50 percent reduction in its water supplies; and
- The reasonable and practical efficient uses of water, recycling, and conservation activities in its service area.

Although the Act requires the UWMP to forecast a minimum of 20 years into the future (2020 through 2040), LBWD's 2020 UWMP makes a 30-year forecast. The additional 10 years allow LBWD to reference the 2020 UWMP in future water supply assessments completed between 2020 and the year 2025 when the next UWMP update is expected.

1.3 Purpose

LBWD's 2020 UWMP has two purposes: (1) it serves as a plan for the City's reliable water supply and managing water resources consistent with LBWD's goals and policy objectives, and (2) it fulfills LBWD's obligations under the California's Urban Water Management Planning Act.

1.4 DWR Guidance

LBWD has created this UWMP using the guidebook provided by the California Department of Water Resources (DWR). The guidebook not only helps urban water suppliers to comply with state law, but because UWMPs must be reviewed by DWR for completeness, an UWMP structured according to the guidebook also assists DWR in its review of the submitted UWMPs. The DWR guidebook includes a "compliance checklist" of the elements required in the UWMP and is designed to assist DWR in its review of the submitted UWMP.

The completed LBWD checklist, arranged by Water Code Section (as opposed to by Subject), is shown at the beginning of this UWMP on ***pages XII through XXIII***. The checklist summarizes LBWD's response to the requirements of the Water Code and indicates where each required element can be found in this 2020 UWMP.

DWR developed standardized tables for the electronic reporting and submittal of data to DWR. LBWD shall electronically submit the standardized tables to the designated DWR portal no later than the June 30, 2021 deadline. Copies of the standardized tables submitted electronically to DWR have also been included as ***Appendix A***.

1.5 COVID-19

There have been enormous health and economic burdens imposed on the City of Long Beach by the COVID-19 pandemic. And while COVID-19 has had no impact on the quality or supply of the City's drinking water, many of LBWD's in-person visits and service counter assistance had been suspended and made available via phone, online or email. This modification was aligned with closure of all other major City facilities as an effort to slow community spread of COVID-19.

Available data from the end of FY 2020 suggests that net total water demand was not significantly different in 2020 when compared to 2019. Commercial water use was significantly reduced, but this reduction was offset by a slight increase from the residential customer sector. The full extent of impacts from the COVID-19 pandemic are still evolving and may not be realized until the next several years, and a slowdown in the economy from COVID-19 may affect water demand projections. Potential impacts from COVID-19 will be monitored into LBWD's water demand and supply planning for the future as necessary.

1.6 Organization of this Document

This report has been prepared in compliance with Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act. The organization of this document follows the ordering of the chapters and sub-sections found in the DWR "Urban Water Management Plan Guidebook 2020." Detailed below is a summary of the chapters and contents of each chapter of the 2020 UWMP.

Chapter 1: UWMP Introduction
Chapter 1 provides a discussion on fundamentals of the 2020 UWMP.

Chapter 2: Plan Preparation
Chapter 2 provides an explanation of the process undertaken by LBWD to coordinate and prepare the 2020 UWMP.

Chapter 3: System Description
Chapter 3 describes the LBWD water system, service area, climate and other various factors that affect water supply and demand.

Chapter 4: Customer Water Use
Chapter 4 describes and quantifies current LBWD water use and projections for future water use through the year 2050.

Chapter 5: Conservation Target Compliance
Chapter 5 reports the water use baseline and targets required to meet compliance with the 2020 per-capita water conservation mandate, also known as SBx7-7. LBWD is in compliance with the 2020 per-capita target, which was adopted in the previous 2015 UWMP.

Chapter 6: System Supplies
Chapter 6 describes and quantifies the current and projected potable and non-potable water sources available to LBWD as a water supplier.

Chapter 7: Water System Reliability
Chapter 7 describes the long-term reliability of LBWD water supplies based upon regulatory and legal constraints, climate factors, and expected growth. This chapter also includes the Drought Risk Assessment, which differs from reliability by allowing a different basis for assessment by characterizing five consecutive dry years.

Chapter 8: Water Shortage Contingency Planning
Chapter 8 describes how LBWD will maintain reliable supplies and reduce the impact of supply reductions that may occur due to drought or sudden catastrophic events.

Chapter 9: Demand Management Measures
Chapter 9 describes the water conservation programs that LBWD had implemented in the past, is currently implementing, and plans to implement in order to reduce the demand on the water supply and meet its urban water use reduction targets.

Chapter 10: Plan Adoption, Submittal, and Implementation
Chapter 10 describes the process LBWD followed to adopt, submit, and implement the 2020 UWMP.

Appendices
The appendices provide detailed tables and background information on the content presented within the main body of the 2020 UWMP.

Attachments
Documents that are referenced in the 2020 UWMP are included as attachments if they are too long to include within the body of the UWMP itself.

CHAPTER 2:
PLAN PREPARATION

Chapter 2 summarizes the actions taken by LBWD to assure coordination and public participation throughout the development of the 2020 UWMP.

2.1 Basis for Preparing a Plan

Due to both the number of customers served and volume of water supplied, LBWD is considered an urban water supplier as defined by the California Water Code Section 10617, and state law requires LBWD's governing body, the City of Long Beach Board of Water Commissioners (LBWD Board), to adopt the 2020 UWMP no later than June 30, 2021.

The UWMP is to assure water suppliers plan for long term reliability, conservation, and efficient use of California's water supplies to meet existing and future demands. State water code requires that planning projections extend at least 20 years beyond the year of the UWMP cycle i.e. through 2040 for the 2020 UWMP cycle. The planning horizon for the LBWD 2020 UWMP is 30 years, i.e. through 2050.

The 2020 UWMPs are due to the California Department of Water Resources (DWR) by July 1, 2021. This 2020 UWMP was prepared by LBWD staff using the DWR "Urban Water Management Plans Guidebook 2020" (UWMP Guidebook). The following discussions, section references and referenced tables reflect this approach.

2.2 Regional Planning

Sections 10608.20(a)(1) and 10608.28 of the Urban Water Management Planning Act allow urban retail water suppliers to plan, comply, and report on a regional basis, on an individual basis, or both. LBWD has chosen to plan both as an individual agency as well as on a regional basis as a member of the Los Angeles Gateway Integrated Water Management Authority.

2.3 Individual or Regional Planning and Compliance

The City of Long Beach is a member of the Los Angeles Gateway Integrated Water Management Authority (Gateway Authority). The Gateway Cities formed the Gateway Authority for the purpose of developing a detailed integrated regional water management plan for the Gateway area and to assist the region in other water related matters. The Gateway Authority is a joint powers authority (JPA) under California law. The City of Long Beach and LBWD participated in the preparation of the 2013 Gateway Integrated Regional Water Management Plan.

As most urban water retail agencies in the Gateway Region are signatories to the Gateway Authority, it is a logical extension of regional planning efforts for the Gateway Authority to comply with the reporting requirements of SBx7-7 on a regional basis. Therefore, the Gateway Authority formed the Gateway Regional Alliance to provide flexibility for the cities and water agencies within the Gateway Region to comply with the regional compliance option available under SBx7-7. LBWD, along with 14 other water agencies comprise the Gateway Regional Alliance.

If a Regional Alliance meets its SBx7-7 regional target, then all suppliers in the alliance will be deemed to be in compliance. If a Regional Alliance fails to meet its regional target, water suppliers in the Alliance that meet their individual targets are still deemed to be in compliance.

LBWD is in compliance with the SBx7-7 water conservation target for 2020 as an individual urban water agency. As of the writing of this draft, the Gateway Alliance is still in the process of calculating whether or not the Regional Alliance has met its 2020 target. However, since LBWD has met its individual target, LBWD is in compliance.

2.4 Fiscal or Calendar Year and Units of Measure

The data reported in the 2020 UWMP and the accompanying standardized tables are reported on a fiscal year basis, which starts July 1 and ends June 30. The 2020 UWMP corresponds with FY 2019-2020, which represents the period from

TABLE 2-1: GATEWAY REGIONAL ALLIANCE PARTICIPATING AGENCIES

Participating Agency
Bellflower-Somerset Mutual Water Company
City of Downey
City of Bell Gardens
City of Lakewood
City of Long Beach
City of Lynwood
City of Norwalk
City of Paramount
City of Pico Rivera
Pico Water District
City of Santa Fe Springs
City of Signal Hill
City of South Gate
City of Vernon
City of Whittier

July 1, 2019 through June 30, 2020. The July 1 through June 30 reporting year is consistent with LBWD's past UWMPs, the Watermaster of the Central Basin aquifer from which LBWD obtains local groundwater supplies, and with the fiscal year for the Metropolitan Water District of Southern California (MWD), the wholesale agency from which LBWD purchases imported water.

Volumes of water for this 2020 UWMP are reported in acre-feet (AF) unless otherwise noted. One acre-foot is the amount of water that would cover an acre of land, approximately the size of a football field, one foot deep with water. There are 325,851 gallons or 43,560 cubic feet in an acre-foot.

2.5 Coordination and Outreach

LBWD has always actively encouraged public participation in its UWMP preparation. Public outreach activities for the 2020 UWMP update are described below. Further documentation is included in ***Appendix B***.

During the preparation of its 2020 UWMP and consistent with the requirements of California Water Code Sections 10620(d)(2) and 10642, LBWD informed several parties that it was preparing the 2020 UWMP, and solicited comments and participation. Notification of the 2020 UWMP update was electronically and physically mailed by March 5, 2021 to all cities and counties within which LBWD provides water, as well as to other interested parties. The notification letter served as both (1) a notice to cities and counties about the 2020 UWMP update, and (2) a notice of the time and place of the corresponding public hearing as required by the California Water Code. The list of notified organizations and individuals is provided in ***Appendix B***.

A public hearing was held on May 27, 2021 during a LBWD Board meeting. A notice of the hearing was advertised in a local newspaper, the Press Telegram, on May 10, 2021 and May 17, 2021 in accordance with California Government Code 6066. The notice was printed in multiple languages to reach a more diverse local population. Copies of the publications of the public hearing are provided in ***Appendix C***. Public comments on the draft 2020 UWMP were taken during the public hearing, as well as approximately 21 days prior to the public hearing.

2.5.1 Coordination with Wholesale Suppliers

Consistent with California Water Code Section 10631(h), LBWD has provided water use projections to Metropolitan Water District of Southern California (MWD). Documentation is included in ***Appendix D***. Further detailed discussion regarding future water use is located under ***Chapter 3***.

CHAPTER 3:
SYSTEM DESCRIPTION

Chapter 3 describes the LBWD water system, service area, climate and demographic features to provide an understanding of the elements that affect water supply and demand.

3.1 Organizational Structure

After 20 years of operation, Long Beach voters approved a City Charter amendment creating the City of Long Beach Board of Water Commissioners (LBWD Board). The LBWD Board is comprised of five members of the Long Beach community who are nominated by the Mayor and approved by the City Council, and LBWD Board members can serve up to two 5-year terms.

The LBWD Board is charged with full jurisdiction over all water works necessary to the acquisition, treatment, sale, and distribution of water served to the City and the City's sanitary sewer system. Among other duties, the LBWD Board has authority to acquire or sell real property, to construct and operate water facilities, to purchase equipment and to enter contracts. Additionally, the LBWD Board is responsible for establishing LBWD's missions and goals, and adopting policies and strategies to meet those ends.

The LBWD Board-adopted mission incorporates the potable water, recycled water and sanitary sewer systems operations and maintenance, and embraces customer-centered, efficient, and environmentally sensitive operations.

The LBWD Board-adopted mission is:

- To deliver an uninterrupted supply of quality water to our customers;
- To effectively dispose of or reclaim sanitary sewage; and
- To operate in an economically efficient and environmentally responsible manner.

The LBWD Board-adopted 'Values' support the mission are:

- A proactive mindset, anticipation of future needs;
- Effective communication within LBWD and the community at large;
- Enthusiastic support of water education programs; and
- Responsible support of water conservation activities.

More information about LBWD is available on the website at www.lbwater.org. Additional information pertaining to the City of Long Beach is available at www.longbeach.gov.

3.2 Regional Location

LBWD's service area, shown in ***Figure 3-1***, coincides with the boundary of the City of Long Beach (City). It is located approximately 24 miles south of downtown Los Angeles and bounded by the City of Compton, Paramount and Lakewood to the north; the City of Seal Beach, Los Alamitos and Rossmoor to the east; the Pacific Ocean to the south; and City of Los Angeles and Carson to the west. The City of Signal Hill is surrounded by the City, but is not serviced by LBWD.

The City is located at the mouth of two significant southland watersheds, the San Gabriel River Watershed and the Los Angeles River Watershed. The topography in the area is generally flat, with elevations sloping down to about 10 feet near the Pacific Ocean, the Port of Long Beach, and areas surrounding the San Gabriel and Los Angeles Rivers. Elevations increase to 120 feet in the central area of the City.

3.3 Service Area Description

The approximate 50 square mile service area is comprised of residential, commercial, and industrial land uses. The City is also home to different types of regional-serving facilities, such as The Port of Long Beach, Long Beach Airport, Cal State University of Long Beach, major healthcare facilities, and large energy production facilities.

The service area is predominantly residential, at about 45% of the total land use. Since 1990, there has been a shift of land uses away from manufacturing and warehousing to more educational and health facilities. The current population is estimated at 497,000 and the Southern California Association of Governments (SCAG) projects the service area to reach a population of approximately 560,000 by 2050. LBWD's service area is mostly built-out and future development is expected to be focused on redevelopment in the downtown and urban areas along major highways (PCH) or along major arterial roads.

3.4 Potable Water Distribution System

LBWD's potable water system, shown in ***Figure 3-2***, consists of two (2) primary pressure zones, and is primarily fed by treated groundwater from LBWD's centralized Groundwater Treatment Plant (GWTP) and supplemented by eight (8) imported water connections. The potable distribution system includes two (2) tank farms, three (3) booster stations, 7,000+ hydrants and over 94,000 active service connections. Approximately 916 miles of transmission and distribution pipelines (2-inch to

54-inch), move water throughout the system and deliver water to homes and businesses in the City.

There are also twenty (20) active inter-agency connections with the Cities of Signal Hill, Compton, Los Angeles, Paramount, Lakewood, and Seal Beach; the Harbor Department; the California Water Company; and the Golden State Water Company. Most of these connections are in place for emergency purposes only.

More detailed information about the potable water supplies is provided under Chapter 6.

3.5 Groundwater Collection and Treatment Systems

More than half of water supplied to the City is produced from groundwater wells that deliver water to the Long Beach Groundwater Treatment Plant (GWTP) via LBWD's Groundwater Collection System. As shown in ***Figure 3-3***, LBWD has a total of 27 active wells, but at any given time one or more of these wells is out of service for maintenance or other issues. 23 miles of collection pipeline ranging from 12-inch to 42-inch deliver the untreated groundwater from the wells to the GWTP. More information about the groundwater supply is provided under ***Chapter 6***.

LBWD has one centralized Groundwater Treatment Plant (GWTP) with a capacity of 62.5MGD. Treatment process includes coagulation, sedimentation, chlorine disinfection, filtration through fine coal and silicate sand, chloramine disinfectant, and fluoride. At the end of the treatment process, the treated water is stored in a 13MG cistern located on-site at the GWTP. The treated, potable water is then pumped into the water distribution system via two (2) booster pump stations.

3.6 Recycled Water System

LBWD provides recycled water to customers on the east side of the LA River within Long Beach borders. The Long Beach Water Reclamation Plant (LBWRP) is the only source of recycled water in the City, and is owned and operated by the Los Angeles County Sanitation Districts (LACSD). The quality of water produced at LBWRP is Title 22 disinfected tertiary recycled water that can be used for irrigation, groundwater recharge and street sweeping. LBWD currently serves large public and private irrigation customers such as schools, parks, and golf courses through an existing distribution system, as shown in ***Figure 3-4.*** The existing distribution system consists of two (2) pressure zones, storage tanks, booster stations and a groundwater well used for emergency purposes only (lack of non-potable supplies).

Per a 1968 agreement with LACSD, LBWD owns 100% of the rights to all the effluent from the LBWRP. Any treated recycled water that is not taken by LBWD into its recycled water distribution system or used at the WRD Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF) is discharged into the Coyote Creek outfall by LACSD.

More information about the recycled water supplies is provided under Chapter 6.

FIGURE 3-1: Long Beach Water Department Service Area

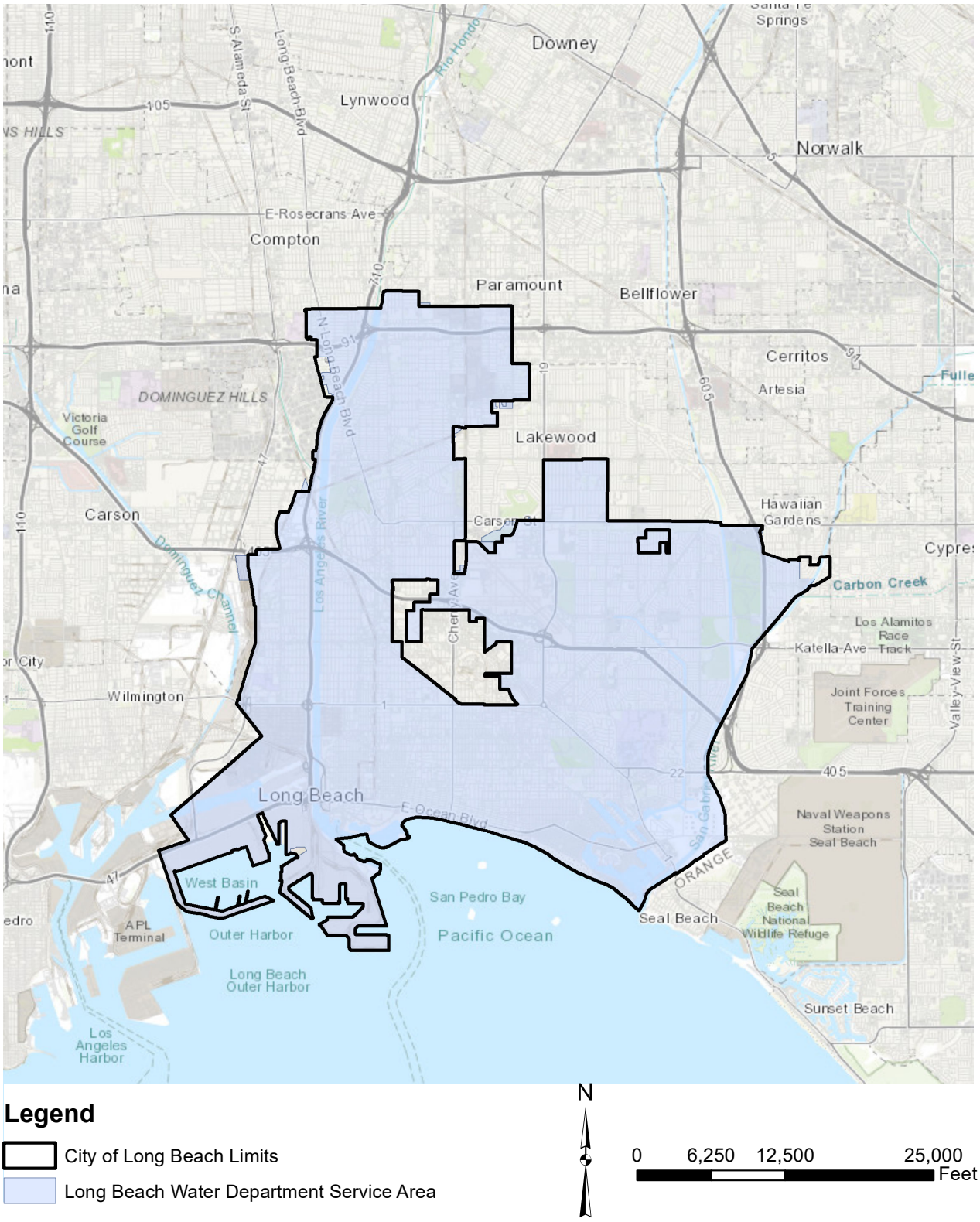


FIGURE 3-2: Potable Water System

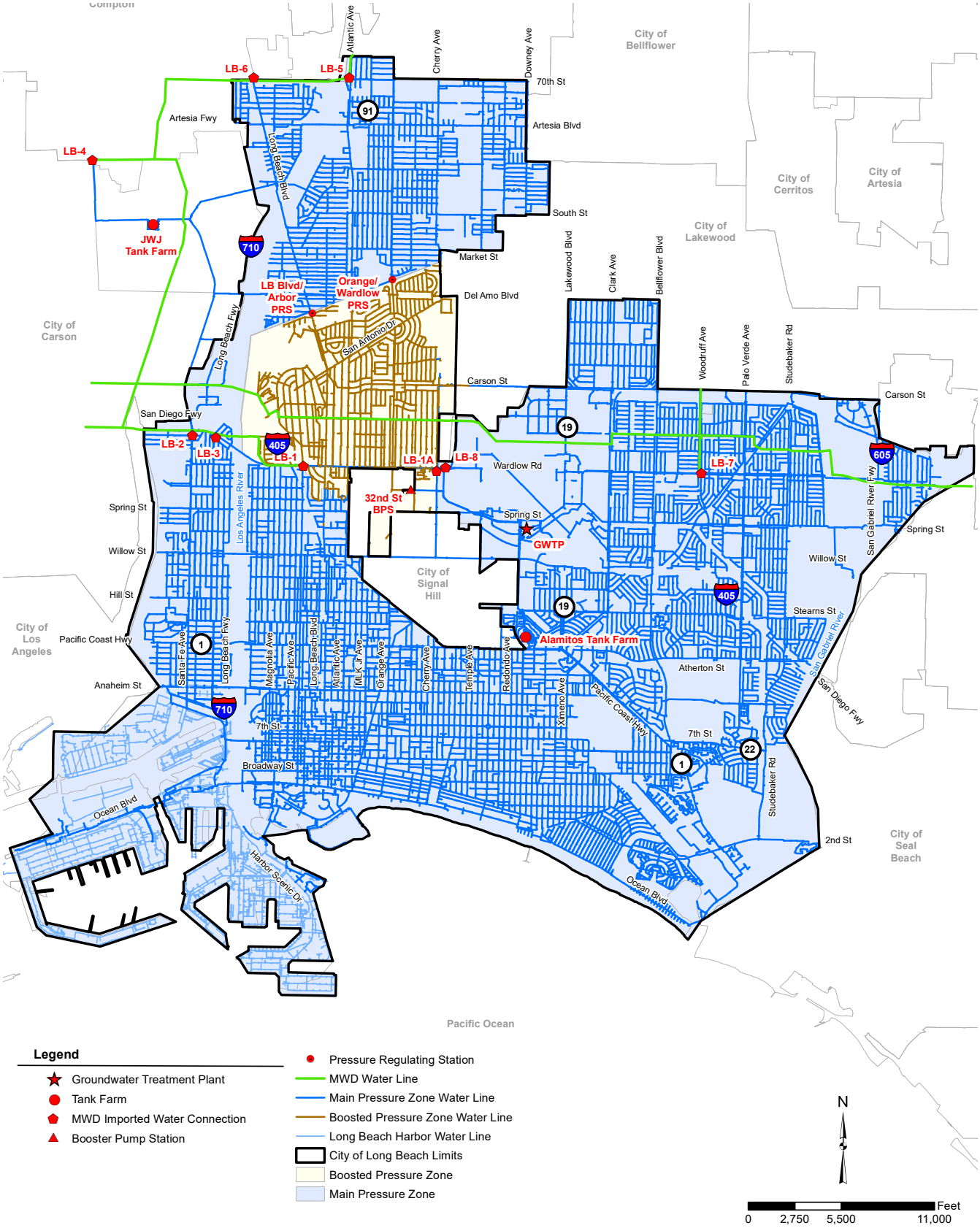


FIGURE 3-3: Groundwater Collection System

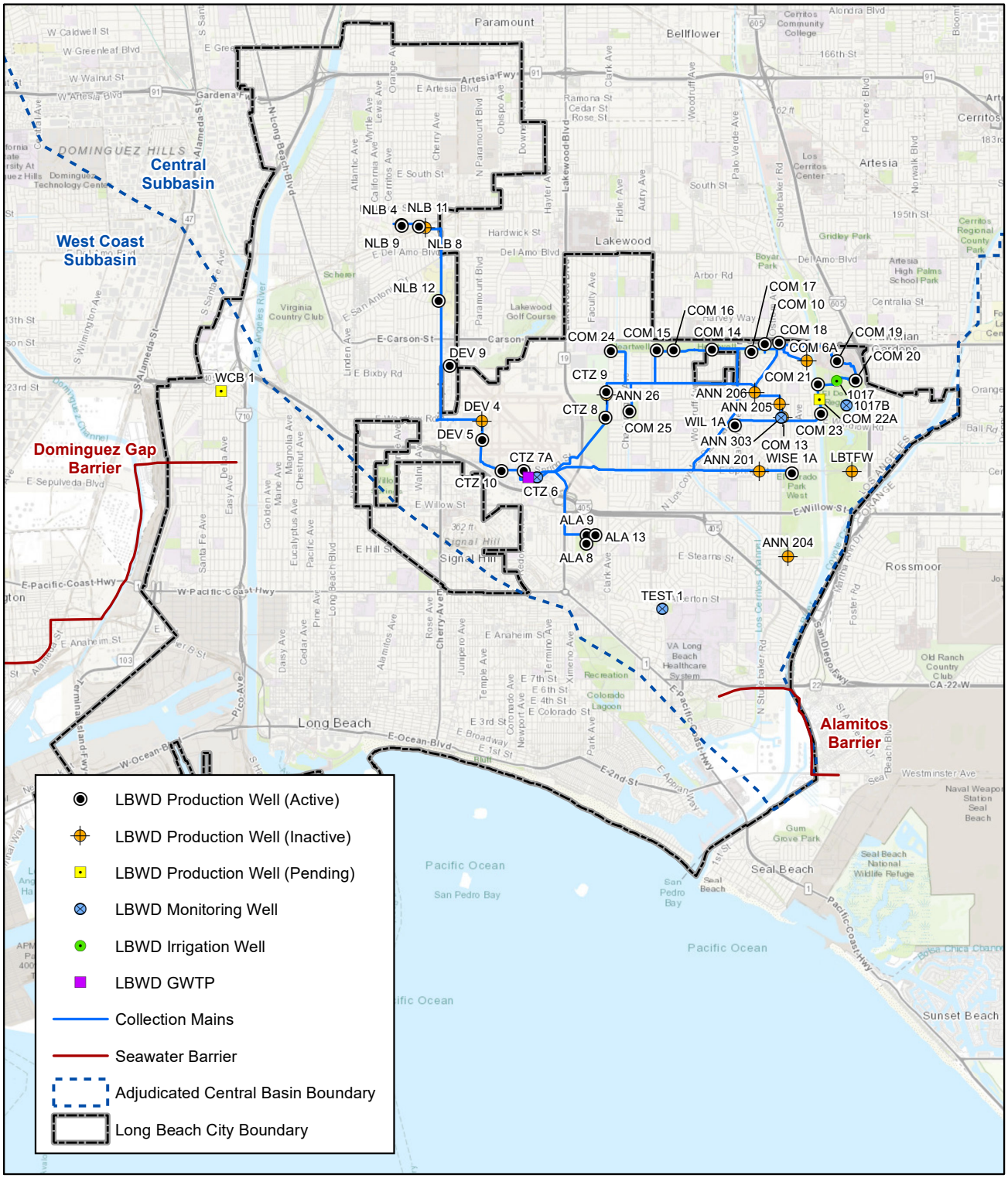
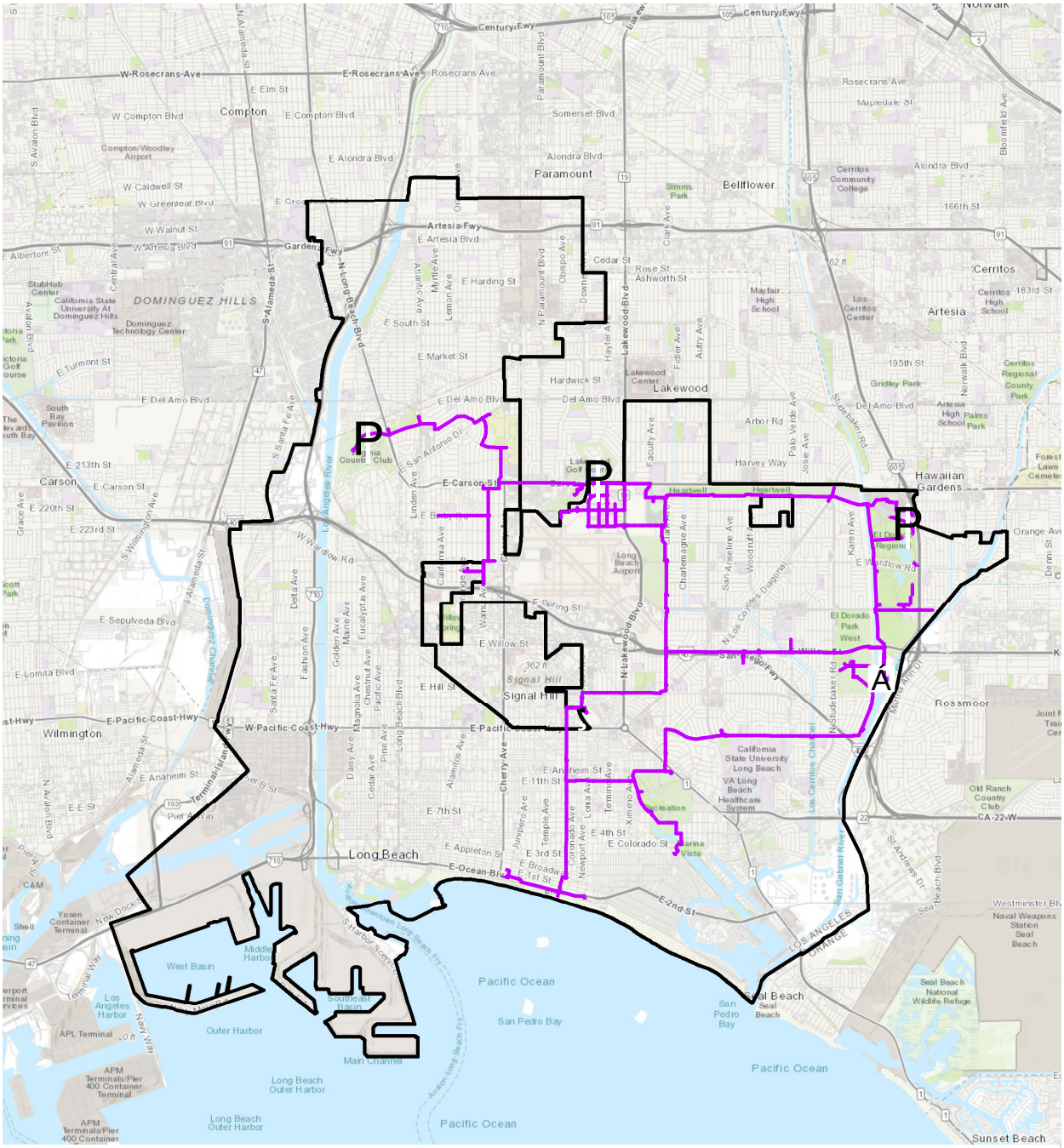


FIGURE 3-4: Recycled Water System

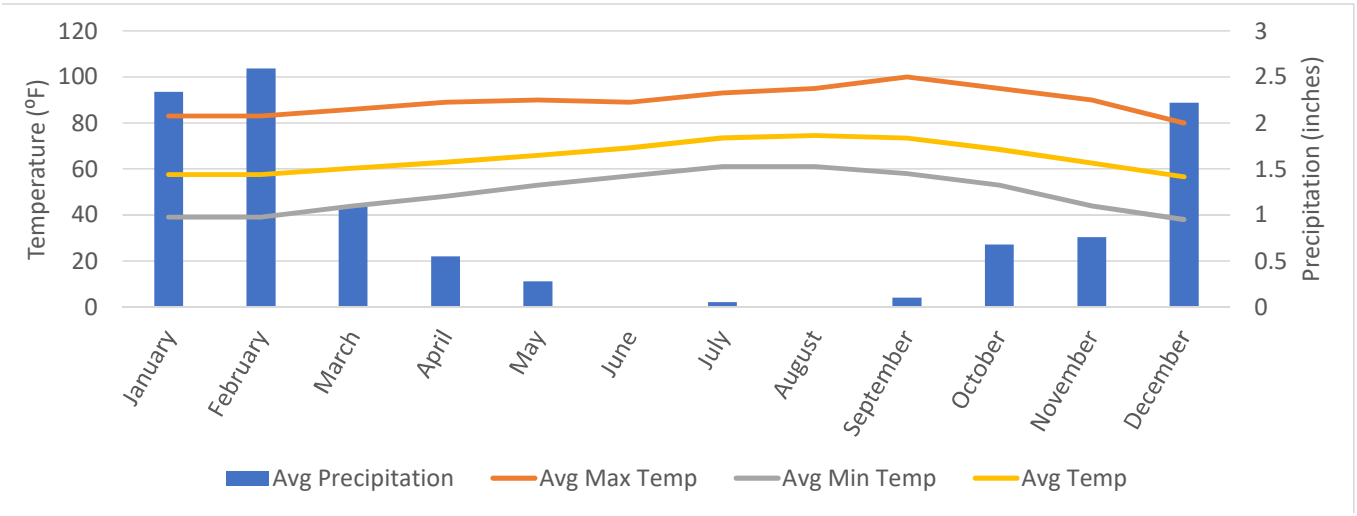


3.7 Climate

Long Beach typically experiences a Mediterranean climate with warm, dry summers and mild winters. All rainfall and weather data is captured through the City of Long Beach's Daugherty Field Data, located near the Long Beach Airport, and reported through the National Oceanic and Atmospheric Association (NOAA).

As shown in ***Figure 3-5***, July to September tend to be the warmest months with average temperatures of about 74°F. December and January are typically the coolest months with average temperatures of about 57°F. Over the last 20 years, the extreme temperatures in the City have been recorded as high as 111°F and as low as 31°F. Significant amounts of precipitation only tend to fall from October through April, and there is little to no rainfall from May through September. On average, monthly precipitation is highest in the winter months, with February having the highest average total precipitation at over 2.5 inches.

FIGURE 3-5: Average Temperature and Precipitation



3.7.1 Impacts Due to Climate Change

In 2019, LBWD completed the Water Resources Plan (WRP) which looks at the City's current and projected water demands, supplies and supply resiliency. As part of that evaluation, the Coupled Model Intercomparison Project Phase 5 (CMIP5) climate forecasts were used to evaluate impacts to water demands, supplies and supply resiliency. Global climate models (GCMs) for CMIP5 utilize Representative Concentration Pathways (RCPs) to show a range in climate forecasts based on radiative forcing (the difference between the incoming energy from sunlight and the energy radiated back into space) which are impacted by greenhouse gas emissions. ***Table 3-1*** presents the four different RCP assumptions used in the CMIP5 GCMs.

For LBWD's analysis, it was decided that RCP8.5 would be used as the base assumption for future climate models for two reasons: (1) while the GCMs using RCP8.5 show the greatest increase in global temperatures, many climate policy experts categorize RCP8.5 as being a good "business-as-usual" assumption for future greenhouse gas emissions; and (2) because the planning period for the WRP ended at the year 2050, the difference in future greenhouse gas emissions and rising temperatures between RCP8.5 and RCP6.0 are negligible from now until year 2080.

Within RCP8.5 there are about a dozen or so GCMs that forecast future temperature and precipitation. To span a reasonable range of potential climate impacts, three (3) scenarios were used during the evaluation. ***Table 3-2*** presents these three scenarios and a summary of relative impacts they have on future water demand and supply sources.

Further discussions of climate change and potential impacts are revisited in subsequent chapters in the 2020 UWMP.

3.8 Population and Demographics

Population projection is a key variable when evaluating future water demands, but can be very difficult to predict over a 25 to 30 year timeframe. Under LBWD's Water Resources Plan, population forecasts were developed based on a 25-year linear trend extrapolated from historical data taken from the California Department of Finance (DOF) and the Southern California Association of Governments (SCAG) from January 1990 to December 2018.

As shown in ***Table 3-3***, the total population is currently estimated to be nearly 497,000 and is projected to grow by nearly 65,000 over the next 30 years, or about 13%.

3.9 Other Demographic Factors Influencing Water Demand

Other demographic data were taken into consideration under the development of the 2020 UWMP. Historical demographic data such as housing and employment can be used to estimate historical per unit of water use. This information was also used as a variable in LBWD's future water demand modeling. Housing and employment data taken from the California Department of Finance (DOF) and the Southern California Association of Governments (SCAG) from January 1990 to December 2018 to provide other demographic projections through 2050.

TABLE 3-1: Coupled Model Intercomparison Project Phase 5 Climate Forecasts

CMIP5 Representative Concentration Pathways (RCP)	Assumption
RCP 2.6	Radiative forcing equal to 2.6 Watts per square meter (W/m2) Annual GHG* emissions peak between 2010-2020 and decline substantially afterward
RCP 4.5	Radiative forcing equal to 4.5 W/m2 Annual GHG emissions peak near 2040 then decline
RCP 6.0	Radiative forcing equal to 6 W/m2 Annual GHG emissions peak near 2080 then decline
RCP 8.5	Radiative forcing equal to 8.5 W/m2 Annual GHG emissions increase throughout 21st century

TABLE 3-2: Global Climate Models and Relative Impacts

Global Climate Model Name	LBWD Demand	Local Groundwater	State Water Project	Colorado River	Overall Impact on Supply Need
GFDL	Minimal Impact	Minimal Impact	Minimal Impact	Minimal Impact	Minimal
CNRM	Moderate Impact	Minimal Impact	Minimal Impact	Moderate Impact	Moderate
CSIRO	Significant Impact	Moderate Impact	Moderate Impact	Significant Impact	Significant

TABLE 3-3: Current and Projected Population

Population	2020	2025	2030	2035	2040	2045	2050
	472,217	507,218	517,822	528,424	539,027	549,629	560,232

As shown in ***Table 3-4***, the number of households is projected to increase by more than 20,000 with two-thirds of that growth being multi-family housing. Long Beach has been mostly built-out, and any future growth will have to be absorbed by urban infill and increase in housing density. Future housing development is projected to occur mainly in the form of high-density multi-family units such as apartments and condominiums.

Employment is also projected to grow at 9%, but with a decline in manufacturing employment. Projecting future employment helps with water demand projections because businesses require water as a direct input to provide goods and services, as well as for on-the-job employee personal uses. Therefore, as the economy grows and the demand for goods and services increases, water demand from the commercial and industrial sectors will also increase. On the other hand, if the economy and employment declines, water demand is also expected to decline.

TABLE 3-4: Demographic Forecasts

	1990	2000	2010	2020	2030	2040	2050
Population	423,845	460,325	471,205	472,217	517,822	539,027	560,232
Total Occupied Households	160,515	162,562	165,959	177,522	182,446	190,697	198,058
Single-Family Occupied Housing Units	71,775	75,157	78,431	81,255	81,586	84,565	86,778
Multifamily Occupied Housing Units	88,740	87,405	87,528	96,267	100,860	106,132	111,280
Median Household Income (2000$)	$41,137	$36,434	$34,690	$43,669	$43,801	$43,874	$43,948
Employment, Total	231,926	193,532	164,759	175,357	177,431	183,486	191,375
Construction	6,041	4,900	2,929	4,299	4,299	4,435	4,600
Manufacturing	65,163	30,199	9,693	9,931	9,637	9,310	9,194
Transportation, Utilities & Communications	13,064	15,320	10,022	10,765	10,711	11,083	11,519
Wholesale Trade	5,993	8,692	5,953	6,725	6,974	7,284	7,803
Retail Trade	28,132	24,750	24,797	26,591	26,565	26,988	27,778
Finance, Insurance & Real Estate	10,424	6,713	6,403	7,467	7,550	7,793	8,116
Services	74,381	72,942	72,451	77,040	79,366	82,761	87,989
Public Administration	28,728	30,016	32,511	32,537	32,331	33,833	34,375

3.10 Land Use

The City of Long Beach is comprised of approximately 25,900 acres. Residential development constitutes approximately 45 percent of the total land use within the City. Within the residential land use category, single-family residential is the largest at approximately 8,100 acres or 31 percent of the total land use within the City. A summary of the existing land uses is provided in ***Table 3-5*** and locations are shown in ***Figure 3-6***. The existing land use information is primarily based on GIS Parcel land use data and City approved General Plan data.

Future land use in the City is focused on compact developments along corridors, infill sites, and around transit stations, while generating new jobs and attracting businesses. The future land use types provided in the City of Long Beach 2019 General Plan vary when compared to existing land use types provided in GIS Land use data. The Neighborhood-Serving Centers and Corridors and Transit-Oriented Developments represent mixed-use areas and are considered redevelopment areas throughout the City. The future land uses are summarized in ***Table 3-6*** and locations are shown on ***Figure 3-7***.

TABLE 3-5: Summary of Existing Land Use

Land Use	Net Area (Acres)	% of Total
Single Family Residential	8,112	31%
Multi-Family Residential – Low	1,963	8%
Multi-Family Residential – Moderate	1,470	6%
Total Residential	**11,545**	**45%**
Commercial	2,064	8%
Mixed Commercial	141	1%
Mixed Commercial – Residential	13	0.10%
Industrial	2,835	11%
Neo-Industrial	468	2%
Open-Space	394	2%
Church	167	1%
Institutional & Government Owned	8,305	32%
Total City	**25,931**	**100%**

FIGURE 3-6: Existing Land Use

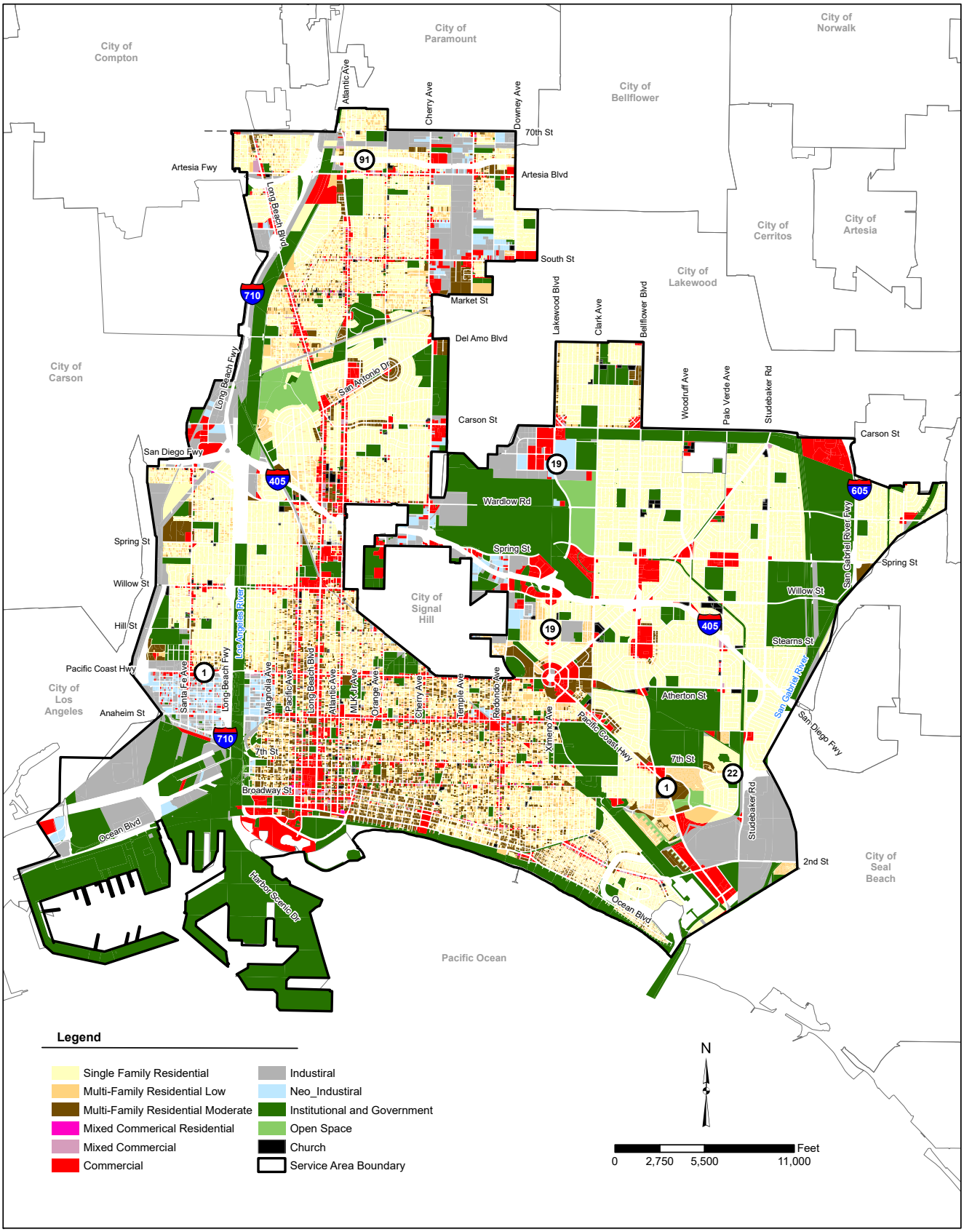
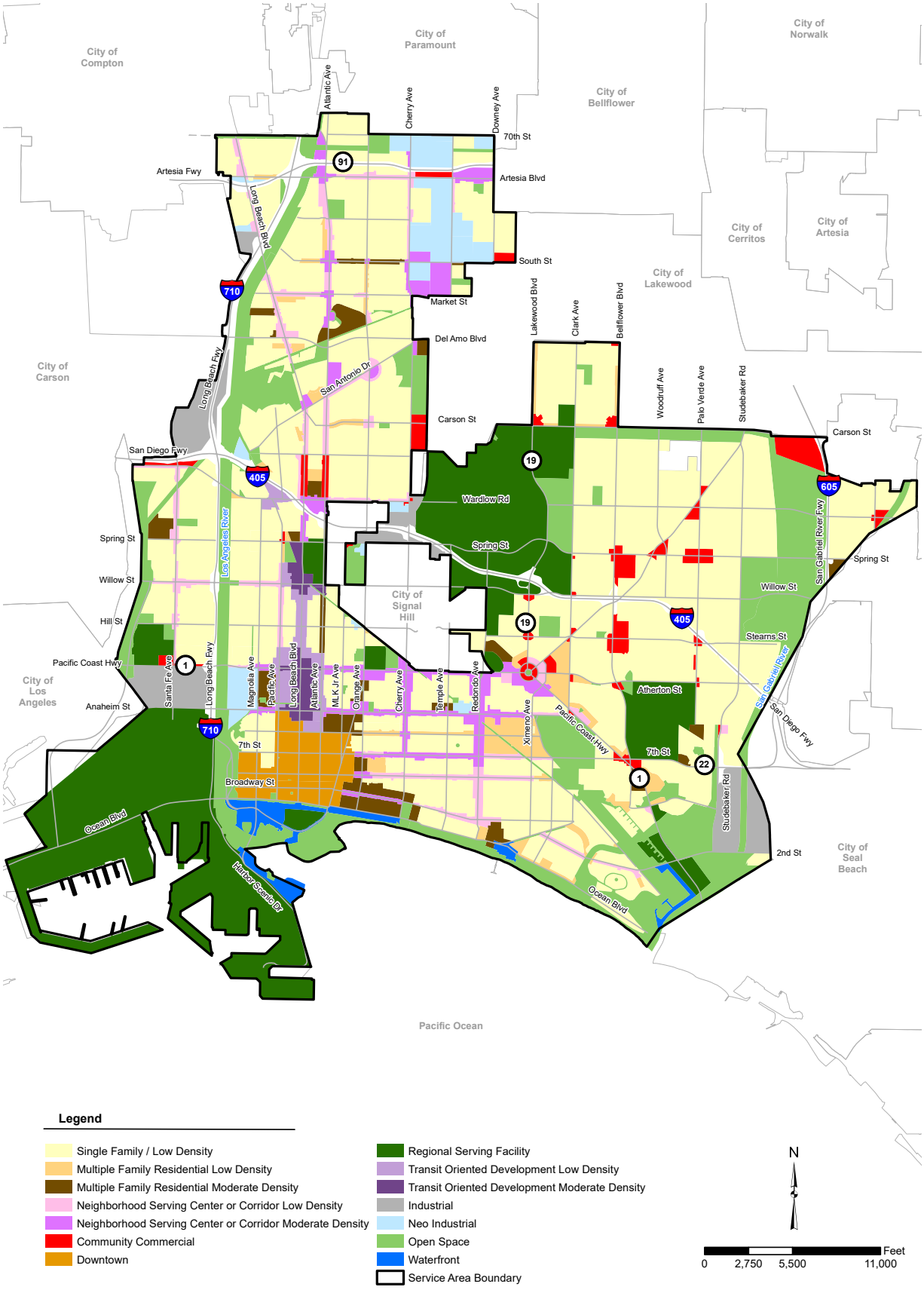
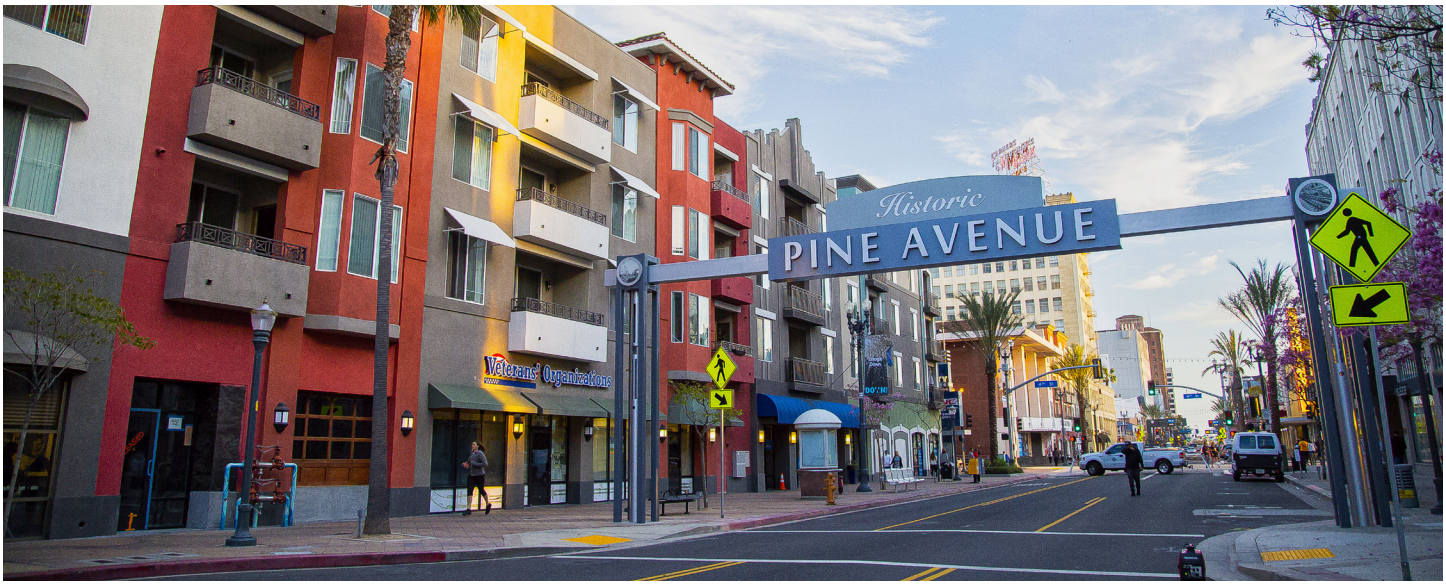


TABLE 3-6: Summary of Future Land Use

Land Use	Gross Area (Acres)	% of Total
Single Family Residential	14,642	43%
Multi-Family Residential – Low	721	2%
Multi-Family Residential – Moderate	688	2%
Total Residential	**16,051**	**47%**
Community Commercial	631	2%
Downtown	652	2%
Neighborhood Serving Center – Low	869	3%
Neighborhood Serving Center – Moderate	956	3%
Transit Oriented Development – Low	307	1%
Transit Oriented Development – Moderate	217	1%
Industrial	955	3%
Neo-Industrial	801	2%
Regional Serving Facility	5,922	17%
Water Front	354	1%
Open Space	5,351	16%
Freeway	982	3%
Total City	**34,047**	**100%**

FIGURE 3-7: Future Land Use





CHAPTER 4:
CUSTOMER WATER USE

Chapter 4 describes and quantifies current LBWD water use and makes projections for future water use through the year 2050.

4.1 Historical Water Use

Accurately tracking and reporting past and current customer water use allows LBWD to properly analyze use of its water supplies and conduct good resource planning. ***Figure 4-1*** presents the historical water demand within LBWD's service area for years 1970 through 2020.

Water use in Long Beach peaked in the late 1980's and has been trending downward ever since. There have been several signification droughts and water shortages in Southern California since the 1970's. Evidence of these droughts can be seen in the reduction of water use.

Historical trends also indicate that water demand tends to rebound after the region recovers from a drought, but the magnitude of rebound is unpredictable. For example, after the 2007-2009 shortage, water use recovered somewhat but remained 13% below pre-shortage levels until falling again in 2015.

4.2 Recent Water Use by Sector

Per capita water use (i.e. gallons of water consumed per person per day [GPCD]) have been on a general decline since the 1980's. Changes

in plumbing codes, and conservation programs (either voluntarily embraced by residents and businesses or mandated by LBWD), have affected water demands.

Table 4-1 shows recent billing data by meter type for years 2014-2019. Residential water use makes up about 68 percent of the total water usage. Commercial and institutional water use accounts for about 27 percent of the total water usage. The remainder is due to industrial and landscape irrigation. A description of each water sector is provided in the subsequent section.

FIGURE 4-1: Historical and Projected Water Use

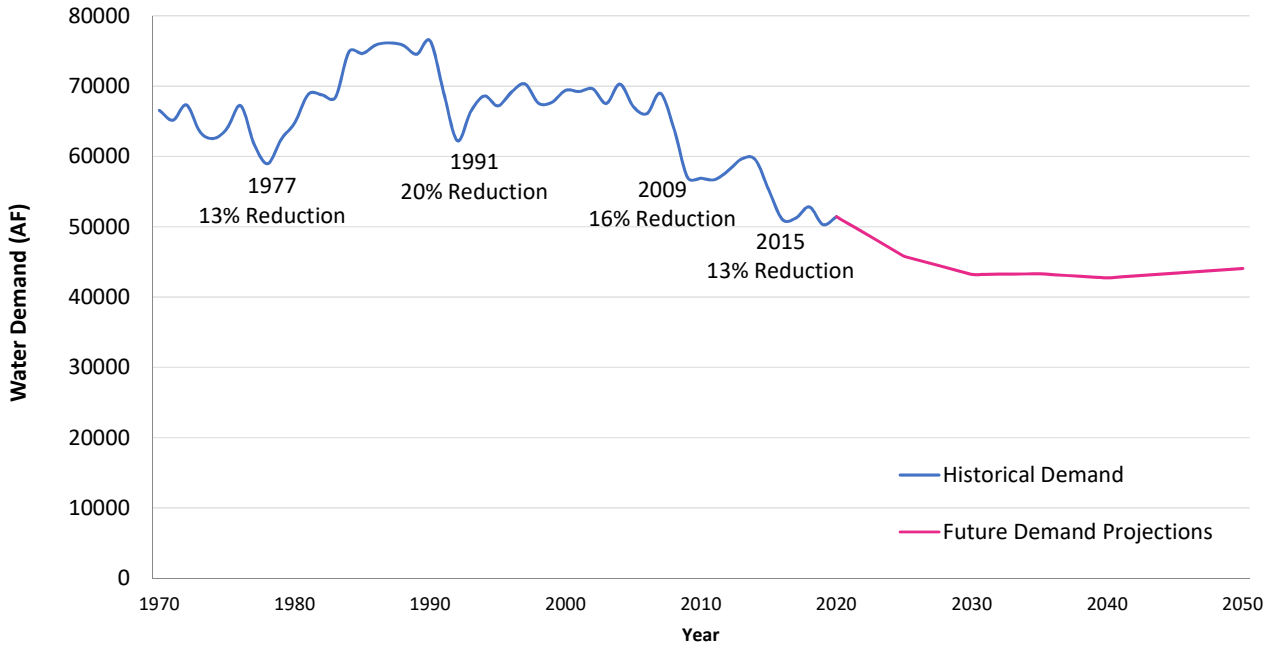


TABLE 4-1: Recent Billing Data

Year	Single Family Residential			Multi-Family Duplex			Commercial/Institutional		
	(AFY)	(MGD)	%	(AFY)	(MGD)	%	(AFY)	(MGD)	%
2014	18,948	16.9	33.5	19,721	17.6	34.8	15,229	13.6	26.9
2015	16,234	14.5	32.3	18,118	16.2	36.1	13,927	12.4	27.7
2016	16,467	14.7	33.0	17,858	15.9	35.8	13,534	12.1	27.1
2017	16,579	14.8	33.3	17,812	15.9	35.8	13,423	12.0	27.0
2018	17,106	15.3	33.8	17,804	15.9	35.2	13,595	12.1	26.9
2019	15,951	14.2	31.5	17,310	15.5	34.2	13,014	11.6	25.7
Average	**16,881**	**15.1**	**32.9**	**18,104**	**16.2**	**35.3**	**13,787**	**12.3**	**26.9**
Year	Industrial			Landscape Irrigation			Total Urban Retail		
	(AFY)	(MGD)	%	(AFY)	(MGD)	%	(AFY)	(MGD)	%
2014	261	0.2	0.5	2,458	2.2	4.3	56,617	50.6	100.0
2015	239	0.2	0.5	1,704	1.5	3.4	50,223	44.8	100.0
2016	250	0.2	0.5	1,840	1.6	3.7	49,948	44.6	100.0
2017	289	0.3	0.6	1,675	1.5	3.4	49,779	44.4	100.0
2018	310	0.3	0.6	1,799	1.6	3.6	50,615	45.2	100.0
2019	286	0.3	0.6	1,651	1.5	3.3	48,212	43.0	95.3
Average	**273**	**0.2**	**0.5**	**1,855**	**1.7**	**3.6**	**50,899**	**45.4**	**99.2**

4.2.1 Residential

LBWD has three different types of residential water service: single-family homes, duplexes, and multi-family housing.

- Single-family water services provide water to detached homes comprising a single dwelling unit, or residence - the typical "home" found in residential neighborhoods. LBWD has just over **60,000** active single-family services.
- Duplex services provide water to two dwelling units, usually attached to one another and usually on a single lot or parcel. Occasionally, both dwellings in the duplex will be individually metered, and have separate dedicated services. LBWD has just **over 8,000** active duplex services, supplying water to almost 15,000 dwelling units.
- Multi-family services provide water to residential buildings with three or more dwelling units. LBWD has about **12,000** active multifamily service connections that supply water to **94,600** dwelling units.

Water demand from the residential sector tends to increase as the population increases. The number of multi-family housing units in Long Beach is expected to grow significantly compared to that of single family units. This housing development trend is the reason why growth in water demand for multi-family housing is projected to outpace the growth in demand for single-family housing.

4.2.2 Landscape Irrigation

Irrigation services supply water solely for the purposes of landscape irrigation. Typical irrigation services are those used for irrigating parks and street medians. LBWD has just over **1,200 active irrigation services.**

The volume of water demanded from dedicated landscape irrigation accounts has been declining at an average annual rate of 0.6 percent from 2003 through 2014. The decline is likely the result of two factors: professional irrigators' increasing awareness of the tremendous waste that had been occurring and proactively reducing that waste, and some landscapes converting their systems to recycled water from potable water.

Although climate change may have a slight impact on the temperature and the amount of precipitation available to plants, the potential upward pressure on water use by landscape from these changes is expected to be offset by a reduction in the amount of turf grass used in the landscape and by improvements in irrigation system technology and management

4.2.3 Commercial/Institutional

This category includes just about every type of nonresidential customer other than irrigation accounts and a small number of industrial customers. For example, it includes office buildings, restaurants, retail outlets and government/ institutional entities such as the Long Beach Unified School District, California National Guard, the City of Long Beach Long Beach Parks, Recreation and Marine. LBWD has almost **6,400 active** Commercial accounts.

4.2.4 Industrial

Industrial services supply water to industrial customers. LBWD has just under **300 active** Industrial services.

4.2.5 Losses

Refer to ***Section 4.3*** for a detailed discussion of water losses.

4.2.6 Seawater Barrier

Groundwater aquifers near coastlines must often be protected from seawater intrusion, which is when saltwater from the ocean migrates underground into the aquifer and subsequently spoils the fresh water there. This is the situation found in the Central Basin near the confluence of the San Gabriel River where it meets the Pacific Ocean.

The Alamitos Seawater Barrier was implemented to prevent ocean water from migrating underground into the Central Basin aquifers; a migration that would spoil this source of fresh water that LBWD relies upon to meet roughly fifty-five percent of its drinking water demand. By injecting potable or highly treated recycled water into the ground where seawater intrudes drinking water aquifers, a pressure ridge that blocks the seawater's migration forms, thereby protecting the aquifers.

The water injected into the Alamitos Seawater Barrier can be either potable water from a MWD connection dedicated to that purpose, or highly purified recycled water from WRD's Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF), or a combination of the two.

This 2020 UWMP does not include deliveries to the Alamitos Seawater Barrier when estimating the future potable water demand within LBWD's service

area. MWD cannot deliver water directly to an end user such as WRD that is not one of its 26 member agencies; MWD water must first go through a meter assigned to one of its 26 member agencies. In the case of the seawater barrier, the MWD meter exclusively serves the seawater barrier and no other user. This meter had previously been assigned to the Central Basin Municipal Water District, a MWD member agency, for more than fifty years. Between 2000 and 2005, the connection was transferred to LBWD. Although the connection is now assigned to LBWD, its sole purpose remains the same. No water passing through this meter falls under LBWD's control or enters LBWD's distribution system.

The Alamitos Seawater Barrier will not use potable water for injection purposes in the future. The LVL AWTF was upgraded in 2019 and is working towards supplying recycled water to 100 percent of the Alamitos Seawater Barrier demand, thereby eliminating the need for imported potable water. Further discussion of recycled water used within LBWD's service area and at the Alamitos Seawater Barrier can be found in ***Chapter 6***.

4.3 Distribution System Water Losses

Water loss is defined as the difference between the quantity of water supplied to customers and the quantity of water consumed by customers. It is comprised of (1) apparent losses, which include unbilled, authorized consumption for operational uses (i.e. firefighting, pipe flushing, street cleaning, dust control, and fire hydrant use) and all types of inaccuracies associated with customer metering, data handling, and theft or illegal use; and (2) real losses, which include all water physically lost due to distribution system leaks, breaks, overflows, and other unbilled, unauthorized consumption.

LBWD conducts an annual water audit using the American Water Works Association (AWWA) M36 method and associated worksheets, and a summary for the past five years are provided below in ***Table 4-2***. Water loss in the LBWD service area is typically less than 10 percent of total demand. Water loss calculations are reported in detail in ***Appendix E***.

TABLE 4-2: Water Losses and Non-Revenue Water

	2016	2017	2018	2019	2020
Unbilled water (metered and unmetered) (AF)	642	129	132	125	127
Apparent water losses (AF)	741	915	902	861	1,159
Real water losses (AF)	610	1,298	789	125	1,390
Total Non-Revenue Water (AF)	**1,993**	**2,342**	**1,823**	**1,111**	**2,677**

For planning purposes, LBWD projects water loss to be steady at 4 percent of total water demand through the year 2050. This estimate reflects the anticipation of leaks and breaks due to aging infrastructure, system flushing, and active management of losses.

LBWD manages real losses through its Distribution Capital Improvement Program (CIP) and Advanced Metering Infrastructure (AMI) Program. The Distribution CIP replaces and renews distribution system pipelines and customer service connections. The deployment of the AMI Program began in 2017 to upgrade all water meters with wireless advanced metering technology and will be completed in 2021. LBWD's AMI Program will increase the ability to detect and repair losses through the distribution system.

Further discussion about management of system losses is provided in **Chapter 9**.

4.4 Projected Water Use

4.4.1 Methodology

Under the development of LBWD's Water Resources Plan (WRP), long term water demand projections were developed by using econometric demand modeling methods for each billing customer sector. These customer sectors followed the same categories as those in ***Section 4.2***, and were defined as:

- Single-Family Residential (SFR) (includes duplexes)
- Multi-Family Residential (MFR)
- Commercial (COM)
- Industrial (IND)
- Irrigation (IRR)

An econometric method was selected over a more simplified per capita water use forecast because it allows for examination of the major factors that influence changes in water use over time. Major factors incorporated into the econometric model fell into one of five general data categories: (1) demographic, (2) water use, (3) weather, (4) economic, and (5) conservation. Econometric models, as opposed to standard statistical models, include independent variables such as income, price of water, and employment characteristics based on the theory that these economic variables have significant influence on water use (i.e. as the economy grows and the demand for goods and services increases, commercial water demand also increase). Demographic forecasts used in the econometric modeling had been previously discussed under ***Chapter 3***.

The forecast approach is summarized by the following steps:

1. Estimate historical dependent variables for each customer type (or sector)
2. Test independent variables for significance in explaining historical water use by customer sector (i.e. per unit water use), with the most robust variables included in final water demand models
3. Project independent variables into the future and use demand model coefficients to forecast future per unit water use by customer sector
4. Project driver variables, such as single-family housing units, multi-family housing units, employment, and irrigation accounts; and multiply drivers by forecasted per unit water use to get forecasted customer sector demands in AFY
5. A factor for non-revenue (i.e. system losses), based on difference between historical water production and billed water use, is added to the total of all customer sector demands in order to get total water demand.

Using the approach outlined above, baseline water demand forecasts were derived by taking the per unit water use factors and multiplying by forecasts of future households, employment, and irrigation accounts.

4.4.2 Estimating Future Water Conservation Savings

Water conservation and water use efficiency reduces the demand for water. Looking to the future, additional water is expected to be conserved as a result of both "active" and "passive" conservation measures. Active conservation refers to the programs water agencies tend to implement at the local level, such as rebate programs for water efficient devices and fixtures, or programs like LBWD's Lawn-to-Garden, which provides an incentive for customers to replace their water intensive grass lawns with drought tolerant gardens. Passive conservation refers to changes in the efficiency standards for new devices sold in California, like toilets and shower heads, or new building codes that restrict the type of landscapes that can be installed with new developments.

Statistically, calculating historical water savings from these programs over time can be a difficult challenge because of inter-correlations with other variables such as weather, housing type, and economic recessions. Instead of quantifying water savings from conservation, index variables were created that estimates indoor water use efficiency for the SFR, MFR, and COM customer sectors. The potential conservation savings, represented by the water use efficiencies, are reflected in the modeling when testing for significance in explaining historical water use.

Additional future conditions for water conservation savings were also assumed and include the following conditions:

- Indoor efficiency improvements based on current plumbing codes and natural replacement rates for plumbing fixtures between 4 and 4.2 annually
- MWELO outdoor water savings for the SFR and COM sector of -8 and -4.5 gallons per unit per day as measured from current water use, respectively, by 2050
    - o CA AB 325 Water Conservation in Landscaping Act passed in 1990 requiring California Department of Water Resources to develop a Model Water Efficient Landscape Ordinance (MWELO). The code was revised in 2010 and again in 2015. MWELO defines the maximum amount of irrigation water that can be applied to a lot of landscape.

4.4.3 Water Use for Lower Income Households

As previously discussed in ***Section 4.4.1*** and ***Chapter 3***, median household income is positively correlated with water demand (i.e. increased income results in increased water demand) and has been considered an independent variable under the econometric water demand forecast method used by LBWD.

4.4.4 Baseline Forecasts

Figure 4-2 presents the per unit water use rates projections to year 2050 for the baseline demand forecast. Under this forecast, SFR unit water use is forecasted to decline from 213 to 186 gallons per home per day, a 13 percent decrease. MFR unit water use declines at roughly the same rate from 141 to 123 gallons per home per day. COM unit water use is forecasted to decline from percent 58 to 50 gallons per employee per day to 2040, then holding steady through 2050. IND unit water use is forecasted to remain relatively steady through year 2050.

The total water demand forecast, presented in ***Figure 4-3***, is the product of the per unit water use factors combined with the demographic forecasts discussed in ***Chapter 3*** and an assumption that non-revenue water (NRW) remain at 4 percent. NRW is water that has been produced and is "lost" before it reaches the customer (i.e. system losses). Under these baseline conditions, water demand is projected to continue to decline through 2030 as water efficiency continues to increase. Water demand is then projected to continue to hold steady through 2040 as water demand increases from population and economic growth are cancelled out by reductions from conservation. In 2040, water demand is projected to begin increasing to approximately 44,000 AF by 2050 as population and economic growth surpasses the reductions in demand from conservation. Per capita water use is projected to decline to 70 GPCD by 2050, as shown in ***Figure 4-4***. And a detailed water demand forecast by customer sector is presented in ***Table 4-3***.

FIGURE 4-2: Per Unit Water Use Rates Projections

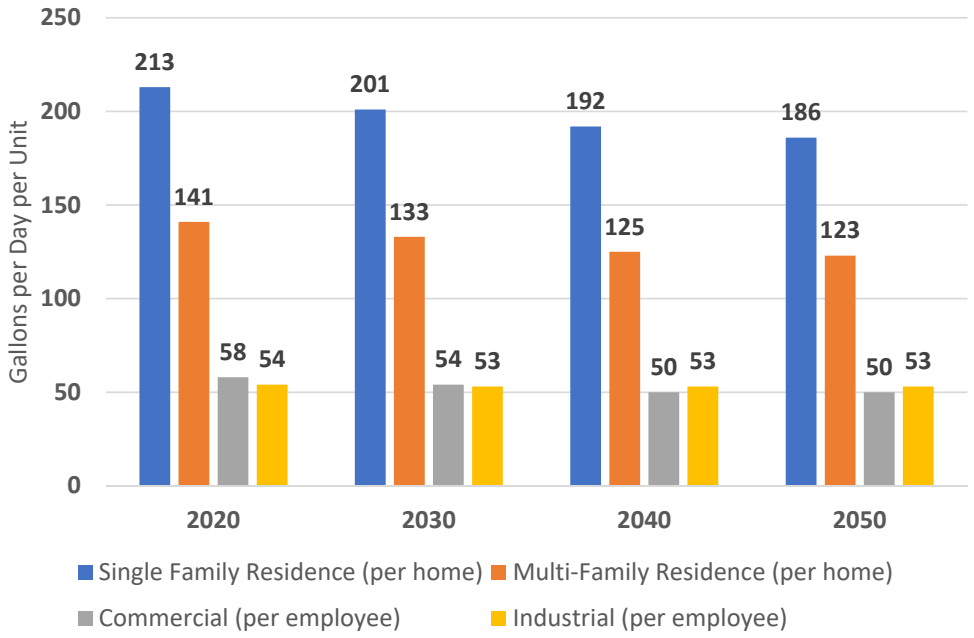
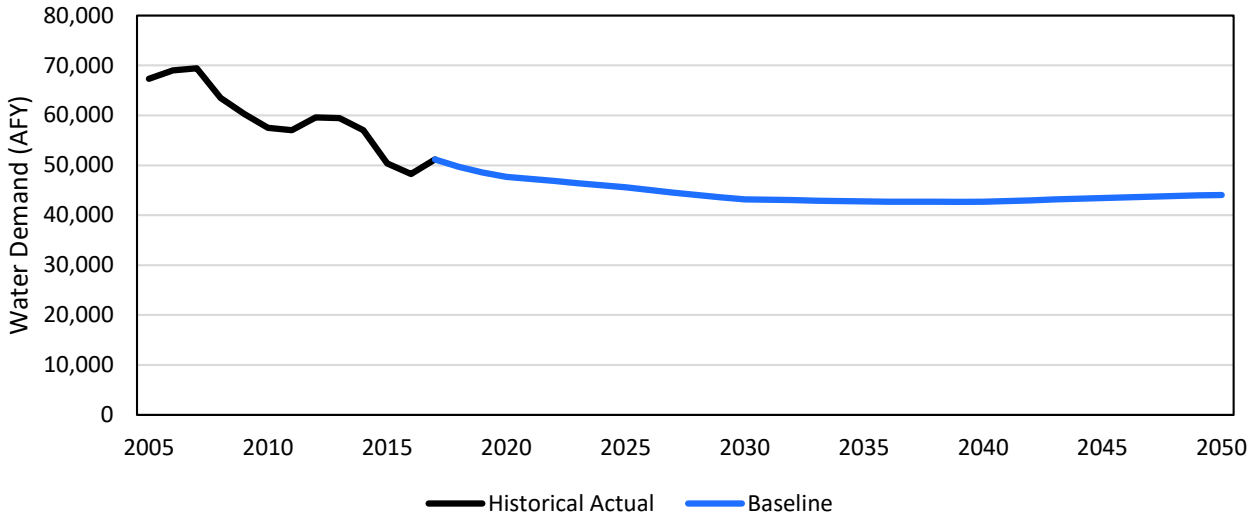


FIGURE 4-3: Projected Water Demand



4.4.5 Projected Water Use 2021 - 2025

Table 4-4 presents the projected water demand for the next five-year sequence from 2021 to 2025. Further discussion surround LBWD's development of a drought risk assessment to satisfy California Water Code is included under ***Chapter 7***.

4.5 Climate Change Considerations

The climate change considerations used when projecting baseline future water demands include the following:

- Historical average climate (defined as the average from 1980 to 2017)
- LBWD will remain in drought restrictions equivalent to Stage 1

Different climate change scenarios, previously discussed in Chapter 3, along with demographic growth and conservation, were used to test the sensitivity of the baseline demand forecast. ***Figure 4-5*** presents the total potable water demand for the year 2050 under the sensitivity test.

When higher demographic forecasts are used with a future climate that is hotter and drier than historical, forecasted water demands are about 5,000 AFY (11 percent) greater in year 2050 over the baseline forecast of 44,000 AFY. Under these same stressed conditions, but with increased levels of water conservation, the potable demand forecast is still 4.5 percent greater than the baseline forecast.

FIGURE 4-4: Projected Water Demand (Per Capita Use)

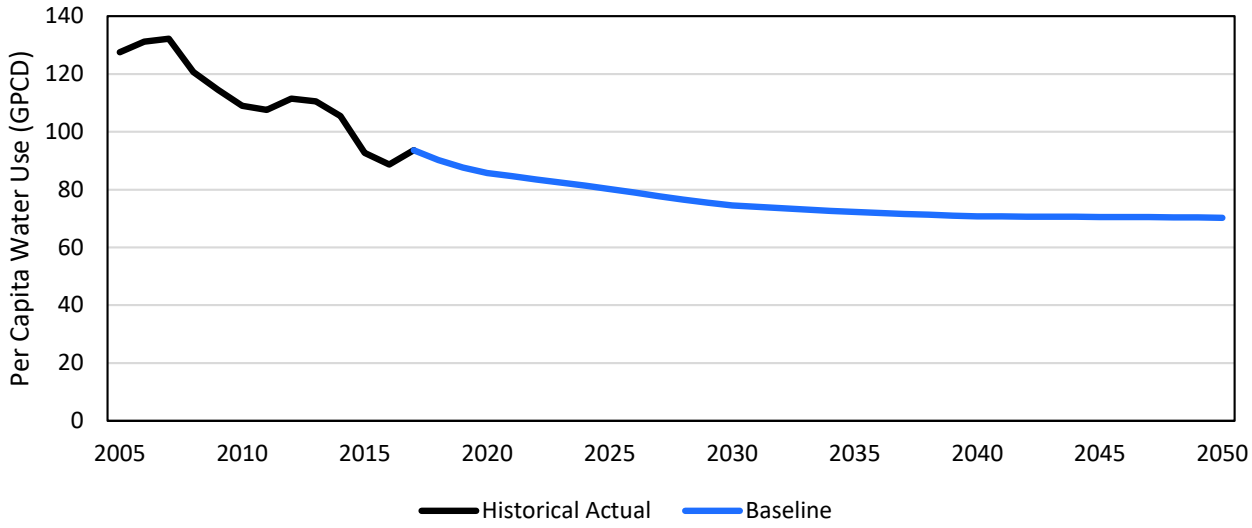


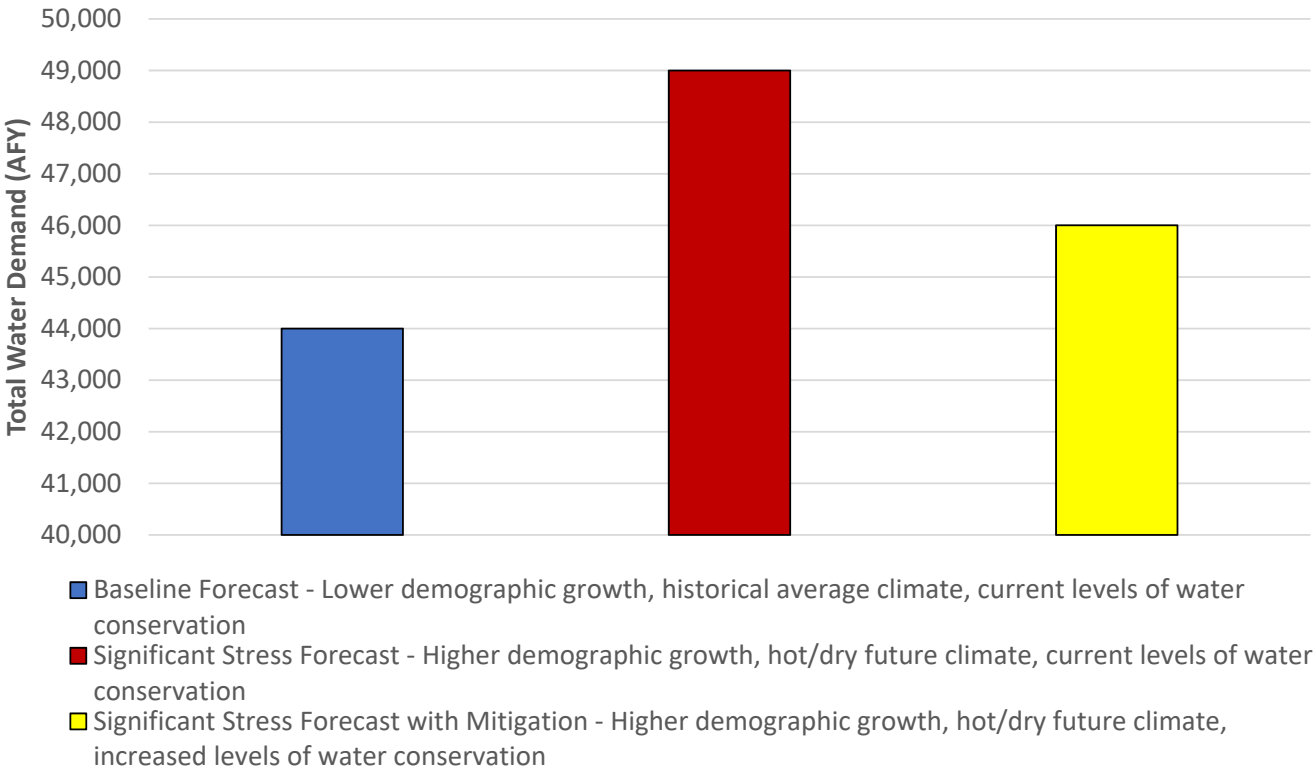
TABLE 4-3: Water Demand Forecast by Sector

Year	Single Family Residential (AFY)	Multi-Family Residential (AFY)	Commercial (AFY)	Industrial (AFY)	Irrigation (AFY)	Total Billed (AFY)	Non-Revenue Water Loss	Total with Losses (AFY)
2020	18,136	14,160	11,084	594	1,820	45,794	4.00%	47,702
2030	16,307	12,987	9,718	574	1,898	41,483	4.00%	43,211
2040	15,916	13,281	9,283	556	1,975	41,012	4.00%	42,721
2050	16,082	13,894	9,735	549	2,049	42,309	4.00%	44,072

TABLE 4-4: 2021 – 2025 Projected Water Demand

Year	Single Family Residential (AF)	Multi-Family Residential (AF)	Commercial (AF)	Industrial (AF)	Irrigation (AF)	Water Loss (AF)	Gross (AF)	Gross with Water Loss (AF)
2021	17,785	13,872	10,839	592	1,828	1,871	44,915	46,787
2022	17,674	13,828	10,749	590	1,836	1,861	44,676	46,538
2023	17,563	13,784	10,659	588	1,843	1,851	44,437	46,289
2024	17,452	13,740	10,569	586	1,851	1,841	44,198	46,039
2025	17,341	13,696	10,479	584	1,859	1,832	43,959	45,790

FIGURE 4-5: Demand Forecast Under Sensitivity Test



CHAPTER 5: CONSERVATION TARGET COMPLIANCE

Chapter 5 reports the water use baseline and targets required by the Water Conservation Act of 2009, also known as the SBx7-7, to set a statewide goal to reduce urban water use by 20 percent by the year 2020. Chapter 5 shows that LBWD has achieved its 2020 Target.

5.1 Water Conservation Act of 2009

The Water Conservation Act of 2009, also known as the SBx7-7, set a statewide goal to reduce urban water use by 20 percent by the year 2020. In order for the State to achieve the 20 percent reduction, each retail urban water suppler is required to calculate its individual water use reduction target for the year 2020, a calculation based on one of the four allowable methods described in CWC §10608.20(b). LBWD used the standardized SBx7-7 Verification Forms provided by DWR to calculate and report its progress in meeting the SBx7-7 water use targets. All SBx7-7 Verification Forms have been included in this UWMP as ***Appendix F***.

5.2 Updating Calculations from 2015 UWMP

5.2.1 Target Method

Water agencies were required to calculate and report in their 2015 UWMP, a 2020 Urban Water Use Target (2020 Target) using one of the four methods described in CWC §10608.20(b). The target would equal:

- Method 1: 80 percent of the water supplier's baseline per capita water use (i.e., a 20 percent reduction); or

- Method 2: Per capita daily water use estimated using the sum of performance standards applied to indoor residential use, landscaped area water use, and CII uses; or
- Method 3: Ninety-five percent of the target calculated by the state for its hydrologic region; or
- Method 4: The calculated savings of metering currently unmetered water connections and achieving water conservation measures in three water use sectors.

In the 2015 UWMP, LBWD identified using Method 1 to establish its 2020 Target, which is 80 percent of its baseline per capita daily water use; in other words, LBWD intended to reduce its per capita water use 20 percent by the year 2020. In the 2015 UWMP, LBWD identified a final reported 2020 target of 107 GPCD.

5.2.2 Regional Alliance Target

Sections 10608.20(a)(1) and 10608.28 of the California Water Code allow urban retail water suppliers to plan, comply, and report the above information on a regional basis, an individual basis, or both. As described in ***Chapter 2***, the City of Long Beach is participating in the Gateway Regional Alliance.

If a Regional Alliance meets its SBx7-7 regional target, then all suppliers in the alliance will be deemed to be in compliance. If a Regional Alliance fails to meet its regional target, water suppliers in the Alliance that meet their individual targets are still deemed to be in compliance. Water suppliers in alliances that meet neither their individual target nor their regional target will be deemed to be noncompliant.

Regional alliances calculate a 2020 Target using one of the three Options listed in Methodology 9 of the DWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.

- Option 1: A population-weighted average. A target is calculated for an individual urban water supplier, using any method described above, and for the compliance-year population data. An agency's target is then multiplied by the ratio of that agency's population to the total population of the alliance. Summing the resulting values from all participating agencies yields the Regional 2020 Target.
- Option 2 and Option 3: An aggregate of individual agency water use and population information. There are slight differences between Option 2 and Option 3, but they can be similarly described. The water use and population information is summed for all participating agencies, and the regional base daily per capita water use is calculated for each year. The 10-year or 15-year baseline is calculated for the region, and one of the four methods described above is applied to obtain the 2020 Target.

For 2015, the Gateway Regional Alliance elected to calculate the 2020 Target using Option 1, a population-weighted average, with individual agencies utilizing Method 1 and Method 3. As of the writing of this UWMP, the Gateway Regional Alliance is unlikely to change from Option 1 since 2020 is the final compliance year.

5.3 Baseline Periods

5.3.1 Determination of the 10-Year Baseline Period

In order to calculate a 2020 Urban Water Use Target, water suppliers must select a 10 to 15-year period from which a baseline average water use is calculated. This baseline period must be a 10 to 15-year continuous period ending between December 31, 2004 and December 31, 2010.

Water agencies must use the 10-year baseline period unless recycled water made up at least 10 percent of their total water deliveries in the year 2008; in which case they have the choice of using a 15-year baseline period. Because recycled water deliveries comprised less than 10 percent of total water delivered by LBWD in 2008, LBWD must use a 10-year baseline period. LBWD's 10-year baseline for setting the 2020 Target begins with fiscal year 1996 and ends with fiscal year 2005 (July 1, 1995 to June 30, 2005).

*Note: Annual water use volumes for the GPCD calculations were based on 12-month periods from July-to June. July through June is consistent with the time frame of the rest of this UWMP

5.3.2 Determination of the 5-Year Baseline Period

Water suppliers are also required to calculate water use for a continuous 5-year period that ends no earlier than December 31, 2007 and no later than December 31, 2010. This 5-year baseline is used to confirm that the selected 2020 Target meets the minimum water use reduction requirements, which is a minimum reduction of 5 percent from the 5-year baseline. LBWD's 5-year baseline for the purposes of this section begin in fiscal year 2004 and conclude in fiscal year 2008 inclusive (July 1, 2003 to June 30, 2008).

*Note: Annual water use volumes for the GPCD calculations were based on 12-month periods from July-to June. July through June is consistent with the time frame of the rest of this UWMP

5.4 Population

In order to calculate annual GPCD, agencies must determine the population that they served for each baseline year in both the 5-year and 10-year baseline periods as well as for the 2020 compliance year.

Because the LBWD service area overlaps substantially (≥ 95 percent) with the City of Long Beach boundaries, LBWD is able to use City of Long Beach population estimates provided by the California Department of Finance to calculate GPCD. Historical populations estimates used for this 2020 UWMP can be found in SBx7-7 Table 3 of ***Appendix F***.

5.5 Gross Water Use

Gross water use is a measure of potable water that enters the distribution system of the supplier over a 12-month period, excluding recycled water. Gross water use must be reported for each year in the baseline periods as well as for the 2020 compliance year. Historical gross water use can be found in SBx7-7 Table 4 of ***Appendix F***.

5.6 Baseline Daily Per Capita Water Use

After determining the population and gross water use for each year in the 10-year baseline period and the 5-year baseline period, the GPCD can be calculated for the baseline periods. LBWD's GPCD for the 10-year baseline period is 134 GPCD, and GPCD during the 5-year baseline period is 128 GPCD. Detailed GPCD calculations for the baseline periods can be found in SBx7-7 Table 5 of ***Appendix F***.

5.7 2020 Compliance Target

5.7.1 Apply Target Method

LBWD has selected Target Method 1: 80 percent of its 10-year baseline GPCD. Since the LBWD 10-year baseline GPCD is 134 GPCD, the 2020 Urban Water Use Target (80 percent of 134 GPCD) is therefore 107 GPCD. LBWD has not changed its Target Method from the 2015 UWMP.

5.7.2 2020 Target Confirmation

LBWD is required to choose the lower of the two 2020 Urban Water Use Targets as calculated using (1) one of the four Methodologies that use the 10-year or 15-year baselines, or (2) 95 percent of the 5-year baseline. Since the LBWD's 5-year baseline is 128 GPCD, that baseline's 2020 Urban Water Use Target (95 percent of 128 GPCD) is 122 GPCD. Because the 10-year baseline target of 107 GPCD is lower than that of the 122 GPCD 5-year baseline, LBWD's 2020 Urban Water Use Target is 107 GPCD.

5.8 2020 Compliance Daily per Capita Water Use

Water suppliers must calculate their actual 2020 water use to determine whether or not they have met their 2020 Urban Water Use Target. LBWD per capita water use for 2020 was 93 GPCD, which is less than the 107 GPCD Confirmed 2020 Target. LBWD has therefore met its 2020 Urban Water Use Target.

5.9 Regional Alliance

The Gateway Regional Alliance calculated its 2020 Target using Option 1 from Methodologies 9 and Methods 1 and 3 from CWC §10608.20(b). These calculations resulted in a weighted GPCD baseline of 116 GPCD, and a 2020 Urban Water Use Target of 105 GPCD.

As of the writing of this UWMP, the Gateway Regional Alliance is still calculating whether it has met its 2020 Target.

TABLE 5-1: 20 x 2020 Urban Use Water Achievement

Baseline Start Year	Baseline End Year	Baseline GPCD	2020 Confirmed GPCD Target	2020 Actual GPCD
1996	2005	134	107	97

CHAPTER 6:
SYSTEM SUPPLIES

Chapter 6 describes and quantifies the sources of water available to LBWD as a water supplier. Locally pumped groundwater, imported surface water purchased from MWD, and recycled water are the primary supply sources available within the LBWD service area.

6.1 Groundwater

Groundwater is the primary source of drinking water in Long Beach. LBWD pumps groundwater through 27 active wells throughout the service area and then conveys the extracted groundwater through a series of collection pipelines to a centralized groundwater treatment plant. Once the raw groundwater is treated, it then gets pumped into the distribution system for consumption. On average between 2015 - 2020, almost 60 percent of LBWD's total water supply came from local groundwater supplies.

6.1.1 Water Rights

As shown in ***Figure 6-1***, two (2) groundwater basins underlie the LBWD service area, namely the Central Basin and the West Coast Basin aquifers. The City of Long Beach holds water rights in both groundwater basins, which are managed by the Water Replenishment District of Southern California (WRD). LBWD has an Allowable Pumping Allocation (APA) for 32,692 AFY from the Central Basin and currently pumps all its groundwater supply from this source. LBWD also has an APA of 0.7 AFY from the West Coast Basin, but currently does not actively pump from this basin.

FIGURE 6-1: Central and West Coast Basins

6.1.1.1 Central Basin

The Central Basin is a groundwater aquifer under 277 square miles in mostly urbanized southern Los Angeles County. The Central Basin is bounded on the north by a surface divide called the La Brea High, and on the northeast and east by the Elysian, Repetto, Merced and Puente Hills. The southeast boundary between Central Basin and Orange County Groundwater Basin roughly follows Coyote Creek, and the southwest boundary is formed by the Newport Inglewood fault.

The Central Basin is currently the only groundwater basin utilized by LBWD. LBWD has an adjudicated right to extract 32,692 acre-feet per year of groundwater from the Central Basin Aquifer. All LBWD's 27 active wells are located within Central Basin. A full description of the Central Basin can be found in the DWR Bulletin 118 Basin Descriptions included as ***Attachment 1***.

6.1.1.2 West Coast Basin

The West Coast Sub-Basin of the Coastal Plain of Los Angeles County Groundwater Basin (West Coast Basin) underlies 160 square miles of the southwestern part of the Los Angeles County coastal area. The basin extends from the coast to just past the 405 Freeway, from the Newport-Inglewood Uplift in the City of Long Beach in the south to the Ballona Creek escarpment just north of the Los Angeles International Airport.

LBWD has an adjudicated right to pump 0.7 acre-feet from the West Coast Basin, but does not actively pump from this source.

A full description of the West Coast Basin can be found in the DWR Bulletin 118 Basin Descriptions included as ***Attachment 2***.

6.1.2 Groundwater Management – Central Basin

The Central Basin was seriously over-drafted by the 1940's, which prompted the adjudication of the basin in Superior Court in the early 1960's. The adjudication now provides the framework for groundwater management of the Central Basin by apportioning pumping rights to certain parties and strictly limiting extractions to those apportioned rights. A copy of the judgment is enclosed as ***Attachment 3***.

The total allowable pumping allocation (APA) is divided among the owners of these water rights. These annual rights to extract water can be exercised, sold, leased or remain unused. Through many years of hard work and investments, LBWD is now the owner of the largest APA in the Central Basin.

The recent Third Amendment to the Central Basin Judgement entered by the Los Angeles Superior Court in 2013 replaced the California Department of Water Resources (DWR) as the Watermaster and created a new Watermaster. The new Watermaster consists of three separate bodies, each with a different function: the Administrative Body to administer the Watermaster accounting and reporting functions, the Water Rights Panel to enforce issues related to pumping rights, and the Storage Panel to approve groundwater storage proposals. The new Watermaster began its duties in July 2014.

Because the total allowable pumping allocation (i.e., the total annual right to extract water on an on-going basis) exceeds the natural yield of the basin, the judgment charges the Water Replenishment District of Southern California (WRD) with the responsibility of replenishing the basin. WRD funds these essential services through a replenishment assessment, meaning that parties extracting

water from the Central Basin pay an assessment to WRD on a per acre-foot extracted basis. The replenishment assessment is used by WRD to purchase replenishment water and to fund other programs for the replenishment and protection of the basin.

The Central Basin is replenished in several ways:

1. **Natural replenishment**
   The amount of natural replenishment to the Central Basin fluctuates from year to year based primarily on the amount of precipitation in the San Gabriel Mountains that makes its way into the San Gabriel River and down to the spreading grounds.

   There are two spreading ground located downstream of the Whittier Narrows Dam and next to the Rio Hondo and San Gabriel river channels; the Rio Hondo Coastal Spreading Grounds and San Gabriel Coastal Spreading Grounds, respectively. The spreading grounds are the primary means of replenishing the Central Basin aquifers and are owned and operated by the Los Angeles County Flood Control District.

2. **Recycled water**
   Recycled water is mixed with imported water and/or natural runoff and allowed to percolate into the groundwater basin. The percolated water filters slowly through the soil, sometimes for many decades, before being extracted. Recycled water is a reliable source of replenishment even during fluctuations in weather, including multiple dry years.

3. **In-lieu replenishment**
   Under certain conditions, parties that own rights to pump water from the Central Basin may choose to essentially retire a portion of their allowable pumping allocation in a particular year to instead purchase an equal amount of imported water from MWD. Rather than pumping the groundwater out and cause WRD to have to later purchase imported water to replenish the amount pumped, forgoing pumping in the first place and leaving the water in the ground "replenishes" the basin. For this reason, WRD provides financial compensation to help offset the higher cost of purchasing the MWD imported water relative to groundwater pumping. In this way, the groundwater basin is replenished through "in-lieu" means rather than directly through physical replenishment.

4. **Imported water**
   When natural, in-lieu, and recycled water replenishment is insufficient, WRD may purchase imported water for replenishment purposes if replenishment supplies are available from MWD.

   WRD may also utilize advanced-treated recycled water generated by the Albert Robles Center for Water Recycling & Environmental Learning (Albert Robles Center) for groundwater replenishment. This facility produces 10,000 AFY of purified water from the San Jose Creek Water Reclamation Plan (SJCWRP) and supplies are conveyed to the Central Basin spreading grounds at the Montebello Forebay. The purified water may also be supplemented with another 11,000 AFY of recycled water (also from a SJCWRP connection) to deliver 21,000 AFY of water to the San Gabriel Coastal Spreading Grounds.

5. **Seawater Barrier Operations**
   The Alamitos Barrier Project (ABP) helps protect groundwater in the Central Basin from coastal seawater intrusion. Reclaimed water for the ABP is supplied from the Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF), which is owned by WRD. WRD purchases Title 22 tertiary treated reclaimed

water from LBWD as influent supply for the barrier. LVL AWTF has the capacity to supply 100 percent of the Alamitos Barrier's needs.

When recycled water is injected into the Alamitos Seawater Barrier, it does not stay there. Therefore, water must essentially be injected into the barrier on a continuous basis. Although a small portion of the water injected into the barrier flows out to the ocean, the vast majority of the injected water flows back into the groundwater basin and helps to replenish the basin.

6.1.2.1 Overdraft Conditions

In the decades prior to the adjudication of the Central Basin, more water was being pumped out of the groundwater basin than going into it, resulting in an overdraft condition with a falling water table. Since the adjudication, the combination of limits on groundwater extractions and active replenishment by WRD have allowed the basin to recover to its current healthy condition.

WRD publishes a comprehensive Engineers Survey and Report each year, and the 2021 report is enclosed as ***Attachment 4***. This report goes into great detail regarding groundwater production, groundwater conditions, the quantity and availability and cost of groundwater replenishment, and groundwater projects and programs.

6.1.3 Groundwater Management – West Coast Basin

By the early 1900's, techniques used to develop groundwater advanced dramatically with the advent of the deep-well turbine pump. Dependable sources of water attracted industry and agriculture, and in time the demand for water exceeded the rate at which the Basin replenished naturally. In the 1920's water levels throughout the Basin dropped below sea level and wells along the western basin

region had to be abandoned due to poor, brackish water quality. By 1932, the entire coastal reach of the Basin was invaded by sea water.

Groundwater quality within the West Coast Basin deteriorated until 1945 when a lawsuit was filed from the California Water Company, City of Torrance, and Palo Verdes Water Company to the Los Angeles County of Superior Court. The objective of the lawsuit were to title the groundwater rights of each pumper and to establish control over groundwater extractions from the Basin. Other organizations joined the litigation, leading to the formation of the West Basin Water Association in 1946. A plan was developed to (1) provide supplemental supply for major producers, (2) limit groundwater extractions, and (3) create an exchange pool to provide pumping rights for users not having access to supplemental water.

The first step of the plan was realized in 1947 with the formation of the West Basin Municipal Water District to distribute water from the Colorado River. The District was annexed to the Metropolitan Water District of Southern California in 1948, and that year Colorado River water began flowing into the West Coast Basin, followed by the State Water Project water in 1974. In 1946, the second and third steps of the plan were taken to the Court's preliminary hearings to define the groundwater problem and outline those areas needing more information. The Court asked the Department of Water Resources (DWR) to define the boundaries and determine the geohydrology characteristics of the West Coast Basin.

Several years passed before water users became sufficiently alarmed by groundwater conditions to draft an Interim Agreement that reduced groundwater extractions until a final judgment could be approved. The Court approved the Interim Agreement on February 16, 1955, and appointed DWR as Watermaster to administer it. On August 18, 1961, after 16 years of litigation, the Court rescinded the Interim Agreement and signed the West Coast Basin Judgment. The Judgment retained DWR as Watermaster.

The Judgment has been amended multiple time since its inception, most recent was on December 5, 2014. A copy of the judgment is enclosed as ***Attachment 5***. For the first time, the Court allows water rights holders to have direct input into how the Judgment is administered and enforced. The Judgment confirms the retirement of DWR as the Watermaster and mandates the creation of a new Watermaster with three separate bodies serving different functions.

Specifically, the Watermaster is composed of the Administrative Body, the Water Rights Panel, and the Storage Panel:

1. The Judgment appoints WRD as the Administrative Body to assist the Court in the administration and enforcement of the provisions of the Judgment. In addition, to fulfill Watermaster accounting and reporting functions.

2. The Water Rights Panel, consisting of five members, enforces issues related to pumping rights within the adjudication and is made up of five West Coast Basin water rights holders. Three of the members are the elected officers of president, vice-president and treasurer of the West Basin Water Association, and the remaining two members are selected by the Board of Directors of the West Basin Water Association.

The Storage Panel is composed of the Water Rights Panel and the WRD Board of Directors, which together review and approve storage projects within the Basin.

Because the total APA exceeds the natural yield of the basin, the judgment charges the Water Replenishment District of Southern California (WRD) with the responsibility of replenishing the basin. WRD funds these essential services through a replenishment assessment, meaning that parties extracting water from the West Coast Basin pay an assessment to WRD on a per acre-foot extracted

basis. The replenishment assessment is used by WRD to purchase replenishment water and to fund other programs for the replenishment and protection of the basin.

The West Coast Basin is replenished in several ways:

1. **Natural replenishment**
   Natural replenishment is largely limited to underflow from the Central Basin through and over the Newport-Inglewood fault zone. There is also artificial recharge associated with the operation of seawater intrusion barriers.

2. **Dominguez Gap Barrier**
   The Dominguez Gap Barrier, located in the southern portion of the West Coast Basin, is supplied approximately 50 percent by imported water from MWD and 50 percent recycled water from the City of Los Angeles Department of Public Works - Bureau of Sanitation Terminal Island Water Reclamation Plant/Advanced Water Purification Facilities (TIWRP/AWPF).

3. **West Coast Barrier**
   The West Coast Barrier is supplied with imported water from MWD and reclaimed water from West Basin Municipal Water District (WBMWD) Edward C. Little Water Recycling Facility (ECLWRF).

The amount of recycled water injected into the West Coast Barrier has increased from 50 to 75 percent. WBMWD is working with WRD to increase the amount of recycled water injected into the Barrier to 100 percent.

6.1.3.1 Overdraft Conditions

In the decades prior to the adjudication of the West Coast Basin, more water was being pumped out of the groundwater basin than going into it, resulting in an overdraft condition with a falling water table and poor water quality. Since the adjudication, the combination of limits on groundwater extractions and active replenishment by WRD have allowed the basin to recover to its current healthy condition.

WRD publishes a comprehensive Engineers Survey and Report each year, and the 2021 report is enclosed as ***Attachment 4***. This report goes into great detail regarding groundwater production, groundwater conditions, the quantity and availability and cost of groundwater replenishment, and groundwater projects and programs.

6.1.4 Watermaster Report and Recent Groundwater Production

The Watermaster develops and adopts an annual report that details the groundwater extractions, storage accounts, use of imported water and recycled water, replenishment operations, and its budget and finances. Within this annual report, monthly production for each well is identified. The 2020-2021 reports are the most current reports as of the adoption of this UWMP and has been included as ***Attachments 6 and 7***.

Table 6-1 shows the LBWD annual production from the Central and West Coast groundwater basins for the years 2016 through 2020. Detailed historical monthly production from the wells is available at the Watermaster's web site: www.wrd.org/watermaster/

TABLE 6-1: Groundwater Volume Pumped

Source	2016	2017	2018	2019	2020
Central Basin	32,505	31,802	29,960	27,359	24,200
West Coast Basin	0	0	0	0	0
Total	**32,505**	**31,802**	**29,960**	**27,359**	**21,932**

Up until 2015, LBWD has been consistently working with MWD and WRD to use a portion of its APA to replenish the groundwater basin through in-lieu means. Therefore, each year LBWD retires the rights to pump a portion of its APA and receives compensation from WRD to purchase additional imported water from MWD. LBWD has not had to use in-lieu means to utilize a portion of its APA from the 2016 – 2019 timeframe but did so for 5,000AF in 2020.

Additionally, there has been a decrease in groundwater production between 2016 – 2020, mostly attributed to a very conscientious water conservation effort by customers (total water consumption decreased), and due to the attrition of LBWD production wells. To increase supply reliability, LBWD is currently undergoing efforts to optimize local water supply sources and maintain a production well field capacity exceeding 32,692 AFY by the year 2032. LBWD anticipates this will provide a peak well field capacity of 49.8MGD, which is the peak production of its centralized groundwater treatment plant (GWTP). Further discussion about future supplies can be reviewed under ***Section 6.6***. Discussion surrounding supply reliability is located in ***Chapter 7***.

LBWD has existing water rights within the West Coast Basin, but does not currently pump groundwater within that Basin. In 2017, a groundwater well (WCB1) was drilled within West Coast Basin and LBWD anticipates to fully utilize this well as a drinking water supply by 2027.

6.2 Imported Water

LBWD also purchases imported water through two major water supply systems, both of which are wholesale from Metropolitan Water Districts of Southern California (MWD):

1. The Colorado River Aqueduct

The Colorado River Aqueduct is constructed and operated by MWD, transports water from the Colorado River to MWD's service area

2. The State Water Project

The State Water Project is owned and operated by the State of California Department of Water Resources (DWR), transports water from the Sacramento-San Joaquin Delta through the California Aqueduct.

MWD was formed in 1928 when California's Metropolitan Water District Act (Metropolitan Act) was signed into law, "for the purpose of developing, storing, and distributing water" to communities in Southern California. MWD does not provide retail water service but supplies water to a small number of retail water agencies and to other wholesale water agencies. MWD service area spans across the Southern California coastal plain as far north as the Ventura County cities of Oxnard and Simi Valley down to the international boundary with Mexico in the south. The Metropolitan Act allows MWD to: levy property taxes within its service area; establish water rates; impose charges for water standby and service availability; incur general obligation bonded indebtedness and issue revenue bonds, notes and short-term revenue certificates: execute contracts; and exercise the power of eminent domain for the purpose of acquiring property.

MWD is the purveyor of imported water for most of Southern California, providing supplemental water to 26 member agencies, including the City of Long Beach, through a regional distribution network of canals, pipelines, reservoirs, treatment plants, pump stations, hydropower plants and other appurtenances. MWD is a special district, governed by a 38-member board of directors representing the 26 member agencies.

LBWD is exclusively a retailer and has historically purchased supplemental imported supplies from MWD to meet water demands through 11 direct interconnections. Located across LBWD's service area, the inter-connections feed different areas of the distribution system. On average between 2016

- 2020, 40 percent of LBWD's total water supply comes from MWD as shown in ***Figure 6-2***. LBWD aims to help improve regional supply reliability by reducing its dependence on purchased imported water through the development of local supplies.

6.2.1 Water Shortage Conditions

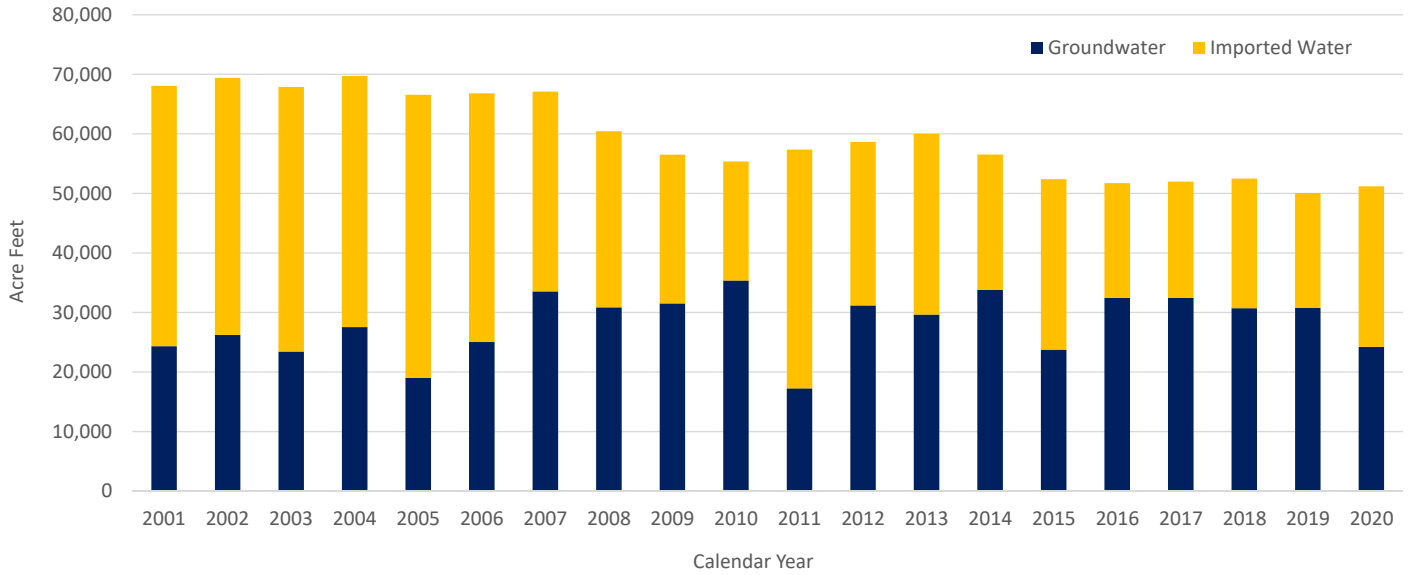
When MWD's total storage allocated to drought protection reaches certain thresholds and MWD operations staff believe its wholesale deliveries will not be able to meet member agencies water demands, MWD enacts its Water Supply Allocation Plan (WSAP). Using formulas to adjust for member agency's local water supplies, conservation and other considerations, MWD allocates its firm water to each member agency for the coming year when the WSAP is enacted. If a member agency's purchase of MWD water goes above this allocation it is subject to a penalty water rate, which is charged above MWD's treated water rate.

MWD has imposed water allocations to its member agencies in 1991, 2007 and 2008, and 2015. Modifications to the existing Bay-Delta Biological Opinions, which impacts exports from the SWP, more frequent and longer droughts affecting both the SWP and Colorado River systems, and new Colorado River Basin drought allocations to the lower basin states (including California) are all threats to imported water reliability. Future climate change could further exacerbate these threats making it more difficult for MWD to provide imported water reliably in the coming decades unless new statewide and regional water conveyance and supply projects are implemented.

6.3 Recycled Water

LBWD is not only a retail water agency, but also collects wastewater from its sewer shed and transports that wastewater to the LACSD regional trunk lines. A portion of the wastewater collected by LBWD is delivered to the Joint Water Pollution Control Plant (JWPCP) in Carson, and the remainder of the wastewater collected by LBWD is delivered to the Long Beach Water Reclamation Plant (LBWRP). The LBWRP treats wastewater collected by not only LBWD but also the wastewater collected by many other communities upstream of Long Beach, such as the cities of Lakewood and Cerritos.

FIGURE 6-2: Groundwater and Imported Supplies Used



The treated Title 22 effluent from LBWRP is currently LBWD's only recycled water supply for distribution. A portion of LBWD's non-potable water demands (i.e. irrigation, industrial) are fulfilled by LBWD through supplies from LBWRP. There is a separate demand that also come from WRD's Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF), which LBWD serves as a retailer. The LVL AWTF further treats the recycled water before injecting it back into the ground for the purposes of sea-water barrier injection for the Alamitos Barrier Project (ABP), which was previously discussed in ***Chapter 4***.

6.3.1 Recycled Water Coordination

The LBWRP is owned and operated by the Los Angeles County Sanitation Districts (LACSD). However, by an agreement between LBWD and LACSD dated in August 1968, all the effluent collected in the LBWRP sewershed belongs to LBWD for use. Any recycled water that is not conveyed into LBWD's recycled water distribution system or used at LVL AWTF, is discharged into the Coyote Creek outfall by LACSD. In June 2020, LACSD filed a waste water change petition to the State Water Resources Control Board to reduce its effluent flow to Coyote Creek. LBWD continues to coordinate with LACSD to utilize 100 percent of available recycled water supply from the LBWRP.

The maximum treatment capacity of the LBWRP is approximately 25 million gallons per day (MGD). LBWRP currently produces an average of about 13,500 AFY (5-year average) of recycled water.

In 2020, the treated effluent from LBWRP was estimated to be 10,685AF. It is assumed that about 10 percent of the total LBWRP influent is lost through system recirculation, or as a treatment system byproduct. Byproduct from LBWRP is transported through a trunk line to the JWPCP located in the City of Carson.

6.3.2 Recycled Water Beneficial Uses

LBWD's recycled water customer base and distribution system have expanded to now supply more than 160 service connections. LBWD recycled water customers include public and private irrigation customers, such as parks, schools, golf courses, cemeteries, and nurseries. The recycled water is also used by THUMS, a consortium of oil companies, which uses the recycled water to re-pressurize offshore oil-bearing strata in order to prevent land subsidence. Additionally, there is the demand from WRD's LVLAWTF for sea-water barrier injection for the Alamitos Barrier Project (ABP).

6.3.2.1 Current Uses of Recycled Water

In 2020, of the estimated 10,685AF effluent produced, 3,402AF of recycled water was used within the LBWD service area, 774AF was supplied for the ABP, and the remaining 6,711AF of recycled water was allowed to discharge into Coyote Creek. ***Table 6-2*** shows the recycled water use in 2020 separated by use type. Descriptions of recycled water uses are provided below:

- Landscape irrigation (excludes golf courses): Recycled water demand for non-golf course irrigation has gradually decreased. This decrease is attributed to the greater efficiency in water use. The total number of recycled water connections has increased from 129 connections in 2015 to 162 connections in 2020. Typical sites other than golf courses that use recycled water for landscape irrigation are the City of Long Beach Parks and Recreation Department that uses a great deal of recycled water for irrigating public parks and street medians or schools that might use the water to irrigate sports fields.
- Golf Course Irrigation: The recycled water demand from golf courses has decreased slightly over the past twenty years. Factors explaining the decreased demand include increased irrigation efficiency and replacing non-essential turf areas with drought tolerant landscaping. If these trends continue, we expect recycled water demand at golf courses will continue to decline. Almost all of the golf courses in the LBWD service area are already using recycled water, and given that Long Beach is a built-out city, it is unlikely additional golf courses will be created in the future, creating additional demands for recycled water.
- Energy Production: Although irrigation customers account for the vast majority of recycled water service connections within the LBWD service area, THUMS Long Beach Company (THUMS) represents the largest individual demand for recycled water. THUMS gets its name from the oil property's original

TABLE 6-2: 2020 Planned Versus Actual Use of Recycled Water

Recycled Water Use Type	2015 Projection for 2020	2020 Actual Use
Landscape Irrigation (excludes golf courses)	2,214	1,643
Golf Course Irrigation	1,542	1,228
Energy Production	967	531
Seawater Barrier Intrusion Available Supply	-	774
Total	**4,723**	**4,176**

shareholders (Texaco, Humble, Union, Mobil and Shell). THUMS extracts oil from the eastern offshore section of California's Wilmington oil field (which lies beneath Long Beach Harbor) and uses recycled water for groundwater injection to re-pressurize offshore oil-bearing strata, preventing land subsidence. The use of recycled water by THUMS fluctuates with the volume of oil extractions and their own complicated conveyance network (pipelines, storage tanks, pumps) where demand is primarily driven mechanically by operations while accepting other additional sources of water to meet process demands.

- Seawater Intrusion Barrier: WRD Leo J. Vander Lans Advanced Water Treatment Facility (LVL AWTF) accepts recycled water from LBWD and further treats it prior to injecting it back into the ground for the purposes of sea-water barrier injection for the Alamitos Barrier Project (ABP). For further discussion, refer to ***Chapter 4***.

Overall, total recycled water use in 2020 was lower than projected in LBWD's 2015 UWMP. Irrigation use (both for landscapes and golf courses) in 2020 was lower than the projections and this may be due to efficiencies in plumbing, conservation and regulatory revisions. Demands from energy production decreased, but may not be representative of the actual need for recycled water since demand. For example, energy production recycled water demand is primarily driven by mechanical operations and the use of other additional sources of water (i.e. potable) to meet process demands. And finally, recycled water demand for seawater barrier operations was not included in 2015 UWMP but has been included under the 2020 UWMP, which is explained in greater detail below.

6.3.2.2 Seawater Barrier Demand for Alamitos Barrier Project (ABP)

The Alamitos Seawater Barrier prevents saline water from traveling into and degrading the fresh water underground in the Central Basin aquifer. This is accomplished through the Alamitos Gap Barrier Project, which injects high-quality water at strategic locations, thereby creating a hydrologic barrier between the ocean and the groundwater.

The Alamitos Gar Barrier Project began operation in 1964, runs approximately 2.2 miles in the southeast corner of Long Beach, involves 43 wells that inject an average of about 6,000 acre-feet of water per year, and is operated by the Los Angeles County Department of Public Works (LACDPW). Historically, LACDPW has used MWD imported potable water for injection but the goal is for WRD's Advanced Water Treatment Facility to eventually supply 100 percent of the water needed at the barrier.

LBWD serves WRD's Advanced Water Treatment Facility recycled water demands, but for several purposes under the 2015 UWMP, recycled water used at the Advanced Water Treatment Facility for injection into the Alamitos Seawater Barrier was treated separately from typical recycled water demands and not reported. At the time, most of the water injected into the seawater barrier has been MWD imported potable water.

Similar to the 2010 UWMP, the LBWD 2020 UWMP will include recycled water demand from the Alamitos Gap Barrier Project, which is served by means of WRD's LVL AWTF. In order to plan recycled water supplies properly, LBWD has determined to report recycled water demand for ABP operations. Potable water demand for the Alamitos Gap Barrier Project will not be considered a part of LBWD's municipal and institutional (M&I) demand for the purposes of this 2020 UWMP.

Accounting for the imported potable water serving the seawater barrier demand separately from M&I demand is congruent with how MWD considers seawater barrier demand. Nevertheless, the supply of imported drinking water to the barrier is a very important consideration and will therefore be discussed in the 2020 UWMP, just not as a reported M&I demand.

As explained in ***Section 4.2.7***, a single MWD connection serves the Alamitos Gap Barrier Project and only the barrier project; the connection serves no other purpose; its serves no municipal and institutional (M&I) demand in LBWD's service area. In fact, this water never enters LBWD's distribution system. This MWD connection, which had been in use for many decades, was owned by a different MWD member agency until 2005; that is, prior to 2005 LBWD's name was not even on the MWD barrier connection.

Even though the name on the MWD connection was recently switched to LBWD from that of the previous MWD member agency, LBWD merely serves as a pass-through agency to facilitate the very important operations of the barrier. Because this demand on MWD at the barrier had never represented a demand by LBWD, it has never been included as part of LBWD's potable demand in past UWMPs. Likewise, the MWD deliveries to the barrier have not been counted as a supply of water to LBWD.

For the purposes of MWD's water shortage allocation, the only demand for water in the LBWD service area that has its own shortage allocation from MWD, apart from all other LBWD demands, is the seawater barrier. MWD creates a separate and unique allocation for the barrier in its shortage allocation plan.

For these reasons, the MWD wholesale supplies to the seawater barrier have not been included in the calculation of total MWD supplies available to LBWD in UWMPs.

Going forward, WRD plans to supply 100 percent of the ABP demands with advanced treated recycled water via the LVL AWTF. And in 2020, LBWD committed at least 6.5MGD of recycled water to supply LVL AWTF operations to meet ABP demands.

6.3.2.3 Future Uses of Recycled Water

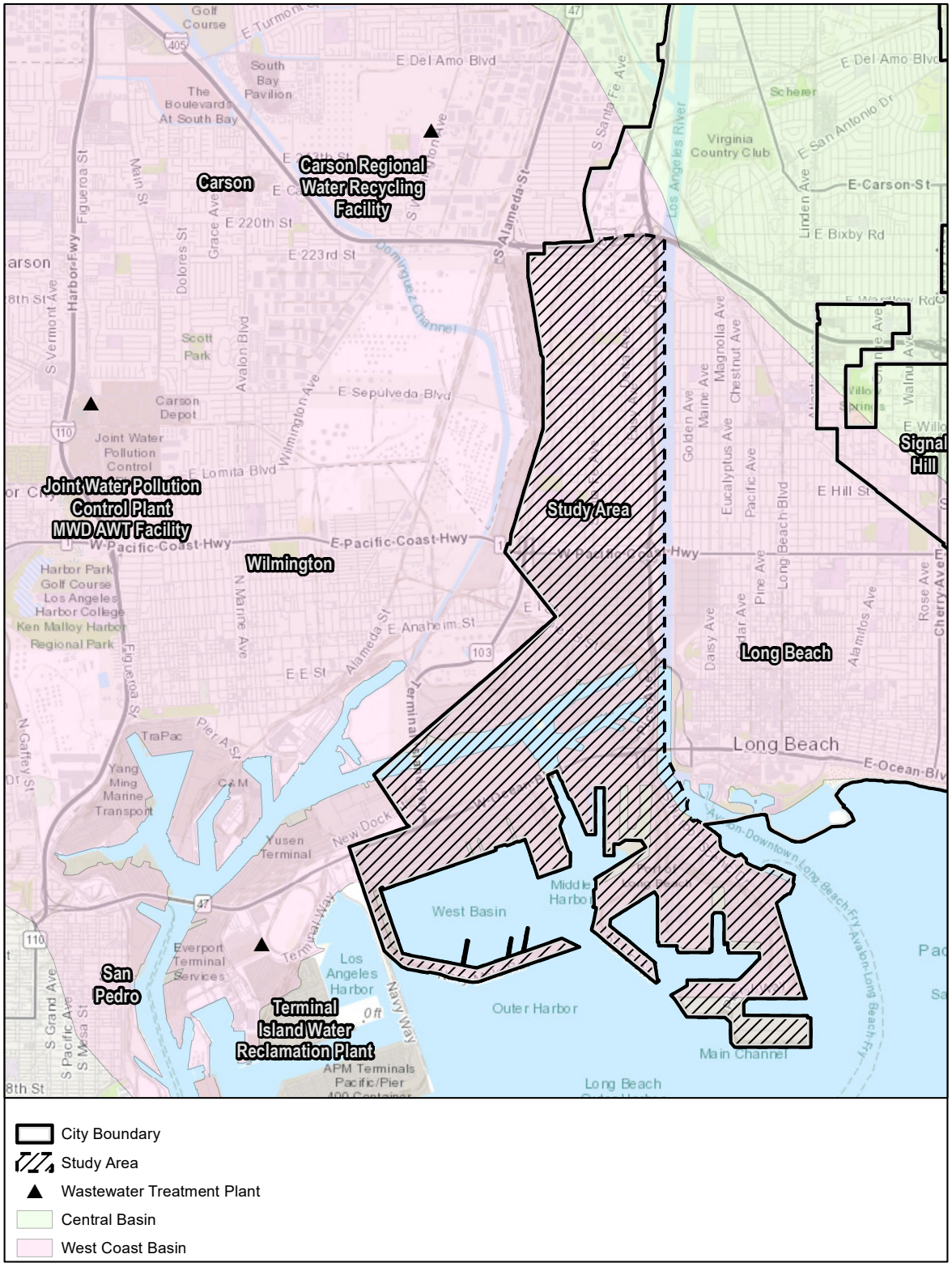
Due to the limited availability of recycled water from the LBWRP, as well as physical and economic constraints, opportunities to expand the current recycled water infrastructure outside of its existing footprint are limited. LBWD continues to optimize recycled water use for existing customers and for those potential customers not connected to the existing distribution system.

Much of the potential recycled water use would be similar to current uses towards irrigation and energy production. And although there are constraints for system expansion as previously mentioned, LBWD encourages recycled water use and has identified future recycled water supplies to fulfill demands for those customers not connected to the existing distribution system. Further discussion related to future supplies is located under ***Section 6.6.3***.

LBWD has identified potential recycled water use for users located within the western portion of the Long Beach area that crosses the Los Angeles River, or "West Long Beach" as shown in ***Figure 6-3***.

Customers in this area currently meet their non-potable demands solely with potable water and LBWD has identified an opportunity to serve advanced treated water to some of these customers through regional partnerships. And although LBWD has identified potential recycled water demand within this area, this projection is excluded from future recycled water demand projections due to the lack of existing infrastructure in the area. More information related to the regional effort currently underway is discussed under ***Section 6.6.3***.

FIGURE 6-3: Potential Recycled Water Users Study Area



LBWD also encourages recycled water use in other sectors such as energy production. For example, potential recycled water use at the Los Angeles Department of Water and Power (LADWP) Haynes Generating Station (Haynes Station) is currently being evaluated. Located in the southeast corner of the LBWD service area, LADWP Haynes Station may potentially utilize recycled water as early as 2025 to replace ocean water for cooling tower processes. At the time of this 2020 UWMP development, a feasibility study evaluating the potential recycled water demands and preliminary pipeline alignments are underway. Because this level of effort is still under a feasibility phase, the potential recycled water demand has not been included under LBWD's future recycled water demand projections.

Overall, recycled water demands are projected to increase across all sectors as shown in ***Table 6-3*** below.

These projections are from the 2019 Water Resources Plan (WRP), where LBWD assumes a conservative approach by assuming demands under these sectors will be fed by recycled water supplies. A detailed discussion surrounding demand projection methodology is listed under ***Chapter 4***.

6.4 Other Supplies

6.4.1 Desalination

From 2006-2010, LBWD partnered with the U.S. Bureau of Reclamation and the Los Angeles Department of Water and Power to research the technical, environmental, and financial feasibility of seawater desalination as a source of potable water, particularly with respect to the energy savings potential of the Long Beach Two-Stage Nanofiltration process of desalinating seawater. The research proved that this two-stage process successfully desalinates seawater using significantly less energy than traditional reverse osmosis.

The LBWD short-term and long-term water supply portfolios are reliable for the next 25 years and sufficient to accommodate the projected growth in demand. Seawater desalination is not necessary to improve the quality of LBWD's water supply. If the water quality of groundwater were an issue, LBWD would deal with the quality issues directly in its existing groundwater treatment plant; if the water quality of imported water were an issue, LBWD would rely upon MWD to take the necessary actions to improve the water quality.

LBWD has no plans for building a seawater desalination plant at this time because LBWD has more cost effective water supply alternatives. Seawater desalination does not appear to be a cost-

TABLE 6-3: Projected Recycled Water Demand

Recycled Water Use Type	2020	2025	2030	2035	2040	2045	2050
Landscape Irrigation (excludes golf courses)	1,643	1,756	1,898	1,921	1,975	2,087	2,049
Golf Course Irrigation	1,228	1,390	1,696	1,431	1,310	1,117	1,409
Energy Production	531	547	574	559	556	572	549
Seawater Barrier Intrusion	774	4,481	4,481	4,481	4,481	4,481	4,481
Total	**4,176**	**8,174**	**8,649**	**8,392**	**8,322**	**8,257**	**8,488**

effective alternative to MWD supplies at this time, nor is it needed to improve LBWD's water reliability and/or water quality. Seawater desalination may be reevaluated if it meets one or more of these criteria at some point in the future, so the possibility of building a seawater desalination plant in the future is discussed in ***Section 6.6***.

6.4.2 Exchanges or Transfers

Exchanges and transfers do not appear to be a cost-effective alternative to MWD supplies, nor are they needed to improve LBWD's water reliability and/or water quality, for the same reasons stated above for seawater desalination. However, as with seawater desalination, exchanges and transfers may satisfy one or more of these criteria at some point in the future. Therefore, although LBWD has not committed to participate in exchanges or transfers at this time, it has not ruled out doing so in the future.

6.4.3 Stormwater

LBWD currently does not directly use stormwater as a source of supply. The possible use of stormwater in the future is discussed in ***Section 6.6***.

6.5 Energy Intensity

A new requirement for the 2020 UWMP is to include any readily obtainable information or an estimate of the amount of energy used to process water supplies, such as energy used to extract, divert, convey, treat, store, and distribute. Energy intensity reporting can be beneficial for water utilities because it identifies associated energy savings and greenhouse gas reduction opportunities. A summary of the energy intensity reporting is shown in ***Table 6-4*** below.

One of the most energy intensive sources of water for LBWD is water purchased from MWD, which imports SWP supplies via the California Aqueduct and Colorado supplies via the Colorado River Aqueduct. The next most energy intensive sources are local supplies of water for LBWD, which include groundwater and recycled water. With available data, groundwater is more energy intensive source than recycled water, but both still have a lower energy intensity than compared to imported MWD water. It is important to note that recycled water energy calculations were for the distribution of recycled water supplies and did not include the treatment processes occurring at the LBWRP. This information was not readily available for use since LBWRP is owned and operated by LACSD.

6.6 Future Supplies

A key objective of the 2019 WRP was to identify and evaluate water supply options that could be developed to meet LBWD's demands through 2050. A range of potential water projects and programs were initially considered and evaluated as part of this effort. This section summarizes 10 supply options considered in the WRP. For detailed supply project option descriptions, refer to the 2019 WRP in ***Attachment 8***.

6.6.1 Central Basin

6.6.1.1 Groundwater Augmentation – LBWRP/LVL Source

The LVL AWTF provides advanced treatment to tertiary effluent from the LBWRP. Although historically, LVL AWTF has supplied a maximum of only 2,350 AFY to the Alamitos Barrier, the facility has a maximum capacity of 8 MGD and is permitted to supply the Alamitos Barrier with up to 100 percent of necessary inflow.

If LVL AWTF were operated at maximum capacity, additional water supply could be made available to LBWD for groundwater injection into the Central Basin. This option would require the construction of injection wells, extraction wells and pipeline

conveyance systems as shown in ***Figure 6-4*** below. LBWD would also need to obtain approval from WRD to increase LBWD's APA by 900 AFY and allow LBWD to pump the recharged water. Further evaluation of the excess flows from LVL AWTF would be needed as these flows are not guaranteed year-round, and future wastewater flows may decrease due to additional water conservation and increased recycled water demands.

6.6.1.2 Groundwater Augmentation – MWD RRWP Source

The proposed RRWP is being developed to deliver up to 150 MGD, or 168,000 AFY, of purified water to four regional groundwater basins through a new regional conveyance system as shown in ***Figure 6-5***. This supply project would provide 4,000 AFY of purified water to be injected into the Central Basin Aquifer for LBWD. MWD would install up to four injection wells to achieve an ongoing

TABLE 6-4: Summary of Energy Intensity Reporting for Water Supplies

				All Water Supplies
Water Supplies	Local	Recycled Water[1]	Volume (AF)	4,176
			Energy Consumed (MWh)	1,169
		Groundwater – Extract/Divert [2]	Volume (AF)	24,200
			Energy Consumed (MWh)	16,418
		Groundwater - Treatment	Volume (AF)	25,593
			Energy Consumed (MWh)	9,744
	Imported	MWD	Volume (AF)	27,204
			Energy Consumed (MWh)	54,906
2020 Total Water Volume Delivered (AF) – Recycled, Local, Import				55,216
Total Estimated Energy Intensity (kWh/AF) – Recycled Water				280
Total Estimated Energy Intensity (kWh/AF) – Groundwater Supplies				551
Total Estimated Energy Intensity (kWh/AF) – Imported Supplies [3]				1,863
Estimated Total Energy Consumed (MWh)[4]				82,237

[1]Recycled water energy consumption only consider discharge/distribution, it does not reflect energy from treatment processes at LBWRP

[2]Information regarding distribution conveyance (i.e booster stations) energy consumption was not readily available and not reflected

[3]MWD treated water energy intensity is the 2013-2018 average including MWD conveyance, treatment, and distribution energy intensities

[4]Total Energy Consumption is estimated; information and data readily available were used but are not comprehensive of entire energy consumption across the LBWD water systems

FIGURE 6-4: Groundwater Augmentation - Long Beach Water Reclamation Plant and Leo Vander Lans

replenishment program in this portion of the Central Basin. The extracted water would then be treated at the LBWD GWTP prior to conveyance into the potable distribution system.

6.6.1.3 Groundwater Augmentation – LBWRP/AWTF

LBWRP effluent is directed to the LVL AWTF, to the LBWD recycled water distribution system, or discharged to nearby Coyote Creek. Approximately 3,200 AFY of effluent could be redirected from the Coyote Creek outfall to additional LBWD uses. LBWD has rights to the effluent leaving LBWRP so no additional negotiations would be required to use this supply.

Additional water storage tanks would need to be available to capture the Coyote Creek discharge and sent to a new Advanced Water Treatment Facility (AWTF) constructed at an empty parcel north of the existing LBWD GWTF. The advanced treated water would then be reinjected into the Central Basin and extracted for treatment and use.

This option would require LBWD to construct injection wells, extraction wells, pipeline conveyance systems and an AWTF as shown in ***Figure 6-6.*** LBWD would also need to obtain approval from WRD to increase LBWD's APA by 3,200 AFY and allow LBWD to pump the recharged water. Further evaluation of the excess flows from LVL AWTF would be needed as these flows are not guaranteed year-round, and future wastewater flows may decrease due to additional water conservation and increased recycled water demands.

FIGURE 6-5: Groundwater Augmentation- Metropolitan Water District Regional Recycled Water Project

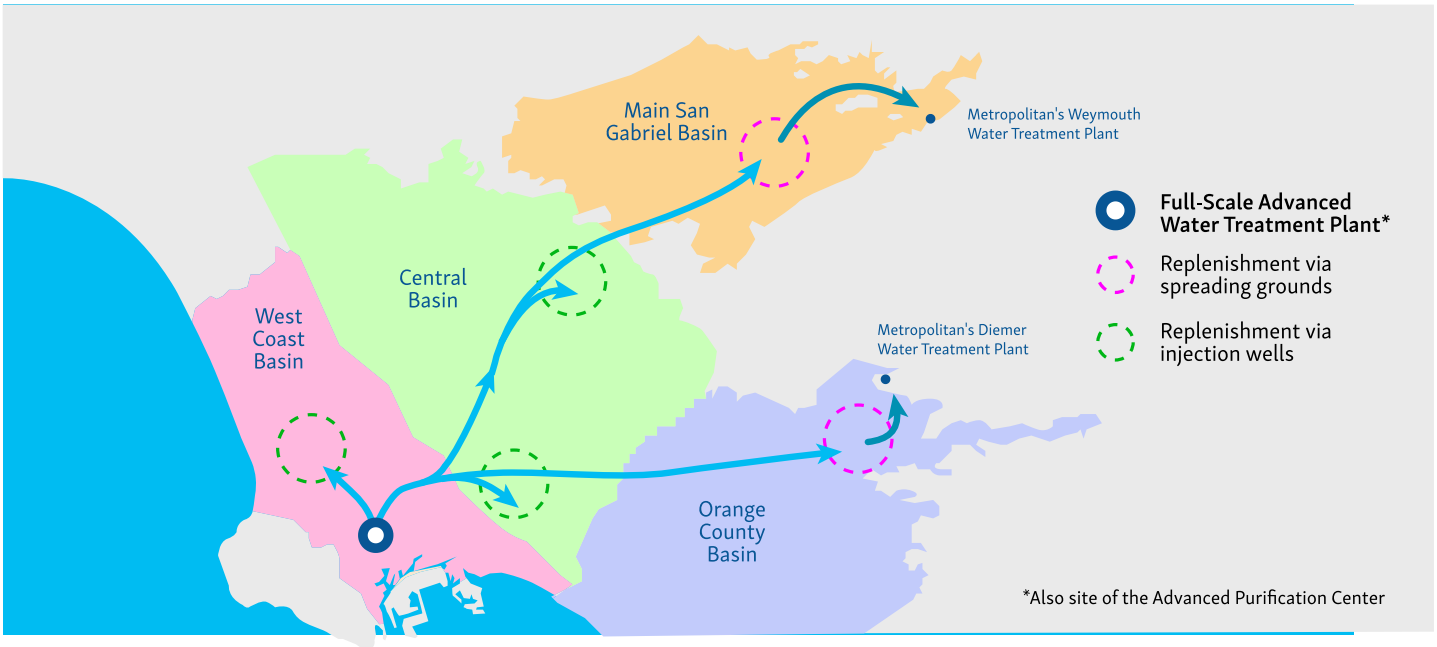
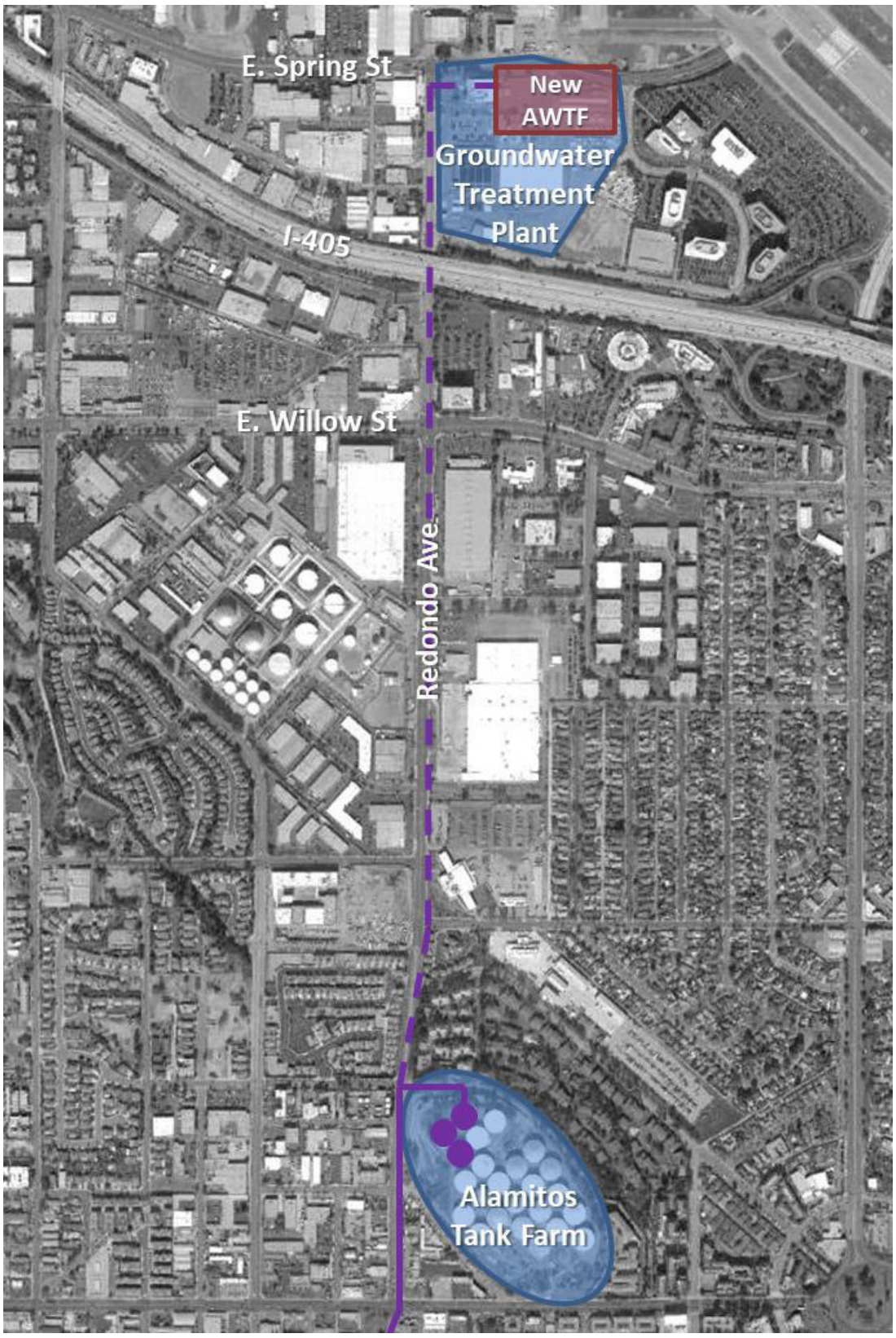


FIGURE 6-6: Groundwater Augmentation - Long Beach Water Reclamation Plant and Advanced Water Treatment Facility



6.6.2 West Coast Basin

Utilization of a new production well, West Coast Basin Well 1 (WCB1), will allow LBWD to utilize its 0.7 AFY APA, and enable LBWD to produce up to 3,000 AFY to help offset imported water use. The WCB1 was drilled in 2017 and is currently under design to develop a pump-to-waste system to further evaluate the water quality before designing and constructing disinfection equipment and connections to the distribution system. The current project schedule projects that future WCB1 supplies will be available for LBWD use by 2027.

6.6.3 Recycled Water

6.6.3.1 Industrial Reuse at Port of Long Beach – LADWP Source

As previously discussed in ***Section 6.3***, many of LBWD's largest commercial and industrial water users, including the Port of Long Beach (POLB) and several oil refineries, are located in west Long Beach and do not have access to recycled water. LBWD has partnered with LADWP on a feasibility study to evaluate advanced treated product water, sourced from LADWP via the Terminal Island Advanced Water Purification Facility (TIAWPF) and supplemented by Hyperion Advanced Water Purification Facility (HAWPF), to be used as a supply for the west Long Beach area.

TIAWPF which was constructed and expanded under a partnership between LADWP and LASAN, does not currently have enough supply to fulfill additional demands, but LADWP is continuing to work with LASAN to identify additional sources of recycled water supplies for the Los Angeles Harbor area, including treated water from Hyperion Water Reclamation Plant. Because the Hyperion Advanced Water Purification Facility (HAWPF) has not yet been constructed, supplying advanced treated water needs in the Port of Long Beach from Hyperion source water would require waiting until construction or working with industrial customers to accept the secondary treated flows. The feasibility of this supply project will need to be further evaluated but LBWD estimates about 1,000AFY of demand could be served by this project.

6.6.3.2 Industrial Reuse at Port of Long Beach – MWD RRWP Source

The 1,000 AFY of advanced treated recycled water demands determined for Industrial Reuse at Port of LB – LADWP Source could be served by the RRWP in Carson instead of by LADWP.

MWD is likely to pursue the construction of a regional recycled water conveyance system in the next 10 years, however LBWD must track progress of the RRWP planning and design process. LBWD would also be responsible for connecting directly to the RRWP conveyance pipeline (at locations to be determined) and for making the delivery of purified water to the end users.

Currently, under a partnership with LADWP, a feasibility study is evaluating LADWP's Harbor Area Recycled Water Infrastructure, supplemented with MWD's RRWP source as a means of delivering recycled water to the west Long Beach area. LBWD estimates about 1,000AFY of demand could be served by this project.

6.6.4 Other Projects

6.6.4.1 LBMUST Advanced Treatment Expansion

The City of Long Beach Public Works Department (COLBPW) is designing the Long Beach Municipal Urban Stormwater Treatment System (LBMUST), to capture and treat dry weather flows. Under the current project, the treatment water that leaves LBMUST facility would be discharged to the Los Angeles River that would meet National Pollutant Discharge Elimination System (NPDES) requirements, but not to a suitable quality for reuse. An expansion of LBMUST would include additional advanced treatment equipment

to further treat the effluent from the Public Works LBMUST treatment facility to a quality that would be suitable for non-potable irrigation use. If an expansion project is advanced, an additional 300 AFY of total supply could be used for non-potable irrigation use.

6.6.4.2 Rainwater Harvesting – Onsite Irrigation

Stormwater capture and rainwater harvesting provide local, non-potable supplies, typically for irrigation use. Large centralized facilities traditionally have been used to manage runoff. The deployment of site-scale decentralized rainwater harvesting devices can reduce the need to purchase expensive urban land or use scarce publicly-owned land for centralized facilities.

To realize an estimated 100 AFY of supply, large cisterns could be installed at school sites and rain barrels would be installed at 27,000 single family residences. This ambitious deployment would need to include an education program to maximize the yield and maintenance of the individual rain barrels and cistern systems.

6.6.4.3 Rainwater Harvesting – Wastewater Augmentation

Stormwater capture and rainwater harvesting could also be used to augment wastewater flows and therefore increase potential recycled water supplies. In addition to on-site storage of collected runoff, these systems would include a connection to the nearest sewer conveyance. Because these connections would have a larger capacity and usage would not be limited to landscaped areas at any particular site, project yields are greater than the onsite irrigation systems. Up to 1,100AFY of water could be collected from target areas in the form of rainfall from various commercial and multi-family residence sites.

6.6.4.4 Seawater Desalination

Since Long Beach is located adjacent to the ocean, seawater desalination will always be a water supply option that can be taken into consideration. However, LBWD has no plans for building a seawater desalination plant at this time because LBWD has more cost effective water supply alternatives. Seawater desalination does not appear to be a cost-effective alternative to MWD supplies, nor is it needed to improve LBWD's water reliability and/or water quality. Seawater desalination may be reevaluated if it meets one or more of these criteria at some point in the future.

6.7 Climate Change Impacts

Although Long Beach may experience climate change in the form of increased temperatures and more erratic yet intense winter precipitation events, climate change is not expected to impact LBWD's water supplies.

6.7.1 Groundwater Supply Climate Change Impacts

Average annual precipitation in Long Beach is expected to increase slightly by the year 2050. However, because impermeable layers of clay and silt prevent rain that falls in Long Beach from percolating into the groundwater supply aquifers, the increased precipitation will not result in additional groundwater supplies.

If precipitation in the watershed that supplies the groundwater basin with natural replenishment were to increase, it is possible that the amount of natural replenishment of the basin would also increase. However, even this increased natural recharge will not provide LBWD with additional supply because the Central Basin Judgement limits the amount of water that LBWD can pump and because the additional natural recharge will simply offset other kinds of recharge, such as recharging the basin with MWD supplies or through in-lieu means.

6.7.2 Imported Water Supply Climate Change Impacts

Climate change is expected to have an impact on water supplies from the Colorado River and the Sierra Nevada Mountains, the two primary water sources for the imported water LBWD purchases from MWD. Details on the impacts of climate change on MWD water supplies can be found in ***Attachment 9***.

Despite the impacts of climate change on MWD's supplies, LBWD does not anticipate its supply of imported water to be impacted due to the following reasons:

- MWD has indicated reliability of future supplies documented in the MWD 2020 UWMP;
- MWD allocation plan guarantees a minimum 100 gallon per capita per day (which is an amount above LBWD's current and projected water demands); and
- LBWD has a preferential right to MWD supplies in excess of the minimum 100 GPCD guaranteed allocation.

Further discussion of these reasons are described in detail in ***Chapter 7***

6.7.3 Recycled Water Supply Climate Change Impacts

The sources of supply to the LB Reclamation Plant are millions of indoor water-using devices such as showers, clothes washers, dish washers, faucets, and so on, that feed wastewater into the LACSD wastewater trunk lines. Climate change is not expected to impact these essential indoor activities and therefore is not expected to impact the supply of wastewater to the LBWRP. Therefore, LBWD recycled water supplies are not expected to be impacted by climate change.

6.8 Summary of Existing and Future Supplies

Existing and projected sources of water for 2020 through 2050 are identified and quantified in ***Table 6-5***. The projections for groundwater and imported water are based on historical use, projections of supply reliability from WRD and MWD.

LBWD plans to utilize an adaptive water resources strategy when managing each supply in relationship to the other identified supplies. For a near-term supply management and use, LBWD will focus on assessment of its groundwater pumping capacity, developing the WCB1 Well, followed by securing highly-treated recycled water from either MWD's RRWP or LADWP's Terminal Island Water Reclamation Plant for industrial use at the Port of Long Beach.

Mid-term and long-term solutions, which are detailed under the 2019 WRP, focus on groundwater augmentation projects, as well as reevaluating the adaptive strategy in concurrence with the preparation of LBWD's 2030 UWMP.

TABLE 6-5: Summary of Existing and Future Water Supplies

Water Supply	2020	2025	2030	2035	2040	2045	2050
Groundwater – Central Basin	24,200	37,126	37,126	41,126	41,126	41,126	41,126
Groundwater – West Coast Basin	0	3,226	3,226	3,226	3,226	3,226	3,226
Imported	27,204	30,900	30,900	30,900	30,900	30,900	30,900
Recycled	10,685	13,500	13,500	13,500	13,500	13,500	13,500
Total	**62,089**	**84,752**	**84,752**	**88,752**	**88,752**	**88,752**	**88,752**

CHAPTER 7: WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Chapter 7 describes the long-term reliability of LBWD water supplies to meet demands through the year 2050. Water supply reliability is described for normal year (i.e. average year), single dry year, and multiple dry year conditions.

7.1 Constraints on Supplies

LBWD's water supplies include groundwater, imported water purchased from MWD, and recycled water. Although LBWD has faced a number of challenges that impact the reliability of these water sources, each of these supplies is expected to be reliable for at least the next 30 years.

7.1.1 Groundwater Reliability

Both the Central Basin and West Coast Basin Judgements' groundwater extraction limitations, multiple on-going basin replenishment projects, adequate funding of the replenishment activities from revenue generated by the replenishment assessment placed on extractions, and sufficient Basin storage will provide LBWD with a very reliable supply of groundwater, even during multiple-dry

years. ***Sections 6.1.2 and 6.1.3*** provide a more complete description of the management of these resources.

The Board of Directors of WRD may declare an emergency and enact measures to encourage reduced pumping if the Basins water resources risk degradation. WRD considers many factors prior to declaration of emergency, including prior year hydrology, potential reductions in MWD supplies, low water elevations in their recharge basins, and high accumulated overdrafts (when groundwater use exceeds the amount of recharge back into the Basin). During past emergencies, WRD has encouraged voluntary reductions among basin users by increasing annual limits on allowable carryover storage (the amount of water in aquifer storage accounts that pumpers are able to leave in between years). WRD allowed parties to carryover 10 percent of their APA during an emergency declaration of 1977 and allowed a 35 percent APA carryover during a 2010 emergency.

7.1.2 Imported Water Reliability

LBWD does not anticipate any projected constraints of its imported water supply to be impacted for the next 30 years due to the following reasons:

- MWD has indicated reliability of future supplies to meet demands as documented in the MWD 2020 UWMP;
- MWD allocation plan guarantees a minimum 100 gallon per capita per day (which is an amount above LBWD's current and projected water demands); and
- LBWD has a preferential right to MWD supplies in excess of the minimum 100 GPCD guaranteed allocation.

7.1.2.1 MWD Declaration of Reliability

MWD is a wholesale water provider serving most of Southern California, and as such, the reliability of MWD is essential for the water reliability of the region. MWD water supplies are imported from Northern California through the State Water Project's California Aqueduct and from the Colorado River through the Colorado River Aqueduct. The MWD 2020 Regional UWMP projects that future supplies from these two imported water sources will be sufficient to meet demands even under multiple-dry year conditions.

7.1.2.2 MWD Commitment to 100 GPCD

MWD incorporated its Water Surplus and Drought Management (WSDM) Plan in its 2020 Regional UWMP. The WSDM Plan articulates different stages of shortages and different actions based on those stages. However, the 'shortages' envisioned in the WSDM Plan have more to do with years in which normal imported deliveries are less than the demand on MWD; these 'shortages' do not necessarily lead to an allocation of water; MWD may choose to mitigate the limitations on normal imported deliveries by drawing on stored water, curtailing interruptible deliveries, acquiring additional supplies from the spot market, and by taking similar types of actions.

MWD refers to a shortage that results in allocation of M&I supplies (municipal and industrial) as an 'Extreme Shortage.' It is MWD's objective to avoid an Extreme Shortage. When MWD enters an Extreme Shortage, it develops an allocation plan based on its board adopted allocation principles. One of those principles is that MWD will guarantee an amount of water necessary for its member agencies to provide a minimum of 100 GPCD to their service areas.

Because LBWD's service area is currently under 100 GPCD and is projected to remain under 100 GPCD through the year 2050, this guarantee by MWD is essentially a guarantee of 100 percent reliability for LBWD.

7.1.2.3 LBWD Preferential Rights to MWD Supplies

Even if MWD's declaration of reliability and its minimum guarantee of 100 GPCD were not enough, LBWD has an additional guarantee of reliability from MWD due to its preferential right to MWD's water supplies. The Metropolitan Water District Act, included as ***Attachment 10***, as enumerated in California law, entitles each member agency to a certain volume of "preferential rights" to the MWD imported water supplies. Per Section 135 of the Metropolitan Water District Act:

"Each member public agency shall have a preferential right to purchase from the district for distribution by such agency, or any public utility therein empowered by such agency for the purposes, for domestic and municipal uses within the agency a portion of the water served by the district which shall, from time to time, bear the same ratio to all of the water supply of the district as the total accumulation of amounts paid by such agency to the district on tax assessments and otherwise, excepting purchase of water, toward the capital cost and operating expense of the district's works shall bear to the total payments received by the district on account of tax assessments and otherwise, excepting purchase of water, toward such capital cost and operating expense."

MWD recalculates preferential rights for each member agency on an annual basis, expressed as a percentage. Long Beach was one of the founding member agencies of MWD and has contributed towards the prescribed capital costs and operating expenses of MWD since the early 1930's and has, therefore, essentially purchased a significant preferential right to MWD's supplies. As of fiscal year 2020, these cumulative contributions from Long Beach equate to preferential right of 2.06 percent of MWD supplies.

Based on a conservative estimate that MWD will have a supply of 1.5 million AF in multiple dry years[1], this 2.06 percent preferential right means that LBWD will have access to a supply of at least 30,900 AF of imported water, an amount that greatly exceeds the projected need of LBWD to supplement groundwater, recycled water and water conservation.

LBWD's average annual demand for MWD supplies over the last 20 years has been about 20,000 AF, which is only 65 percent of the water LBWD has a preferential right to even in the extreme scenario wherein MWD has only 1.5 million AF of supplies available. Because LBWD has a preferential right to MWD's supplies in excess of its need for that water, there are no projected constraints on LBWD imported water supplies needed by LBWD even in extreme shortage conditions.

[1] It is highly unlikely that MWD will have less than 1.5 million acre-feet of water even in multiple dry-year events. MWD's 2020 Regional UWMP assumes it will be able to supply 2.1 million acre-feet even during multiple dry years.

7.1.3 Recycled Water Reliability

The supply of recycled water is not affected by single or multi-year droughts. The source of supply to the Long Beach Water Reclamation Plant (LBWRP) is fundamentally wastewater from indoor uses such as toilet flushing, showers, clothes washing, wastewater from commercial kitchens, industrial manufacturing. These uses are not, to a large effect, impacted by single or multi-year droughts, but rather attributed to indoor water use efficiencies from plumbing codes and active conservation programs from LBWD. ***Figure 7-1*** plots the LBWRP effluent over the past 5 years.

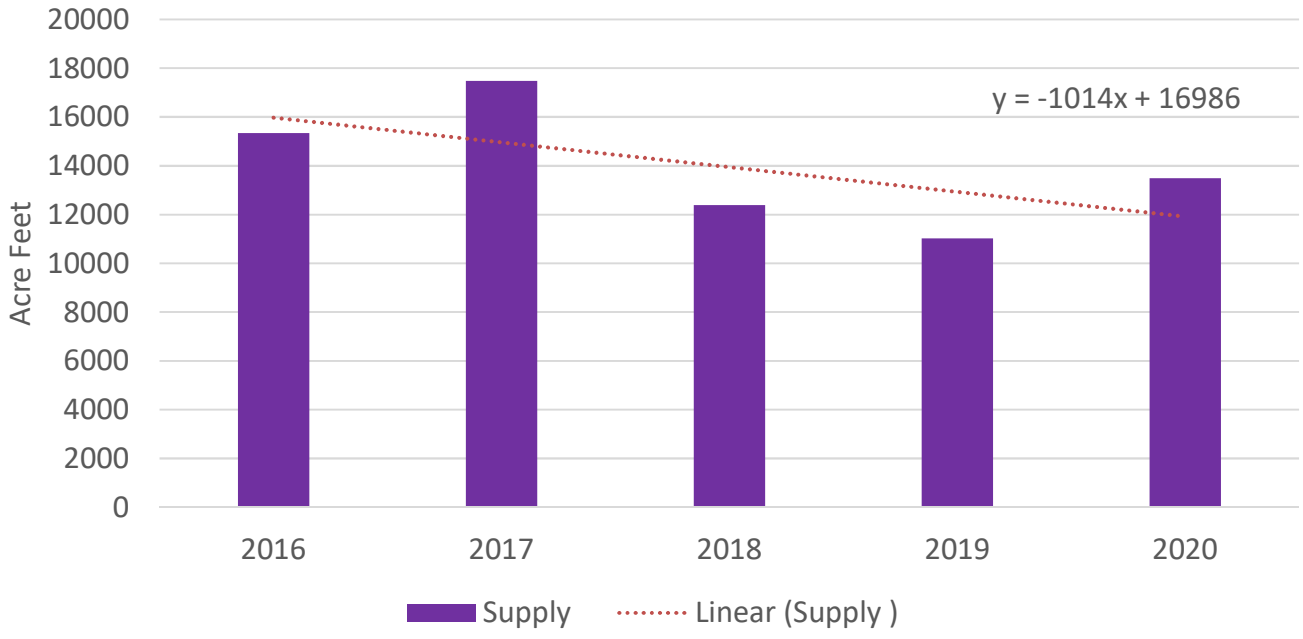
Although available supplies are trending down, the production of recycled water at the LBWRP exceeds current and future potential uses of recycled water. Therefore, LBWD recycled water supplies are not projected to face constraints.

7.2 Reliability by Type of Year

Historically, LBWD water supplies have proven to be reliable during normal years and even during the driest single year and multiple consecutive dry-year hydrologic conditions. As described in ***Section 7.1***, each individual LBWD water supply is reliable and is not projected to be constrained in the future. Therefore, LBWD water supplies are projected to continue to be reliable during a single dry-year or multiple dry-years through 2050.

Historical precipitation data was referenced to determine which years to use for the purposes of evaluating LBWD supply reliability during a single dry year and multiple dry years. The single driest year (July through June) in Long Beach in the past 50 years was 2007, which only had 2.1 inches of precipitation the entire year. The driest four-year period in the past 50 years has been from 2012 through 2016, averaging just 6.7 inches of precipitation annually, as shown in ***Figure 7-2***.

FIGURE 7-1: 2016 – 2020 Recycled Water Supply



7.2.1 Single Dry Year Supply Reliability

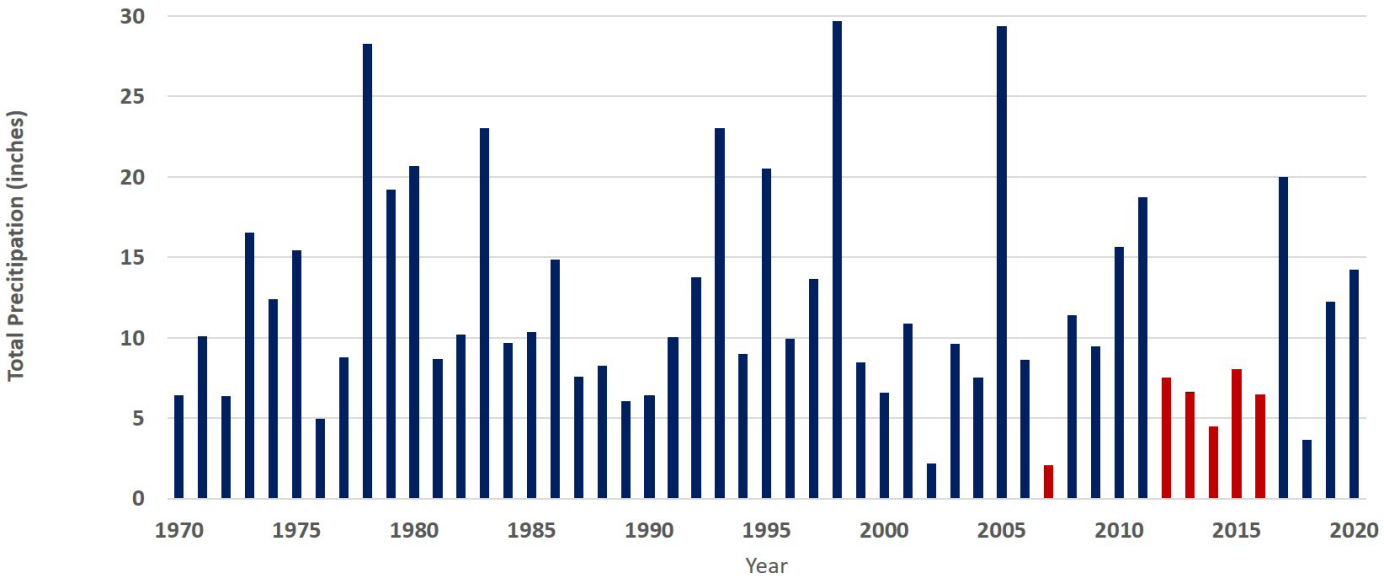
The single driest year used by LBWD for analysis was the critically dry year of 2007, which experienced a just 2.1 inches of total rainfall for the entire year. All LBWD water supplies were reliable during this single dry year.

7.2.1.1 Single Dry Year Groundwater Reliability

LBWD pumped 25,411 AF of groundwater in 2007 despite the critically dry conditions, which was an amount almost identical to the average annual pumping amount for the previous 10 years, or 23,995 AF. More importantly, LBWD was free to pump its adjudicated APA of roughly 32,692 AF in 2007 if it had chosen to; there were no constraints limiting the production to 23,995 AF. Additionally, the 10-year average in the subsequent years showed that LBWD pumped more than the single dry year; it is important to note that the subsequent years included the driest five-year period within California in the past 50 years. During the post 10-year time frame, WRD did not impose mandatory pumping restrictions.

As explained in multiple sections throughout this document, the Central Basin is a very reliable source of water because of the adjudication, because WRD actively manages the replenishment of the basin, and because WRD is able to generate sufficient revenue to adequately replenish the basin through the replenishment assessment on extractions. LBWD groundwater supplies are therefore projected to be reliable even under critically dry single year conditions.

FIGURE 7-2: Historical Precipitation



7.2.1.2 Single Dry Year Imported Water Reliability

As represented in ***Figure 7-3***, LBWD purchased 43,558 AF of imported water from MWD in 2007 despite the critically dry conditions, which was an amount almost identical to the average annual purchases in the prior 10 years of 44,488 AF. LBWD's imported water supplies are therefore projected to be reliable even under critically dry single year conditions. Average annual purchases in the subsequent 10 years was significantly lower at 26,617AF, primarily due to decreased demand rather than any constraint on the availability of imported water. The actual import supplies were reliable during that post 10-year period.

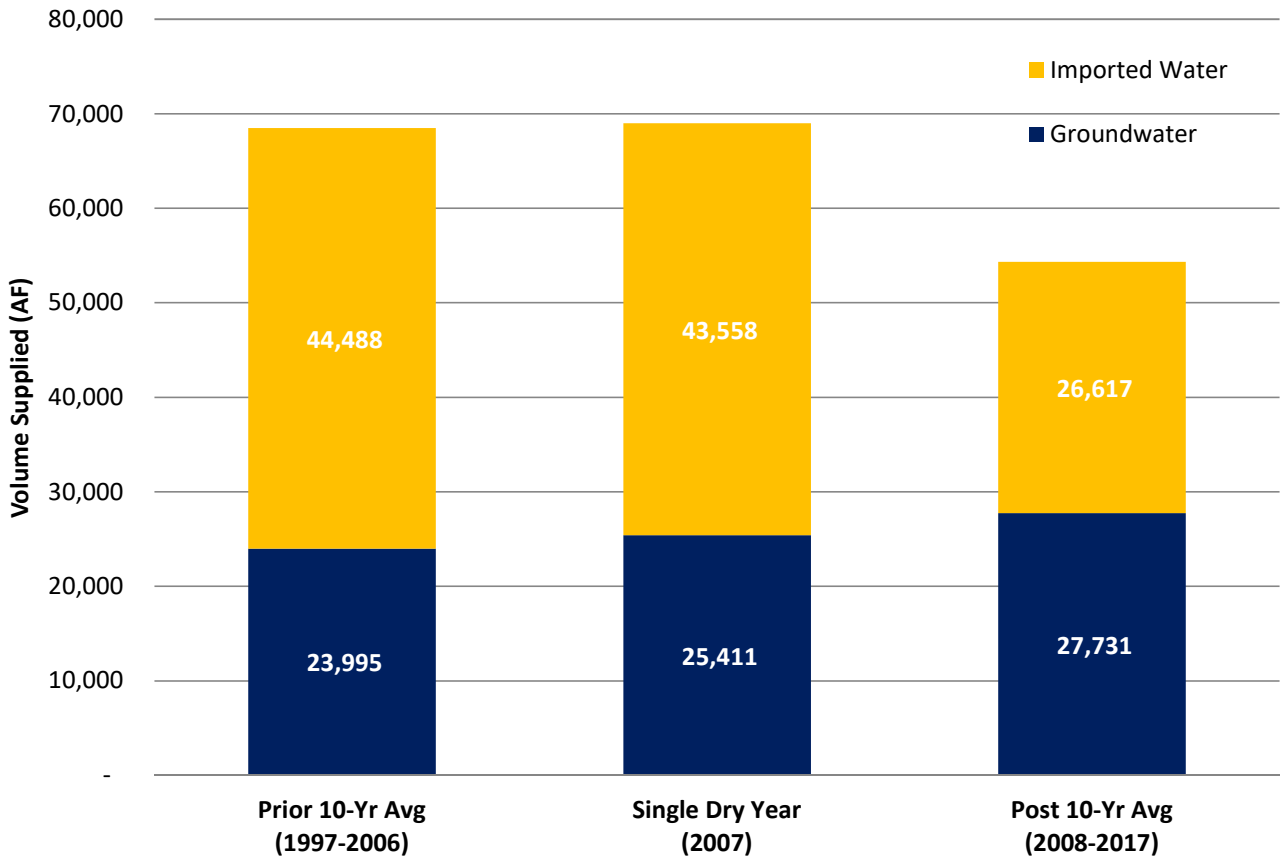
7.2.2 Multiple Dry Year Supply Reliability

The multiple dry year period used by LBWD for this analysis were the four years 2012 through 2016, the driest five year period in the past 50 years. This time period was not only one of driest in Long Beach, but it was the driest in California in the last 500 years. Despite the historical nature of this dry period, all LBWD water supplies were reliable during each of the five consecutive dry years.

7.2.2.1 Multiple Dry Year Groundwater Reliability

LBWD's groundwater supplies were very reliable in each of the five consecutive dry years from 2012 through 2016. The amount of groundwater

FIGURE 7-3: Single Dry Year Water Supply Reliability



physically pumped by LBWD during each of the four dry years fluctuated, but this fluctuation was due to the amount of in-lieu replenishment undertaken by LBWD and WRD.

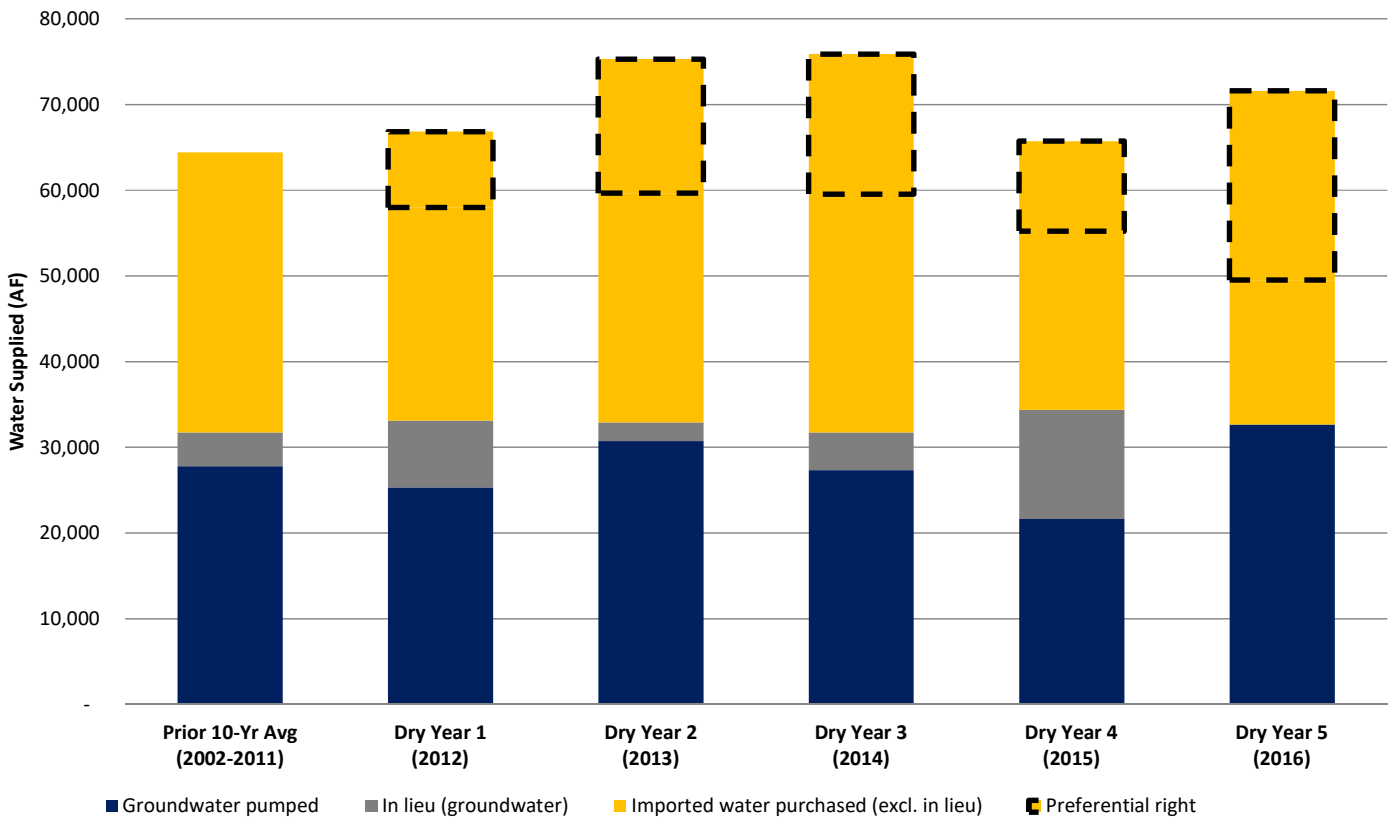
In an agreement with WRD, LBWD purchased additional imported water and retired the equivalent amount of groundwater pumping rights each year in exchange for WRD financially compensating LBWD to help defray the cost of the additional imported water purchases. The combination of groundwater pumped and imported water purchased in-lieu of groundwater was essentially equivalent to or greater in each of the five dry years than the average of the ten years prior to the dry years. Therefore, LBWD's groundwater supplies are projected to be reliable even in multiple dry year conditions as severe as 2012 through 2016.

As stated previously in ***Section 7.1.1***, the Central Basin is a very reliable source of water because of the adjudication, active Basin management, and sufficient revenue from replenishment assessments. LBWD groundwater supplies are therefore projected to be reliable even under critically dry multi-year conditions.

7.2.2.2 Multiple Dry Year Imported Water Reliability

LBWD purchases wholesale imported water from MWD to supplement its groundwater, recycled water, and water conservation. Therefore, because the overall water demand in each of the five dry years from 2012 through 2016 was lower than the average demand of the ten previous years, LBWD imported water purchases were also lower. The

FIGURE 7-4: Multiple Dry Year Water Supply Reliability



decrease in imported water purchases were a result of decreased demand rather than any constraint on the availability of imported water.

Due to the preferential rights LBWD has to MWD supplies of imported water explained in ***Section 7.1.2.3***, LBWD would have still been able to purchase as much imported water even in dry year 5 (2016) to provide customers a total of 71,584 AF, an amount greater than the 64,410 AF average demand for the ten years prior to the five dry years. Additionally, MWD in its 2020 regional UWMP clearly articulates how it will continue to provide reliable supplies to its member agencies even during multiple dry year events.

LBWD imported water supplies are therefore projected to be reliable even under multiple dry year conditions as severe as 2012 through 2016.

7.3 Supply and Demand Assessment

LBWD projects that water supplies will be sufficient to meet all demands through the year 2050 during normal, single dry year, and multiple dry year hydrologic conditions. ***Table 7-1*** compares projections of LBWD water supply and demand under the different hydrologic conditions.

Future water supply projections are based on those detailed in ***Table 6-5*** of ***Chapter 6*** and the assessment of supply reliability addressed in ***Section 7.2***. As described in ***Section 7.2***, LBWD water supplies are projected to be 100 percent reliable in a single dry year as well as multiple dry years.

Future demand projections are based on potable and recycled water demand projections detailed in ***Chapters 4 and 6, respectively***. Although historical precedent has consistently proven that water demands decrease in dry years due to voluntary and mandatory water use restrictions and a general increase in public awareness of the need for water conservation, this 2020 UWMP takes a conservative approach to planning by assuming that water demand will remain steady, rather than decrease during dry years.

Overall, ***Table 7-1*** shows that LBWD supplies are projected to significantly exceed demands through 2050 even in future dry years if customers do not reduce their demand as they have done in recent droughts.

TABLE 7-1: Supplies and Demands Under Different Hydrologic Conditions

Forecast Year	2025	2030	2035	2040	2045	2050
Normal Year						
Supply	84,752	84,752	88,752	88,752	88,752	88,752
Demand	53,964	53,964	51,861	51,691	51,653	52,570
Surplus	30,788	30,788	36,891	37,061	37,099	36,182
Single-Dry						
Supply	84,752	84,752	88,752	88,752	88,752	88,752
Demand	53,964	53,964	51,861	51,691	51,653	52,570
Surplus	30,788	30,788	36,891	37,061	37,099	36,182
Multi-Dry						
Supply	84,752	84,752	88,752	88,752	88,752	88,752
Demand	53,964	53,964	51,861	51,691	51,653	52,570
Surplus	30,788	30,788	36,891	37,061	37,099	36,182

7.4 Local Supply Reliability

Over time, LBWD total supplies consumed have decreased and imported MWD supplies have been replaced with higher groundwater pumping volumes, as shown in ***Figure 7-5***.

These supply resources do face a number of challenges that impact their supply reliability. Variations in hydrology and the evolving environmental and regulatory issues surrounding the Delta affect the availability of imported water. Similarly, variable hydrology, especially long-term droughts, and climate change are impacting the availability of groundwater supplies. Finally, the increase in water efficiency through continued progress with water conservation impacts the climate-proof supply of recycled water.

Given the uncertainties in imported water and climate change, LBWD identified a plausible range of future water supply projects and supply options available to increase local supply reliability. Reliability of future supplies on a project level basis is mentioned under Chapter 6 and detailed under the 2019 Water Resources Plan (***Attachment 8***). These projects have been individually ranked and scored based on several weighted criteria, with supply reliability being a factor.

LBWD has identified risks in developing supply reliability analysis on a project level basis. First, a risk would be not implementing enough local water supply projects to deal with imported water constraints, worsening droughts and climate change (i.e. under-performing). And second, would be over-investing in local water supply projects if climate change impacts on water supplies are less severe, and wholesalers are successful in implementing projects to improve import supply reliability. This led to LBWD to develop an overall adaptive management approach, which would help reduce the risks of under-performing or over-investing in local supply projects.

7.4.1 Adaptive Management Approach

Instead of only relying on a prescriptive plan that lays out a specific timeline for implementing new projects, adaptive management provides a flexible roadmap for making incremental investments as the future unfolds.

TABLE 7-5: Groundwater and Imported Supplies

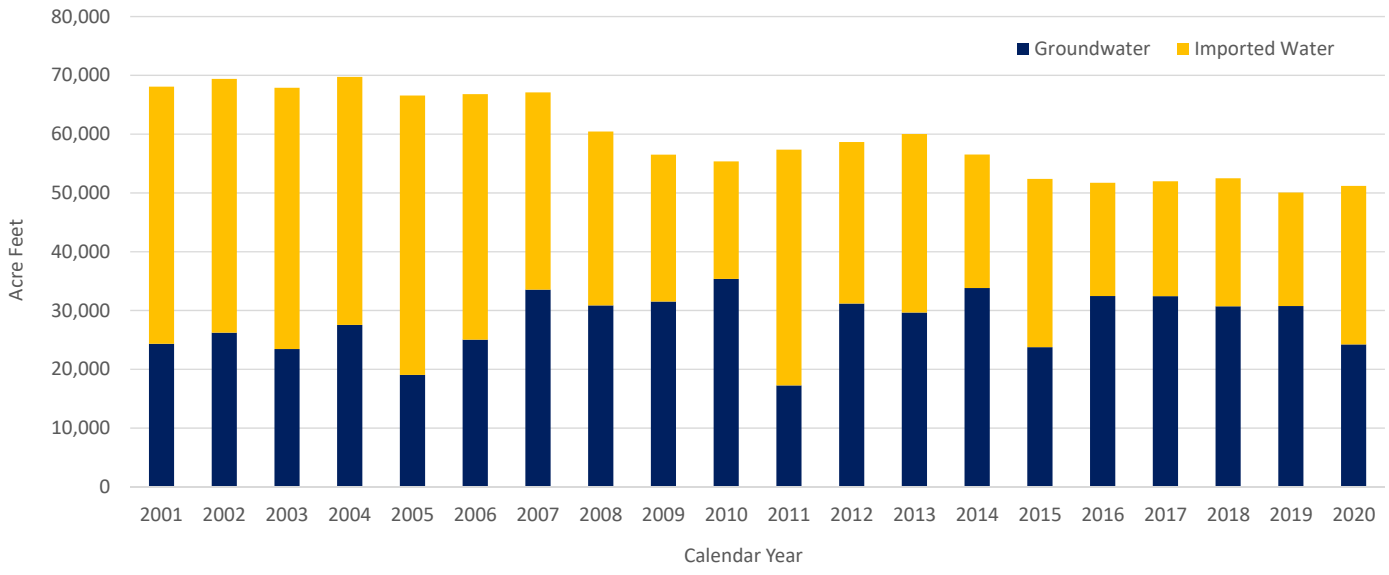
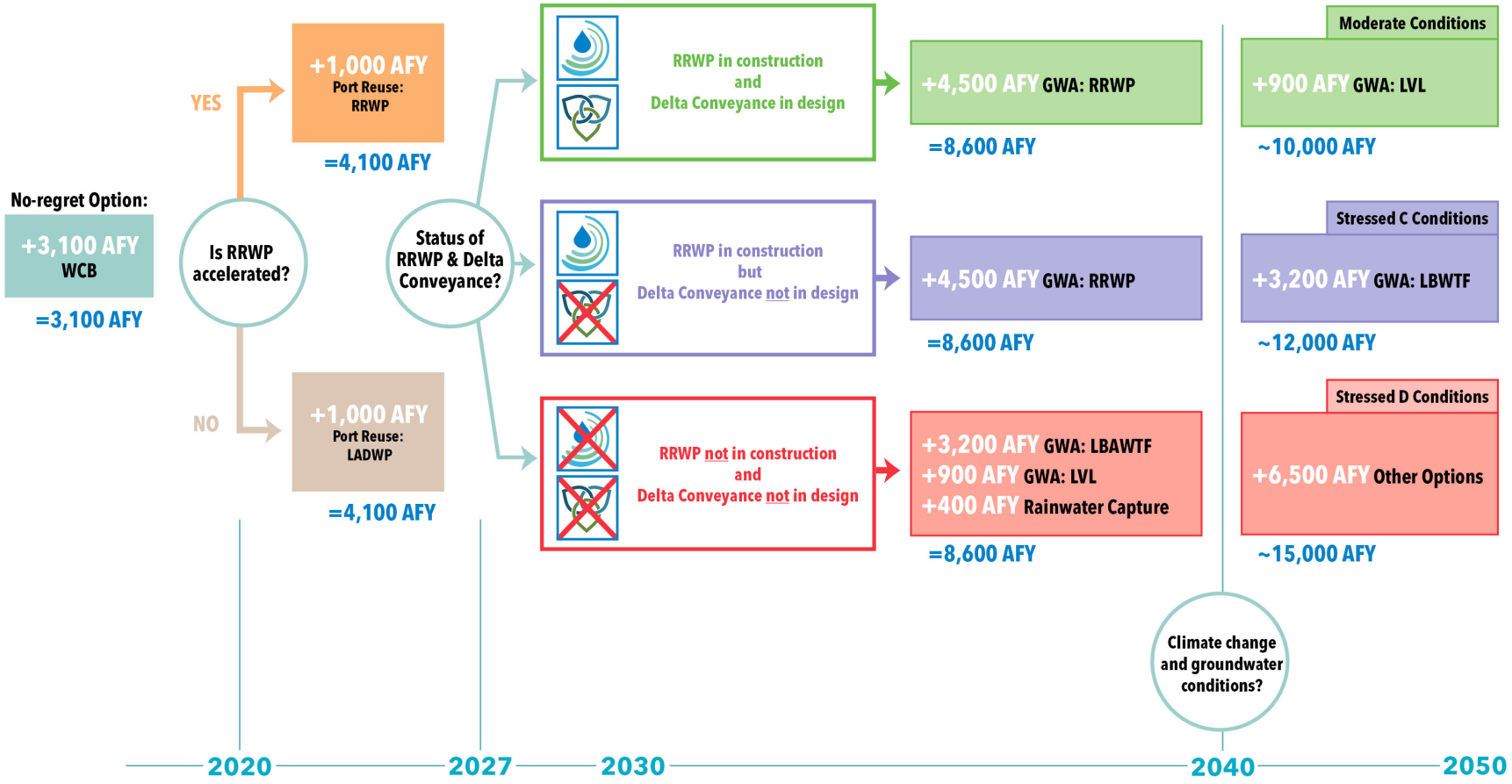


FIGURE 7-6: Long Beach Water Department's Adaptive Management Approach



Based on an adaptive management approach, ***Figure 7-6*** summarizes the overall water resources strategy for LBWD. The strategy can be interpreted as a decision tree, where triggers indicate which branch of outcomes are likely and what actions to take. Triggers are defined and monitored over time to that help identify what future is more likely to occur and which options should be implemented to address that future. Alternatively, No-Regret Options are those highly-ranked options that can be implemented within the first several years and provide benefits under a wide range of uncertainties.

Further discussion surrounding the adaptive management approach and considerations can be referred to under the 2019 Water Resources Plan (***Attachment 8***).

7.5 Drought Risk Assessment (DRA)

In compliance with Water Code Section 10635(b), a drought risk assessment (DRA) which evaluates LBWD's water demands and supplies over an assumed five-year drought period is presented in ***Table 7-2*** in ***Section 7.5.2***.

7.5.1 Data, Methods, Reliability and Basis for Supply Shortage Conditions

7.5.1.1 Demands

Although historical precedent has consistently proven that water demands decrease in dry years due to voluntary and mandatory water use restrictions and a general increase in public awareness of the need for water conservation, this DRA will take a conservative approach by assuming water demand will remain relatively steady, rather than decrease during dry years. LBWD determined that this was an appropriate conservative approach to project short-term demands within the five-year time frame.

7.5.1.2 Supplies

Groundwater: Groundwater supplies may be significantly affected by reduced rainfall and corresponding natural basin recharge during a five-year drought period. As previously discussed under ***Section 7.1.1***, LBWD assumes that similar to past emergencies, WRD will utilize similar tools that help manage groundwater basin conditions (i.e. voluntary reductions). These conditions are not anticipated to make any significant impacts to LBWD's groundwater production program or pumping targets.

Imported Water: MWD's 2020 Urban Water Management Plan indicates that MWD will continue to provide 100 percent supply capability over the next five years under a consecutive five-dry year period starting in 2021. LBWD applied a very conservative approach by assuming MWD will be only able to provide LBWD supplies equivalent to its preferential rights, which is less than MWD's 100 GPCD minimum supply guarantee.

Recycled Water: Recycled water is considered an independent variable in multi-year droughts. This

TABLE 7-2: Drought Risk Assessment

	2021	2022	2023	2024	2025
Gross Water Use	53,854	53,659	53,463	53,267	53,964
Total Supplies	79,426	80,626	83,852	83,852	84,752
Surplus/Shortfall without WSCP Action	25,572	26,967	30,389	30,585	30,788

supply is assumed to be reliable within the next five-year time frame and the supply average of the previous 5-years was used as the amount available for LBWD.

7.5.2 Comparison of Total Water Supplies and Uses During the Drought

Given the assumptions and methodology discussed above, the DRA shows no anticipated shortages over a five-year drought period starting in 2021.

CHAPTER 8: WATER SHORTAGE CONTINGENCY PLANNING

Chapter 8 describes how LBWD will maintain reliable supplies and reduce the impact of supply reductions that may occur due to drought or sudden catastrophic events.

LBWD's Water Conservation and Water Supply Shortage Plan (Conservation & Shortage Plan), as amended in 2016, is included in this UWMP as ***Attachment 11***.

The objectives of the Conservation & Shortage Plan are to:

- Prevent water supply shortages through aggressive and effective water management programs such as conjunctive use, water conservation, water education and use of reclaimed water; and
- Minimize the impact of a water supply shortage on the City's population and economy; and
- Provide first for public health and fire protection and other essential services, then to provide for the economic health of the City, and then to provide for other uses of water; and
- Ensure that water users who conserve water during normal-year hydrology and wet-year hydrology are not disadvantaged by the Conservation & Shortage Plan during shortages.

8.1 Water Supply Reliability Analysis

As previously discussed in ***Chapters 6 and 7***, though Long Beach may experience climate change in the form of increased temperatures and erratic winter precipitation events, it is not expected to impact LBWD's water supplies. And LBWD water supplies are projected to be 100 percent reliable in a single dry year as well as multiple dry years. And although supplies and supply reliability have been evaluated, the Conservation & Shortage Plan is a standalone document which LBWD will follow to address impacts of any supply reductions.

8.2 Annual Water Supply and Demand Assessment Procedures

As required by Water Code Section 10632.1, LBWD shall prepare and submit, on or before July 1 of each year, or within 14 days of receiving its final allocations, an annual water supply and demand assessment (Annual Assessment) to the Department of Water Resources (DWR). The procedures used in conducting an annual water supply and demand assessment will include the following:

- The written decision-making process that LBWD will use each year to determine its water supply reliability
- Key data inputs and assessment methodology used to evaluate LBWD's water supply reliability for the current year and one dry year, including all of the following:
  - o Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable;
  - o Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year;
  - o Existing infrastructure capabilities and plausible constraints;
  - o A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment;
  - o A description and quantification of each source of water supply.

The Annual Assessment and associated reporting are to be conducted based on LBWD's procedures in the Conservation and Shortage Plan. LBWD regularly conducts assessments of near-term water supply conditions to ensure appropriate shortage response actions, if any, are triggered in a timely manner. As of the date of this 2020 UWMP, a streamlined process between an early Annual Assessment and the Conservation & Shortage Plan has not been formulated. LBWD plans to streamline this process and submit to DWR by the July 1, 2022 deadline.

8.3 Six Standard Water Shortage Stages

As required by California Water Code Section 10632(a)(3), LBWD has developed and included a cross-reference relating its existing stages of action under the Conservation & Shortage Plan to the six (6) standard water shortage levels, detailed in ***Table 8-1*** below. The shortage levels have been standardized to provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions. The six (6) standard water shortage levels correspond to progressively increasing estimated shortage conditions (up to 10-, 20-, 30, 40-, 50-percent, and greater than 50-percent shortage compared to the normal reliability condition) and align with the response actions LBWD would implement to meet the severity of the impending shortages.

TABLE 8-1: Six Standard Water Shortage Stages

2015 UWMP Shortage Stage	Water Supply Conditions (Approx. LBWD Shortage %)[1]	2020 WSCP Level	2020 Shortage Level
1- Non-Shortage Conditions	No Shortage (0%)	1	≤ 10%
	MWD Shortage Stages 1 through 3 – "Shortage" (0%)		
2- Imminent Water Supply Shortage	MWD Shortage Stages 4 and 5 – "Severe Shortage" (0%)	2	Up to 20%
3- Stage 1 Shortage	MWD Shortage Stage 6 – "Extreme Shortage" (1-9%) 1%-18% reduction in LBWD wholesale supply		
4- Stage 2 Shortage	19% reduction in wholesale supply (10%)	3	Up to 30%
		4	Up to 40%
5- Stage 3 Shortage	52% reduction in wholesale supply (27%)	5	Up to 50%
	58% reduction in wholesale supply (30%)		
	77% reduction in wholesale supply (40%)		
	97% reduction in wholesale supply (50%)		
	Up to 60% total supply reduction between MWDSC wholesale and groundwater production[2]	6	>50%

[1] The numeric percentages shown for "Water Supply Conditions (Approx. LBWD Shortage %)" are guidelines. LBWD has not adopted specific numeric percentage targets that in all cases trigger a shortage declaration. Rather, the LBWD Board of Water Commissioners takes these supply conditions under advisement, along with, potentially, many other factors relevant at the time the decisions are being considered

[2] Under the 2015 UWMP Shortage Stages, LBWD did not evaluate a supply reduction greater than 50% but has done so under the 2020 UWMP. A greater supply reduction would still be considered a Stage 3 Shortage under LBWD's Conservation & Shortage Plan

8.3.1 Non-shortage Conditions (DWR Water Shortage Level 1)

LBWD believes it is necessary for communities in Southern California to use water efficiently even during non-shortage years. The water that is conserved in non-shortage years and placed into storage provides the reliability we enjoy during single dry year and multiple dry year events. To that end, LBWD maintains a robust water conservation program in dry years and wet, including a prohibition against certain uses of water irrespective of the hydrologic conditions. These permanent prohibitions are summarized in ***Section 8.4*** and are detailed in the Conservation & Shortage Plan included as ***Attachment 11***.

8.3.2 Imminent Water Supply Shortage (DWR Water Shortage Level 2)

The first action level is the Imminent Water Supply Shortage. When there seems to be a significant likelihood that an actual water supply shortage may take place, the declaration of an "imminent" water supply shortage allows LBWD to broadcast to the public the increased need to begin conserving water and, in fact, begins the process of extraordinary conservation in Long Beach. The hope is that by taking action before an actual emergency takes place, the emergency can be avoided or at a minimum, mitigate its impact.

The LBWD Board has the sole discretion to declare an Imminent Water Supply Shortage. Per the adopted Conservation & Shortage Plan, "The type of event which may prompt the Board to declare an Imminent Water Supply Shortage may include, among other factors, a finding that its wholesale water provider calls for extraordinary water conservation."

MWD, the wholesale water provider for LBWD, has adopted a Water Surplus and Drought Management Plan (WSDM Plan), which outlines the expected sequence of resource management actions that MWD will execute during surpluses and shortages. The WSDM Plan defines a Shortage Stage 4 as a "severe shortage" meaning that MWD "can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation." Therefore, the LBWD Imminent Water Supply Shortage most closely aligns with MWD Shortage Stage 4, but the LBWD Board is not constrained by any shortage declaration taken or not taken at MWD.

8.3.3 Stage 1 Water Supply Shortage (DWR Water Shortage Level 2)

The second action level is the Stage 1 Water Supply Shortage. The LBWD Board has the sole discretion to declare a Stage 1 Water Supply Shortage. Per the adopted Conservation & Shortage Plan, "The type of event which may prompt the Board to declare a Stage 1 Water Supply Shortage includes, among other factors, is a reduced allocation of water by the Department's wholesale water provider."

According to the MWD's WSDM Plan, Shortage Stage 6 is an "extreme shortage" that requires MWD to allocate available supply to its customers such as LBWD. Therefore, the LBWD Stage 1 Water Supply Shortage most closely aligns with MWD Shortage Stage 6, but the LBWD Board is not constrained by any shortage declaration taken or not taken at MWD.

8.3.4 Stage 2 Water Supply Shortage (DWR Water Shortage Levels 3 and 4)

The third action level is the Stage 2 Water Supply Shortage. The LBWD Board has the sole discretion to declare a Stage 2 Water Supply Shortage. Unlike the Imminent Water Supply Shortage and the Stage 1 Water Supply Shortage, there are no

specific criteria or examples of events described in the Conservation & Shortage Plan that might be considered by LBWD Board's when considering elevating the conditions to a Stage 2 Water Supply Shortage.

The LBWD Board would most likely consider a Stage 2 Water Supply Shortage declaration if the water supply conditions have deteriorated since the declaration of the Stage 1 Water Supply Shortage, if additional conservation has been required by regulatory agencies, or if the LBWD Board identified any other factor requiring additional extraordinary conservation. For example, the LBWD Board declared a Stage 2 Water Supply Shortage on May 11, 2015, in response to several factors:

1. Governor Brown issuing Executive Order B29-15 on April 1, 2015, imposing a mandatory statewide 25 percent water reduction as a result of the worst drought in California's recorded history; and

2. The State Water Resources Control Board imposing on Long Beach a water use reduction target of 16 percent compared to water usage in 2013; and

3. MWD declaring an Extreme Shortage and a 15 percent allocation shortage.

It is important to note that factors 1 and 2 listed above are regulatory factors that do not necessarily reflect the actual supply conditions to LBWD. The 15 percent MWD allocation shortage in factor 3 would only reflect an overall 7.5 percent reduction in LBWD's water supplies (because only about half of LBWD's supplies come from MWD), which may not have, by itself, necessitated the declaration of a Stage 2 Water Supply Shortage. Unless future regulatory mandates to reduce water usage take into account the water supplies actually available to individual water agencies, there may continue be a slight disconnect between LBWD's water supply shortage declarations and actual water supply conditions.

8.3.5 Stage 3 Water Supply Shortage (DWR Water Shortage Levels 5 and 6)

The fourth and final action level is the Stage 3 Water Supply Shortage. The LBWD Board has the sole discretion to declare a Stage 3 Water Supply Shortage. No criteria are outlined in the LBWD Conservation & Shortage Plan that would recommend when the LBWD Board might declare a Stage 3 Water Supply Shortage. The LBWD Board would most likely consider a Stage 3 Water Supply Shortage declaration if the water supply conditions deteriorated subsequent to the declaration of the Stage 2 Water Supply Shortage, if additional conservation were required by regulatory agencies, or if the LBWD Board identified any other factor requiring additional extraordinary conservation.

In 2015, the LBWD Board declared a Stage 2 Water Supply Shortage after Governor Brown's Executive Order calling for a 25 percent statewide reduction in water use compared to 2013, for which Long Beach was individually responsible for contributing a 16 percent reduction. The total water use in 2013 was 59,644 acre-feet, so a 16 percent reduction would result in total water use of only 50,101 acre-feet. Although LBWD did not have an actual water supply shortage, this mandated reduction could be treated as a regulatory shortage that resulted in LBWD taking action as if it only had 50,101 acre-feet of supply. 50,101 acre-feet is equivalent to 74 percent of the water supplies available to LBWD in 2015, or a 26 percent supply reduction. Therefore, if a supply reduction greater than 26 percent occurs, including a 50 percent reduction, the LBWD Board would likely seriously consider declaring a Stage 3 Water Supply Shortage to achieve the necessary level of demand reduction.

8.4 Shortage Response Actions

8.4.1 Demand Reductions

The Conservation & Shortage Plan specifies the prohibitions on certain end uses of water under each of the six levels of supply shortages described in ***Section 8.3. Table 8-2*** summarizes the demand reductions at each stage.

8.4.2 Supply Augmentation

The Conservation & Shortage Plan specifies the supply augmentation methods under each of the six levels of supply shortages described in ***Section 8.3. Table 8-3*** summarizes the demand reductions at each stage.

8.4.3 Operational Changes

LBWD continues to make operational changes across all water supply conditions, mainly by proactively managing water loss. Major efforts to improve monitoring and tracking of customer usage rates have been improved by the Advanced Metering Infrastructure (AMI) implementation, which is further discussed in ***Chapter 9***. The AMI implementation has nearly completed and LBWD looks forward to more closely track water use, waste and leaks on a timely basis. In addition, LBWD plans to develop a large meter maintenance cycle for its CII customers to streamline infrastructure repairs and improve system efficiency.

8.4.4 Additional Mandatory Restrictions

Implementation of mandatory restrictions can be an effective but unpopular method for reducing customer usage because it is associated with enforcement actions and penalties. Mandatory restrictions can include a number of items such as limitations on outdoor water use (timing, volume, location), limiting total residential water use, restrictions on using water for certain functions (e.g., car washing), and other restrictions.

8.4.5 Emergency Response Plan

If LBWD were not able to meet all of the demand placed upon it by its customers, LBWD could declare a water emergency and take appropriate actions as outlined in its Conservation & Shortage Plan.

Additionally, LBWD in cooperation with federal authorities, regional and local first-responders, and other experts, have developed a confidential and comprehensive study of its vulnerabilities and have completed the necessary measures to mitigate the reasonable impacts of these types of events on its ability to serve its customers. Given the critical nature of the services provided by LBWD to the public's welfare, and recent security considerations, the responses to be taken by LBWD to mitigate the impacts of certain emergencies and catastrophic events are no longer explored in public forums such as the 2015 UWMP. It would be a disservice to our valued customers if LBWD were to describe, in a public document such as the UWMP, the potential threats against it, potential LBWD responses to these events, and the potential impacts on the ability of LBWD to successfully perform its essential services as a result of catastrophic events.

8.4.6 Seismic Risk Assessment and Mitigation Plan

The 2017 Hazard Mitigation Plan (***Attachment 12***) was prepared in response to the Disaster Mitigation Act of 2000, which requires state and local governments to prepare Mitigation Plans to document their mitigation planning process, and identify hazards, potential losses, mitigation needs, goals and strategies.

In addition to the Mitigation Plan, LBWD has conducted risk assessments of potable water infrastructure under the Water Master Plan ***(Attachment 13***), and additionally plans to begin a condition assessment of the GWTP in 2021.

TABLE 8-2: Shortage Response Actions – Demand Reductions

2020 WSCP Level	Percent Reduction	Prohibited Use
1	<10%	Excess use, loss, or escape of water through breaks, leaks, or other malfunctions
		Irrigating landscape between 9AM-4PM
		Excessive runoff from irrigation
		Irrigation system malfunction resulting in waste
		Irrigating landscape during measurable rainfall, or at any time within 48 hours afterwards
		Washing hardscape without a pressurized device (>1,000 psi or <3gpm)
		Washing vehicle using a hose without a shut-off nozzle
		Any other water use resulting in unreasonable runoff as determined by General Manager
		Operating fountain or water feature that does not re-circulate the water
		Hotel/motel failing to provide customers option of not having towels and linens laundered daily
		Commercial, industrial, and institutional food preparation using pre-rinse heads >1.5gpm
		Operating a commercial laundry system installed after Nov. 3, 2006, that does not recirculate water
		Operating a conveyor type car wash system that does not recirculate was and/or rinse water
		Installing single-pass cooling systems in buildings requesting water connection after Nov. 3, 2006
		Using potable water when reclaimed water is determined to be a cost-effective alternative and the customer has had ninety (90) days to make the conversion to reclaimed water
		Excessive irrigation using reclaimed water that causes runoff due to saturation
2	10-20%	Serving drinking water at restaurants unless expressly requested by the customer
		Irrigating other than 3 designated days per week
		Irrigating more than 10 minutes per station (20 minutes if rotating head)
		Irrigating other than 2 designated days per week in winter (Oct-Mar)
		Filling residential swimming pools and spas with potable water
		Other prohibited uses as determined by the LBWD Board
3 and 4	20-30%	Irrigating other than 2 designated days per week year-round
		Other prohibited uses as determined by the LBWD Board
5 and 6	30-40%	Other prohibited uses as determined by the LBWD Board

TABLE 8-3: Shortage Response Actions – Supply Augmentation Methods

2020 WSCP Level	Percent Reduction	Supply Augmentation Methods
1	<10%	Expand Public Information Campaign
		Provide Rebates on Plumbing Fixtures and Devices
		Provide Rebates for Landscape Irrigation Efficiency
		Provide Rebates for Turf Replacement
2	10-20%	Expand Public Information Campaign
		Provide Rebates on Plumbing Fixtures and Devices
		Provide Rebates for Landscape Irrigation Efficiency
		Provide Rebates for Turf Replacement
		Implement or Modify Drought Rate Structure or Surcharge
		Other - Increase charge for violation of water-use restriction
3 and 4	20-30%	Expand Public Information Campaign
		Provide Rebates on Plumbing Fixtures and Devices
		Provide Rebates for Landscape Irrigation Efficiency
		Provide Rebates for Turf Replacement
		Implement or Modify Drought Rate Structure or Surcharge
		Other - Increase charge violation of water-use restriction
5 and 6	30-40%	Expand Public Information Campaign
		Provide Rebates on Plumbing Fixtures and Devices
		Provide Rebates for Landscape Irrigation Efficiency
		Provide Rebates for Turf Replacement
		Implement or Modify Drought Rate Structure or Surcharge
		Other - Increase charge for violation of water-use restriction

8.5 Communication Protocols

LBWD shall declare a water shortage emergency condition to prevail within its service area when it finds and determines that the demands and requirements of its customers cannot be satisfied without depleting water supplies to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.
And in an event of a water shortage, LBWD will follow communication protocols as outlined in the Conservation & Shortage Plan
(Attachment 11) to inform customers; the general public and interested parties; and local, regional, and state government entities.

When an Imminent Water Supply Shortage, a Stage 1: Water Supply Shortage, a Stage 2: Water Supply Shortage, or a Stage 3: Water Supply Shortage is declared by the Board, the LBWD shall provide notice to its customers by including the following:

- Effective date of the declaration;
- The Prohibited Use of Water (PUoW) associated with the relevant supply shortage;
- Information about rate increases, if any, resulting from the declaration; and
- The importance of taking additional voluntary actions to conserve water

The communication protocols shall be pursued to California Government Codes Article 2, Section 8558. The list of contacts for all entities for which LBWD provides service is included under
Appendix B.

8.6 Compliance and Enforcement

LBWD has found customer education to be the most effective means of achieving compliance with the prohibited uses of water. LBWD customers have been extremely responsive to the water supply challenges facing the region, and over the years have achieved incredible levels of water conservation. As our customers have proven to be both willing and voluntary partners in our recent conservation success, LBWD prefers to continue to educate and assist customers in their compliance efforts rather than to achieve compliance through punitive measures.

LBWD encourages customers to report apparent violations and has made reporting easy by providing customers four simple anonymous ways to report violations: a smart phone app, a website, email, or a telephone phone "hot line." **Each year, LBWD processes about 9,000 reports that contain approximately 16,000 individual violations.** After receiving the reports, LBWD sends an "Informational Letter" to most of the alleged violators. The Informational Letter informs the customer of the importance of conserving water, the alleged violation, and how violations of that type may be rectified. These Informational Letters are effective and reinforce the belief that most people in Long Beach will act responsibly when informed, because rarely does a second letter have to be sent to the same customer for the same violation.

Enforcement through penalties is used only as a last resort in situations where customers are engaging in prohibited use of water activities after having received ample communication and opportunity to correct their water wasting practices. The details regarding penalties and enforcement of the prohibited uses of water can be found in the Conservation & Shortage Plan and the LBWD Rules, Regulations, and Charges (included as
Attachment 14).

The first step in the enforcement process is to serve the customer a Warning Letter containing the following information:

- The account number and service address where the violation took place;

- A description of the violation and the provision of the Water Conservation and Water Supply Shortage Plan violated;
- Possible suggestion(s) for eliminating the violation;
- An order to the customer to correct the violation no later than the specified correction date;
- An explanation of the possible consequences of failure to correct the violation in a timely manner. This explanation informs the customer that subsequent separate and distinct offenses of the provision of the Conservation & Shortage Plan shall result in a Notice of Violation and a Prohibited Use of Water Charge.

The goal of the Warning Letter is to make sure that customer is aware that they are using water in a prohibited manner and to provide them with as much information as possible to help them to correct the problem.

In the cases where a violation of the same prohibited use of water occurs again within 365 days of receiving an initial Warning Letter, then the customer is issued a Notice of Violation. The Notice of Violation includes a Prohibited Use of Water Charge, and the amount of the Prohibited Use of Water Charge is determined by the LBWD Board by Resolution and listed in the LBWD Rules, Regulations, and Charges (***Attachment 14***). The applicable Resolution as of the date of this 2020 UWMP is LBWD Board Resolution Number WD-1354 (included as ***Attachment 11***).

This resolution set the Prohibited Use of Water Base Charge at one hundred and fifty dollars ($150.00) for the period prior to the effective date of a declared Stage 1: Water Supply Shortage, two hundred dollars ($200.00) after the effective date of a declared Stage 1: Water Supply Shortage, two hundred and fifty dollars ($250.00) after the effective date of a declared Stage 2: Water Supply Shortage, and at the time a Stage 3: Water Supply Shortage is declared the Board will determine the corresponding Base Charge.

If a customer continues to violate the same prohibited use of water, then the charge associated with each subsequent Notice of Violation is multiplied by the total number of Notice of Violations issued for that same violation. For example, the Prohibited Use of Water Charge associated with a third Notice of Violation issued for the same violation taking place after the effective date of a declared Stage 1 Water Supply Shortage would be six hundred dollars ($600.00), which is three times the Base Charge of two hundred dollars (3 x $200.00 = $600.00).

8.7 Financial Consequences of WSCP

LBWD is not very vulnerable financially to the loss of water sales that take place when our customers conserve a lot of water during shortages. Even during shortages, LBWD continues to generate revenue through its daily service charge, and although LBWD's revenue declines when customers reduce purchases, its expenses decline as well. When customers purchase less water, LBWD purchases less of its most expensive water supply: MWD's imported water. So for every dollar of revenue lost from reduced sales, LBWD's expenses decline by roughly $0.88.

In an extreme shortage when the demand for water is cut by 50 percent, essentially all costs associated with wholesale purchases would be eliminated. These purchases represent about 25 percent of LBWD budget. Also during an extreme shortage, LBWD may increase water rates for the sake of encouraging additional water conservation. However, with the reduction in costs, the rate increase would have to be managed so as not to generate an amount of revenue greatly in excess

of LBWD revenue requirements. A continuation of the daily service charge and the combination of slightly higher rates and dramatic reduction in costs would compensate for the revenue lost due to less volumetric water sales.

Also, LBWD maintains large capital improvement programs (CIP), and much of the CIP is done using LBWD's own work force. This work includes on-going water main replacement and meter exchange programs. In the event of a funding shortfall resulting from an extreme shortage, LBWD would have the option of reducing expenses by postponing certain capital projects and re-directing staff to emergency conservation efforts. After the emergency, the staff would return to their normal CIP duties.

Furthermore, as a prudent utility providing an essential public service, LBWD maintains a responsible fund balance for use in emergencies. In the unlikely event LBWD were financially stressed as a result of an extreme water shortage, these reserves could be utilized.

8.8 Monitoring and Reporting

Water meters record all the water that goes into LBWD's distribution system, and all the water used by our customers. These records make it possible for LBWD to calculate the water savings resulting from implementing different water shortage stages. Electronic systems monitor the production of groundwater remotely, and MWD has a similar system for its connections with LBWD. All LBWD customer accounts are metered, so consumption can also be determined.

The extent of estimating supply and demand gap reductions vary depending on the shortage level and action. For example, determining the use reductions from providing rebates on exchanges of plumbing fixtures is more transparent on a per unit basis. Alternatively, expanding public information campaigns is not as straightforward of a calculation but can be estimated based on overall consumption data along with other assumptions factored in.

8.9 WSCP Refinement Procedures

Currently, the Conservation & Shortage Plan is updated and adopted per Board's discretion based on shortage conditions. In the future, the Conservation & Shortage Plan will be updated to improve procedures for systematically monitoring and evaluating the functionality of the Conservation & Storage Plan. The update will ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

8.9.1 WSCP Adoption, Submittal, and Implementation

The LBWD Conservation & Shortage Plan was most recently adopted by the LBWD Board on June 2, 2016 and has been included as ***Attachment 11***. The Conservation & Shortage Plan will be updated and coordinate with the Annual Water Supply and Demand Assessment Procedures outlined previously in ***Section 8.2***.

8.10 Special Water Feature Distinction

LBWD separately categorizes water features that are not pools or spas in the Conservation & Shortage Plan. For example, LBWD identifies operating a fountain or other water feature that does not re-circulate the water, under Prohibited Uses of Water at All Times. Alternatively, this is categorized differently from leaving a residential swimming pool and/or spa uncovered when not in use, under Stage 1 Water Shortage restrictions. This separation is primarily due to the different water use of each water feature. For example, non-pool or non-spa water features may use or be able to use recycled water, whereas pools and spas must use potable water for health and safety considerations.

CHAPTER 9: DEMAND MANAGEMENT MEASURES

Chapter 9 describes the water conservation programs and other efforts that LBWD had implemented in the past, is currently implementing, and plans to implement in order to reduce the demand on the water supply and meet its urban water use reduction targets. Many of the targets in this section are directly related to those discussed elsewhere in this UWMP.

9.1 Existing Demand Management Measures for Retail Suppliers

9.1.1 Water Waste Prevention Ordinances

About 25 years ago, the LBWD Board adopted water waste prevention mandates, known as "prohibited uses of water". These prohibited uses of water are incorporated into the City's municipal code by reference. The LBWD Board reviews and revises these prohibited uses from time to time as needed; most recently in 2016. The prohibited uses of water are detailed in ***Section 8.4***, and the enforcement of the prohibited uses of water is discussed in ***Section 8.6***.

9.1.2 Metering

It is axiomatic in the water industry that water conservation programs begin with measuring customers' water usage and billing them accordingly. LBWD's service area is fully metered and has been so for many decades.

Customers' water meters slow down as they age and as more and more water pass through them. So unlike a brand new meter, a meter that is old and has seen a lot of usage will no longer record all the water that passes though it; for example, the meter may only record 97 percent of the water that passes

through it. To maintain their usefulness in measuring customer water use, meters must be replaced as they become less accurate over time. LBWD has determined through extensive meter testing on its meter test bench and analysis, that meters should be replaced about once every twenty years.

In 2019, after conducting a few successful advanced metering infrastructure (AMI) pilot programs over the preceding years, LBWD began a full deployment to replace all existing meters with "smart meters." It is estimated that by mid-2021, all customers in the LBWD service area will be equipped with smart meters. LBWD is looking forward to continued work in this field to more closely track water use, waste, and leaks on a timely basis as well as to assist in our customers in behavioral water conservation practices.

9.1.3 Conservation Pricing

In addition to individually metering customers, those customers subsequently must be billed according to their metered water usage in order to achieve the desired water conservation results. LBWD has incentivized significant levels of water conservation for decades by billing customers according to their metered water usage.

Commercial, institutional, industrial and irrigation customers are charged a flat per-unit rate. Their water bill is based on the volume of metered water they consume; the more water the customer consumes, the higher their water bill.

LBWD uses a "tiered" water rate structure for residential customers, meaning that as the customer uses more water, the rate they pay per unit of water used also increases.

LBWD has for many years used a three-tiered inclining block rate for residential customers. Additionally, because LBWD is also a wastewater collection agency and because the fees it charges

for wastewater services are tied to the volume of metered water usage, the wastewater charges amplify the water conservation signal incentivizing the customer to save water.

9.1.4 Public Education and Outreach

LBWD has had and continues to have a vibrant public education and outreach program. Efforts include captivating in-school seminars for young students, popular landscape classes for adults, bill-inserts delivered to customers throughout the year, promotions at movie theaters, bus stops, bus tails, billboards, and newspaper advertisements.

LBWD has created several themes for the purpose of instilling the water conservation ethic, including the water conservation mascot "Conserv'n Mervyn", the "Grow Local Love" themes utilized in the turf replacement program, the "Mission H2O Long Beach" concept designed to encourage the Long Beach community to work with LBWD to achieve higher levels of water conservation, and the more recent "Certified Blue LB" brand to encourage water conservation in the local hospitality and food service industries. LBWD actively issues many press releases throughout the year and organizes press events. LBWD's "Speakers Bureau", a volunteer group of employees, attend 40-50 public events in Long Beach each year to help provide a consistent public presence in promoting water conservation.

LBWD is also very active on the internet and in social media, using platforms such as Facebook, Twitter, Instagram and placing strategic Google banner ads.

9.1.5 Programs to Assess and Manage Distribution System

Financial investments in infrastructure by LBWD over the past 20 years have prevented potential water loss in the distribution system. Due to these

infrastructure investments, LBWD's system losses are very low by industry standards: averaging only about 2 to 5 percent per year. LBWD manages system losses primarily through pressure management and monitoring by utilizing inputs from SCADA and periodic data from pressure transducers. Routine inspection and preventative maintenance efforts are conducted to maintain accuracy of the pressure transducers and LBWD continues to improve efforts towards proactive leak detection.

In addition, LBWD continues to invest in its water main replacement and meter replacement programs. LBWD's Automated Meter Infrastructure Program (described previously in ***Section 9.1.2***) enable improved management of system losses.

LBWD provides emergency response to reports of main breaks 24-hours a day, 7 days a week. LBWD also conducts visual inspection for the surface above all its major pipelines on a regular basis, looking for possible water leaks and breaks.

The Department has tracked its system losses informally for years, but the American Water Works Association system loss spreadsheet has been used since 2009. A copy of the most recent system loss spreadsheet is included as ***Appendix E.*** By continuing and improving efforts to prevent and quantify water loss, LBWD is able to address a standardized method of water loss from the State Water Board and identify potential gaps in order to achieve such standard method.

9.1.6 Water Conservation Program Coordination and Staffing Support

LBWD's water conservation coordinator is the Manager of Water Resources. Other conservation staff include five professionals and two water conservation interns. Additionally, LBWD's Government and Public Affairs section actively promotes water conservation through traditional forms of communication with our customers such as newspaper ads, bill inserts, billboard advertising, and through "new media" such as the internet and social media.

9.1.7 Other Demand Management Measures

LBWD has a number of demand management measures in addition to those discussed above. These additional measures include the following:

Turf Replacement

Lawn to Garden Program

LBWD has had a very successful award-winning "Lawn-to-Garden" turf replacement program since 2010. LBWD also has a successful program for large landscapes such as commercial campuses, public facilities, and multi-family developments. Approximately 3,700 residential yards have been converted to beautiful drought-friendly landscapes that thrive in the semi-arid Long Beach region, replacing more than 3.7 million square feet of turf grass. Because Lawn-to-Garden landscapes only require about 20-percent of the irrigation water of grass lawns, they have been a major contributor the LBWD's overall success in water conservation. In addition to conserving water, these landscapes tend to increase the amount of habitat for wildlife such as hummingbirds and butterflies, and reduce urban runoff from landscape irrigation.

As a part of the turf replacement programs LBWD offers roughly 22 free landscape classes per year and has agreements with most of the local plant nurseries to provide discounts to the Lawn-to-Garden customers. Designing a landscape is often one of the most challenging obstacles in a turf replacement. In 2018 LBWD began offering a design assistance incentive to eligible customers. The Design assistance incentive connects Lawn to Garden applicants with a list of LBWD verified local landscaping professionals to help produce aesthetically pleasing and functional garden spaces.

Since the program's inception, LBWD has hosted an annual Garden Tour which is a free tour of roughly twenty beautiful Long Beach residential landscapes that have gone through the Lawn-to-Garden program. The annual Garden Tour has been successful in attracting over 1,000 attendees each year.

Native Plant Parkway Program

In 2020, LBWD launched a new pilot program to promote the multiple benefits of California native plants and address water consumption in parkways (the median area between the sidewalk and the curb found in many Long Beach neighborhoods). The Native Plant Parkway Pilot Program is a turf replacement alternative that provides planting kits of California native plants, mulch and stepping stones to eligible customers. In a year since its inception, the Native Plant Parkway Program has helped to convert over 50 parkway strips into California native garden habitats.

Low Income and Disadvantaged Community Programs

The Long Beach Water Department strives for equity and inclusiveness to create opportunities for all customers, regardless of income or locale, to incorporate a more water use efficient lifestyle. In late 2019 and early 2020, LBWD launched its first set of programs to promote water conservation in low-income multifamily housing and single family residences.

DIME

The Direct Installation for Multifamily Efficiency (DIME) Program provides and installs high efficiency toilets, shower heads, kitchen and faucet aerators as well as communal coin operated clothes washers in multifamily dwelling units at no cost to the customer or resident. Since the inception of DIME, the program has helped to retrofit over 700 multifamily dwelling units and counting.

DIG

The Direct Install Gardens (DIG) program is a turf replacement alternative program for customers residing in low income and disadvantaged communities. The DIG program replaces non-functional grass lawns with a multi-benefit, low water-use garden. Through the DIG program, the customer's existing irrigation system is upgraded to a more efficient option consisting of drip irrigation, micro-spray, high efficiency spray or a hybrid system integrated with a weather sensor. The DIG program also serves as a partnership with the Long Beach Conservation Corps that provides job training in the areas of drought tolerant landscaping, efficient irrigation systems and landscape maintenance to local at-risk youth.

Rebates

LBWD offers a wide variety of rebates to both residential and non-residential properties. These include rebates for toilets, clothes washers, sprinkler nozzles, weather-based irrigation controllers, air-cooled ice machines, cooling towers and many other devices.

9.2 Implementation over the Past Five Years

Over the past five years, LBWD has continuously implemented and continued to develop the demand management measures mentioned in this chapter to achieve water use targets.

9.3 Water Use Objectives (Future Requirements)

LBWD has prioritized achieving its water use objectives and remains dedicated towards creating a more sustainable and water use efficient community. Objectives set by forthcoming legislation will remain a priority to which LBWD will continue to develop and adapt its demand management measures where necessary in order to fulfill.

CHAPTER 10: PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Chapter 10 describes the process LBWD followed to adopt, submit, and implement the 2020 UWMP.

10.1 Inclusion of All 2020 Data

LBWD is reporting on a fiscal year basis from July 1 through June 30, and data for the entire 2020 fiscal year (July 1, 2019 through June 30, 2020) has been reported.

10.2 Notice of Public Hearing

LBWD was required to hold a public hearing prior to adopting the 2020 UWMP. The public hearing provided an opportunity for the public to provide input to the plan before it is adopted. There are two audiences to be notified for the public hearing: cities and counties, and the general public.

10.2.1 Notice to Cities and Counties

Ninety-nine percent of LBWD's accounts are located in the City of Long Beach; the balance is located in an unincorporated area within the county of Los Angeles and several other cities. Cities and counties wherein at least one LBWD customer resides were sent notification letters, at least 60 days prior to the public hearing, that LBWD would be reviewing and considering amendments to the 2020 UWMP. The full list of cities and counties are listed in ***Appendix B***.

10.2.2 Notice to the General Public

LBWD noticed the public hearing via publications in the Press-Telegram and through www.lbwater.org. The notices were published once a week for two successive weeks. The notice included the time and place of hearing, as well as the location where the 2020 UWMP was available for public inspection. A copy of the public notice has been included as ***Appendix C***.

10.3 Public Hearing and Adoption

A public hearing was held on **May 27, 2021**, where information was provided on the baseline values, water use targets, and implementation plan required in the Water Conservation Act of 2009 described in Chapter 5. The LBWD Board adopted the 2020 UWMP on **June 10, 2021**. The adoption resolution has been included as ***Appendix G***.

10.4 Plan Submittal

The 2020 UWMP was submitted electronically to DWR within 30 days of adoption and prior to the **July 1, 2021** deadline.

Also within 30 days of adoption, LBWD submitted a printed hard copy and electronic copy of the 2020 UWMP via mail to the California State Library.
Electronic copies of the adopted LBWD 2020 UWMP which included the Water Conservation & Water Shortage Plan (Conservation & Shortage Plan) were submitted to the cities and counties where LBWD provides water listed in **Appendix B**.

10.5 Public Availability

The adopted 2020 UWMP, along with the most recent Conservation & Shortage Plan, has been made available for public review on the LBWD website at: **www.lbwater.org/uwmp**

APPENDICES:
LIST OF APPENDICES

The appendices provide detailed tables and background information on the content presented within the main body of the 2020 UWMP.

List of Appendices

Appendix A	DWR UWMP Standardized Tables
Appendix B	Coordination and Outreach
Appendix C	Public Notification Ad
Appendix D	Metropolitan Water District Coordination
Appendix E	Water Losses
Appendix F	DWR SBx7- 7 Compliance Forms
Appendix G	Board Resolution Adopting the 2020 UWMP

APPENDIX A: DWR Tables

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
CA 1910065	Long Beach Water Department	93,964	51,039
	TOTAL	93,964	51,039

Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
7/1	
Units of measure used in UWMP * (select from drop down)	
Unit	AF

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
Metropolitan Water District of Southern California

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	472,217	507,218	517,822	528,424	539,027	549,629

Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Single Family		Drinking Water	16,374
Single Family	Duplex	Drinking Water	2,922
Multi-Family		Drinking Water	14,642
Commercial		Drinking Water	12,595
Industrial		Drinking Water	280
Landscape	Irrigation	Drinking Water	1,678
Other Potable	Fire	Drinking Water	0
Losses		Drinking Water	2,549
		TOTAL	51,040

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water - Projected						
Use Type		Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	2025	2030	2035	2040	2045 (opt)
Single Family		17,341	16,307	16,231	15,916	15,999
Multi-Family		13,696	12,987	13,256	13,281	13,588
Commercial		10,479	9,718	9,578	9,283	9,509
Industrial		584	574	565	556	553
Landscape	Irrigation	1,859	1,898	1,936	1,975	2,012
Losses		1,832	1,728	1,732	1,709	1,736
	TOTAL	45,791	43,212	43,298	42,720	43,397

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*
[2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	51,040	45,791	43,212	43,298	42,720	43,397
Recycled Water Demand[1] *From Table 6-4*	4,176	8,174	8,649	8,392	8,322	8,257
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	55,216	53,965	51,861	51,690	51,042	51,654

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
07/2019	2549.263
07/2018	985.993
07/2017	1690.73
07/2016	2212.728
07/2015	1350.443

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Chapter 4, Section X.X
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes

Submittal Table 5-1 Baselines and Targets Summary
From SB X7-7 Verification Form
Retail Supplier or Regional Alliance Only

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	*1996*	*2005*	*134*	*107*
5 Year	*2004*	*2008*	*128*	

Submittal Table 5-2: 2020 Compliance
From SB X7-7 2020 Compliance Form
Retail Supplier or Regional Alliance Only

2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
97	*0*	*97*	*97*	*YES*

Submittal Table 6-1 Retail: Groundwater Volume Pumped

☐	Supplier does not pump groundwater. The supplier will not complete the table below.
☐	All or part of the groundwater described below is desalinated.

Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Alluvial Basin	Central Groundwater Basin	32505.2	31802.18	29959.95	27359.32	24,199.55
Alluvial Basin	West Coast Groundwater Basin	0	0	0	0	0
	TOTAL	32,505	31,802	29,960	27,359	24,200

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020						
☐	There is no wastewater collection system. The supplier will not complete the table below.					
100	Percentage of 2020 service area covered by wastewater collection system *(optional)*					
100	Percentage of 2020 service area population covered by wastewater collection system *(optional)*					
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
Sanitation Districts of Los Angeles County	Estimated	10,685	Sanitation Districts of Los Angeles County	Long Beach Water Reclamation Plant	Yes	Yes
Total Wastewater Collected from Service Area in 2020:		10,685				

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020

☐ **No wastewater is treated or disposed of within the UWMP service area.** The supplier will not complete the table below.

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)*[2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop***	Treatment Level ***Drop down list***	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Long Beach Water Reclamation Plant	Discharge 001 Coyote Creek	Longitude: 118.08778º West Latitude: 33.79861º North	NPDES No. CA0054119	River or creek outfall	Yes	Tertiary	10,685	6,711	3,402	774	0
						Total	10,685	6,711	3,402	774	0

NOTES: NOTES: The Long Beach Water Department supplies recycled water to the Leo J. Vander Lans Advanced Water Treatment Facility (LVL), which in turn supplies advanced treated water to the Alamitos Seawater Barrier Project (outside of LBWD service area). During the 2017-2019 calendar years, LVL was offline to address facility upgrades and improvements, thus a lower quantity of recycled water demand is reflected in the 2020 reporting period. Data taken from LACSD filter effluent flow/LBWD demand analysis, and recycled water monthly reports. There is a differential of approximately 200AF between the two data sources, potentially due to operations and/or system loss.

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area								
☐	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.							
Name of Supplier Producing (Treating) the Recycled Water:	Sanitation Districts of Los Angeles County							
Name of Supplier Operating the Recycled Water Distribution System:	Long Beach Water Department							
Supplemental Water Added in 2020 (volume) *Include units*	0 AF							
Source of 2020 Supplemental Water	Not Applicable							
Beneficial Use Type *Insert additional rows if needed.*	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)
Agricultural irrigation								
Landscape irrigation (exc golf courses)		Tertiary	1,643	1,756	1,898	1,921	1,975	2,087
Golf course irrigation		Tertiary	1,228	1,390	1,696	1,431	1,310	1,117
Commercial use								
Industrial use								
Geothermal and other energy production		Tertiary	531	547	574	559	556	572
Seawater intrusion barrier		Advanced	774	4,481	4,481	4,481	4,481	4,481
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)								
Reservoir water augmentation (IPR)								
Direct potable reuse								
Other (Description Required)								
		Total:	4,176	8,174	8,649	8,392	8,322	8,257
2020 Internal Reuse			0					

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☐	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.	
Beneficial Use Type	**2015 Projection for 2020 [1]**	**2020 Actual Use[1]**
Agricultural irrigation		
Landscape irrigation (exc golf courses)	2,214	1,643
Golf course irrigation	1,542	1,228
Commercial use		
Industrial use		
Geothermal and other energy production	967	531
Seawater intrusion barrier		774
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	4,723	4,176

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
Page 49, Section 6.3.2.3	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Feasibility Study	Evaluate feasibility of conveying recycled water from LADWP Harbor Area infrastructure to Port of Long Beach and adjacent areas.	Not Applicable	1,040
Feasibility Study	Evaluate feasibility of conveying recycled water to LADWP Haynes Generating Station.	Not Applicable	7600
		Total	8,640

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Page 52, Section 6.6.1	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Purchased or Imported Water	MWDSC	26,840	Drinking Water	35,100
Groundwater (not desalinated)	Central Basin	24,200	Drinking Water	32,692
Groundwater (not desalinated)	West Coast Basin	0	Drinking Water	1
Recycled Water	LBWRP	4,176	Recycled Water	13,495
	Total	55,216		81,288

Submittal Table 6-9 Retail: Water Supplies — Projected

Water Supply	Additional Detail on Water Supply	Projected Water Supply * Report To the Extent Practicable									
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		**2025**		**2030**		**2035**		**2040**		**2045** (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Purchased or Imported Water	MWDSC	30,900		30,900		30,900		30,900		30,900	
Groundwater (not desalinated)	Central Basin*	37,126	37,126	37,126	37,126	41,126	41,126	41,126	41,126	41,126	41,126
Groundwater (not desalinated)	West Coast Basin	3,226	3,226	3,226	3,226	3,226	3,226	3,226	3,226	3,226	3,226
Recycled Water	LBWRP	13,500	See note	13,500	See note	13,500	See note	13,500	See note	13,500	See note
	Total	84,752	40,352	84,752	40,352	88,752	44,352	88,752	44,352	88,752	44,352

NOTES: Groundwater sources from Central Basin includes raw groundwater delivered through Lakewood interconnect and conveyed to LBWD Treatment Plant. Recycled Water from LBWRP available volume is based on previous 5-year average supply available, which LBWD owns 100% effluent.

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☐	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	**% of Average Supply**
Average Year	1991		100%
Single-Dry Year	2007		100%
Consecutive Dry Years 1st Year	2012		100%
Consecutive Dry Years 2nd Year	2013		100%
Consecutive Dry Years 3rd Year	2014		100%
Consecutive Dry Years 4th Year	2015		100%
Consecutive Dry Years 5th Year	2016		100%

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	84,752	84,752	88,752	88,752	88,752
Demand totals *(autofill from Table 4-3)*	53,965	51,861	51,690	51,042	51,654
Difference	30,787	32,891	37,062	37,710	37,098

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	84,752	84,752	88,752	88,752	88,752
Demand totals*	53,964	51861	51,691	51,042	51,653
Difference	30,788	32,891	37,061	37,710	37,099

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	84,752	84,752	88,752	88,752	88,752
	Demand totals	53,964	51,861	51,691	51,042	51,653
	Difference	30,788	32,891	37,061	37,710	37,099
Second year	Supply totals	84,752	84,752	88,752	88,752	88,752
	Demand totals	53,964	51,861	51,691	51,042	51,653
	Difference	30,788	32,891	37,061	37,710	37,099
Third year	Supply totals	84,752	84,752	88,752	88,752	88,752
	Demand totals	53,964	51,861	51,691	51,042	51,653
	Difference	30,788	32,891	37,061	37,710	37,099
Fourth year	Supply totals	84,752	84,752	88,752	88,752	88,752
	Demand totals	53,964	51,861	51,691	51,042	51,653
	Difference	30,788	32,891	37,061	37,710	37,099
Fifth year	Supply totals	84,752	84,752	88,752	88,752	88,752
	Demand totals	53,964	51,861	51,691	51,042	51,653
	Difference	30,788	32,891	37,061	37,710	37,099
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	53,854
Total Supplies	79,426
Surplus/Shortfall w/o WSCP Action	25,572
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	25,572
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	53,659
Total Supplies	80,626
Surplus/Shortfall w/o WSCP Action	26,967
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	26,967
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	53,463
Total Supplies	83,852
Surplus/Shortfall w/o WSCP Action	30,389
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	30,389
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	53,267
Total Supplies	83,852
Surplus/Shortfall w/o WSCP Action	30,585
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	30,585
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	53,964
Total Supplies	84,752
Surplus/Shortfall w/o WSCP Action	30,788
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	30,788
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions (*Narrative description*)
1	Up to 10%	No Shortage; Prohibited Use of Water At All Times - Up to 21% MWDSC wholesale supply reduction
2	Up to 20%	Imminent Water Supply Shortage; Stage 1 Shortage - Up to 41% MWDSC wholesale supply reduction
3	Up to 30%	LBWD Stage 2 Shortage - Up to 62% MWDSC wholesale supply reduction
4	Up to 40%	LBWD Stage 2 Shortage - Up to 82% MWDSC wholesale supply reduction
5	Up to 50%	LBWD Stage 3 Shortage - Up to 100% MWDSC wholesale supply reduction
6	>50%	LBWD Stage 3 Shortage - Up to 60% total supply reduction from MWDSC wholesale and groundwater production

NOTES:These "Water Supply Conditions" and "Approximate % Retail Shortage" are estimates. The LBWD has not adopted specific numeric targets that would trigger a particular Shortage Phase.

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	<10%		Yes
1	Landscape - Limit landscape irrigation to specific times	<10%		Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	<10%		Yes
1	Landscape - Other landscape restriction or prohibition	<10%	Irrigation system malfunctions resulting in water waste must be repaired in a timely manner	Yes
1	Other - Prohibit use of potable water for washing hard surfaces	<10%		Yes
1	Water Features - Restrict water use for decorative water features, such as fountains	<10%	Fountain or water feature must re-circulate the water	Yes
1	CII - Lodging establishment must offer opt out of linen service	<10%		Yes
1	CII - Commercial kitchens required to use pre-rinse spray valves	<10%	Must be less than 1.5gpm	Yes
1	CII - Other CII restriction or prohibition	<10%	Commerical laundry systems installed after Nov. 3, 2006 must re-circulate water	Yes
1	Other - Require automatic shut of hoses	<10%	For vehicle washing	Yes
1	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	<10%		Yes

1	Other	<10%	Installing single-pass cooling systems in buildings requesting water connection after Nov. 3, 2006	Yes
1	Other	<10%	Using potable water when General Manager determines reclaimed water is a cost-effective alternative	Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	<10%	Excessive irrigation using reclaimed water that causes runoff due to saturation	Yes
1	Other	<10%	Any other water use resulting in unreasonable runoff as determined by General Manager	Yes
2	CII - Restaurants may only serve water upon request	10-20%		Yes
2	Landscape - Limit landscape irrigation to specific days	10-20%	3 days/week, year round	Yes
2	Landscape - Other landscape restriction or prohibition	10-20%	10 minutes per station (20 if rotating head)	Yes
2	Landscape - Limit landscape irrigation to specific days	10-20%	2 days/week, Oct-Mar	Yes
2	Other water feature or swimming pool restriction	10-20%	Prohibit use of potable water for filling of residential swimming pools	Yes
3 and 4	Landscape - Limit landscape irrigation to specific days	20-30%	2 days/week, year round	Yes
5 and 6	Other	30-40%	To be determined by Board	Yes

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
1	Expand Public Information Campaign	<10%	
1	Provide Rebates on Plumbing Fixtures and Devices	<10%	
1	Provide Rebates for Landscape Irrigation Efficiency	<10%	
1	Provide Rebates for Turf Replacement	<10%	
2	Expand Public Information Campaign	10-20%	
2	Provide Rebates on Plumbing Fixtures and Devices	10-20%	
2	Provide Rebates for Landscape Irrigation Efficiency	10-20%	
2	Provide Rebates for Turf Replacement	10-20%	
2	Implement or Modify Drought Rate Structure or Surcharge	10-20%	
2	Other actions (describe)	10-20%	Increase charge for violation of water-use restriction
3 and 4	Expand Public Information Campaign	20-30%	
3 and 4	Provide Rebates on Plumbing Fixtures and Devices	20-30%	
3 and 4	Provide Rebates for Landscape Irrigation Efficiency	20-30%	
3 and 4	Provide Rebates for Turf Replacement	20-30%	
3 and 4	Implement or Modify Drought Rate Structure or Surcharge	20-30%	
3 and 4	Other actions (describe)	20-30%	Increase charge violation of water-use restriction
5 and 6	Expand Public Information Campaign	30-40%	
5 and 6	Provide Rebates on Plumbing Fixtures and Devices	30-40%	

5 and 6	Provide Rebates for Landscape Irrigation Efficiency	30-40%	
5 and 6	Provide Rebates for Turf Replacement	30-40%	
5 and 6	Implement or Modify Drought Rate Structure or Surcharge	30-40%	
5 and 6	Other actions (describe)	30-40%	Increase charge for violation of water-use restriction

Submittal Table 10-1 Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
Bellflower	X	X
Compton	X	X
Hawaiian Gardens	X	X
Lakewood	X	X
Los Alamitos	X	X
Paramount	X	X
Signal Hill	X	X
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Los Angeles County	X	X

APPENDIX B: Stakeholder Coordination

Category	City/Agency/Organization	Notified of UWMP Preparation	Participated in UWMP Development	Contacted for Assistance	Commented on Draft	Attended Public Meeting	Received Public Review Draft	Received Copy of UWMP
Cities in which LBWD accounts are located	City of Bellflower	X					X	X
	City of Compton	X					X	X
	County of Los Angeles, Unincorporated	X					X	X
	City of Hawaiian Gardens	X					X	X
	City of Long Beach	X	X	X			X	X
	City of Lakewood	X					X	X
	City of Los Alamitos	X					X	X
	City of Paramount	X					X	X
	City of Signal Hill	X					X	X
Water suppliers and management agencies	Metropolitan Water District of Southern California	X	X	X			X	X
	Water Replenishment District of Southern California	X		X			X	X
	Los Angeles County Sanitation Districts	X	X	X	X		X	X
	Los Angeles County	X					X	X
	Gateway Water Management Authority	X	X	X			X	X
Other	Environment Now	X					X	X
	Surfrider Foundation	X					X	X
	Sierra Club – Long Beach Group	X					X	X
	El Dorado Audubon Society	X					X	X
	General Public	X			X		X	X

APPENDIX C: Public Notification Ad

Advertising Order Confirmation

AdTaxi | Press-Telegram • The Beach Reporter
Daily Breeze • Palos Verdes Peninsula News

05/04/21 4:03:12PM
Page 1

Ad Order Number	Customer	Payor Customer	PO Number
0011460605	CITY OF LB WATER DEPT	CITY OF LB WATER DEPT	
Sales Representative	**Customer Account**	**Payor Account**	**Ordered By**
Tammy Butikofer	5007766	5007766	Kaylee.Weatherly@lbwater.org
Order Taker	**Customer Address**	**Payor Address**	**Customer Fax**
Tammy Butikofer	1800 E WARDLOW RD ATTN ACCOUNTS PAYABLE LONG BEACH, CA 90807	1800 E WARDLOW RD ATTN ACCOUNTS PAYABLE LONG BEACH, CA 90807	
Order Source	**Customer Phone**	**Payor Phone**	**Customer EMail**
Select Source	562-570-5503	562-570-5503	Yesenia.Jimenez@lbwater.org

Current Queue	Invoice Text
Ready	

Tear Sheets	Affidavits	Blind Box	Materials	Promo Type	Special Pricing
0	0				

Ad Number	Ad Size	Color	Production Color	Ad Attributes	Production Method	Production Notes
0011460605-01	4 X 15.00				Ad Production	

External Ad Number	Pick Up	Ad Type	Released for Publication
		Legal Display	

Product	Requested Placement	Requested Position	Run Dates	# Inserts
Press Telegram	Legals CLS	General - 1076~	05/10/21, 05/17/21	2

Order Charges:

Net Amount	Tax Amount	Total Amount	Payment Amount	Amount Due
2,472.80	0.00	2,472.80	0.00	**$2,472.80**

If this confirmation includes an advertising proof, please check your proof carefully for errors, spelling, and/or typos. Errors not marked on the returned proof are not subject to credit or refunds.

Please note: To meet our printer's deadline, we must have your proof returned by the published deadline, and as indicated by your sales rep.

I hereby authorize publication of the above described advertising.

✕ _____

Signature Date

Please note: If you pay by bank card, your card statement will show the merchant as "SoCal Newspaper Group".

C:\Program Files\NEWSCYCLE Solutions\AdBase Services\AdbaseWebServices\2d3fba6c-23b3-47e8-8058-e1f083713f56_SCNG Order Confirmation.rpt 603395:186 r:LP22-03/14/17 Database: SCNG_PROD

APPENDIX D: Metropolitan Water District Coordination

From: Dean Wang
To: Heather Rhee
Subject: FW: Draft Demand Forecasts
Date: Tuesday, March 16, 2021 10:44:19 AM
Attachments: LongBeach (DRAFT (2-21-2021)).pdf

Dean Wang
562.570.2311

From: Fandialan,Edgar P [mailto:efandialan@mwdh2o.com]
Sent: Thursday, March 4, 2021 5:35 PM
To: Anatole Falagan <Anatole.Falagan@lbwater.org>; Dean Wang <Dean.Wang@lbwater.org>
Subject: Draft Demand Forecasts

-EXTERNAL-

To UWMP Member Agency Coordinators:

As part of our 2020 UWMP coordination and to assist with your agency's preparation of your plan, Metropolitan is sending your agency's draft demand forecasts through 2045 under normal water year, single dry year, and droughts lasting five consecutive years. This information is consistent with the reliability assessments contained in Metropolitan Public Review Draft 2020 UWMP that will be posted on March 8, 2021 on Metropolitan's website: www.mwdh2o.com.

As indicated in my previous email announcement, Metropolitan will host an on-line UWMP Member Agency Coordination meeting on Thursday, March 18, 2021 from 2:30-4:00 pm. Topics of discussion will include a status update of the 2020 UWMP, draft UWMP Appendix 13 (Alternative Forecast of Demand on Metropolitan, included in the March draft 2020 UWMP), and draft Appendix 11 Reduced Delta Reliance Reporting. The registration information for this meeting was previously emailed to you. I am looking forward to your participation at the meeting and our continued coordination through the completion of our 2020 UWMPs.

Thanks,
Edgar

Edgar Fandialan
Principal Engineer, Water Resource Management Group
Metropolitan Water District of Southern California

From:	Dean Wang
To:	Heather Rhee
Subject:	FW: Request for 2020 Urban Water Management Plan
Date:	Tuesday, March 16, 2021 10:34:59 AM
Attachments:	Long Beach 2020 UWMP Local Production Forecast Survey - Submitted 20201026.xlsx

---

Dean Wang
562.570.2311

From: Dean Wang
Sent: Monday, October 26, 2020 10:02 AM
To: Carrillo,Carlos A <CCarrillo@mwdh2o.com>
Cc: Anatole Falagan <Anatole.Falagan@lbwater.org>
Subject: RE: Request for 2020 Urban Water Management Plan

Hi Carlos,

Attached is the requested information for Long Beach.

Regards,

Dean Wang
Long Beach Water Department
562.570.2311
Dean.Wang@LBWater.org

From: Carrillo,Carlos A [mailto:CCarrillo@mwdh2o.com]
Sent: Tuesday, October 20, 2020 6:08 AM
To: Anatole Falagan <Anatole.Falagan@lbwater.org>; Dean Wang <Dean.Wang@lbwater.org>
Subject: FW: Request for 2020 Urban Water Management Plan
Importance: High

-EXTERNAL-

Hello,

A friendly reminder to please submit the requested information requested in the email below. Due to the quick turnaround, we request that the information be submitted before the end of this week.

Thank you,
Carlos

Carlos Carrillo
Metropolitan Water District
(213) 217-7140

ccarrillo@mwdh2o.com

From: Carrillo,Carlos A
Sent: Thursday, October 8, 2020 7:24 PM
To: Anatole Falagan (Anatole.Falagan@lbwater.org) <Anatole.Falagan@lbwater.org>; Dean Wang (dean.wang@lbwater.org) <dean.wang@lbwater.org>
Cc: Polyzos,Demetri J <DPolyzos@mwdh2o.com>
Subject: Request for 2020 Urban Water Management Plan

Good afternoon,

Thank you for participating in today's UWMP MA Working Meeting. As discussed in today's meeting, we need your help in projecting local supplies as well as verifying water suppliers within your service area.
Please find the attached workbook containing historical production from the 2020 Local Supply Survey. Please provide local supply projections in the following format:

- By source type (groundwater recovery, recycled water, surface water, and seawater desalination)
- By end use type (AG, MI, groundwater replenishment, seawater barrier)
- The projection should include annual production from 2020-2025 and production in five-year increments from 2025-2050

If you have different projections under normal water years, single dry years, and five consecutive dry years, please provide those as well. Feel free to use this workbook or provide the above-mentioned information in whichever way is easiest for you.

In addition, please review and edit the attached water supplier inventory list for water suppliers within your service area. Lastly, please submit this requested information by **Friday, October 16th.**

Please let us know if you have any questions.

Thank you!

Carlos Carrillo
Associate Resource Specialist | Resource Planning Team
Water Resource Management Group
Metropolitan Water District of Southern California
Phone: (213) 217-7140 | Email: ccarrillo@mwdh2o.com

APPENDIX E: Water Losses

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: Long Beach Water Department
Reporting Year: 2016 (7/2015 - 6/2016)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED			Pcnt:	Value:	
Volume from own sources:	8	32,505.200 acre-ft/yr	-0.82%		acre-ft/yr
Water imported:	5	18,534.500 acre-ft/yr	-0.35%		acre-ft/yr
Water exported:	n/a	0.000 acre-ft/yr			acre-ft/yr
WATER SUPPLIED:		**51,373.545** acre-ft/yr			

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION			Pcnt:	Value:	
Billed metered:	7	49,380.933 acre-ft/yr			
Billed unmetered:	n/a	0.000 acre-ft/yr			
Unbilled metered:	n/a	0.000 acre-ft/yr			
Unbilled unmetered:		642.169 acre-ft/yr	1.25%		acre-ft/yr
AUTHORIZED CONSUMPTION:		**50,023.102** acre-ft/yr			

Click here: ? for help using option buttons below

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)			Pcnt:	Value:	
		1,350.443 acre-ft/yr			
Apparent Losses					
Unauthorized consumption:		128.434 acre-ft/yr	0.25%		acre-ft/yr
Customer metering inaccuracies:	8	488.723 acre-ft/yr	0.98%		acre-ft/yr
Systematic data handling errors:		123.452 acre-ft/yr	0.25%		acre-ft/yr
Apparent Losses:		**740.609** acre-ft/yr			

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	**609.834**	acre-ft/yr
WATER LOSSES:	**1,350.443**	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	**1,992.612**	acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	912.0	miles
Number of active AND inactive service connections:	93,372	
Service connection density:	102	conn./mile main
Are customer meters typically located at the curbstop or property line?	Yes	
Average length of customer service line:		(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	68.0	psi

COST DATA

Total annual cost of operating water system:	$41,108,717	$/Year
Customer retail unit cost (applied to Apparent Losses):	$3.00	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	$942.00	$/acre-ft ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 74 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Water imported
2: Volume from own sources
3: Billed metered

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

Click to access definition
Click to add a comment

Water Audit Report for: Long Beach Water Department
Reporting Year: 2016 7/2015 - 6/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

<---------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

			Pcnt:	Value:	
Volume from own sources:	6	31,802.180 acre-ft/yr	-0.30%		acre-ft/yr
Water imported:	5	19,597.430 acre-ft/yr	-0.16%		acre-ft/yr
Water exported:	n/a	0.000 acre-ft/yr			acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 51,526.710 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: for help using option buttons below

			Pcnt:	Value:	
Billed metered:	7	49,185.165 acre-ft/yr			
Billed unmetered:	n/a	0.000 acre-ft/yr			
Unbilled metered:	n/a	0.000 acre-ft/yr			
Unbilled unmetered:	5	128.817 acre-ft/yr		128.817	acre-ft/yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: 49,313.982 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 2,212.728 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		128.817 acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	8	662.980 acre-ft/yr	1.33%		acre-ft/yr
Systematic data handling errors:		122.963 acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 914.760 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,297.968 acre-ft/yr

WATER LOSSES: 2,212.728 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 2,341.545 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	922.0 miles
Number of active AND inactive service connections:	9	93,429
Service connection density:		101 conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 9 68.0 psi

COST DATA

Total annual cost of operating water system:	10	$41,108,717	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$2.83	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	7	$979.00	$/acre-ft ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 69 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Water imported
3: Billed metered

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0
American Water Works Association.

? Click to access definition
+ Click to add a comment

Water Audit Report for: Long Beach Water Department
Reporting Year: 2018 (7/2017 - 6/2018)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	6	29,959.950	acre-ft/yr	5	-0.60%		acre-ft/yr
Water imported:	6	22,846.580	acre-ft/yr	5	0.27%		acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 52,925.855 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	51,102.810	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	5	132.315	acre-ft/yr		132.315	acre-ft/yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: 51,235.125 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 1,690.730 acre-ft/yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		132.315	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	6	641.631	acre-ft/yr	1.24%		acre-ft/yr
Systematic data handling errors:		127.757	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 901.703 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 789.028 acre-ft/yr

WATER LOSSES: 1,690.730 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,823.045 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	923.0	miles
Number of active AND inactive service connections:	9	94,102	
Service connection density:		102	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 9 68.0 psi

COST DATA

Total annual cost of operating water system:	10	$41,495,879	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$2.76	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$1,015.00	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 67 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Water imported
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

Click to access definition
Click to add a comment

Water Audit Report for: Long Beach Water Department
Reporting Year: 2019 7/2018 - 6/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED				Pcnt:	Value:	
Volume from own sources:	6	27,359.320	acre-ft/yr	5	1.54%	acre-ft/yr
Water imported:	6	23,090.100	acre-ft/yr	5	0.11%	acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr			acre-ft/yr
WATER SUPPLIED:		**50,009.105**	acre-ft/yr			

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION				Pcnt:	Value:	
Billed metered:	6	48,898.090	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	5	125.023	acre-ft/yr		125.023	acre-ft/yr
AUTHORIZED CONSUMPTION:		**49,023.113**	acre-ft/yr			

Click here: ? for help using option buttons below

Use buttons to select percentage of water supplied **OR** value

				Pcnt:	Value:	
WATER LOSSES (Water Supplied - Authorized Consumption)		**985.993**	acre-ft/yr			
Apparent Losses						
Unauthorized consumption:		125.023	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	4	613.949	acre-ft/yr	1.24%		acre-ft/yr
Systematic data handling errors:		122.245	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:		**861.217**	acre-ft/yr
Real Losses (Current Annual Real Losses or CARL)			
Real Losses = Water Losses - Apparent Losses:		**124.775**	acre-ft/yr
WATER LOSSES:		**985.993**	acre-ft/yr

NON-REVENUE WATER			
NON-REVENUE WATER:		**1,111.015**	acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA			
Length of mains:	9	924.0	miles
Number of active AND inactive service connections:	9	94,254	
Service connection density:		102	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	9	65.1	psi

COST DATA				
Total annual cost of operating water system:	10	$39,174,628	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$2.83	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$1,050.00	$/acre-ft	Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 64 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Water imported
3: Customer metering inaccuracies

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0
American Water Works Association

? Click to access definition
+ Click to add a comment

Water Audit Report for: Long Beach Water Department
Reporting Year: 2020 (7/2019 - 6/2020)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

	Grading	Value		Master Meter and Supply Error Adjustments Grading	Pcnt:	Value:	
Volume from own sources:	6	21,931.550	acre-ft/yr	5	1.57%		acre-ft/yr
Water imported:	6	29,471.620	acre-ft/yr	5	0.22%		acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 50,999.472 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grading	Value		Pcnt:	Value:	
Billed metered:	6	48,322.710	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	5	127.499	acre-ft/yr		127.499	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 48,450.209 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption): 2,549.263 acre-ft/yr

Apparent Losses

	Grading	Value		Pcnt:	Value:	
Unauthorized consumption:		127.499	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grading	Value		Pcnt:	Value:	
Customer metering inaccuracies:	9	910.820	acre-ft/yr	1.85%		acre-ft/yr
Systematic data handling errors:		120.807	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,159.126 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,390.137 acre-ft/yr

WATER LOSSES: 2,549.263 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 2,676.762 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grading	Value	
Length of mains:	9	925.0	miles
Number of active AND inactive service connections:	9	93,964	
Service connection density:		102	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

	Grading	Value	
Average operating pressure:	9	71.9	psi

COST DATA

	Grading	Value		
Total annual cost of operating water system:	10	$93,836,955	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$3.12	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$1,078.00	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 68 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Water imported
2: Volume from own sources
3: Billed metered

APPENDIX F: DWR SBx7-7 Compliance Forms

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	472,217
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	**2020 Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**2020 Deductions**					**2020 Gross Water Use**
		Exported Water *	**Change in Dist. System Storage*** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use***	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	51,399			-		-	**51,399**
*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.							
NOTES:							

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Metropolitan Water District of Southern California
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	27,204	-	27,204

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Central Basin Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	24,195		24,195

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
51,399	472,217	**97**
NOTES:		

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
97	-	-	-	-	97	107	**YES**
[1] *All values are reported in GPCD* [2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*							
NOTES:							

Appendix G - Board Resolution (PLACEHOLDER)

ATTACHMENTS:

Documents that are referenced in the 2020 UWMP are included as attachments if they are too long to include within the body of the UWMP itself.

Most of these attachments are very large documents and can be found on the internet (links are provided below and on the LBWD website at www.lbwater.org).

All attachments are available for review, by appointment, during normal business hours, at LBWD administration offices, located at 1800 East Wardlow Road. Copies of these attachments are only provided with the official adopted UWMP sent to the California Department of Water Resources. Photocopies of the attachments are available at cost.

List of Attachments

1. DWR Bulletin 118 Basin Description:Central Basin
2. DWR Bulletin 118 Basin Description: West Coast Basin
3. Central Basin Judgement
4. WRD Engineers Survey and Report, 2021
5. West Coast Basin Judgement
6. WRD Watermaster's Central Basin Report, FY 2019 - 2020
7. WRD Watermaster's West Coast Basin Report, FY 2019 - 2020
8. LBWD Water Resources Plan, 2019
9. MWD 2020 UWMP (Draft)
10. MWD Act
11. LBWD Water Consercation and Water Supply Shortage Plan (WD - 1354)
12. Long Beach Hazard Mitigation Plan
13. LBWD Water Master Plan, 2020
14. LBWD Rules, Regulations, and Charges (revised December 2017)

2020

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