

Task 3

LSGCD Strategic Planning for Groundwater Management and Development of Summary Results

Prepared for Findings & Review Committee



PREPARED BY LBG-GUYTON ASSOCIATES
OCTOBER 9, 2017 (REVISED OCTOBER 10, 2017)



General Concepts For Groundwater Pumping Scenarios

Run A MOD

- Groundwater pumping similar to current GMA 14 Run 2 with increase in SVGU and Exempt pumping

Run B MOD

- Same as Run A MOD with addition of 30 percent of TQD distributed back to LVGUs in areas of concentrated pumping

Run C

- Same as Run A MOD with addition of 30 percent of TQD distributed to areas of estimate future urbanization

Run D

- Same as Run B MOD until 2020 when Evangeline Aquifer pumping is reduced by 19 percent and Jasper Aquifer pumping is increased by 16 percent and the adjustments are included through 2070 (Revised 10/10/2017)

Montgomery County Pumping (acre-ft/yr)

2016	Aquifer	GMA14	Run A MOD	Run B MOD	Run C	Run D
		Run 2				
	Chicot	12,500	5,900	5,900	5,900	5,900
	Evangeline	27,500	31,800	31,800	31,800	31,800
	Jasper	23,900	21,500	21,500	21,500	21,500
	Total	63,900	59,100	59,100	59,100	59,100

2030	Aquifer	GMA14	Run A MOD	Run B MOD	Run C	Run D
		Run 2				
	Chicot	13,900	8,000	8,900	8,000	8,900
	Evangeline	27,500	37,800	47,800	46,600	39,000
	Jasper	22,600	25,100	36,200	38,400	42,200
	Total	64,000	70,900	92,900	92,900	90,100

2070	Aquifer	GMA14	Run A MOD	Run B MOD	Run C	Run D
		Run 2				
	Chicot	13,500	10,200	11,200	10,200	11,200
	Evangeline	26,500	43,600	54,500	53,300	44,500
	Jasper	24,000	25,900	38,000	40,300	44,300
	Total	64,000	79,700	103,800	103,800	100,000

8/2017



Comparison of Available Drawdown in Wells Completed in the Chicot Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Static Water Level and Current Pump Setting, ft

- 0' - 50'
- 51' - 100'
- 101' - 200'
- 201' - 300'
- 301' - 500'
- 500' +

2010-2070 Head Change, ft

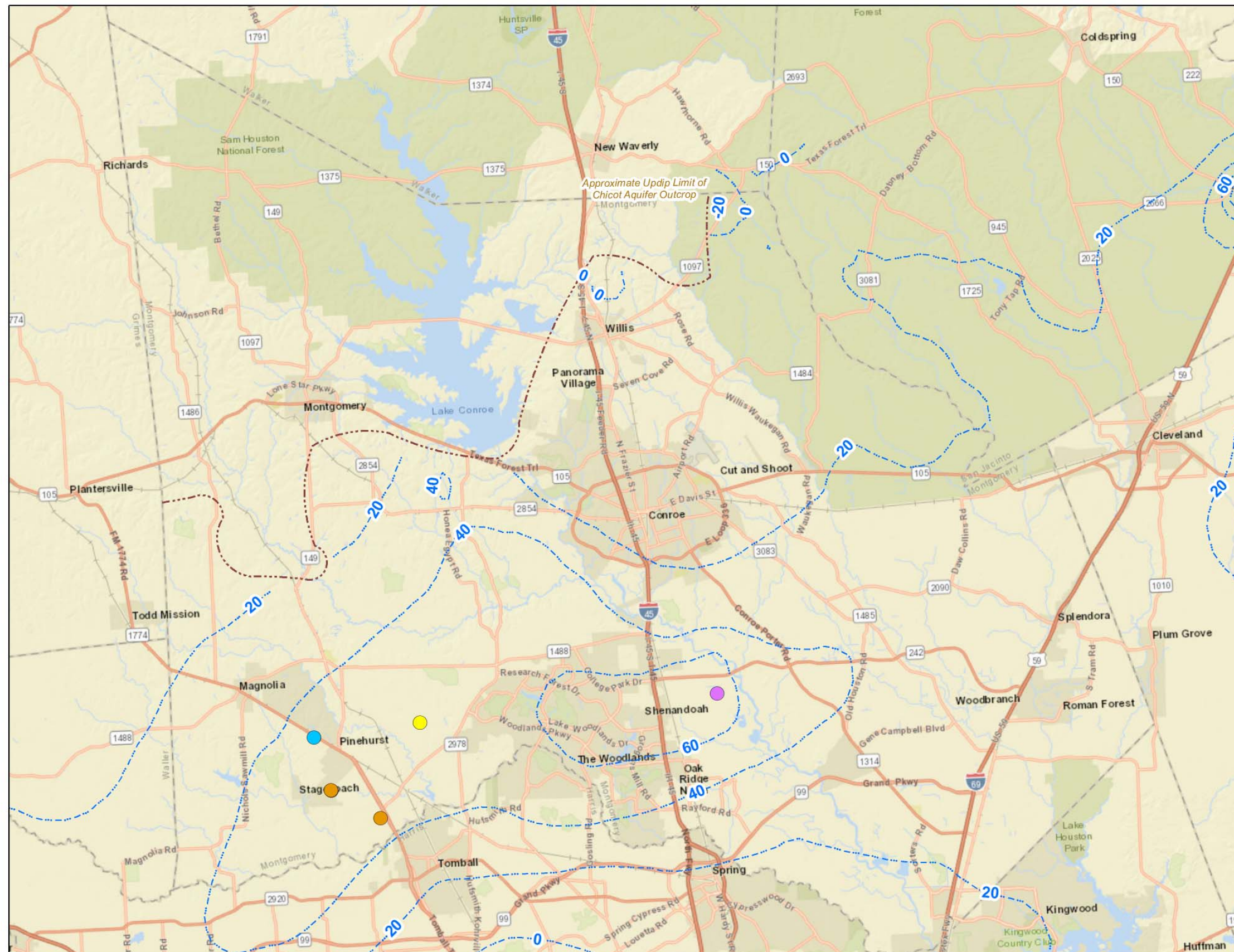
Contour Interval = 20 ft

- Recovery
+ Drawdown

--- Run D



Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, OpenStreetMap contributors, and the GIS User Community



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Comparison of Available Drawdown in Wells Completed in the Chicot Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Current Pump Setting and Top of Liner/Screen, ft

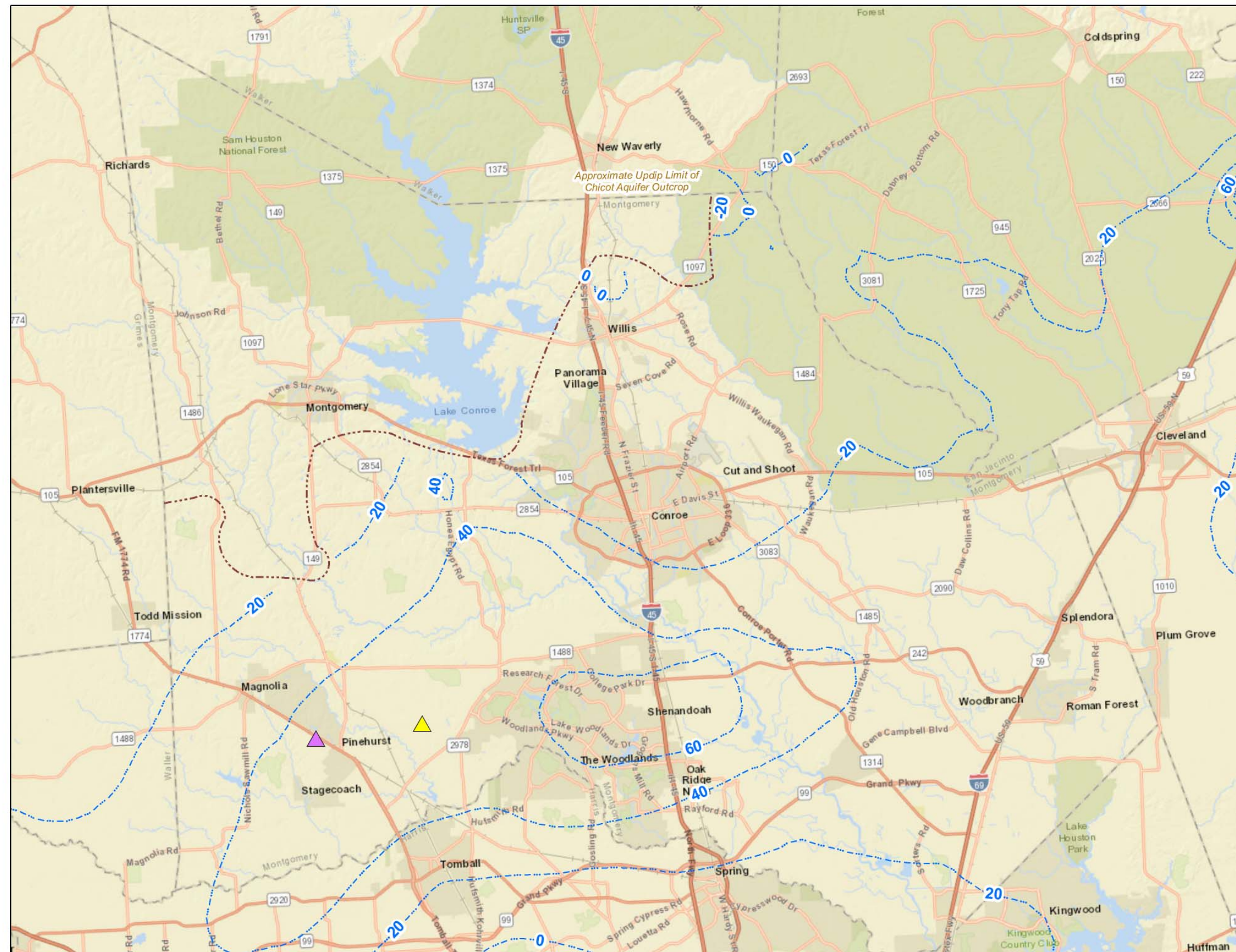
- ▲ 0' - 50'
- ▲ 51' - 100'
- ▲ 101' - 200'
- ▲ 201' - 300'
- ▲ 301' - 500'
- ▲ 500' +

2010-2070 Head Change, ft

Contour Interval = 20 ft

- Recovery
+ Drawdown

--- Run D



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Comparison of Available Drawdown in Wells Completed in the Evangeline Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Static Water Level and Current Pump Setting, ft

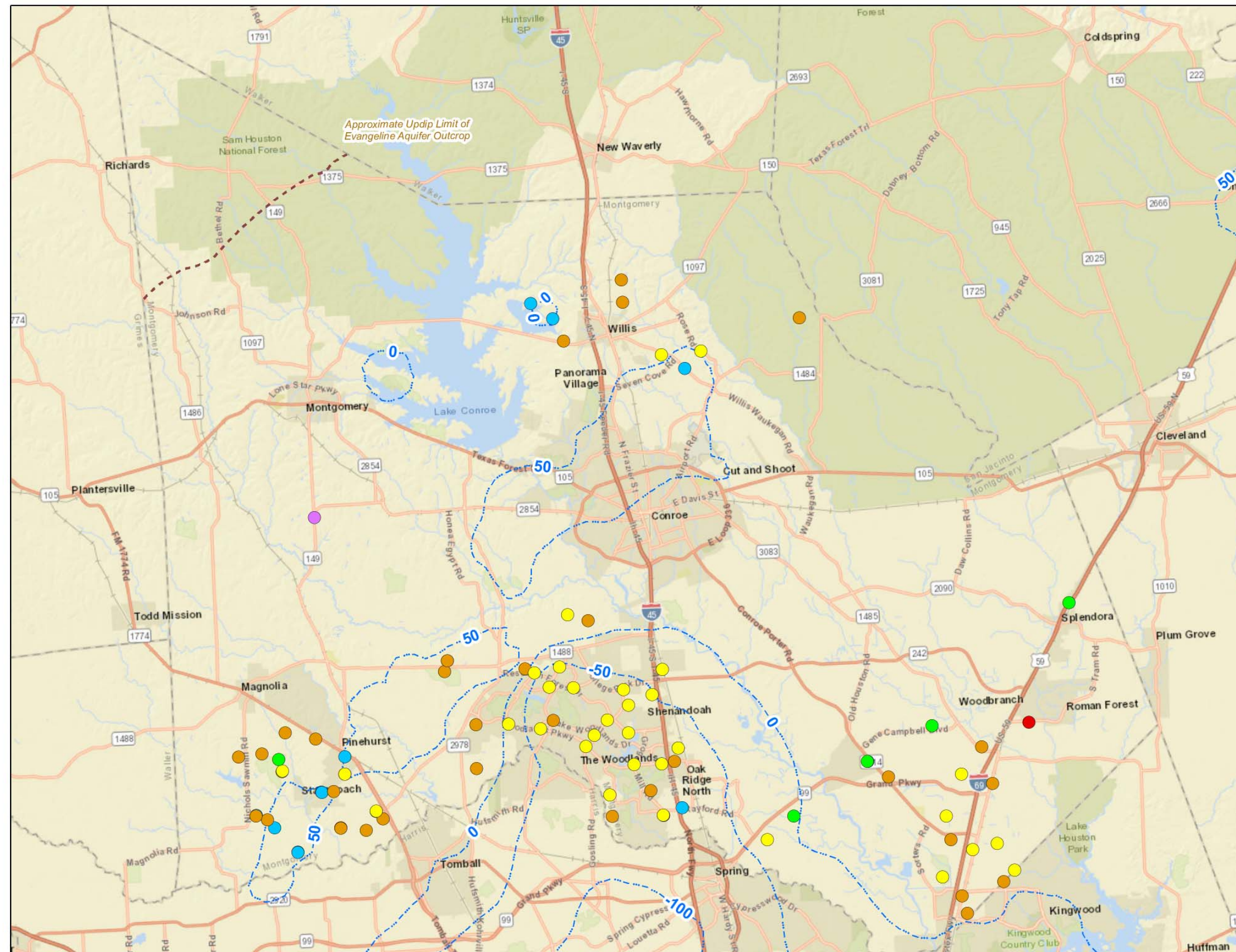
- 0' - 50'
- 51' - 100'
- 101' - 200'
- 201' - 300'
- 301' - 500'
- 500' +

2010-2070 Head Change, ft

Contour Interval = 50 ft

- Recovery
+ Drawdown

--- Run D



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Comparison of Available Drawdown in Wells Completed in the Evangeline Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Current Pump Setting and Top of Liner/Screen, ft

- 0' - 50'
- 51' - 100'
- 101' - 200'
- 201' - 300'
- 301' - 500'
- 500' +

2010-2070 Head Change, ft

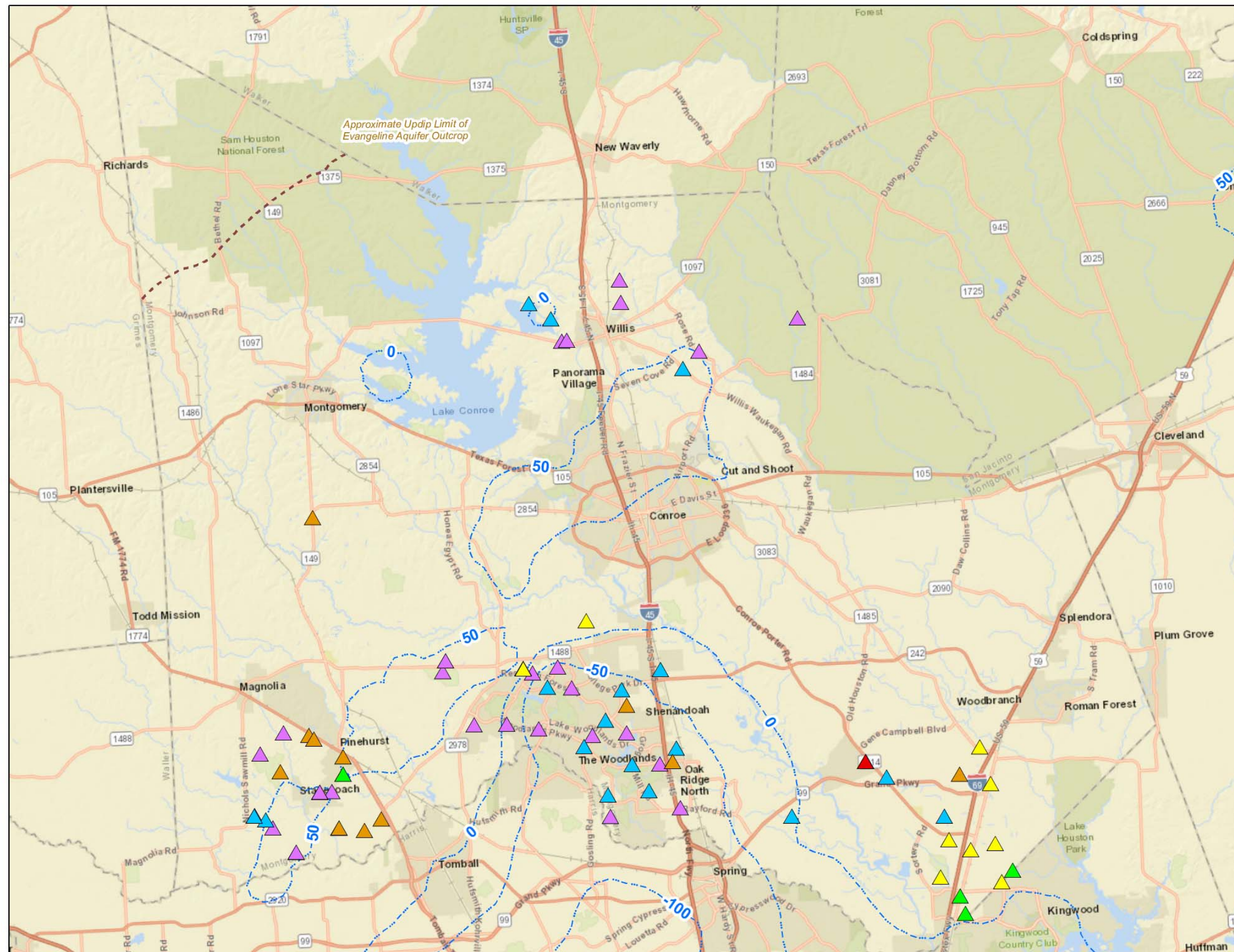
Contour Interval = 50 ft

- Recovery
+ Drawdown

Run D



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Comparison of Available Drawdown in Wells Completed in the Jasper Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Static Water Level and Current Pump Setting, ft

- 0' - 50'
- 51' - 100'
- 101' - 200'
- 201' - 300'
- 301' - 500'
- 500' +

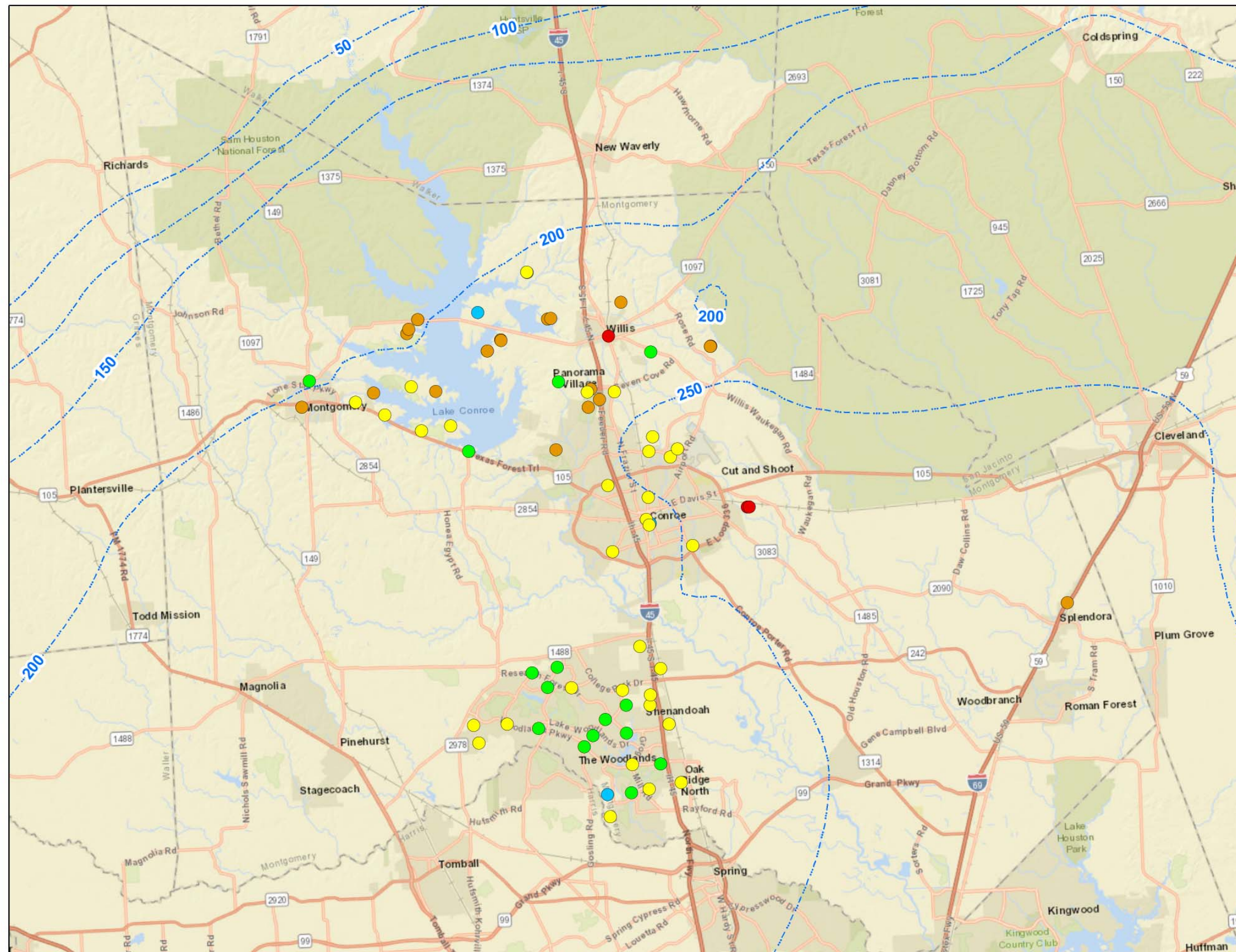
2010-2070 Head Change, ft

Contour Interval = 50 ft

- Recovery
- + Drawdown
- - - Run D



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Comparison of Available Drawdown in Wells Completed in the Jasper Aquifer to Model Simulated Drawdown Contours

Vertical Difference Between Current Pump Setting and Top of Liner/Screen, ft

- ▲ 0' - 50'
- ▲ 51' - 100'
- ▲ 101' - 200'
- ▲ 201' - 300'
- ▲ 301' - 500'
- ▲ 500' +

2010-2070 Head Change, ft

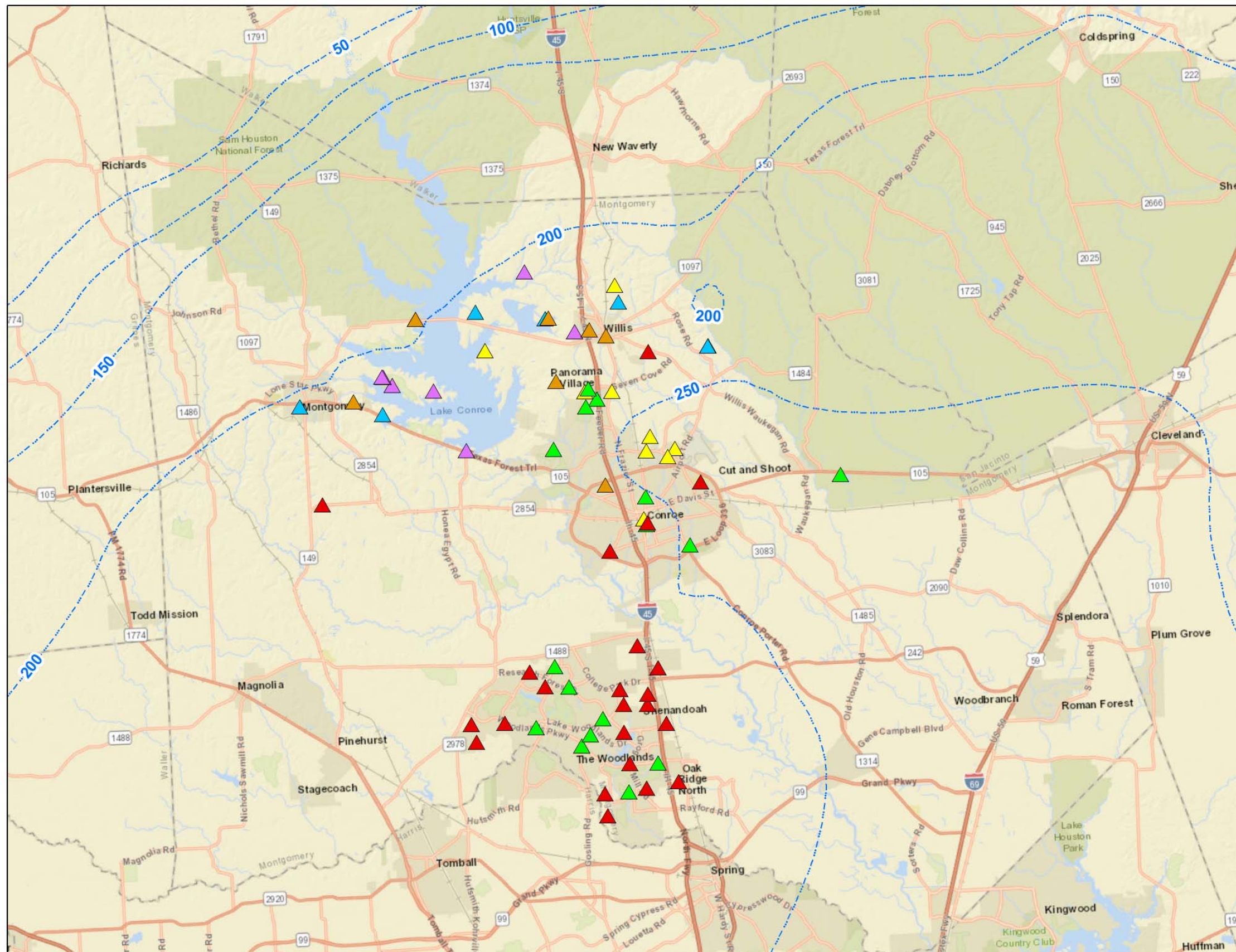
Contour Interval = 50 ft

- Recovery
- + Drawdown

--- Run D



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Average Drawdown 2070, ft.

	GMA14 Run 2			Run D		
County	Chicot	Evangeline	Jasper	Chicot	Evangeline	Jasper
Montgomery	25	-5	36	30	20	224
Grimes	6	5	53	6	5	88
Walker	1	9	42	1	9	61
San Jacinto	24	19	109	23	19	165
Liberty	28	29	121	28	30	228
Waller	34	40	102	33	39	202

Summary of Model Runs

- Overall pumping for Run D is 100,000 ac-ft/yr by 2070 and is about 11 percent from the Chicot Aquifer, 44.5 percent from the Evangeline Aquifer and 44.3 percent from the Jasper Aquifer. The distribution of pumping between the Evangeline and Jasper aquifers is similar to the distribution in Montgomery County in 2015.
- Run D artesian head decline results are similar to previous runs for the Chicot Aquifer.
- Run D artesian head decline results for the Evangeline Aquifer are a small amount less compared to Run B MOD.
- Run D artesian head decline results for the Jasper Aquifer show additional artesian head decline compared to Run B MOD and C as the quantity of water pumped is greater.

Summary of Model Runs (cont'd)

- For the Jasper Aquifer based on Run D, the Lake Conroe area would experience artesian head declines that could restrict the pumping rates of wells below current levels.
- The estimated average drawdown for the Jasper Aquifer for Montgomery County increases substantially in Run D based on the model simulation because of the quantity of pumping compared to Runs A MOD, B MOD and C.
- The Jasper Aquifer in Run D results in an increase in average drawdown of at least 45 percent in surrounding counties compared to GMA 14 Run 2 values.
- Underlying assumptions influencing the modeling results are that growth in water demand in the county continues based on the 2017 State Water Plan and the estimated reduction in pumping in the Evangeline Aquifer over the upcoming decades in mainly the north part of Harris County.