DRAFT Memorandum

Date:	Friday, January 19, 2018
Project:	2021 Brazos G Regional Water Plan
To:	Brazos G Regional Water Planning Group
From:	David D. Dunn, P.E.
Subject:	Process to Incorporate Modeled Available Groundwater (MAG) Peak Factors

This memorandum is intended to summarize the concept of the MAG Peak Factor and recommend a process by which Brazos G might request the use of MAG Peak Factors for some aquifers in some counties.

By rule, groundwater availability used to determine groundwater supplies available to Water User Groups (WUGs) and Wholesale Water Providers (WWPs) is based on the Modeled Available Groundwater (MAG). The MAG is the average annual pumping that can be produced from an aquifer within a given county and river basin so that the Desired Future Conditions (DFCs) established by a Groundwater Management Area (GMA) are not violated. The TWDB determines the MAG values that are to be used as the Brazos G Plan is developed. During the planning process, the MAG volumes in each decade are apportioned to individual WUGs and WWPs based upon actual available installed pumping capacity. In multiple counties and aquifers, the available pumping capacity of all users exceeds the MAG and the MAG is pro-rated to individual users based upon their portion of the pumping capacity and, sometimes, by individual water demands.

The water demands in the planning process are defined as “dry-year” demands, or water demands that will occur in abnormally dry or drought years without drought restrictions in place. The overall goal of the planning process is to produce a regional water plan that will fully supply the projected dry-year demands through a repeat of drought of record hydrology without shortages. This is a rational approach when comparing surface water supplies with water demands, because the basis of supply for surface water sources is dry, drought-of-record conditions. For some groundwater systems sensitive to annual hydrologic variability, such as the Northern Edwards Aquifer, this is also a rational approach, as the MAG by necessity is based upon dry or drought-of-record conditions which would occur simultaneously with the increased, dry-year demands. However, supplies from some aquifer systems, such as the Carrizo-Wilcox Aquifer, are not sensitive to annual fluctuations in hydrology. This has resulted in a conservative approach to planning for groundwater supplies because it is assumed that the hot, dry-year demands will occur in each year of the planning horizon (2020 – 2070). In actuality, water demands for most water use types only infrequently reach the level of the dry-year demands upon which the planning is based.

With the realization that demands in many years will be substantially less than the dry-year demands, the planning rules have been changed to allow the use of a MAG Peak Factor to increase the estimated supplies from specific aquifers to values greater than the MAG on a decadal basis. This would be accomplished by multiplying a MAG Peak Factor (greater than 100 percent) by the MAG in that decade to represent the available groundwater to be used for planning purposes. However the bottom line is that these adjustments to the MAG must honor the approved DFCs.

The TWDB has issued two documents (attached) which describe first, the concept and rationale for the MAG Peak Factor, and second, the process for submitting and reviewing a request for a MAG Peak Factor by a regional water planning group.

Table 1 lists the major and minor aquifers in the Brazos G Area and the rationale for or against requesting a MAG Peak Factor.

The TWDB guidance identifies the requirements for requesting a MAG Peak Factor. This process requires close coordination with both the groundwater conservation districts and groundwater management areas having oversight of an aquifer, and approval by the TWDB. Following is the suggested process and schedule for Brazos G to follow in requesting MAG Peak Factors.

1. **January/February 2018.** Groundwater subcommittee meets to discuss MAG Peak Factor and identify the technical means to determine a rational MAG Peak Factor for specific aquifers in specific counties.
2. **February/March, 2018.** HDR performs a statistical analysis of groundwater demands to identify the difference between dry-year demands, which are used in regional planning, and average-year demands of actual pumping. This analysis will be used to compute the annual variability of groundwater use from aquifers in selected counties, and the amount that dry-year demands exceed average-year demands which will be used to calculate the MAG Peak Factor. HDR suggests that a conservative portion of the resulting factor be used, for example, 80 percent of the initial calculated value to account for the influence of varying aquifer boundary conditions. This analysis will also determine an annual pumping pattern to apply within a groundwater availability model to determine if the proposed MAG Peak Factor will cause an aquifer's Desired Future Conditions to be violated.
3. **March/April, 2018.** Request that the effected groundwater conservation districts perform groundwater modeling to determine the effect of applying the MAG Peak Factor on specific aquifers in specific counties. A MAG Peak Factor cannot be considered for counties/aquifers for which funding is not available to perform the necessary modeling.
4. **April/May, 2018.** Prepare documentation and submit the analyses to the affected groundwater conservation districts and groundwater management areas for their approval.
5. **May, 2018.** Brazos G RWPG approves and submits the requested MAG Peak Factors and documentation to the TWDB for approval. TWDB staff indicate that approval of MAG Peak Factors may take up to 60 days.

6. **July, 2018.** TWDB provides final approval of MAG Peak Factors and the resulting groundwater availability values are updated for all affected WUGs and WWPs for inclusion in the technical memorandum.

Based on the initial identification of candidate aquifers, coordination will need to be made with the eight groundwater conservation districts and three groundwater management areas identified in Table 2.

Table 1. Brazos G Aquifers and MAG Peak Factor Recommendations

Aquifer	Total MAG (acft/yr)	Brazos G GW Demands (2016 Plan, acft/yr)	Counties	MAG Peak Factor?	Rationale
Blaine	14,562	5,809	Fisher, Knox, Nolan, Stonewall	No	Insufficient demands
Brazos River Alluvium	87,989	57,689	Bosque, Brazos, Burleson, Falls, Grimes, Hill, McLennan, Milam, Robertson, Washington	No	Drought sensitive
Carrizo-Wilcox	217,751	142,856	Brazos, Burleson, Falls, Grimes, Lee, Limestone, Milam, Robertson	**Yes**	Ideal aquifer for MAG PF. Also in Williamson County, but MAG insufficient in Williamson County to warrant MAG PF.
Dockum	14,880	9,880	Fisher, Kent, Nolan	No	Insufficient demands
Edwards-BFZ (N. Segment)	9,921	9,917	Bell, Williamson	No	Drought sensitive
Edwards-Trinity (Plateau)	1,182	1,089	Nolan, Taylor	No	Insufficient demands and supplies to warrant MAG PF
Ellenburger-San Saba	2,593	13	Lampasas	No	Insufficient demands and supplies to warrant MAG PF
Gulf Coast	26,952	16,945	Brazos, Grimes, Washington	No	Insufficient demands
Hickory	128	--	Lampasas, Williamson	No	Insufficient demands and supplies to warrant MAG PF
Marble Falls	2,837	19	Lampasas	No	Insufficient demands and supplies to warrant MAG PF

Aquifer	Total MAG (acft/yr)	Brazos G GW Demands (2016 Plan, acft/yr)	Counties	MAG Peak Factor?	Rationale
Navasota River Alluvium	2,216	--,	Grimes	No	Drought sensitive
Queen City	1,780	833	Brazos, Burleson, Grimes, Lee, Milam, Robertson, Washington	No	Insufficient demands and supplies to warrant MAG PF
Seymour	83,074	81,590	Fisher, Haskell, Jones, Kent, Knox, Stonewall, Throckmorton, Young	No	Drought sensitive
Sparta	17,522	10,319	Brazos, Burleson, Grimes, Lee, Robertson, Washington	**Yes**	Ideal aquifer for MAG PF
Trinity	148,441	115,000	Limited to Counties where the aquifer is completely or almost completely confined. This includes: Bell, Bosque, Falls, Hill, Johnson, Limestone, McLennan and Milam.	**Maybe**, in selected counties.	The confined part of the aquifer is greatly isolated from short-term hydrologic fluctuations. May not have sufficient budget to perform analysis and coordinate with the additional GCDs and GMAs.
Woodbine	7,032	2,277	Hill, Johnson, Limestone, McLennan	No	Insufficient demands
Yegua-Jackson	24,056	8,000	Brazos, Burleson, Grimes, Lee, Washington	**Yes**	Ideal aquifer for MAG PF
Other (Local) Aquifers	3,724	2,778	Shackelford, Stephens, Throckmorton, Williamson, Young	No	Insufficient demands and supplies to warrant MAG PF

Table 2. Groundwater Conservation Districts and Groundwater Management Areas Regulating Aquifers for which MAG Peak Factors May Be Desirable

Aquifer	GCD/Counties	GMAs
Carrizo-Wilcox	• Bluebonnet GCD: Grimes • Brazos Valley GCD: Brazos, Robertson • Lost Pines GCD: Lee • Post Oak Savannah GCD: Burleson, Milam • No GCD: Falls, Limestone	8, 12, 14
Sparta	• Bluebonnet GCD: Grimes • Brazos Valley GCD: Brazos, Robertson • Lost Pines GCD: Lee • Post Oak Savannah GCD: Burleson • No GCD: Washington	8, 12, 14
Yegua-Jackson	• Bluebonnet GCD: Grimes • Brazos Valley GCD: Brazos • Lost Pines GCD: Lee • Post Oak Savannah GCD: Burleson • No GCD: Washington	8, 12, 14
Trinity	• Clearwater GCD: Bell • Middle Trinity GCD: Bosque • Prairielands GCD: Hill and Johnson • Southern Trinity GCD: McLennan • Post Oak Savannah GCD: Milam • No GCD: Falls, Limestone	8, 12