LOWER COLORADO RIVER AUTHORITY
WATER CONSERVATION PLAN
DRAFT – For Board Consideration in April 2024

1.0 INTRODUCTION

1.1 Purpose and Policy

The Lower Colorado River Authority (LCRA) is a water conservation and reclamation district established by the Texas Legislature in 1934. LCRA was created to manage water supply and flooding in the lower Colorado River basin, generate and distribute electric power, protect the quality of surface water within the lower Colorado River basin, and provide water and land recreational opportunities for the residents of Texas.

LCRA developed this Water Conservation Plan for municipal, irrigation, recreation, industrial and agricultural water rights. This plan fulfills requirements of the Texas Administrative Code, Title 30, Chapter 288, Subchapter A, Water Conservation Plans, and Subchapter C, Required Submittals. This Water Conservation Plan supersedes the components of the LCRA Water Conservation Plan approved by the LCRA Board of Directors in 2019.

1.2 History of LCRA Water Conservation

Water conservation is an important strategy for mitigating the effects of urban growth on the region's water resources, particularly in Travis County and surrounding areas. In addition to reducing future water demands, water conservation can make important contributions toward satisfying the water and wastewater service requirements of growing urban populations and economies. More than 25 years ago, LCRA implemented a comprehensive water conservation program targeted at what was then the two largest water use sectors within the water service area -- irrigated agriculture and municipal.

In 1989, prior to the Texas Administrative Code, Chapter 288 rules, LCRA developed Rules for Water Conservation and Drought Contingency and required all firm water customers applying for a new or modified contract to develop plans in accordance with these rules. At that time, LCRA also began providing conservation program planning support to its wholesale municipal water customers by offering technical assistance, coordinating plumbing retrofit programs and developing education efforts.

As the largest historical user of water in the lower Colorado River basin, irrigated agriculture provided a good opportunity for LCRA to reduce overall water demand through conservation programs. Between 1989 and 1997, the introduction of volumetric pricing and canal rehabilitation is estimated to have saved approximately 13% a year, or about 41,500 acre-feet annually, of the projected water use that would have occurred without conservation practices in place. House Bill (HB) 1437 was passed in 1999, allowing up to 25,000 acre-feet of water to be transferred to Williamson County subject to a requirement that there be no net loss to the Colorado River basin. This supply has been contracted to Brazos River Authority and is supplied to the cities of Round Rock, Liberty Hill and Georgetown. (HB 1437 also allows for the supply of water to the cities of Cedar Park and Leander.) Most of the conservation strategies implemented in the LCRA agricultural divisions since then have been funded or partially funded by money collected from a surcharge on the water reserved or

transferred. Other sources of funding include federal and state grants, and in-kind labor or direct funding from LCRA's agricultural operations budget.

1.3 2019 Water Conservation Plan Results

LCRA continually works to improve and expand conservation strategies throughout the basin. Strategies include collecting baseline data, conducting verification studies, benchmarking of other successful water providers, and working with builders, landscapers and environmental interests.

Since 2012, new conservation programs include a residential outdoor rebate program; a commercial, institutional and industrial (CII) water audit and rebate program; a firm water customer cost-share program; irrigation evaluation training; and an irrigation technology rebate program. LCRA periodically updates rebates offered through these programs and adopted an expanded set of residential outdoor rebates in 2017. The most recent program update was in 2022. The programs are available to water users that directly or indirectly receive water from LCRA. Municipal customer mandatory requirements such as irrigation standards and permanent landscape watering schedules account for nearly 70 percent of the savings. In 2022, LCRA revised its Water Conservation Plan rules for firm water contracts to include a requirement for its municipal customers to adopt a permanent no more than twice weekly watering schedule. Firm water customers are responsible for enforcing the watering schedule. LCRA requires its customers to submit annual water conservation and drought contingency plan implementation surveys. During years when LCRA requires its customers to implement mandatory drought response measures, staff includes a section in the survey addressing drought enforcement. As of 2023, about 7,634 acre-feet per year is saved from implementation of firm water conservation strategies.

LCRA also has implemented or completed several key agricultural conservation projects since 2019. Conservation projects that continue to provide annual savings include the Garwood measurement project, a land leveling grant program, the Gulf Coast Agricultural Division gate rehabilitation project and the Garwood gate automation project. LCRA also has a revised its land leveling grant program (see section 4). As of 2023, LCRA estimates the three-year rolling average annual water savings in LCRA's agricultural divisions is 14,769 acre-feet. This averaging is used to provide a more consistent savings number during droughts, when curtailments can result in no savings in Lakeside and minimal savings in Gulf Coast, as occurred in 2023. This methodology is also consistent with the accounting approach for implementing requirements of HB1437. The 2022 three-year rolling average of the amount of conserved water was 16,520 acre-feet per year, reflecting a curtailment of the second growing season in the Lakeside and Gulf Coast divisions.

1.4 2024 Water Conservation Plan Development

LCRA developed its 2024 Water Conservation Plan strategies using largely the same framework as the 2019 plan, with planned expansion of existing programs, outreach, technical assistance and marketing efforts.

The plan is divided into a baseline chapter and chapters about firm water customers, LCRA agricultural divisions and LCRA power plants. Because the City of Austin has its own water rights, the Austin water utility is required to submit its own water conservation plan directly to the Texas Commission on Environmental Quality (TCEQ). Water conservation strategies for Austin are not included in this plan.

2.0 Baseline Profile and Water Conservation Goals

2.1 Overview of LCRA Water Service Area

LCRA provides water from its water rights in the Colorado River basin for municipal, industrial, recreation, irrigation, agricultural, domestic, environmental and other purposes. Surface water supplies are a combination of the natural flow of the Colorado River and stored water from lakes Buchanan and Travis.

As of February 2024, LCRA had firm water contracts with 73 municipal wholesale raw water customers, which serve an estimated population of more than 500,000, and the City of Austin, which serves a population of more than 1 million. LCRA also has firm water contracts with 40 large irrigation and recreation customers, of which 12 are golf course customers; 12 industrial use customers, which includes four LCRA power plants; four agricultural customers; 20 small landscape irrigation and recreation customers; 3,776 domestic use customers; and 74 temporary customers.

LCRA also provides water to customers in the LCRA-owned Gulf Coast, Lakeside and Garwood agricultural divisions, as well as Pierce Ranch, under provisions in the state-approved Water Management Plan. Figure 2-1 illustrates the LCRA water service area and the locations of LCRA power plants, LCRA agricultural divisions and large municipal water customers.

Water demands and water supply available under LCRA's water rights vary with weather conditions. Water use also can vary substantially from year to year based on dry or wet conditions and drought response measures in place. Table 2-1 provides a summary of the reported water use from 2019-2023.

The annual demand for municipal contracts, exclusive of Austin, in 2023 was approximately 118,514 acre-feet. LCRA supplied 7,041 acre-feet of water to its firm irrigation and recreational water customers, which are mainly golf courses. The majority of LCRA industrial water use is for generating electricity. LCRA power plants used 12,616 acre-feet in 2023. Other industrial water uses customers, including manufacturing and steam electric generation, used 17,707 acre-feet in 2023.

In addition to water use under firm water commitments, in 2023 the LCRA agricultural divisions and Pierce Ranch diverted and used 88,991 acre-feet of water for agricultural purposes. Water use in 2022 reflects partial curtailment of water in the agricultural divisions during the second irrigation season; water use in 2023 reflects complete curtailment of water in the Lakeside, Gulf Coast and Pierce Ranch operations. (Pierce Ranch diverted 1,876 acre-

feet of run-of-river water in 2023.) In addition to interruptible stored water being curtailed, Stage 2 drought restrictions under LCRA's Drought Contingency Plan were in effect starting in August 2023.

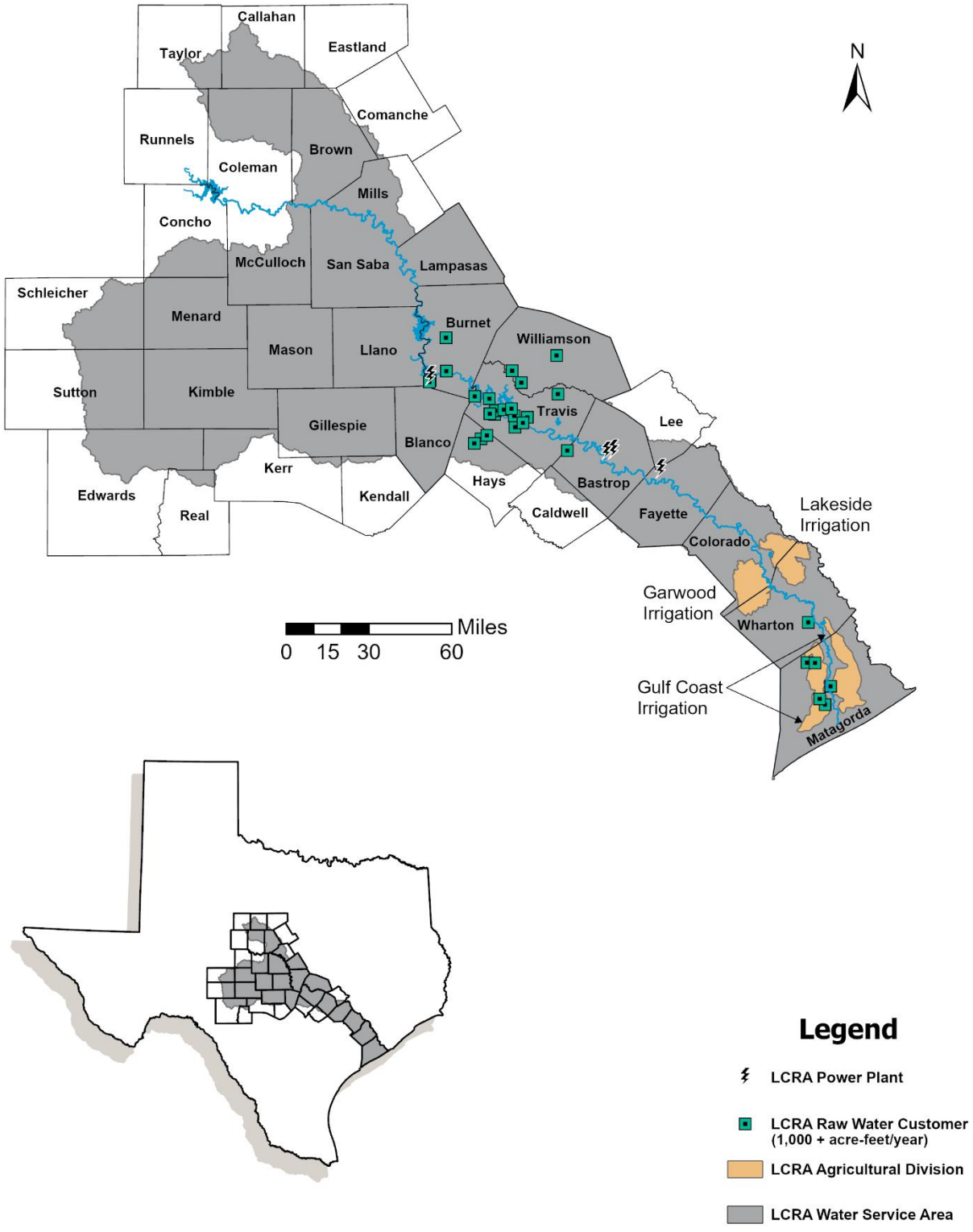
Balancing the need for well-planned infrastructure, water quality protection and water conservation is important as LCRA works to protect and extend the basin's natural resources. LCRA continues to work with its customers, regional interests, environmental interests, upstream water rights holders and adjoining regional planning groups to find sensible, equitable, beneficial, and economical solutions to the water supply challenges that face this growing region

Table 2-1 LCRA Reported Total Water Use (acre-feet)[1]

	2019	2020	2021	2022	2023[5]
Industrial	16,844	17,970	13,359	22,064	17,707
LCRA Power Plants	10,373	14,125	14,514	13,986	12,912
Municipal, City of Austin[2]	35,259	56,434	37,640	109,883	102,194
Municipal, Other	77,441	88,097	81,180	91,771	96,595
Irrigation and Recreation	6.766	7,413	4,205	6,898	7,041
Irrigation Operations[3]	182,155	214,145	161,510	232,349	88,891
Environmental Flow[4]	61,954	115,585	31,318	40,510	35,287
Total	**390,792**	**513,769**	**343,726**	**517,461**	**360,627**

[1] Reported water use numbers obtained from LCRA annual Water Use Reports and does not include groundwater use.
[2] The City of Austin used additional water for all years under its own water rights.
[3] Includes LCRA agricultural divisions and Pierce Ranch.
[4] Stored waters released for the environment.
[5] Water use in 2023 reflects curtailment of water in LCRA's three agricultural divisions and Pierce Ranch due to the drought.

Figure 2-1: Map of LCRA Water Service Area, LCRA Agricultural Divisions, LCRA Power Plants and Large Municipal Water Customers



2.2 Water Use

2.2.1 Municipal Water Use

In 2023, LCRA supplied water to more than 500,000 people through LCRA wholesale municipal water customers, not including the City of Austin. These customers obtain their water supplies from LCRA's water rights for lakes Buchanan and Travis and the amended Garwood water right. LCRA municipal customers are diverse and include cities, water supply corporations, municipal utility districts, water control and improvement districts, and others, the majority of whom are in the Highland Lakes and Travis County areas. Wholesale municipal customer metered water use for 2019-2023 is included in Appendix A.

Only a few mid-sized customers have substantial commercial and multifamily use, with 93 percent of the connections reported in the service area outside of Austin in 2022 classified as single family. LCRA customer gallons per capita per day (GPCD) varies greatly, with several smaller rural systems near or less than 100 GPCD to systems serving mostly suburban single-family homes with large, irrigated lots with usage near 200 GPCD. This wide range also is reflected in the ratio of summer to winter use. LCRA municipal customers use about twice as much water in the summer than winter. In 2022, the estimated GPCD was 148 within the LCRA service area, excluding the City of Austin.

2.2.2 Irrigation and Recreation Water Use

In 2023, LCRA supplied 7,041 acre-feet to 60 irrigation (not including agricultural irrigation in the agricultural divisions) and recreational water customers with firm water contracts. Irrigation and recreational contracts include contracts with golf courses, children's camps, homeowner's associations, hotels, school districts and others including for agricultural irrigation and landscape irrigation around subdivisions. In 2023, golf course water use accounted for about 50 percent of the total water use by irrigation and recreation customers. In 2023, municipalities in LCRA's service area outside of the City of Austin provided approximately 10,000 acre-feet of treated wastewater as direct reuse, mainly to golf courses and irrigation of common areas around subdivisions and roadways. Wholesale irrigation and recreation metered water use for 2019-2023 is included in Appendix A.

2.2.3 Industrial Water Use

The majority of industrial water use in LCRA's service area goes toward power generation facilities, including LCRA's four power plants (Fayette Power Project, Thomas C. Ferguson Power Plant, the Lost Pines Power Park, Winchester Power Plant) and Bastrop Energy Partners. STP Nuclear Operating Company (STPNOC) has a contract with LCRA, and jointly owns a water right with LCRA that provides run-of-river to the power plant. STPNOC has not used any backup water supply from lakes Buchanan and Travis in the last five years. In addition, LCRA provides water to customers with industrial facilities in the Gulf Coast Agricultural Division canal system. Other industrial customers include facilities that produce gravel and concrete. Wholesale industrial metered water use for 2019-2023 is included in Appendix A. Water conservation strategies for LCRA wholesale power generation is found in Chapter 5 and Appendices B, C and D.

2.2.4 Domestic and Temporary Water Use

In addition to firm municipal, industrial, irrigation and recreational contracts, LCRA also has several thousand domestic use contracts. Domestic use contracts are for individual or household domestic purposes. The water is diverted solely through the efforts of the end-user. As of February 2024, LCRA has 3,776 domestic use contracts totaling about 4,600 acre-feet. The contract quantity for domestic users is calculated based on LCRA's permanent maximum twice weekly watering restrictions that encourage efficient landscape watering.

LCRA also sells water to a wide-ranging customer base that purchase relatively small amounts of water (less than 10 acre-feet) for a relatively short amount of time (three years or less). These temporary customers use water for purposes such as irrigation, business interests, construction activities and recreational purposes. As of February 2024, LCRA has 74 temporary use contracts.

2.2.5 Agricultural Irrigation Water Use

LCRA owns the water rights associated with the Garwood, Gulf Coast, Lakeside and Pierce Ranch agricultural operations, and LCRA operates the infrastructure associated with the Garwood, Gulf Coast and Lakeside divisions. LCRA provides water to Pierce Ranch under a long-term interruptible contract, and to farmers in the Garwood, Gulf Coast and Lakeside divisions who obtain interruptible agricultural water contracts. Combined, LCRA's three agricultural divisions cover an area of 830 square miles. Gulf Coast has the largest area at almost 500 square miles, Lakeside is almost 200 square miles, and Garwood is 150 square miles. Crops include rice, turf grass, cotton, corn, milo, soybeans, and hay. Land also is sometimes flooded for wildlife management at the end of the irrigation season if water is available for supplemental use contracts. In a non-curtailed year, over 90 percent of the crops planted in Lakeside and Garwood is rice (about 80 percent in Gulf Coast). In addition to row crops, the Gulf Coast division has some turf grass farms and aquaculture.

Table 2-2: LCRA Agricultural Operations Acreage and Water Use: 2019-2023

Agricultural Operations	2019	2020	2021	2022[1]	2023[2]
Gulf Coast					
First Crop Rice Acres	6,253	9,590	8,952	8,327	0
Second Crop Rice Acres	3,280	5,035	2,972	0	0
Supplemental Acres[1]	4,863	5,975	3,113	4,662	0
Total Water Diverted [2] (a-f/yr)	33,838	56,836	37,640	40,116	10,278
Irrigation for Rice Crop (a-f/yr)	19,137	33,553	20,197	22,521	0
First Crop (a-f/acre)	2.51	2.71	1.79	2.70	0
Second Crop (a-f/acre)	1.04	1.50	1.42	0	0
Supplemental Water Use[1] (a-f/yr)	2,980	3,236	2,148	3,984	0
Supplemental Water Use (a-f/acre)	0.54	0.47	0.33	0.85	0

[1] In 2022, no interruptible stored water was provided for second crop water use in Gulf Coast, Lakeside, or Pierce Ranch.

[2] In 2023, no interruptible stored water was provided for first or second crop water use in Gulf Coast, Lakeside, or Pierce Ranch. Reported diversions are for industrial customers that divert water from LCRA's canal system.

Total Water Used (a-f/yr)	22,116	36,789	22,345	26,505	0
Water Loss (a-f/yr)	11,722	20,047	13,819	13,611	
Percent of Water Loss	25.2%	29.4%	29.6%	25.1%	
Lakeside					
First Crop Rice Acres	17,998	21,460	21,594	25,625	0
Second Crop Rice Acres	8,273	13,042	15,666	0	0
Supplemental Acres[1]	1,392	856	1,299	875	0
Total Water Diverted	57,052	64,774	47,840	77,503	0
Irrigation for Rice Crop (a-f/yr)	41,928	48,671	36,307	64,606	0
First Crop (a-f/acre)	1.76	1.66	0.94	2.52	0
Second Crop (a-f/acre)	1.24	1.00	1.03	0	0
Supplemental Water Use[1] (a-f/yr)	2,869	1,199	1,735	235	0
Supplemental Water Use (a-f/acre)	2.10	1.40	1.30	0.30	0
Total Water Used (a-f/yr)	44,797	49,871	38,041	64,841	0
Water Loss (a-f/yr)	12,255	14,903	9,799	12,662	0
Percent of Water Loss	21.5%	23.0%	20.5%	16.3%	0
Garwood					
First Crop Rice Acres	17,574	19,756	19,777	20,785	20,013
Second Crop Rice Acres	13,319	16,146	17,308	15,878	16,334
Supplemental acres[1]	4,618	3,136	3,148	3,508	3,406
Total Water Diverted	74,615	75,530	63,565	100,242	87,014
Irrigation for Rice Crop (a-f/yr)	66,575	53,567	49,530	52,985	75,761
First Crop (a-f/acre)	2.13	1.92	1.20	3.19	2.29
Second Crop (a-f/acre)	1.27	1.05	1.14	1.24	1.83
Supplemental Water Use[1] (a-f/yr)	7,502	3,399	3,533	4,661	4,453
Supplemental Water Use (a-f/acre)	1.60	1.10	1.10	1.30	1.30
Total Water Used (a-f/yr)	61,734	58,429	46,892	90,617	80,214
Water Loss (a-f/yr)	12,881	17,101	16,673	9,625	6,800
Percent of Water Loss	17.3%	22.6%	26.2%	9.6%	7.8%
Pierce Ranch					
First Crop Rice Acres	2,499	2,494	2,225	2,676	0
Second Crop Rice Acres	1,597	1,746	1,522	0	0
Supplemental Acres	844	844	622	724	0
Total Water Diverted	16,650	17,006	12,465	14,488	1,876
First Crop Diversions (a-f/yr)	8,381	9,663	5,980	11,124	0
Second Crop Diversions (a-f/yr)	8,269	7,343	6,484	3,364	0
Total Water Diverted - all Divisions (a-f/year)[2]	**182,155**	**214,145**	**161,510**	**232,349**	**88,891**

[1]Other water use includes water used for irrigating turf and row crops, and for wildlife management.
[2] Diversions include industrial uses for customers served through the canal system (OQ Chemicals and Underground Services Markham)

Various irrigation systems are used depending on the crop and irrigation structures in each division. Most fields are flood irrigated through a levee system. Within the canal systems, Lakeside Agricultural Division has approximately 2,000 structures, Gulf Coast Agricultural Division has approximately 2,400 structures and Garwood Agricultural Division has approximately 1,150 structures. These structures include bulkheads, water boxes, aluminum slide gates, and control or “check” structures such as aluminum flash board risers, pipes and valves, pipe headers, bridges, foot bridges, crossings, siphons, and under-drains.

Total agricultural water uses in the downstream agricultural operations in 2023 was 88,891 acre-feet of water from the Colorado River. Water loss calculated for each of LCRA’s agricultural divisions represent the difference between the amount of water diverted from the river and the amount of water measured and billed to customers at the field. Annual water loss for each LCRA agricultural division is shown in Table 2-3. This figure is not available for Pierce Ranch since it is an LCRA wholesale customer.

2.3 2024 Water Conservation Goals

In the next five to 10 years, the municipal population served by LCRA is expected to grow significantly and most municipal water conservation savings will come from landscape irrigation standards and permanent watering schedules implemented by customers, and infrastructure upgrades and reuse projects implemented through the water conservation incentives grant and rebates program.

LCRA goals for firm and interruptible water supply include:

Five-year goals:

- 1,000 acre-feet savings per year from LCRA power generation industrial water use.
- 12,000 acre-feet savings per year from firm water contract use. (non-power generation)
- 18,000 acre-feet savings per year from use in the agricultural divisions during a year with no curtailment of interruptible stored water.

10-year goals:

- 1,100 acre-feet savings per year from LCRA power generation industrial water use.
- 15,000 acre-feet savings per year from firm water contract use. (non-power generation)
- 20,000 acre-feet savings per year from use in the agricultural divisions during a year with no curtailment of interruptible water supply.

The five-year goals build on water savings from 2019-2023. Firm water savings are estimated to increase from 7,634 acre-feet in 2023 to 12,000 acre-feet in 2029 and are projected to come from expanding existing firm water programs and additional customer strategies. These goals do not reflect the conservation efforts from the City of Austin, LCRA’s largest municipal customer. Savings in the agricultural operations are expected to increase from 16,500 acre-feet in 2022 to 18,000 acre-feet in 2029, with projected savings coming from completion of the gate automation project in the Garwood Agricultural Division, the completion of a gate

automation project in the Lakeside Agricultural Division, savings from existing and newly re-leveled fields, and canal lining of segments serving industrial customers.

The 10-year goals build on expected water savings from 2024-2029. The firm water savings are expected to increase to 15,000 acre-feet by 2034 and are projected to come from expanding existing firm water programs and additional customer strategies. These goals do not reflect the conservation efforts at the City of Austin. Savings in the agricultural operations are expected to increase to 20,000 acre-feet by 2034.

3.0 Firm Water Conservation Strategies

3.1 Monitoring and Record Management System

LCRA maintains records of water distribution and sales using a third-party billing system, which provides a central, automated location for water billing information. A detailed description of the billing system is available upon request.

3.2 Monitoring and Measuring Water Use

LCRA Water Contract Rules impose requirements on LCRA's raw water customers to properly measure water diversions. Measuring devices must be accurate within plus or minus 5% of the indicated flow over the possible flow range. Meters generally are read on a monthly basis. Customers generally are required to provide third-party verification of meter testing and calibration to LCRA staff each year, while some smaller customers with contract quantities not exceeding 30 acre-feet per year must provide the verification at least once every two years.

Residential property owners pumping water from the Highland Lakes for domestic use are required to obtain contracts from LCRA. LCRA estimates an average of about 4,600 acre-feet per year is being pumped from the Highland Lakes by lakeside residents, mostly for landscape watering. LCRA staff works with each customer to determine the size of the irrigated area, which determines the contract quantity. Domestic users must comply with a maximum twice-a-week permanent landscape watering schedule, except during extreme drought conditions or when water restrictions change under the LCRA Drought Contingency Plan.

3.3 Reservoir Systems Operations Plan

LCRA manages the Highland Lakes under the Water Management Plan (WMP) which is approved by TCEQ. The plan governs LCRA's operation of lakes Buchanan and Travis to meet the needs of major water users throughout the lower Colorado River basin. Under the WMP, LCRA uses unregulated inflows entering the river from drainage areas downstream of the Highland Lakes to the maximum extent possible before waters stored in the lakes are released to satisfy downstream water needs. The LCRA WMP is available at www.lcra.org/watermanagementplan.

LCRA has improved its ability to manage water supply operations by 1) improving coordination with major customers to better quantify return flows and manage pumping operations below the Highland Lakes; 2) improving river modeling to better quantify run-of-river water in the Colorado River below the Highland Lakes; 3) improving decision support tools to more efficiently use stored water by using run-of-river water to meet demands as much as possible; and 4) improving control of releases from the Highland Lakes to more precisely match releases to downstream demands.

3.4 Firm Water Contract Requirements

TCEQ rules mandate that LCRA, as a water rights holder, require wholesale water customers with new or amended contracts to develop a water conservation plan. LCRA has developed Water Conservation Plan Rules for raw water customers, which are designed to extend existing surface water supplies through water conservation. LCRA requires that its customers designate a water conservation coordinator, provide annual plan implementation reports, and adopt a permanent maximum twice-weekly watering schedule.

All firm raw water customers except domestic use and temporary contract customers are required to specify five- and 10-year conservation targets for water savings and adopt minimum conservation measures, such as leak detection and repair, conservation water rates and education. LCRA encourages customers with new or revised contracts to adopt additional conservation strategies not required in the rules, such as irrigation evaluations, deed restrictions for new development, and partnering with LCRA on rebate programs. The LCRA Water Contract Rules, including the Water Conservation Plan Rules, are available at www.lcra.org/firmwateruse.

3.5 Water Rates

LCRA's firm water rates encourage water conservation by combining reservation and volumetric water rate structures. The current water rate is $155 per acre-foot per year of firm water used. The cost for any water used above the contracted amount increases to $290 per acre-foot. The water rate is $77.50 per acre-foot per year for firm water reserved for future use. Under LCRA's Water Conservation Plan Rules, all LCRA municipal wholesale customers must employ water rate structures that are not promotional, meaning the water rate structure must be cost-based and not encourage the excess use of water. LCRA's current water rate structure does not charge different firm water rates for different types of firm water use.

3.6 Customer Cost-Share Program

LCRA's Firm Water Conservation Cost-Share Program provides funding for water efficiency projects and programs established by LCRA's firm water customers. LCRA's firm water customers include cities, utilities, industries, and irrigation and recreational water users. Cost-share funds are available to projects that result in measurable water savings. Since 2019, LCRA has awarded $700,000 while leveraging an additional $13 million in cost-share funding provided by recipients. LCRA provides funding of up to 50% of the project cost or an annualized cost of $155 per acre-foot (the current raw water rate), whichever is less. Projects

funded in the past five years include converting irrigated areas from raw or potable use to recycled water; decreasing utility system water loss including projects to recycle water in the water and wastewater treatment processes; improving irrigation efficiency through irrigation technology upgrades; and implementation of customer portals and utility-side tracking tools for water loss in conjunction with projects to convert metering systems from manual or drive-by monthly readings to automated metering infrastructure (AMI). Applications are accepted twice yearly. LCRA plans to increase funding for this program in the next five years and expand the types of entities that are eligible to receive funding.

3.7 End-User Conservation Incentives

LCRA offers up to $600 per year per property in rebates for WaterSense smart irrigation controllers, irrigation system evaluations, pressure-reducing irrigation technology, soil moisture sensors and rain sensors, pool filters and covers, aeration, soil testing, and compost and mulch for residential end-users of LCRA's wholesale customers. In 2019, LCRA began accepting rebate applications online. Since 2020, LCRA has processed 1,287 rebate applications and awarded $138,085 in rebates. LCRA plans to increase funding and marketing efforts to enhance program awareness and participation over the next five years.

LCRA's Commercial, Industrial, and Institutional (CII) Rebate Program helps businesses, industries, schools, churches, and other institutions that directly or indirectly receive water from LCRA incorporate new water-saving equipment and practices. LCRA offers rebates up to $125 per hour for outdoor audits (not to exceed $2,000), or up to $125 per hour for indoor and outdoor water audits (not to exceed $5,000). The program provides rebates to replace inefficient plumbing, irrigation equipment, or process change outs up to a fixed dollar amount or cost per acre-foot saved, based on recommendations from indoor and outdoor water audits. A facility can receive a rebate of up to $1,500 per fiscal year for irrigation equipment upgrades, aeration, compost and mulch, soil moisture sensors, and rain sensors. LCRA also has a grant that awards up to 50 percent of the project cost, up to $20,000, for large- scale rainwater harvesting, air-cooled ice machines, HVAC condensate recycling and other water-saving technology.

3.8 Landscape Irrigation Evaluations

LCRA offers irrigation evaluation training to staff members who work for LCRA wholesale water customers. As of 2022, 10 LCRA municipal customers offer irrigation evaluations to their customers. LCRA also offers rebates up to $100 for irrigation evaluations as part of its residential rebate program and up to $5,000 for an indoor and outdoor water audit for CII customers. 118 wholesale customers end-users have received rebates for irrigation evaluations since 2020. LCRA also offers evaluations to domestic users. LCRA will continue to partner with firm water customers to increase participation.

3.9 Public Education and Awareness

Community Outreach

LCRA staff regularly speaks to community groups such as homeowner associations, individual businesses, non-profit groups such as master gardeners and business groups, and firm water customer meetings.

LCRA's water conservation website, WaterSmart.org, provides educational materials and links to additional water conservation resources, including cost-share incentive and rebate programs. LCRA is working to expand participation in its water-saving programs.

WaterMyYard Program
LCRA has partnered with Texas A&M AgriLife Extension on its WaterMyYard program, which was developed to provide homeowners with scientific data to determine how much water they should use for their yards. The WaterMyYard website provides homeowners with recommendations on how many minutes to run their irrigation systems based on their utility's current recommended irrigation schedule, their sprinklers' precipitation rates, the water holding capacity of their soil, and evapotranspiration rates based on their location within the service area and proximity to the LCRA sponsored weather stations.

LCRA contributes local climate data to the website collected from eight LCRA Hydromet weather stations. WaterMyYard participants are notified weekly how long to run their irrigation system based on the climatic conditions such as rainfall, solar radiation, temperature, and wind speeds that occurred during the past week. LCRA will continue to promote this program within the service area.

Regional Partnerships
LCRA helped develop the annual Central Texas Water Conservation Symposium, a daylong workshop for community leaders featuring water conservation experts from around Texas and the United States and continues to have an active role in organizing and funding the yearly event. LCRA joins other central Texas water suppliers and local environmental groups in the central Texas area in supporting the symposium, which generally has about 150 attendees. Participants share information and promote water efficiency education, legislation, programs, technologies, and other integral components of water conservation.

3.10 School Education

LCRA Parks
LCRA Parks operates two natural science centers that provide educational and recreational programming to youth and adults. The LCRA Parks mission is to protect natural resources; provide access to parks, lakes, and tributaries of the lower Colorado River for public recreation; and to promote land and water stewardship through education and recreation programs and services. Natural science programs educate pre-kindergarten through 12th grade students and various community groups about water quality, water conservation, wildlife, geology, and other science and natural history curriculums, reaching over 23,000 visitors annually.

Colorado River Alliance Programs
LCRA provides guidance and technical assistance to the Colorado River Alliance (CRA), which provides a Colorado River water education program, including information on water conservation, to third to fifth graders at LCRA's Redbud Center. The program raises student awareness of the Colorado River in Texas and increases conservation and stewardship of the river through hands-on, field-based learning.

3.11 LCRA Facilities

LCRA facilities staff ensure the irrigation systems on LCRA grounds, particularly at the General Office Complex (GOC) and the Dalchau Service Center in Austin, are maintained to minimize leaks and ensure uniform distribution. Facilities staff members have performed irrigation system audits of GOC grounds. Staff plan to continue annual irrigation evaluations of the irrigation systems on LCRA grounds.

Additionally, LCRA facilities and water conservation staff members work with CRA and local native plant experts to maintain the native plant flora at the Redbud Center, which is part of the water education curriculum CRA provides.

3.12 Municipal Customer Mandatory Requirements

There are several types of regulatory requirements that have been adopted proactively by LCRA municipal customers or are required by the state for larger municipalities. LCRA enforces a watering schedule for its domestic use customers, and municipal firm water customers enforce watering schedules for their end users.

Irrigation System Standards
Texas Local Government Code Section 401.006 requires all municipalities with a population of more than 20,000 to adopt landscape irrigation ordinances that follow TCEQ rules for irrigation design, require the installer of an irrigation system to be licensed, require a permit prior to installing an irrigation system, and include minimum standards for the design, installation and operation of irrigation systems. This applies to several large LCRA customers, and several additional customers have adopted these standards on their own. As of 2022, 14 LCRA customers have a permitting and inspection program to implement the TCEQ landscape irrigation standards for new irrigation systems.

Permanent Mandatory Watering Schedules
LCRA updated its Water Conservation Plan Rules in November 2022 to require its customers to adopt a permanent no more than twice weekly watering schedule. This measure not only saves a substantial amount of water, but lowers peak use during the summer, reducing pressure on water treatment plants and extending the period of time before a new water treatment plant is needed.

3.13 City of Austin/LCRA Water Partnership

In 2008, LCRA and the City of Austin agreed to a cooperative structure known as the Water Partnership. The Water Partnership is in place to jointly evaluate, plan and implement approved strategies to optimize water supplies in the basin. LCRA and Austin also have improved the efficiency with which water is released from the Highland Lakes for downstream uses by increasing coordination on daily diversions to Austin water treatment and power plants, return flows from Austin wastewater treatment plants, and Austin's operation of Longhorn Dam.

3.14 Conservation Research and Verification

LCRA partners with customers and other research organizations to promote innovative measures and determine water savings.

LCRA compiles annual progress report surveys from its water customers to track progress on water conservation goals, develops its own program implementation reports to the Texas Water Development Board (TWDB) and plans future programs.

LCRA monitors water savings using a conservation tracking tool developed by the Alliance for Water Efficiency (AWE). This tool was developed to be used at the retail level and can provide a detailed cost benefit analysis of individual conservation strategies.

In 2022, LCRA contracted with Freese & Nichols to develop a model to verify conservation related water savings for LCRA's nine largest municipal customers, excluding the City of Austin. The model projected water demand over time, taking weather-related factors and the presence of drought restrictions into account and compared those projections to actual use to estimate water savings from conservation efforts. The study found a decrease of about 2 GPCD per year in water use since 2010, estimating a total water savings of about 11,000 a-f per year in 2022 for the subset of LCRA's nine largest customers. The study also compared this "top-down" approach to the "bottom-up" approach LCRA uses to estimate annual savings reported to TWDB using the AWE tracking tool and validated that LCRA's methodology for estimating savings is reasonable and lower than the savings estimated using the model-based "top-down" approach. The study also noted that LCRA's annual savings estimating methodology does not include TWDB plumbing code savings. LCRA used the study in setting the 2024 Water Conservation plan goals for firm water contract use.

LCRA is working with Freese & Nichols on an update to the water supply resource report by the end of 2024. The update will analyze the costs and benefits of various future water supply strategies, which will include several municipal and agricultural water conservation related strategies.

4.0 Agricultural Water Conservation Strategies

LCRA continues to reach milestones completing significant water conservation related projects in its agricultural divisions. The 2019 goal of saving 15,000 acre-feet per year was

almost met and would have been surpassed if the drought had not required LCRA to cut off interruptible stored water from lakes Buchanan and Travis to customers in the Lakeside and Gulf Coast agricultural divisions in 2023. The conservation strategies implemented in the Garwood Agricultural Division, which continued to receive water in 2023, were instrumental to retaining savings. As of 2023, the three-year rolling average annual water savings in the agricultural divisions is 14,769 acre-feet. The averaging, as reported, factors in reduced savings in years in which supply was curtailed. A detailed explanation of the components of the total savings amount can be found in the HB 1437 annual report, which is updated annually. In 2019, LCRA completed automation and rehabilitation of main gates along all main canal lines in the Gulf Coast division and in 2023, LCRA completed automation of main gates in the Garwood division.

Laser land leveling grants distributed between 2006 and 2013 continue to generate water savings when those fields are in production, but savings from fields that reached their 15-year life cycle began to expire in 2021. In 2023, LCRA launched a laser land leveling recertification cost-share program to touch up fields with a permanent levee design and redesign fields with temporary levee designs to have permanent levee designs.

4.1 Monitoring and Records Management Strategy

LCRA agricultural divisions are operated to maximize water efficiency under Canal Operating Procedures guidelines. An irrigation coordinator manages the delivery of water to customer fields in each canal section, collecting on-farm water measurements, checking the system for leaks, high canal levels and potential water waste daily. Water orders are placed with the irrigation coordinator, who then generally has a set number of days to deliver water to the customer field. Canals are managed daily, and water is adjusted based on system demand. Daily measurements are entered into LCRA's billing system software, which tracks volumetric water use for each field.

LCRA maintains irrigation water use and sales records through the Water Application Management System (WAMS) and contract information is stored in LCRA's contract repository. A map indicating the Texas land survey number and outlined fields in production is attached to each irrigation contract at the local division office. The contract contains acreage for each land survey and is scanned and uploaded. Field location information is maintained in a GIS platform. The WAMS billing system includes a customer portal that has automated standard water use reports that provide a running total of water use data by field and by structure as well as detailed data by watering event. This information is updated at least weekly during the irrigation season.

4.2 Agricultural Water Rates

LCRA's current rate structure applies per acre-foot of water delivered. Agricultural irrigation water rates vary for each agricultural division. Information about the rates for all three divisions is available upon request. Interruptible customers are subject to tiered pricing which encourages conservation. This pricing has been implemented at all the agricultural divisions in the form of surcharges, which apply when water use exceeds certain established limits. These surcharges can increase the effective rate for the water delivered to more than 2.5

times the per acre-foot charge. Through the customer portal mentioned above, customers are regularly provided with water use information, so they are aware of the potential for high water use to result in surcharges. Surcharges have resulted in fewer customers and fewer fields with high water use.

Volumetric measurement also is an important strategy to support the verification of savings for other conservation strategies such as precision land leveling. In 2021, LCRA worked with the University of Wisconsin to complete a study to quantify savings from conservation strategies in Garwood. Based on that study, LCRA updated the savings estimate for the Garwood volumetric measurement project completed in 2012 to 0.33 acre-foot per acre in production. LCRA will continue to monitor and measure water use to encourage efficient use of water in the agricultural divisions.

4.3 Automation and Modernization of Gates

In 2019, LCRA completed the Gulf Coast gate rehabilitation and control project. From 2020-2023, LCRA automated 46 main canal gate structures in the Garwood Agricultural Division. A TWDB grant helped cover the project cost. The project was different from earlier gate projects, because the main canal gate structures in Garwood had metal slide gates in good condition and only needed to be automated. In 2023, LCRA began a pilot gate automation project in the Lakeside division to automate one main structure on the Chesterville line of the Lakeside canal system. The pilot project will test a gate design that will incorporate an overflow to pass high canal flows resulting from rainfall in the Lakeside system. LCRA plans to continue gate automation in Lakeside with the goal of completing main gate structures within the next five years. Automation of Lakeside gates is in LCRA's 2023 10-year capital plan.

4.4 Canal Lining

LCRA has shifted the focus of future canal lining efforts to canal lines servicing industrial customers, which are used year-round. LCRA is evaluating the cost effectiveness of different canal lining options in these areas and will prioritize lining of segments with higher-than-average water loss. A pilot project conducted to line a small area with known seepage issues with bentonite clay was a successful and cost-effective solution. LCRA is exploring whether this option could be scaled to larger canal lines and longer segments. LCRA could implement a lining project in the next five to 10 years, subject to availability of funding.

4.5 Precision Land Leveling

In October 2022, the LCRA Board of Directors approved a new land leveling recertification program to upgrade fields previously leveled through the Natural Resource Conservation Service's Environmental Quality Incentives Program (EQIP) with temporary levee designs or recertify fields with permanent levee designs that are still reliably saving water. By leveling land, the average required field flood depth is reduced, which increases the efficiency of water used on individual fields. NRCS defines the useful life of projects in the EQIP program. Per NRCS, the useful life of precision land-leveling projects is 15 years. LCRA's previous land leveling program was from 2006 to 2013, so using the NRCS definition, the useful life on

land LCRA awarded cost-share grants began maturing in 2021. The new program incorporates more stringent requirements than the EQIP program, based on findings from savings verification studies, and includes funding for structures for water control. These new requirements include a permanent levee field design with an average field levee density of less than 0.10 levees per acre. In recent years, NRCS has not funded recertification of previously leveled projects and does not require permanent levee field designs, so LCRA's program no longer operates in conjunction with EQIP.

In 2023, LCRA executed 25 contracts to redesign or regrade 1,970 acres. As of February 2024, this work is complete on 376 acres. Producers have up to two years to complete the releveling work following contract execution. LCRA plans to continue this program through the next five to 10 years, subject to availability of funding.

In 2024, LCRA expects to complete a study began in 2021 to update a 2012 savings verification study conducted by LCRA and The University of Texas LBJ School of Public Affairs. The original study quantified water savings from on-farm precision land leveling in the Lakeside division for five years using LCRA billing data and detailed farmer surveys. The study showed that precision land leveling accounted for 0.30 acre-feet of water saved per acre for the first crop when compared to unleveled fields. LCRA has revised this estimate to 0.46 acre-feet per acre by extrapolating water savings for second crop from the savings for first crop based on average water use.

In 2020, the model for this study was updated and used for a similar survey and analysis on water use data in the Garwood division. Based on findings from both savings' verification studies, LCRA added a maximum levee density requirement to field designs to qualify for participation in the land leveling recertification program.

5.0 WHOLESALE POWER GENERATION

5.1 Introduction

Most of the water use characteristics of a power plant are fixed once the facility has been built. Modifications to make it more thermodynamically efficient can result in small reductions in water use, similar to the way new pollution abatement practices are designed. These small changes on a plant-by-plant basis are important to the water conservation potential for LCRA's electric generation system because energy conservation efforts can directly impact water use.

This chapter will provide information on LCRA power plants -- Fayette Power Project (FPP); Lost Pines Power Park, including Sim Gideon and Lost Pines 1 power plants; Winchester Power Plant; and the Thomas C. Ferguson Power Plant -- and how a new generation mix and conservation efforts impact water use.

Unless otherwise noted, all generating capacity and energy values in this Industrial Water Conservation section refer to gross generation in units of megawatt hours (MWh) or kilowatt hours (kWh). "Gross" power values represent the total production from a generator. "Net" power values represent the remaining power after plant power usage has been subtracted. Gross power better reflects the water used for power production. In addition, the capacity values in this section represent the output levels that the generating units can dependably produce in the summer (Gross Dependable Capacities).

5.2 Baseline Profile

As of 2023, LCRA provides wholesale electric power to over 30 city utilities in a 53-county service area, as seen in Figure 5-1.

LCRA operates one gas-fired steam powered generating facility, one coal-fired steam powered generating facility, two combined cycle combustion turbine facilities, and a combustion turbine peaking facility. FPP has three units, two of which are owned jointly with Austin Energy. The power plants that LCRA currently operates have a total dependable gross capacity of 3,854 MW, as summarized in Table 5-1.

A small portion of LCRA's electric generation is from renewable sources – hydroelectric, solar and wind power. LCRA operates six dams along the Colorado River: Buchanan (forming Lake Buchanan); Inks (forming Inks Lake); Wirtz (forming Lake LBJ); Starcke (forming Lake Marble Falls); Mansfield (forming Lake Travis) and Tom Miller (forming Lake Austin). Two of the lakes created by the dams, Buchanan and Travis, are water supply reservoirs. Together, the hydroelectric plants at each of the dams have more than 295 MW of capacity, but do not consume water for generating operations. Typically, hydroelectric generation only occurs during a water release intended for another purpose.

Figure 5-1 LCRA Electric Power Service Area

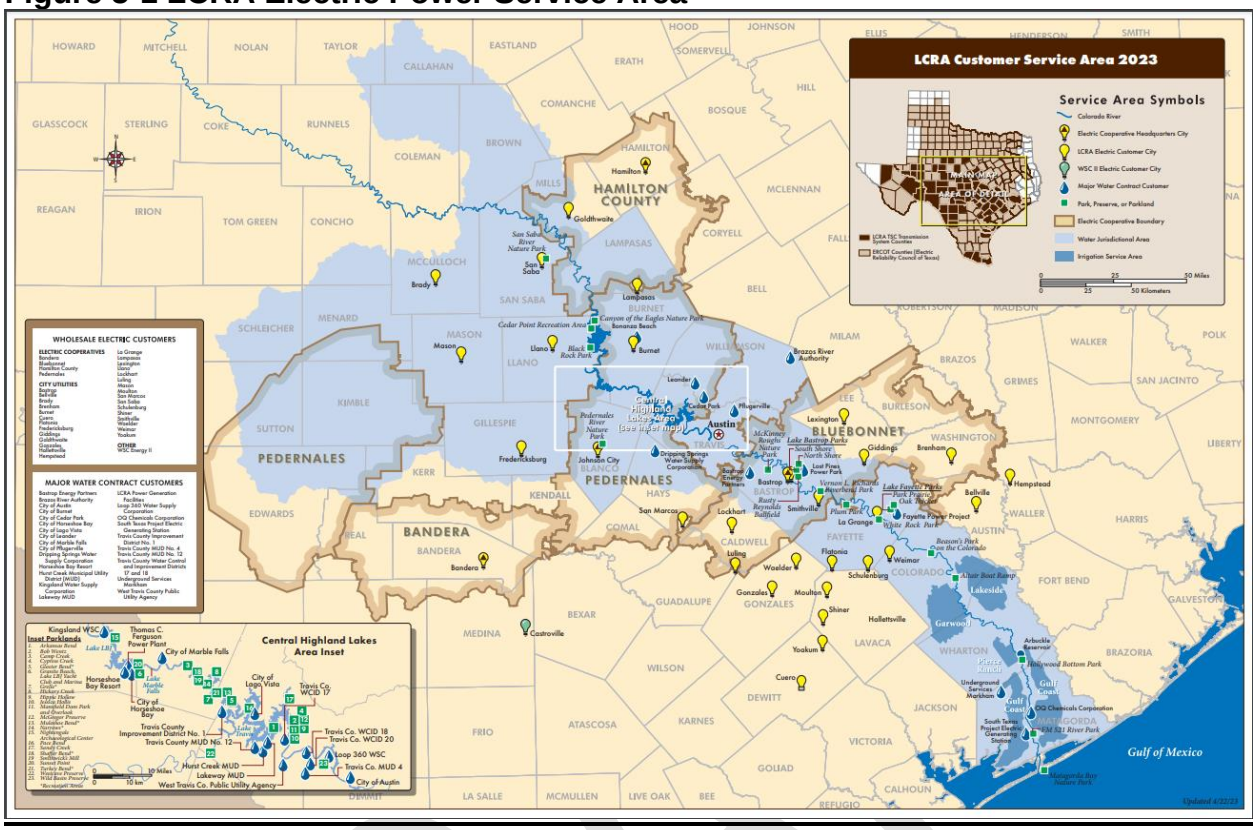


Table 5-1 Summary of the Generating Capacity operated by LCRA in the Lower Colorado River Basin (Region K)

Power Plant	Location	Type of Plant	Mega-watts	Year Begun
Lost Pines 1	Bastrop	Gas Fired Combined Cycle	518	2001
Sim Gideon	Bastrop	Gas Fired Steam	626	1965
Fayette Power Project	Fayette County	Coal Fired Steam	1,708[1]	1979
Hydroelectric Power	Various Locations	Hydroelectric Turbine	295	1930's
Winchester Power Park	Winchester Texas	Gas Fired Combustion Turbine	180	2010
Ferguson Power	Horseshoe Bay	Gas Fired Combined Cycle	527	2014

[1] Austin Energy co-owns two FPP units. Austin Energy owns 624 MW and LCRA owns 1,084 MW.

5.2.1 Water Use

Once a power plant is built and put into operation, the opportunities to reduce its water use per kilowatt hour (kWh) are somewhat limited. With the commissioning of Lost Pines 1 in 2001 and continuing with Winchester and Ferguson Power Plant, all LCRA's additional generation capacity has been designed to help conserve water and energy. Some water reuse values have been recategorized from previous versions of the plan.

Table 5-2 Water Usage Summary and Comparison

Power Plant	Average Annual Water Usage 2020 – 2022, acre-feet per year	Water Usage, gallons per MWh	Average Annual Savings over conventional steam plant (FPP), acre-feet per year	Year Begun
Sim Gideon	3,976	1,685	N/A	1965
Fayette Power Project	10,382	330	N/A	1979
Lost Pines 1	1,178	135	2,396	2001
Winchester Power Park	3	5	50	2010
Ferguson Power Plant	1,220	116	2,241	2014
Current Total	16,754	N/A	3,896	

Table 5-3 Water Reuse

	Direct Reuse, acre-feet per year	Indirect Reuse, acre-feet per year
FPP	520	554
Lost Pines Power Park		155
Ferguson Power Plant		49
Total	520	758

5.2.2 Natural Evaporation

Natural evaporation occurs on any water surface. LCRA does not report natural evaporation as used or consumed water because it would occur whether the power plants existed or not. However, LCRA monitors evaporation and precipitation at the FPP weather station and also obtains data from the TWDB website: https://waterdatafortexas.org/lake-evaporation-rainfall.

In Central Texas, the average annual gross evaporation from pond surfaces typically exceeds the average annual amount of precipitation that falls on pond surfaces. The level of Lake Bastrop is generally maintained at approximately 449.3 feet above mean sea level (feet msl) from October through March each year and is raised to 450 feet msl in the summer; thus, the surface area varies between 880 acres in the winter and 906 acres in the summer. By reducing the surface area in the winter, natural evaporation is reduced by a very small amount, but more storage capacity is made available to capture runoff, if it occurs. Based on precipitation and natural evaporation data available from TWDB for 2020-2022, the annual net evaporation for Lake Bastrop (natural evaporation minus precipitation) averaged 891 acre-feet per year.

The normal operating levels for Cedar Creek Reservoir are 388 feet to 391 feet above mean sea level. The resulting surface area of the reservoir is between 2,316 and 2,450 acres. The 2020 – 2022 average annual net evaporation for Cedar Creek Reservoir (natural evaporation minus precipitation), based on the TWDB database, averaged 1,999 acre-feet per year.

Based on precipitation and natural evaporation data available from TWDB for 2020- 2022, the annual net evaporation for Lake LBJ (natural evaporation minus precipitation) averaged 12,863 acre-feet per year.

5.3 Water Conservation Savings and Goals

Currently, estimated water savings as a result of the combustion turbines at Lost Pines 1, Ferguson and Winchester generation is 3,896 acre-feet per year. This equates to an LCRA system-wide consumed water savings of 23%., Table 5-2 summarizes this water usage. Table 5-3 summarizes water reuse at LCRA power plants. The direct reuse total of 520 acre-feet per year and the conservation total of 3 acre-feet per year (see Appendix C Section 3) are incorporated into LCRA's water conservation goals listed in Section 2.3.

Energy and water efficiency programs save water at the point of use and reduce the energy needed to pump, treat, and distribute water and wastewater. This reduction in energy use can equal an estimated 2 to 4 kilowatt-hours per 1,000 end-use gallons of water saved.

LCRA looks for opportunities to save and reuse water at its power plants. LCRA will also continue to track water use per MW of generation at each of its power plants to help ensure efficient use of water. Further detail on the specific conservation strategies and associated water savings amounts are provided for each of LCRA's power plants in Appendices B-D.

5.4 Systemwide Conservation Strategies

5.4.1 LCRA POWERHOUSE Education Program

LCRA's POWERHOUSE energy investigation program teaches middle school students and their families about the effects of energy use on natural resources and the environment. Utilities sponsor the program for schools within their service areas. POWERHOUSE also helps users estimate water usage and costs.

5.4.2 Metering and Leak Detection

All water diverted from the Colorado River is metered using pump curves and other methods approved by TCEQ for water diversions. The plant master meters, per LCRA rules, are maintained within an accuracy of plus or minus 5% in order to measure and account for the amount of water diverted from the source of supply. The Cedar Creek dam is equipped with monitoring equipment. Leaks that occur within the structure of the power plant are easily visible. Major flows of water such as the cooling water pumps are monitored at all plants.

5.5 Conservation Plans for LCRA Power Plants

Water conservation plans for each LCRA power plant are found in Appendices B-D.

APPENDIX A

Municipal Firm Water Customer Contracted Use – 2019-2023

Customer Name	2019	2020	2021	2022	2023
AQUA TEXAS D/B/A PECAN UTILITIES	0.0	0.0	26.0	41.3	34.8
AQUA TEXAS, INC. - BARTON CREEK LAKESIDE WATER SYSTEM	0.0	0.0	38.3	50.9	160.3
AQUA UTILITIES, INC D/B/A AQUA TEXAS (RIVERCREST)	374.8	409.5	378.9	500.3	479.0
AUSTIN YMBL SUNSHINE CAMPS	0.3	0.3	0.1	0.3	0.6
BRAZOS RIVER AUTHORITY	322.1	863.7	841.7	3,231.2	4,744.7
BRYANT, KATHIE	22.9	27.6	18.4	15.7	25.1
CAMP LONGHORN, LTD	70.7	63.2	50.9	86.6	75.3
CITY OF AUSTIN HANDCOX WTP	28,520.5	28,575.2	32,053.0	29,011.4	25,813.6
CITY OF BURNET	416.3	466.2	439.1	500.8	653.9
CITY OF CEDAR PARK	15,552.1	16,617.0	14,841.8	16,194.3	16,425.0
CITY OF COTTONWOOD SHORES	152.2	144.5	129.8	167.7	170.9
CITY OF DRIPPING SPRINGS	103.9	148.8	192.8	342.4	352.6
CITY OF GRANITE SHOALS	438.7	457.2	400.2	445.1	434.3
CITY OF HORSESHOE BAY	2,065.2	2,170.1	1,828.0	2,530.0	2,295.9
CITY OF LAGO VISTA	1,411.1	1,499.0	1,316.4	1,710.3	1,594.1
CITY OF LEANDER	8,653.7	10,615.6	9,450.7	12,039.9	12,335.4
CITY OF MARBLE FALLS	1,442.1	1,560.9	1,364.9	1,815.2	1,793.6
CITY OF PFLUGERVILLE	6,022.7	8,345.5	6,859.1	8,971.9	7,334.6
CORIX UTILITIES TEXAS INC.	245.7	277.5	242.1	284.5	324.7
DRIPPING SPRINGS WSC	701.4	740.7	927.4	1,049.7	1,011.8
EANES ISD	15.3	12.1	14.4	21.4	21.9
HAYS COUNTY WCID #1	424.8	511.3	437.5	560.9	725.7
HAYS COUNTY WCID #2	408.7	517.5	481.7	554.2	409.6
HIDDEN VALLEY SUBDIVISION COOPERATIVE	0.8	0.6	0.2	0.6	0.5
HURST CREEK MUD	1,071.4	1,055.6	852.3	1,236.9	1,051.5
JONESTOWN WSC	712.1	885.5	739.1	945.3	960.1
KINGSLAND WSC	817.1	930.2	837.7	1,057.9	1,001.3
LAKEWAY MUD #1	2,187.5	2,579.5	2,189.2	2,710.4	2,382.1
LAZY NINE MUD #1A	470.8	565.9	484.4	543.4	728.8
LEN D. JORDAN D/B/A SAIL HAVEN WATER SYSTEM	6.9	8.0	7.1	8.8	7.5
LLANO COUNTY MUD #1	66.3	84.3	79.1	80.0	77.8
LOOP 360 WSC	747.5	893.6	731.5	926.6	1,021.0
MONARCH UTILITIES I, LP	81.0	104.1	89.9	132.3	131.4

PECAN UTILITIES CO INC	32.9	39.5	4.8	0.0	0.0
PENINSULA BLUFFS, LP	20.3	26.3	12.8	13.2	11.4
RESORT RANCH OF LAKE TRAVIS, INC.	2.8	3.0	1.2	0.5	0.9
REUNION RANCH WCID	271.3	321.4	307.0	359.8	319.2
SENNA HILLS MUD #1	207.4	236.9	264.8	260.0	225.6
SJWTX D/B/A CANYON LAKE WATER SERVICE CO	177.7	213.2	190.4	236.8	203.9
TRAVIS COUNTY ID #1	0.0	0.0	0.0	0.0	0.2
TRAVIS COUNTY MUD #04	2,072.2	2,133.5	1,907.3	2,770.2	2,419.5
TRAVIS COUNTY MUD #10	84.1	92.6	78.2	119.5	85.0
TRAVIS COUNTY MUD #12	609.4	888.5	816.5	1,126.5	1,219.7
TRAVIS COUNTY MUD #18	188.7	204.2	173.4	227.9	338.3
TRAVIS COUNTY WCID #17	7,236.2	8,099.6	7,263.4	9,330.1	8,851.5
TRAVIS COUNTY WCID #18	729.4	871.2	719.9	985.8	917.4
TRAVIS COUNTY WCID #20	477.5	466.2	392.2	530.8	554.4
TRAVIS COUNTY WCID POINT VENTURE	229.9	257.5	206.9	228.2	241.8
UNDINE DEVELOPMENT LLC	104.8	93.7	80.4	111.8	98.5
VILLAGE OF BRIARCLIFF	271.7	306.1	266.5	336.2	328.9
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	5,589.0	6,371.6	6,745.0	8,094.6	6,392.5
WINDERMERE OAKS WSC	55.2	68.2	44.5	50.7	48.3
Grand Total	**91,887**	**101,824**	**97,819**	**112,551**	**106,836**
Customer Name	**2014**	**2015**	**2016**	**2017**	**2018**

Irrigation Firm Water Customer Contracted Use – 2019-2023

Customer Name	**2019**	**2020**	**2021**	**2022**	**2023**
6D RANCH, LTD	22.0	25.3	15.6	57.3	40.5
APPLIED MATERIALS, INC.	64.0	64.0	64.0	64.0	64.0
AUSTIN COUNTRY CLUB	195.4	218.3	175.9	272.7	266.4
AUSTIN GOLF CLUB, INC.	189.5	198.9	122.6	254.7	232.3
BAE SYSTEMS INTEGRATED DEFENSE SOLUTIONS	3.6	3.6	3.6	3.6	3.6
BARTON CREEK LAKESIDE IRRIGATION CO, INC	119.4	173.8	151.2	181.9	168.8
BARTON CREEK RESORT LLC	238.4	301.7	261.6	356.3	220.2
BLUE LAKE GOLF CLUB, INC.	40.6	11.1	0.0	1.8	0.0
BLUEBONNET HILLS GOLF COURSE, LTD	111.0	0.0	0.0	0.0	0.0

BOOT RANCH HOLDINGS LLC	79.6	50.3	36.3	22.2	35.0
BULL CREEK MANAGEMENT LLC	48.1	45.6	46.4	46.6	66.4
CF RIVER PLACE ARCIS LLC	44.4	103.3	81.0	220.0	131.7
CF TWIN CREEKS ARCIS LLC	187.2	273.1	163.7	161.4	230.9
CITY OF AUSTIN (WALLER CREEK)	141.9	52.7	200.6	163.3	226.9
CITY OF AUSTIN D/B/A GREY ROCK GOLF CLUB	45.9	54.0	54.0	54.0	54.0
CLUBCORP GOLF OF TEXAS LP	143.2	68.6	66.9	95.4	139.0
COLOVISTA COUNTRY CLUB POA	0.0	0.0	0.0	0.0	0.0
ESCONDIDO CLUB, INC.	298.3	312.9	264.4	432.2	381.9
GIACOMO PROPERTIES LLC D/B/A LEGENDS ON LBJ	0.0	0.0	42.6	250.3	269.5
GRAY WOLF GOLF, LLC	0.0	0.0	0.0	23.9	4.5
GREAT HILLS GOLF CLUB OF AUSTIN INC D/B/A GREAT HILLS CC	114.7	131.7	121.1	120.6	153.9
GRIDIRON CREEK RANCH LAKE LEWIS & RIVER BLUFF	0.0	0.0	0.0	42.2	126.3
GRIDIRON CREEK RANCH LTD	0.0	0.0	0.0	11.2	0.0
HIGHLAND LAKE ATHLETIC CORP D/B/A/ CAMP CHAMPIONS	0.0	0.0	0.0	0.0	0.0
HORSESHOE BAY APPLEHEAD ISLAND POA INC.	0.0	0.0	0.0	0.0	0.0
HORSESHOE BAY POA	21.5	21.0	16.0	25.0	21.0
HORSESHOE BAY RESORT LTD	1,091.3	1,159.6	688.2	1,156.0	965.8
HYATT CORPORATION (AUSTIN)	1.9	0.0	0.0	0.0	0.0
HYATT REGENCY LOST PINES RESORT	256.0	278.9	216.8	328.5	284.0
ISLAND ON LAKE TRAVIS COA, INC.	19.2	17.9	14.6	16.7	12.7
KING RANCH TURFGRASS LP	553.2	742.8	630.5	773.2	693.1
LA GRANGE ISD	17.3	20.0	7.0	16.9	8.4
LAKECLIFF DREAM, LLC	344.6	264.6	68.5	438.6	622.7
LAKE POINTE MUD	23.2	11.9	8.0	19.0	26.8
LAKESIDE HEIGHTS INC	0.0	0.0	10.8	31.5	28.8
LCRA FACILITIES	8.6	20.4	13.4	21.4	16.6
MARINA CLUB HOA, INC.	9.8	14.3	6.8	6.6	5.9
PAM MCCASKILL D/B/A AUSTIN ORCHARD	4.9	5.4	13.2	20.3	15.6
PEDERNALES GOLF CLUB, INC.	40.2	43.0	24.6	37.4	40.4
POINT VENTURE POA, INC.	0.8	0.0	0.0	22.4	18.7
POTTS LAND COMPANY, LLC	11.9	12.7	9.2	10.7	12.3
RESERVE AT LAKE TRAVIS RESIDENTIAL COMMUNITY, INC.	102.2	119.0	60.9	74.1	132.0
RICHARD T SUTTLE JR, TRUSTEE	0.0	0.0	0.3	0.0	0.0

RIVER PLACE GOLF GROUP, LP	0.0	0.0	0.0	0.0	0.0
ROUGH HOLLOW SOUTH SHORE II MASTER COMMUNITY, INC.	47.8	21.3	31.4	33.7	39.3
ST. STEPHEN'S EPISCOPAL SCHOOL	47.2	38.0	16.9	52.8	50.0
TEXAS WATER TRADE	0.0	0.0	0.0	292.0	277.8
TOMMY LEE JONES (FLEMING SPRINGS RANCH)	0.0	20.0	20.0	20.0	20.0
TRAILS POA, INC.	12.2	26.3	30.0	20.4	37.7
TRAVIS COUNTY MUD #04	551.2	487.2	170.3	444.5	806.2
TRAVIS COUNTY WCID #17	0.0	0.1	0.0	0.0	21.9
TUSCAN VILLAGE HORSESHOE BAY COMMUNITY, INC.	0.0	0.0	0.0	10.7	16.9
VOLENTE BEACH, INC.	0.5	0.0	0.0	0.0	0.0
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	175.8	139.3	52.0	430.8	302.1
Grand Total	**5,429**	**5,553**	**3,981**	**7,139**	**7,293**

Industrial Firm Water Customer Contracted Use – 2019-2023

Customer Name	**2019**	**2020**	**2021**	**2022**	**2023**
ALAMO CONCRETE PRODUCTS CO	0.0	0.0	0.0	78.3	93.2
BASTROP ENERGY PARTNERS LP	1,582.6	1,863.5	1,282.3	2,035.3	2,254.3
CITY OF AUSTIN D/B/A AUSTIN ENERGY	600.4	3,593.0	2,578.2	5,029.5	3,413.3
INEOS USA OIL & GAS	0.0	9.3	7.2	44.7	0.0
MAGNOLIA OIL & GAS OPERATING LLC	39.3	159.5	62.4	0.0	13.1
OQ CHEMICALS CORP	5,089.5	5,869.9	3,424.6	4,804.0	4,962.9
STP NUCLEAR OPERATING COMPANY[3]	24,028.4	12,794.7	79,094.4	9,955.3	42,137.5
TXI OPERATIONS, LP	36.3	57.5	47.6	40.4	47.0
UNDERGROUND SERVICES MARKHAM LLC	7,686.9	6,636.4	4,526.4	9,448.7	7,184.3
Grand Total	**39,063**	**30,984**	**91,023**	**31,436**	**60,106**

[1] Values are diversions from the river to refill the main cooling reservoir when river water is available and do not reflect consumptive use from the reservoir.

APPENDIX B

LOST PINES POWER PLANT WATER CONSERVATION PLAN

1.0 Lost Pines Power Park Description

Lost Pines Power Park in Bastrop County is comprised of the Sim Gideon Power Plant and the Lost Pines 1 Power Project, co-owned by LCRA and GenTex Power Corporation, an LCRA affiliate. Lost Pines 1, in service since 2001, is a 536 MW natural gas-fired, combined-cycle power plant. Lost Pines 1 has two gas-fired combustion turbines and one steam turbine. The two combustion turbines work much like jet engines, with the waste heat from the two turbines used to generate steam in the heat recovery steam generator (HRSG). Because of this configuration, the plant is 30-40 percent more thermodynamically efficient than a conventional steam electric system.

The Sim Gideon units are conventional steam electric units and are the oldest gas-fired power plants in service in the LCRA system. The three units of Sim Gideon include:

- Unit 1, completed in 1965, with a capacity of 142 MW
- Unit 2, completed in 1968, with a capacity of 142 MW
- Unit 3, completed in 1971, with a capacity of 342 MW

Winchester is a 186 MW “peaker” plant located about 20 miles north of La Grange in Fayette County. Although it is operated from Lost Pines 1, it is not technically part of Lost Pines 1. Winchester has no cooling reservoir and uses simple cycle combustion turbines that require relatively small amounts of water, which helps reduce water consumption in the LCRA generating system.

Both Sim Gideon and Lost Pines 1 are located on Lake Bastrop. TCEQ Certificate of Adjudication No. 14-5473 authorizes LCRA to divert water from the Colorado River and impound it in Lake Bastrop for power plant operations. The reservoir can also capture inflows from the Spicer Creek watershed into the reservoir. LCRA can impound up to 16,590 acre-feet when the reservoir is full. In addition to its surface water rights, LCRA also has groundwater permits that allow a maximum of 10,000 acre-feet per year to be pumped in a single year, and up to 6,500 acre-feet per year on a five-year average.

Lake Bastrop acts as a large cooling pond for Sim Gideon and Lost Pines 1. Water is passed through the power plant condensers to condense steam back into water for reuse in the plant’s steam cycle. Warmed lake water is returned to circulate through the reservoir and cool before being used again. The cooling water from the plants is discharged into a lined discharge channel, which travels approximately one mile and enters the north side of Lake Bastrop. This separation of the discharge from the intake side of the lake prevents short-circuiting and ensures that the full cooling capacity of the lake surface is utilized. Water can also be released back into the river downstream of the lake to pass flood flows.

Between 2020-2022, groundwater use averaged 5,040 acre-feet annually. Between 2020-2022, LCRA diverted no water from the Colorado River into Lake Bastrop.

2.0 Lost Pines Power Park Water Use

The primary water uses at Lost Pines Power Park are cooling pond forced evaporation from condenser cooling and other equipment cooling, boiler makeup water and employee sanitation.

2.1 Condenser cooling

Condenser cooling is the process by which water from a cooling pond is pumped through a heat exchanger to remove waste heat and condense the steam after it passes through the steam turbine. At Lost Pines Power Park, the cooling pond (Lake Bastrop) water is heated between approximately 6 to10^{o} F as it passes through the condenser. This warm water is then circulated back into and through the reservoir for cooling by the processes of evaporation, convection and radiant cooling.

In 2020, 2021 and 2022, Lost Pines 1 produced an average of 2,769,413 MWh each year - an average of 969,295 MWh per year from the steam turbine and 1,800,119 MWh per year from the two combustion turbines. Thus, the combustion turbines generate approximately 65 percent of the Lost Pines 1 power output, and the steam turbine generates approximately 35 percent.

Because the Lost Pines 1 combustion turbines reject very little heat to the cooling pond, Lost Pines 1 causes much less forced evaporation than an equivalent steam unit. If the Lost Pines 1 steam turbine has a heat rejection characteristic comparable to the similarly loaded FPP units, and using the method developed by George Ward[1] as an improvement to the Harbeck diagram method, Lost Pines 1 forced evaporation for 2020-2022 is an average of 1,096 acre-feet per year. The combustion turbines do use a small amount of cooling water for cooling (i.e. lube oil coolers). This amount is factored into the calculation of the steam turbine heat rejection.

Generation from the Sim Gideon facilities has increased considerably over the past five years. The average generation from the facility was 761,285 MWh annually between 2020 and 2022. The increase in output has increased the contribution of the facility toward the forced evaporation of Lake Bastrop. The forced evaporation attributable to the Sim Gideon units averaged 3,890 acre-feet annually from 2020 to 2022.

The total steam generation output for both Lost Pines 1 and Sim Gideon facilities averaged 3,530,699 MWh per year over the 2020-2022 timeframe. The Lost Pines 1 steam turbine produced an average of 78% of the steam power generated at Lost Pines Power Park and the Sim Gideon facilities produced the remaining 22 percent.

2.2 Boiler makeup water

Boiler makeup water is taken from wells on the LPPP facility. It is treated by filtration, reverse osmosis (RO) and ion exchange before being used in the boiler. The resulting water is extremely pure. High purity water is also used in the laboratory and for cooling of the gas turbines inlet air. Based on recent operating levels for these two facilities, approximately 168 acre-feet a year are used for this purpose. Another 143 acre-feet are returned to the cooling pond reservoir for reuse.

2.3 Employee sanitation

Employee sanitation facilities use potable water purchased from the Aqua Water Supply Corporation. The two power plants at Lost Pines Power Park have about 40 plant and office personnel. Lost Pines Power Park purchases approximately 2 acre-feet of potable water per year according to LCRA records and the water balance. A wastewater treatment plant at Lost Pines Power Park treats human wastewater and discharges most of the effluent to an onsite sewage facility spray field. The balance is sent to the cooling pond for reuse as cooling water. This report assumes that one-half of the potable water is consumed, or 1 acre-foot per year for years 2020-2022.

2.4 Landscape irrigation

In an effort to reduce freshwater usage, Lost Pines Power Park has eliminated landscape irrigation at the facility.

Table 1 Summary of Estimated Water Use for the Lost Pines Power Park – 2020-2022

Type of Use	Lost Pines 1 Acre-feet/year	Sim Gideon Acre-feet/year	Combined Acre-feet/year
Forced Evaporation	1,096	3,890	4986
Boiler Makeup	82	86	168
Employee Sanitation	1	0	1
Total	**1,179**	**3,976**	**5,154**

Lost Pines 1 uses 23 percent of all consumed water and Sim Gideon uses 77 percent.

Table 2 Summary of Estimated Water Use for Winchester Power Park – 2020-2022

Type of Use	Acre-feet/year
Combustion and generation enhancement	3
Total	**3**

Based on an average generation for the years 2020-2022 and the water use above; Lost Pines 1 utilizes 0.135 gallons per kWh or 135 gallons per MWh. The Sim Gideon Plant utilizes 1.685 gallons per kWh or 1,685 gallons per MWh. Winchester Power Park utilizes 0.005 gallons per kWh or 5 gallons per MWh.

3.0 Lost Pines Power Park Water Conservation Goals and Strategies

The following are water conservation features for Lost Pines Power Park:

- Lost Pines 1 combined cycle power plant is the most significant conservation feature of Lost Pines Power Park. This saves at least 1,654 acre-feet per year over what a conventional steam electric plant would use. Lost Pines 1 savings are based on water usage rates of the similarly loaded FPP units, applied to the non-steam, combustion turbine generation of Lost Pines 1.
- Low-NOx burners and selective catalytic reduction technology instead of water injection. This technology controls nitrogen oxides during combustion without water, potentially reducing water usage of up to 503 acre-feet per year.
- Water conservation discussions during monthly safety meetings. *
- Aggressive repair of potable water leaks both within the plant and up to the water meter just outside of the plant boundaries. *
- Aggressive repair of service water leaks within the plant. *
- Indirect reuse due to boiler water production rejects and sanitation water processing totals 44 acre-feet per year.
- The use of groundwater for plant use has eliminated delivery losses for water released from lakes Buchanan and Travis by an average of 145 acre-feet per year.

*These items save an estimated 1 acre-foot per year combined.

Future conservation strategies include:

- Maintaining zero water use for landscape with a savings goal of 1 acre-foot per year.
- Continuing existing water conservation strategies outlined above.

APPENDIX C

FAYETTE POWER PLANT WATER CONSERVATION PLAN

1.0 Fayette Power Project Description

- FPP is a coal-fired steam electric power plant. Beginning operation in 1979, the three-units have a generating capacity of 1,708 MW. Unit 1, completed in 1979, with a gross dependable capacity of 624 MW (co-owned with Austin Energy)
- Unit 2, completed in 1980, with a gross dependable capacity of 624 MW (co-owned with Austin Energy)
- Unit 3, completed in 1988, with a gross dependable capacity of 460 MW

FPP is in Fayette County on Cedar Creek Reservoir. (The reservoir is sometimes referred to as Lake Fayette or Fayette County Reservoir.) Certificate of Adjudication 14-5474 authorizes LCRA to impound up to 74,140 acre-feet in the reservoir. LCRA is authorized to divert up to 73,759 acre-feet per year of water from the Colorado River to the reservoir for industrial purposes under Certificates of Adjudication Nos.14-5478 and 14-5482. As part of 14-5474, LCRA is also authorized to impound inflows from the Cedar Creek Watershed. LCRA is authorized to divert, circulate and recirculate from Cedar Creek Reservoir for industrial purposes. LCRA is also authorized to divert water under water right 14-5434E (the amended Garwood right) for use at FPP. The City of Austin has its own water right, no. 14-5471, for the diversion of up to 24,000 acre-feet per year from the Colorado River, plus a contract with LCRA for 7,500 acre-feet per year.

The surface water is pumped from the Colorado River through a pipeline to maintain lake levels. The metered diversions from the river for 2020, 2021 and 2022 measured 13,361 acre-feet, 12,766 acre-feet and 14,358 acre-feet per year, respectively, for an average of 13,495 acre-feet per year. These values include both LCRA and Austin Energy portions. Additional water is captured from the Cedar Creek watershed and impounded.

There are several smaller industrial waste ponds on site, including the Reclaim Pond, the Coal Pile Runoff Pond (CPRP), the Combustion By-products Landfill Pond (CBLP) and the Ash Silo Area Pond. Water from CPRP, CBLP and the Ash Silo Area Pond are capable of transferring water to the Reclaim Pond, along with other sources from the plant for reuse.

2.0 Fayette Power Project Water Use

Water is currently used at FPP for the following:

- Cooling pond forced evaporation from condenser cooling and other equipment cooling;
- Stack gas scrubbers for air pollution control on Units 1, 2, and 3;
- Natural evaporation from the various industrial waste ponds;
- Boiler soot blowing and venting;
- Boiler seal systems and bottom ash removal systems;

- Plant wash-down systems and dust suppression; and
- Potable water purchased for employee sanitation and landscape irrigation.

2.1 Condenser cooling

The cooling pond water at FPP is heated between approximately 8 to 20^{o} F as it passes through the condenser heat exchangers. This warm water is then circulated back into and through the reservoir to cool by the processes of evaporation, convection and radiant cooling. During 2020-2022, FPP generated a total of 30,752,898 MWh or an average of 10,250,966 MWh per year. Based on the previously mentioned method by George Ward, the forced evaporation for all three units due to condenser cooling calculates to an average of 7,918 acre-feet per year. Unit equipment upgrades have led to reduced water usage over previous years.

Water from Cedar Creek Reservoir also cools a variety of mechanical equipment. Based on historical test data, this cooling water stream rejects approximately 2 percent as much heat to the lake as the condenser cooling water. This results in another 161 acre-feet per year of forced evaporation.

2.2 Stack gas scrubbers

Stack gas scrubbers are used to remove sulfur oxides from the power plant stack gas emissions. All three FPP units have flue gas desulfurization systems and use scrubbers with a slurry of powdered limestone to capture the sulfur oxides. The heat content of the stack gas represents approximately 10% of the energy released through coal combustion at the power plant. Water in the slurry cools the gas to below the water boiling point through evaporation. This process results in approximately 1,833 acre-feet per year of water consumed through evaporation, based on water use testing and the 2020-2022 generating output levels. The resulting slurry from the scrubber process contains calcium sulfate and is a by-product sold to third parties for beneficial reuse.

Much of the water used for the scrubber process can be obtained from the Reclaim Pond which collects water from the following sources:

- Rainwater, both direct and runoff;
- Boiler water treatment processes;
- Domestic wastewater treated effluent; and
- Runoff from other sources.

This Reclaim Pond is an example of an industrial storm and rainwater reuse project.

2.3 Industrial wastewater pond natural evaporation

The Reclaim Pond, CPRP, CBLP and the Ash Silo Area Pond exist to support plant operations. This report categorizes their net natural evaporation (natural evaporation minus rainfall) as used water. During 2020-2022, these ponds had a combined net natural evaporation average of 65 acre-feet of water per year.

2.4 Boiler soot blowing and vents

The boilers use 290 acre-feet per year through soot blowing operations and a variety of ventings to atmosphere.

2.5 FPP Boiler seal systems and bottom ash removal

The bottom ash and seal systems currently use 157 acre-feet per year.

2.6 Plant wash-down systems and dust suppression

FPP uses water to limit the generation, dispersion and accumulation of dust, including coal dust, throughout the plant site. According to a combination of measured flows and FPP Water Balance values, the plant uses 140 acre-feet per year to perform these health- and safety-related tasks.

2.7 Potable water purchases

FPP purchases potable water from the Fayette Water Supply Corporation (WSC) whose source is groundwater from the Carrizo-Wilcox Aquifer. The plant has about 185 personnel. Approximately 16 acre-feet of treated water are purchased annually, of which approximately 1 acre-foot is used for landscape irrigation purposes and 15 acre-feet for employee sanitation. Approximately 11 acre-feet per year of treated wastewater is sent to the Reclaim Pond for reuse.

The plumbing fixtures at FPP are water-conserving based on the current federal standard.

Table 1 Fayette Power Project Estimated Annual Water Use

Type of Use	Acre- feet/year
Forced evaporation	8,079
Scrubbers	1,733
Boiler soot blowing and venting	290
Boiler sealing and bottom ash handling	58
Net natural evaporation from industrial waste ponds	65
Dust control and wash down	140
Employee consumption	16
Landscape irrigation	1
Total	**10,382**

Table 1 indicates that more than 99 percent of the water use at FPP is for plant operation, while less than 1 percent is used for employee sanitation and irrigation purposes. Based on an average generation for 2020-2022 and the above water use, water use per kWh at FPP is 0.330 gallons per kWh or 330 gallons per MWh.

3.0 Fayette Power Project Water Conservation Features and Strategies

Water-saving features for FPP include:

- Water-saving plumbing fixtures for employees: 2 acre-feet per year.
- Minimal landscape watering: 1 acre-foot per year.
- **Total savings: 3 acre-feet per year**.

Direct reuse features for FPP involve using the Reclaim Pond water for:

- Stack gas scrubber makeup: 347 acre-feet per year.
- Various plant wash down locations: 23 acre-feet per year.
- Boiler sealing systems: 150 acre-feet per year.
- **Total direct reuse: 520 acre-feet per year.**

Indirect reuse features for FPP include:

- Recycling CPRP water back to the reservoir: 373 acre-feet per year.
- Sending boiler water production system (reverse osmosis system) process reject water to the reservoir for makeup purposes: 181 acre-feet per year.
- **Total indirect reuse: 554 acre-feet per year.**

APPENDIX D

FERGUSON POWER PLANT WATER CONSERVATION PLAN

1.0 Ferguson Power Plant Description

The Thoms C. Ferguson Power Plant a 527 MW (Gross Dependable, Summer Capacity) natural gas-fired, combined-cycle power plant in Horseshoe Bay, became commercially operational in 2014. Like Lost Pines 1, the Ferguson Power Plant employs two combustion turbine-generators and one steam-powered turbine-generator. As a result, the Ferguson Power Plant incorporates the same water-saving arrangement as Lost Pines 1, in which the two combustion turbines units do not reject heat to the cooling lake and therefore do not cause any forced evaporation.

2.0 Ferguson Power Plant Water Use

The primary water uses at the Ferguson Power Plant are forced evaporation on Lake LBJ from condenser cooling and other equipment cooling, boiler makeup water and employee sanitation.

2.1 Condenser Cooling

Water from Lake LBJ is heated between approximately 6 to 12^{o}F as it passes through the condenser's heat exchange process. This warm water is then circulated back into and through the lake for cooling by the processes of evaporation, convection, and radiant cooling.

In 2020, 2021, and 2022, Ferguson produced an average of 3,417,674 MWh each year – an average of 1,251,928 MWh per year from the steam turbine and 2,165,746 MWh per year from the two combustion turbines. Thus, the combustion turbines generate approximately 64 percent of the power output, and the steam turbine generates approximately 36 percent. Like Lost Pines, the combustion turbines do not reject heat to the cooling lake, causing much less forced evaporation than an equivalent simple cycle steam unit. Ferguson forced evaporation calculates to a 2020-2022 annual average of 1,683 acre-feet.

2.2 Boiler makeup water

Boiler makeup water is taken from Lake LBJ. It is treated by filtration, reverse osmosis (RO) and ion exchange before being used in the boiler. The resulting water is extremely pure. High purity water is also used in the laboratory and for cooling of the gas turbines inlet air. Between 2020 and 2022, Ferguson withdrew approximately 136 acre-feet of water per year for this purpose and returned 45 acre-feet to Lake LBJ.

2.3 Employee sanitation

Ferguson purchases approximately 1 acre-feet of water per year from the City of Horseshoe Bay for employee sanitation facilities.

2.4 Landscape irrigation

There is no landscape irrigation at Ferguson Power Plant.

Table 1 Ferguson Power Plant Estimated Annual Water Use

Type of Use	Acre- feet/year
Forced evaporation	1,128
Boiler Makeup	91

Employee consumption	1
Total	**1,220**

3.0 Ferguson Power Plant Water Conservation Features and Strategies

The following are water conservation features for the Ferguson Power Plant:

- The Ferguson combined cycle design. This uses at least 2,241 acre-feet a year less than a conventional, simple-cycle steam power plant
- Indirect reuse due to boiler water production rejects and sanitation processing totals 45 acre-feet per year.
- Aggressive repair of water leaks within the plant.

* Ferguson savings are based on water usage rates of the similarly loaded FPP units, applied to the non-steam, combustion turbine generation of Ferguson.