Nacatoch Aquifer: Not Relevant for Purposes of Joint Planning

GMA 11 Technical Memorandum 16-04, Draft 1

William R. Hutchison, Ph.D., P.E., P.G.
May 3, 2016

Introduction

The Texas Water Development Board, in its July 2013 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Nacatoch Aquifer as not relevant for purposes of joint planning.

Aquifer Description and Location

As described in George and others (2011):

> ***The Nacatoch Aquifer*** *is a minor aquifer occurring in a narrow band across northeast Texas. The aquifer consists of the Nacatoch Sand, composed of sequences of sandstone separated by impermeable layers of mudstone or clay. These sandstones are marine in origin, coarsen upward, and are laterally discontinuous. The number of sand layers varies throughout the Nacatoch's extent, and the thickness of individual sand units ranges from more than 100 feet in the north to less than 20 feet to the south. Thickness of intervening mudstone*

> *units similarly ranges from more than 100 feet to only a few feet. Freshwater saturated thickness averages about 50 feet. The aquifer also includes a hydraulically connected cover of alluvium that is as much as 80 feet thick along major drainages. Groundwater in this aquifer is usually under artesian conditions except in shallow wells where the Nacatoch Formation crops out and water table conditions exist. The Mexia-Talco Fault Zone generally delineates the subsurface limit of the aquifer. The groundwater in the aquifer is typically alkaline, high in sodium bicarbonate, and soft. Total dissolved solids in the subsurface increase and are significantly higher south of the Mexia-Talco Fault Zone, where the water contains between 1,000 and 3,000 milligrams per liter of total dissolved solids. Water from the aquifer is extensively used for domestic and livestock purposes. The city of Commerce historically pumped the greatest amount from the Nacatoch Aquifer but has recently attempted to convert to surface water; however, because of recent droughts, the city has pumped 30 to 50 percent of its water from the aquifer. As a result of Commerce's reduced pumping, the declining water levels that had developed around Commerce in Delta and Hunt counties are stabilizing. The North East Texas Regional Water Planning Group, in its 2006 Regional Water Plan, recommended new and supplemental groundwater wells in the Nacatoch Aquifer as a water management strategy.*

Figure 1 (taken from Wade and others, 2014) shows the limited extent of the Nacatoch Aquifer in GMA 11. Note that it occurs only in a small portion of Bowie, Henderson, Morris, Red River, and Titus counties.

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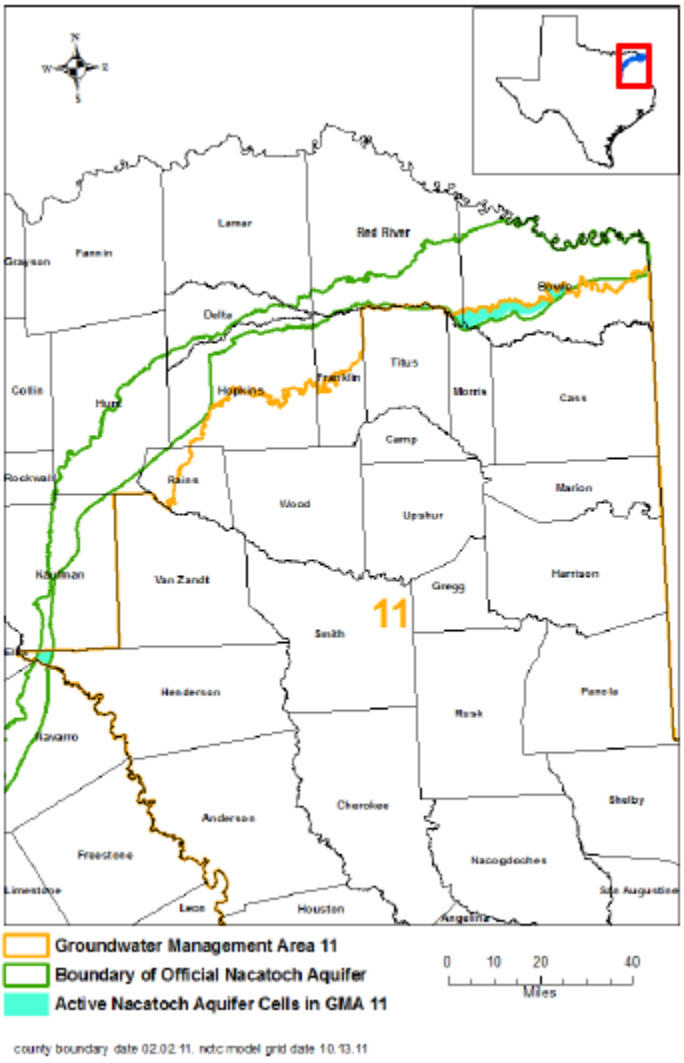

Figure 1. Location of Nacatoch Aquifer in GMA 11

Aquifer Characteristics

Beach and others (2009) developed a groundwater availability model for the Nacatoch Aquifer for the Texas Water Development Board. This study appears to document only two estimates of hydraulic conductivity in GMA 11 (Beach and others, 2009, pg. 4-57) in Bowie County (1 to 3 ft/day). The groundwater modeling effort included developing estimates of hydraulic conductivity throughout the area (Beach and others, 2009, pp 8-4 and 8-5).

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Groundwater Demands and Current Groundwater Uses

The Texas Water Development Board pumping database shows 2012 groundwater pumping for the Nacatoch Aquifer as follows:

- Bowie: 1,466 AF/yr
- Henderson: 12 AF/yr
- Hopkins: 1,113 AF/yr
- Titus: 100 AF/yr

No pumping estimates are listed for Morris or Red River counties.

Total Estimated Recoverable Storage

Wade and others (2013) documented the total estimated recoverable storage for the Nacatoch Aquifer in GMA 11 as follows:

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Bowie	140,000	35,000	105,000
Henderson	9,800	2,450	7,350
Morris	2,900	725	2,175
Red River	11,000	2,750	8,250
Titus	15,000	3,750	11,250
Total	178,700	44,675	134,025

Total storage is given in the first column. The recoverable storage is assumed to be between 25 and 75 percent of the total storage.

Explanation of Non-Relevance

Due to its limited areal extent and generally low use, the Nacatoch Aquifer is classified as not relevant for purposes of joint planning in Groundwater Management Area 11.

References

Beach, J.A., Huang, Y., Symank, L., Ashworth, J.B., Davidson, T., Vreugdenhil, A.M., and Deeds, N.E., 2009. Final Report: Nacatoch Aquifer Groundwater Availability Model. Prepared for the Texas Water Development Board, January 2009, 304p.

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Wade, S., Shi, J., and Seiter-Weatherford, C. 2014. GAM Task 13-034: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 11. Texas Water Development Board, Groundwater Resources Division, April 2, 2014, 30p.