

## **Exhibit C**

LCRA Board Resolution Approving WMP  
and Authorization for LCRA Staff  
to Prepare and File WMP

CERTIFICATE

STATE OF TEXAS       §  
                                  §  
COUNTY OF TRAVIS   §

I, Thomas E. Oney, hereby certify that I am the General Counsel and Assistant Secretary of the Board of Directors of the Lower Colorado River Authority (LCRA), a conservation and reclamation district, duly organized and existing under and by virtue of the public laws of the State of Texas.

I further certify that the Board of Directors of LCRA, on December 11, 2018, in a meeting posted properly in accordance with the Texas Open Meetings Act and with a quorum present and voting, unanimously approved a resolution authorizing the general manager or his designee to prepare and submit to the Texas Commission on Environmental Quality for review and approval an application to amend LCRA's Water Management Plan for lakes Buchanan and Travis, as evidenced in LCRA Board Minute No. 18-80, duly recorded in the Board's minutes of the meeting.

I further certify that the attached is a true and correct excerpt from the Board's minutes of the meeting held on December 11, 2018, and of the aforesaid resolution adopted at the meeting.

TO CERTIFY WHICH, witness my hand and official seal this the 19<sup>th</sup> day of February, 2019.



  
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Thomas E. Oney, General Counsel  
and Assistant Secretary of the  
LCRA Board of Directors

EXCERPT FROM THE MINUTES OF THE REGULAR MEETING  
OF THE BOARD OF DIRECTORS  
OF THE LOWER COLORADO RIVER AUTHORITY  
HELD ON DECEMBER 11, 2018

\* \* \* \* \*

**18-80** Upon motion by Director Spears, seconded by Vice Chair Martine, the Board by a vote of 15 to 0 unanimously approved the resolution authorizing the general manager or his designee to prepare and submit to the Texas Commission on Environmental Quality for review and approval an application to amend LCRA's Water Management Plan for lakes Buchanan and Travis, as recommended by staff in Agenda Item 15 [attached hereto as Exhibit M].

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**FOR ACTION**

## **15. Proposed Amendment to Water Management Plan for Lakes Buchanan and Travis**

### **Proposed Motion**

Approve the attached resolution authorizing the general manager or his designee to prepare and submit to the Texas Commission on Environmental Quality for review and approval an application to amend the Water Management Plan consistent with this agenda item.

### **Budget Status and Fiscal Impact**

The proposed action would have no budgetary or fiscal impact on the fiscal year 2019 business plan.

### **Summary**

Under LCRA's water rights for lakes Buchanan and Travis, LCRA was required to develop a WMP and amend the plan as needed. The WMP is an operational plan designed to ensure LCRA can meet firm customer demands without shortage through a repeat of the Drought of Record. The WMP sets forth conditions under which LCRA can provide interruptible stored water for irrigated agriculture while protecting firm customers' demands. The WMP also addresses the environmental flow needs of the lower Colorado River and Matagorda Bay.

The WMP has been revised periodically based on new information, including changed conditions and new scientific studies. TCEQ in November 2015 approved the current WMP.

The TCEQ order approving the 2015 WMP required that LCRA begin the process for revising the WMP no later than Jan. 1, 2018. In January 2018, LCRA staff met with TCEQ to discuss the overall framework for the WMP revision. The framework of the revision includes:

- (1) Maintain combined storage in lakes Buchanan and Travis above 600,000 acre-feet through a repeat of historic hydrology;
- (2) Include additional hydrology through calendar year 2016;
- (3) Update firm and interruptible demands to reflect future conditions through year 2025; and
- (4) Retain a three-tier regime for interruptible agricultural curtailment that considers storage and inflow conditions, plus the use of a look-ahead test.

Beginning in May 2018, LCRA staff held a series of meetings with various interested groups as staff developed the proposed revision to the WMP. Through this process, LCRA staff presented and made refinements to customer demands, approaches for curtailing interruptible stored water, and approaches for providing water to help meet environmental flow needs in the lower Colorado River and Matagorda Bay.

LCRA staff recommends the Board adopt the attached proposed resolution, which authorizes the general manager or his designee to file an application with TCEQ to amend the 2015 WMP to incorporate the changes summarized in the exhibits to the proposed resolution, allowing staff to make non-substantive changes to the staff

proposal presented in this agenda item and to make other clerical changes and appropriate updates. This application will be the basis of a new WMP for TCEQ to then adopt and LCRA to implement.

**Presenter(s)**

John B. Hofmann  
Executive Vice President, Water

Monica Masters  
Vice President, Water Resources

**Exhibit(s)**

- A – LCRA Board Resolution Regarding Revisions to LCRA’s Water Management Plan for Lakes Buchanan and Travis
- B – Summary of Proposed Changes for 2018 WMP Application
- C – Proposed Approach for Interruptible Agricultural Curtailment
- D – Proposed Approach Regarding Environmental Flows

**EXHIBIT A**

**LCRA BOARD RESOLUTION  
REGARDING REVISIONS TO LCRA'S WATER MANAGEMENT PLAN  
FOR LAKES BUCHANAN AND TRAVIS**

WHEREAS, the Lower Colorado River Authority operates its water rights for lakes Buchanan and Travis pursuant to a Water Management Plan; and

WHEREAS, the Water Management Plan is periodically updated; and

WHEREAS, the order approving the current Water Management Plan required that LCRA begin the process for developing a revision to the Water Management Plan by Jan. 1, 2018; and

WHEREAS, as part of the process for developing a proposed revision, LCRA staff has engaged in a process with various interested parties; and

WHEREAS, LCRA staff recommends changes to the Water Management Plan as summarized in Exhibits B, C and D.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors hereby approves the following:

1. The general manager or his designee is authorized to prepare and file an application to amend the Water Management Plan for lakes Buchanan and Travis consistent with the staff proposal summarized in Exhibits B, C and D. Such application may include non-substantive changes to the staff proposal and other clerical changes and appropriate updates; and
2. Following the approval of the proposed revision to the Water Management Plan by the Texas Commission on Environmental Quality, LCRA staff shall implement the approved plan and thereafter convene periodically with interested parties to provide information and a forum for discussion regarding the implementation of the Water Management Plan. Topics for discussion may include the amounts of demand experienced in the basin, the hydrologic conditions and the sources of supply used to meet demands. Discussion also may include identification of possible changes for the subsequent revision to the Water Management Plan. As part of the process for the subsequent revision to the Water Management Plan, staff will work with basin interests to explore ways to incent future advanced water conservation strategies that are costly to implement by allowing a portion of verified water savings from such strategies to be accrued to the direct benefit of the implementing entity as well as the entire basin.

**EXHIBIT B**

**SUMMARY OF PROPOSED CHANGES FOR 2018 WMP APPLICATION**

<b>Issue</b>	<b>2015 WMP</b>	<b>2018 LCRA Proposal</b>
<b>Hydrology</b>	Includes hydrology from 1940 through 2013.	Adds hydrology through 2016; include revisions in other periods with slight changes from TCEQ data.
<b>Other LCRA water rights</b>	Includes assumptions on use of LCRA's downstream water rights.	Adds assumptions on use of LCRA's amended Garwood water right and Arbuckle Reservoir.
<b>Minimum combined storage in lakes Buchanan and Travis for WMP models</b>	Maintains storage above 600,000 acre-feet in period of record through 2013.	Maintains storage above 600,000 acre-feet in period of record through 2016.
<b>Demand scenario</b>	Reflects approximate midpoint between 2010 and 2020 Region K projected demands.	Bases demands on highest expected use for the 2020 to 2025 time frame. Applies weather variability to all demand types.
<b>Approach for curtailing interruptible agricultural supply under different drought scenarios</b>	Includes framework with three curtailment conditions: Extraordinary Drought, Less Severe Drought and Normal. Also includes look-ahead test if storage may fall below specified levels.	Continues framework with three curtailment conditions and look-ahead test. Includes additional test for entering Extraordinary Drought based on shorter-term intense drought conditions similar to those experienced in 2011. See Exhibit C.

Issue	2015 WMP	2018 LCRA Proposal
<b>Application of limits on interruptible stored water for agriculture</b>	Applies interruptible stored water amounts from curtailment curves as strict volumetric limits on the amounts of water available for diversion at the Gulf Coast, Lakeside and Pierce Ranch irrigation operations, with separate allocations for first and second seasons.	Reduces maximum amounts of interruptible stored water available for diversion, and modifies curtailed amounts of interruptible stored water. Modifies combined storage trigger level for entering Less Severe Drought in first and second seasons from 1.6 million to 1.5 million acre-feet and modifies trigger level for a partial curtailment of second season under Normal conditions from 1.55 million to 1.4 million acre-feet. See Exhibit C.
<b>Limit on releases of interruptible stored water</b>	Not included.	Adds a maximum limit on releases of interruptible stored water. See Exhibit C.
<b>Anytime (or mid-crop) cutoff for interruptible agricultural supply</b>	Sets combined storage level for anytime cutoff during a crop season at 900,000 acre-feet in Normal conditions and 950,000 acre-feet in Less Severe Drought conditions.	Modifies combined storage level for anytime cutoff during a crop season increased to 1 million acre-feet (for both Normal and Less Severe Drought conditions). See Exhibit C.
<b>Decision dates for determining interruptible agricultural supply and environmental criteria</b>	Sets evaluation dates: March 1 for first season and environmental flows from March through June; July 1 for second season and environmental flows from July through the following February.	Adds a Nov. 1 evaluation date for environmental flows for November through the following February. See Exhibit D.

<b>Issue</b>	<b>2015 WMP</b>	<b>2018 LCRA Proposal</b>
<b>Dedicated releases for environmental flows</b>	Includes annual and multiyear caps on dedicated releases for environmental flow needs. Maintains firm commitment of 33,440 acre-feet per year.	Incorporates updated annual and multiyear caps for dedicated releases for environmental flow needs. No changes to firm commitment. See Exhibit D.
<b>Releases for bay inflow needs</b>	Sets five levels of bay inflow criteria. Ties various limits on releases specifically for bay and estuary inflows to storage levels, water supply condition or availability of interruptible stored water for agriculture.	Continues five levels of bay inflow criteria. Updates limitations on releases of water specifically for bay inflow needs. See Exhibit D.
<b>Releases for instream flows</b>	Sets three levels of instream flow criteria: Subsistence, Base-Dry and Base-Average	Modifies combined storage trigger for switching from Base-Dry to Subsistence criteria. Modifies obligation at Wharton gauge when combined storage is less than 900,000 acre-feet. See Exhibit D.
<b>Use of Arbuckle Reservoir to help meet environmental flow needs</b>	Not included.	Makes water stored in Arbuckle Reservoir available as a source for meeting LCRA's obligations for bay inflows.
<b>Criteria for Drought Worse than Drought of Record declaration</b>	Intensity criteria based on 1950s Drought of Record.	Updates intensity component of the intensity test and the duration component of the duration test to reflect the recent new Drought of Record.
<b>Combined firm yield of lakes Buchanan and Travis</b>	434,154 acre-feet per year based on 1950s drought as Drought of Record.	418,800 acre-feet per year based on recent drought as a new Drought of Record.

**EXHIBIT C**

**PROPOSED WMP REVISION: INTERRUPTIBLE AGRICULTURAL CURTAILMENT**

**Maximum Amounts of Interruptible Stored Water Available for Diversion at Gulf Coast, Lakeside and Pierce Ranch Operations**

*First Season Interruptible Stored Water Availability*

<b>Normal Conditions</b>		<b>Less Severe Drought Condition</b>	
Combined storage on March 1 (million acre-feet)	Interruptible supply (acre-feet)*	Combined storage on March 1 (million acre-feet)	Interruptible supply (acre-feet)*
Below 1.1	0	Below 1.1	0
1.1 to 1.3	107,100 to 178,000	1.1 to 1.499999	88,200 to 155,000
Above 1.3	178,000	1.5 or above	N/A
*Anytime cutoff if storage drops to or below 1 million acre-feet		*Anytime cutoff if storage drops to or below 1 million acre-feet	

*Second Season Interruptible Stored Water Availability*

<b>Normal Conditions</b>		<b>Less Severe Drought Condition</b>	
Combined storage on July 1 (million acre-feet)	Interruptible supply (acre-feet)*	Combined storage on July 1 (million acre-feet)	Interruptible supply (acre-feet)*
Below 1.1	0	Below 1.1	0
1.1 to 1.4	39,700 to 66,000	1.1 to 1.499999	39,700 to 55,000
Above 1.4	66,000	1.5 or above	N/A
*Anytime cutoff if storage drops to or below 1 million acre-feet		*Anytime cutoff if storage drops to or below 1 million acre-feet	

**Maximum Interruptible Stored Water Release From Lakes Buchanan and Travis**

The maximum release of interruptible stored water from lakes Buchanan and Travis for orders at the Gulf Coast, Lakeside and Pierce Ranch operations is 210,000 acre-feet in first season and 82,000 acre-feet in second season.

**Normal Conditions**

Normal water supply conditions apply unless the criteria for an alternate condition are met.

### **Less Severe Drought Condition**

Criteria for entering the Less Severe Drought condition:

1. Combined storage is below 1.5 million acre-feet on March 1 or July 1 AND cumulative three-month inflows total less than 50,000 acre-feet; OR
2. Combined storage is below 1.4 million acre-feet on March 1 or July 1 AND cumulative three-month inflows total less than the 33rd percentile for the three-month period; OR
3. Based on the prior evaluation date, the condition was Extraordinary Drought and the criteria for exiting Extraordinary Drought are met while the criteria for exiting Less Severe Drought are not met.

Criteria for exiting the Less Severe Drought conditions:

1. Combined storage was above 1.5 million acre-feet at any time since the prior evaluation date; OR
2. Combined storage was above 1.4 million acre-feet at any time since the prior evaluation date AND the cumulative three-month inflows on March 1 or July 1 equal or exceed the median for the three-month period.

However, if either criteria for *entering* Less Severe Drought are met, that condition remains in effect.

### **Extraordinary Drought Condition**

Under Extraordinary Drought, no interruptible stored water is supplied except to the Garwood Irrigation Division.

Criteria for entering the Extraordinary Drought condition:

1. Combined storage is below 1.3 million acre-feet on March 1 or July 1, AND at least 18 months have passed since the combined storage was 98 percent full or more, AND the intensity criteria indicates a drought of severity equal to or exceeding the 1950s drought; OR
2. On the July 1 evaluation date, combined storage is below 1.4 million acre-feet, AND combined storage decreased from March 1 to July 1 by at least 300,000 acre-feet.

Criteria for exiting the Extraordinary Drought condition:

Combined storage was above 1.3 million acre-feet at any time since the prior evaluation date.

However, if either criteria for *entering* Extraordinary Drought are met, that condition remains in effect.

If the criteria for exiting the Extraordinary Drought condition is met, the condition automatically switches to the Less Severe Drought condition unless the criteria for exiting Less Severe Drought also are met.

**Look-Ahead Test for Interruptible Agricultural Cutoff**

If the LCRA Board determines that combined storage would drop below 600,000 acre-feet in the next 12 months or below 900,000 acre-feet in the upcoming irrigation season (first or second), no interruptible stored water will be supplied in the upcoming irrigation season except to the Garwood Irrigation Division.

**General Rules Regarding the Supply of First and Second Irrigation Season Water**

1. If interruptible stored water is not supplied for first season, interruptible stored water also is cut off for second season.
2. If interruptible stored water is cut off for the remainder of a season and combined storage is less than 1.3 million acre-feet, all run-of-river water that originates above Mansfield Dam also is cut off; if combined storage is 1.3 million acre-feet or higher, any run-of-river water that originates upstream is passed through, limited to the amount needed to finish the season.
3. If the interruptible stored water supply amount allocated for diversion for first season is reached in a year in which there is interruptible stored water available for second season, all or a portion of the second season allocation can be used to finish first season. If the maximum release of interruptible stored water from lakes Buchanan and Travis for first season is reached in a year in which there is interruptible stored water available for second season, a portion of the second season maximum release can be used to finish first season.

**EXHIBIT D**

**PROPOSED WMP REVISION: ENVIRONMENTAL FLOWS**

**Arbuckle Reservoir**

Water stored in Arbuckle Reservoir can be used as a substitute for releases from lakes Buchanan and Travis to satisfy an environmental flow obligation under the Water Management Plan.

**Evaluation Date**

Add a Nov. 1 evaluation date for determining environmental flow criteria in effect from November to February.

**Instream Flow Criteria**

Modify the triggers for Base-Dry and Subsistence to the following:

<b>Combined Storage (million acre-feet)</b>	<b>Instream Flow Level</b>
Above 1.96	Base-Average
1.80 to 1.959	Base-Dry
Below 1.80	Subsistence

Modify the obligation for Wharton when combined storage is below 900,000 acre-feet: after storable inflows are fully used to meet Subsistence criteria, releases of stored water from lakes Buchanan and Travis will be made to maintain the greater of 50 percent of Subsistence or a flow of 107 cubic feet per second at the Wharton gauge.

**Instream Flow Compliance**

LCRA will meet its obligation for instream flows under this WMP by scheduling releases relying on best available data sources, such as: measurements of rainfall and water levels in streams and reservoirs; flow ratings for streams, canals, hydroelectric turbines, spillways, floodgates, and pumps; elevation/area/capacity ratings for reservoirs; model results for predicted storm runoff and ungauged gains or losses of flow along the Colorado River; simulated routing and attenuation of flows along channels and through reservoirs; effluent discharge as reported by wastewater treatment plant operators; and, scheduled and actual pumping as reported by major diverters.

**Bay Inflow Criteria**

For the added Nov. 1 evaluation date, use alternate triggers for OP-3 and OP-4 as shown below, and remaining triggers consistent with other evaluation dates:

<b>Combined Storage (million acre-feet)</b>	<b>Freshwater Inflow Criteria</b>
1.95 and above for March 1 and July 1; 1.85 and above for Nov. 1	OP-4
1.5 to 1.949 for March 1 and July 1; 1.5 to 1.849 for Nov. 1	OP-3
1.3 to 1.499	OP-2
1.0 to 1.299	OP-1
Less than 1.0	Threshold only

**Bay Maximum Monthly Release**

The maximum release of storable inflows to help meet freshwater inflow criteria is limited based on combined storage at the end of the month for which the bay obligation is determined as follows:

<b>Combined Storage (million acre-feet)</b>	<b>Maximum Bay Release (acre-feet)</b>
1.5 and above	82,000
1.3 to 1.499	56,000
Less than 1.3	25,000

**Bay Condition Limited to Threshold**

1. If combined storage falls below 1.0 million acre-feet at any time during a month, Threshold is the only freshwater inflow criteria in effect for that month.
2. If combined storage on the evaluation date is less than 1.3 million acre-feet and interruptible stored water for the Gulf Coast, Lakeside and Pierce Ranch irrigation operations is cut off for the season, Threshold is the only freshwater inflow criteria in effect until the next evaluation date. (For the November to February period, the determination of whether interruptible stored water is cut off is based on the preceding irrigation season.)

**Bay Release Percentage Rule**

Releases for bay criteria that exceed 15,000 acre-feet in a month are limited to the following percentages of storable inflows that remain after the release of water for instream flows and the release of 15,000 acre-feet for bay criteria.

<b>Combined Storage</b> (million acre-feet)	<b>Bay Release Percentage</b>
Less than 1.5	50 percent
1.5 or greater	60 percent

**Annual and Multiyear Caps**

Update based on final model output.

**Bay Relief Provision**

For rainfall on the bay that exceeds the median monthly rainfall by a specified amount or significant inflows in the first days of the following month that result in bay salinity in the optimal levels over a specified duration, LCRA’s obligation to provide additional water to help meet a bay operational criteria would be deferred or waived.