

February 15, 2018

Jeff Walker  
Texas Water Development Board  
1700 North Congress  
Austin, Texas 78711-3231

Subject: Procedures for Determining Water Availability and Water Supplies for the 2021 Plateau Regional Water Plan

Dear Mr. Walker:

The Plateau Region Water Planning Group (Region J) met on February 15, 2018 and discussed the process to determine the amount of surface water available from existing and future water management strategies using the guidance provided by the Texas Water Development Board (TWDB) in the base scope of work for the present cycle of Regional Water Planning. During this meeting, Region J discussed specific deviations from, or clarifications of, the standard TWDB guidance that will be employed to develop the 2021 Plateau Region Water Plan consisting of specific items that are either not specified in the TWDB rules, or deviations from the standard TWDB methodologies.

By this letter, the Plateau Region requests that the TWDB allow the Region to use these alternative assumptions outlined in the following paragraphs throughout the regional planning process for analyses that determine surface water availability to existing rights, and also for analyses to determine the potential supplies available from new water management strategies.

### Surface Water Supplies

In its guidelines for Regional Water Planning, the TWDB requires that water availability be based on results derived from the official Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs). The TCEQ WAMs, which have been developed for all river basins in Texas, simulate the management and use of streamflow and reservoirs over a historical period of record, adhering to the prior appropriation doctrine, which governs the State of Texas water right priority system. The TCEQ WAMs are the fundamental tools used to determine surface water availability for water rights permitting, and contain information about water rights in each respective river basin.

The Plateau Region planning area includes the Rio Grande, Nueces, San Antonio, Colorado, and Guadalupe river basins. For planning purposes, adjustments to these official WAMs are allowable to better reflect current and future surface water conditions in the Region. Such adjustments, as proposed herein, require the approval of the TWDB in order to be incorporated into the Texas Commission on Environmental Quality (TCEQ) Rio Grande River Basin, Nueces River Basin, Colorado River Basin, and Guadalupe/San Antonio River Basin Water Availability Models (WAMs).

The aforementioned TCEQ WAMs for these Plateau Region river basins contain information on all water rights in these basins. Embedded within the models are certain assumptions that the TCEQ specifies when analyzing water right reliabilities. Water supply availability under drought-of-record conditions is considered in the planning process to insure that water demands can be met under the critical circumstances. For surface water supplies, drought-of-record conditions relate to the quantity of water available to meet existing permits from the Rio Grande, Nueces, Colorado, Guadalupe, and San Antonio rivers and their tributaries as estimated by Run 3 of the official TCEQ WAMs. There are several versions of each of these WAMs, and the TWDB guidance stipulates that regional water planning groups use the version that TCEQ uses to analyze applications for perpetual water rights. This scenario is often referred to as the

WAM "Run 3". The full appropriation assumptions in the TCEQ WAM Run 3 scenario are conservatively modeled for permitting purposes, but may not necessarily be the most appropriate to apply to the regional water planning process. Such assumptions can be changed by modifying model parameters when the model is used for regional water planning purposes.

The Plateau Region Water Planning Group requests that the TWDB approve the following assumptions and approaches for use in characterizing and representing existing and potential future surface water supplies in the 2021 Plateau Region Water Plan. The WAMs containing the necessary modifications to the official TCEQ WAM that incorporate these assumptions will be referred to as the "Region J WAMs." A detailed breakdown of the models to be employed for the evaluation of existing water supply and water management strategies (WMS's) is provided in Table 1.

Table 1 - Base Hydrologic Models

MODEL	USE FOR EXISTING SUPPLIES	USE FOR WATER MANAGEMENT STRATEGIES
<u>Surface Water – Rio Grande River Basin</u>		
<ul style="list-style-type: none"><li>Rio Grande River Basin Water Availability Model (RIO GRANDE WAM) (TCEQ)</li></ul>	✓	✓
<u>Surface Water – Nueces River Basin</u>		
<ul style="list-style-type: none"><li>Nueces River Basin Water Availability Model (NUECES WAM) (TCEQ)</li></ul>	✓	✓
<u>Surface Water – Colorado River Basin</u>		
<ul style="list-style-type: none"><li>Colorado River Basin Water Availability Model (COLORADO WAM) (TCEQ)</li></ul>	✓	✓
<u>Surface Water – Guadalupe &amp; San Antonio River Basins</u>		
<ul style="list-style-type: none"><li>Guadalupe and San Antonio River Basin Water Availability Model (GUADALUPE/SAN ANTONIO WAM)</li></ul>	✓	✓

The proposed assumptions to be utilized by the Plateau Region Water Planning Group include the following items:

**GENERAL**

- The most recent available versions of the TCEQ WAMs for the Rio Grande, Nueces, Colorado, and Guadalupe/San Antonio River basins will be obtained from TCEQ. It is anticipated that each WAM will contain the latest approved water rights. This is to ensure that the latest official versions of these WAMs will formulate the basis of subsequent Plateau Region analyses.



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- These WAMs will include the official TCEQ assumption of full consumption of existing water rights with no (zero) return flows. This assumption is consistent with surface water permitting and is conservative in the context of evaluations in future water availability.
- Evaluations of reuse, when/if applicable, will be performed consistently with TCEQ evaluations, incorporating appropriate documented minimum and permitted return flows for technical considerations. Evaluations of reuse as a WMS may also include consideration of those return flows identified in the most recently available, official TCEQ WAM reflecting recent return flow conditions (WAM Run 8).
- Channel losses employed in the determination of water availability will be based on channel loss factors employed within the official State WAMs.
- Evaluations of Aquifer Storage and Recovery will consider surface water availability as determined by the WAM compared to demand, with the firm supply being the maximum demand that could be met assuming a repetition of the period of record drought.
- Environmental flow standards have been adopted by the TCEQ for all of the Plateau Region's river basins. These standards are incorporated into the applicable official TCEQ WAMs, and will be reflected in evaluations of all Plateau Region water supplies as represented in the WAM.
- Subordination of water rights will be modeled in a manner consistent with modeled subordination within the official TCEQ WAMs.
- Water supply determination for municipal and industrial users will be calculated using the results from the WAMs in the following ways:
  - o Run of the river rights will be determined in accordance with TWDB guidelines which state that the use-appropriate monthly percentage of the annual firm diversion must be satisfied in each and every month of the simulation period for all surface water diversions.
  - o Reservoirs will use firm yield unless a change is specifically requested by a reservoir owner and approved by the RWPG and TWDB, as appropriate per TWDB guidelines.
  - o The calculated source availabilities will be compared against existing legal and infrastructure constraints (water treatment plants, pipelines, intakes, etc.) and will be constrained if the existing infrastructure or legal capability is not sufficient to facilitate full utilization of the source. The most constrained amount will be used as the firm supply.
- Water supply for irrigation rights will be determined using firm reliability (100%). Per TWDB guidance, in the absence of any supply information or justification of reliable supplies available in a drought of record, supply values will be set equal to zero.
- Per TWDB guidance, in the absence of any supply information or justification of reliable supplies available in a drought of record, livestock supply values will be set equal to zero.

Specifics regarding surface water availability modeling of each river basin are presented by basin below. Considerations regarding the simulation of reservoir conditions (i.e., sedimentation effects) are then discussed.

#### *RIO GRANDE RIVER BASIN (INCLUDING THE PECOS AND DEVILS RIVER)*

Portions of the Rio Grande River Basin, including its tributaries, are located in Val Verde, Edwards, and Kinney Counties in the Plateau Region. The Pecos River forms a portion of the boundary between Terrell County in the Far West Texas Region and Crockett County in Region F before reaching Langtry in Val Verde County in the Plateau Region. The Devils River originates in Sutton County and proceeds generally southward through Val Verde County before reaching Amistad International Reservoir. There are no surface-water rights on the Pecos and Devils Rivers within the Plateau Region. Amistad International Reservoir is located in the Rio Grande River Basin on the border between the United States and Mexico near the City of Del Rio, and was constructed jointly by the two nations. It was completed in 1968, with a maximum capacity of 5.25 million acre-feet, with approximately 3.5 million acre-feet of storage used for conservation. Lake Amistad is not a present source of supply for the Plateau Region, as the City of Del Rio and downstream irrigators in Val Verde County obtain their supply primarily from San Felipe Springs and Creek.

For the Rio Grande River Basin, the most recently available official TCEQ WAM Run 3 (ver. Feb. 1, 2018) will be employed. This updated WAM reflects TCEQ's latest updates and corrections, representing a hydrologic period from 1940-2000.

#### *NUECES RIVER BASIN*

Portions of the Nueces River Basin, including its tributaries, are located within Edwards, Kinney, Real, Kerr, and Bandera Counties within the Plateau Region, with the main stem Nueces forming a portion of the border between Real and Edwards Counties. Headwater tributaries of the Nueces River located in the Plateau Region include the Sabinal River and Hondo Creek in Bandera County, the West Nueces River in Edwards and Kinney Counties, and the Frio, East Frio, and Dry Frio Rivers in Real County.

For the Nueces River Basin, the most recently available official TCEQ WAM Run 3 (ver. Jan. 7, 2013) will be employed for all availability analyses in the Nueces River Basin. The hydrologic period represented in this WAM is 1934-1996.

#### *COLORADO RIVER BASIN*

The headwaters of the South Llano River, a tributary of the Colorado River, lie within Edwards County, while other tributaries are within Kerr County and Real County. For the Colorado River Basin, the most recently available official TCEQ WAM Run 3 (ver. Feb. 1, 2018) will be employed for all availability analyses in the basin. The hydrologic period represented in this WAM is 1940-2013.

#### *SAN ANTONIO RIVER BASIN*

The headwaters of the San Antonio River are within Bandera County. Medina Lake, located within the San Antonio River Basin, was constructed in 1911 to provide irrigation water for farmers to the southwest of San Antonio. Although commonly referred to as Medina Lake, the lake is actually a system consisting of Medina Lake and Diversion Lake (the latter being where diversions from this dual-lake system are authorized). Diversion Lake was impounded in 1913, and is located approximately 4 miles downstream of Medina Lake.

For the San Antonio River Basin, the most recently available official TCEQ Guadalupe/San Antonio WAM Run 3 (ver. Oct. 17, 2014) will be employed for all availability analyses in the basin. The hydrologic period represented in this WAM is 1934-1989.



#### GUADALUPE RIVER BASIN

The portion of the Guadalupe River Basin within the Plateau Region lies almost entirely within Kerr County. Three tributaries (Johnson Creek, North Fork, and South Fork) converge west of the City of Kerrville, forming the Guadalupe River course. Three recreational reservoirs permitted for non-consumptive, recreational uses are located in the basin near Kerrville. As noted in the 2016 Plateau Regional Water Plan, "pursuant to a Memorandum of Understanding (MOU) between the Guadalupe-Blanco River Authority (GBRA) and the Commissioner's Court of Kerr County, the South Central Texas Water Planning Group (Region L) recognized a potential commitment of approximately 6,000 acre-feet/year from the firm yield of Canyon Reservoir for the calendar years 2021 through 2050."

For the Guadalupe River Basin, the most recently available official TCEQ Guadalupe/San Antonio WAM Run 3 (ver. Oct. 17, 2014) will be employed for all availability analyses in the basin - the same as that employed for the San Antonio River Basin. The hydrologic period represented in this WAM is 1934-1989.

#### SIMULATION OF RESERVOIR CONDITIONS (SEDIMENTATION)

As mentioned previously, the two reservoirs located within the Plateau Region are Amistad Reservoir (located in the Rio Grande River Basin) and Medina Lake (San Antonio River Basin). Canyon Reservoir (located in the Guadalupe River Basin) is located within Region L; and as mentioned above has been recognized in previous planning as a potential supply for Kerr County in the Plateau Region. Although these reservoirs do not presently provide supply to the Region, each could do so in the future pending availability of firm supplies.

In the consideration of available firm supplies under existing and future conditions, reservoir sedimentation can reduce the storage capacity of a reservoir, impacting the beneficial uses of reservoirs such as water supply, flood control, hydropower, navigation, and recreation. Surveys of volumetric storage in a reservoir allow for the derivation of rates and loadings of sediment to the reservoir. The annual loading can then be distributed to determine a revised elevation-area-capacity curve which models the distribution of the total volume of sediment accumulated at the end of an analysis period. The resultant area-capacity relationship is then incorporated into the applicable WAM for the given reservoir.

For those reservoirs lacking volumetric surveys, original area-capacity relations employed within WAM Run 3 will be assumed constant. If a reservoir (or reservoir system) is calculated to have no firm yield, that result will be assumed for all decades in the 2020-2070 planning horizon. For reservoirs with available volumetric survey information, an annual sediment rate will be calculated, and loadings calculated for Year 2020 and Year 2070. Sediment distribution within the reservoir will be calculated, and resultant 2020 and 2070 area-capacity curves will be developed and employed within the applicable WAM to calculate 2020 and 2070 firm yields. The intervening decadal firm yields will then be linearly interpolated.

#### INTERREGIONAL COORDINATION

Major downstream water rights include those in Region L supplied by the Guadalupe-Blanco River Authority out of Canyon Lake and by the Bexar-Medina-Atascosa WCID#1 out of the Medina/Diversion system. The firm yields of Canyon and Medina can limit the amount of water available for appropriation in both the Plateau Region and Region L. Major downstream water rights in Region M (i.e., cities and irrigators on the Rio Grande downstream from Amistad Reservoir) do not limit the amount of water available for appropriation in the Plateau Region because currently the Plateau Region does not depend on the Falcon-Amistad system. TCEQ's Lower Rio Grande Watermaster allocates

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water rights on the Rio Grande according to the supply in the Amistad Reservoir and in accordance with the 1944 International Treaty with Mexico.

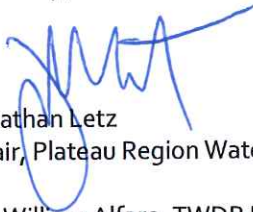
For those instances where modeled surface water supply results can inform upon or impact determinations of surface water availability in the Plateau Region or other regions, modeled results and approaches will be shared and coordinated to ensure consistency between regions, in a manner consistent with TWDB guidelines and the assumptions described herein.

#### CONCLUSION

These assumptions are recommended to be used throughout the regional planning process for analyses that determine water availability for existing supplies, and also for analyses to determine the potential supplies available from new water management strategies. The assumptions described herein require the approval of the TWDB in order to be incorporated into the Plateau Region's analyses.

If you have any questions regarding this request, please contact me at your convenience. We appreciate the TWDB's consideration of this request.

Sincerely,



Jonathan Letz  
Chair, Plateau Region Water Planning Group

cc: William Alfaro, TWDB Project Manager  
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