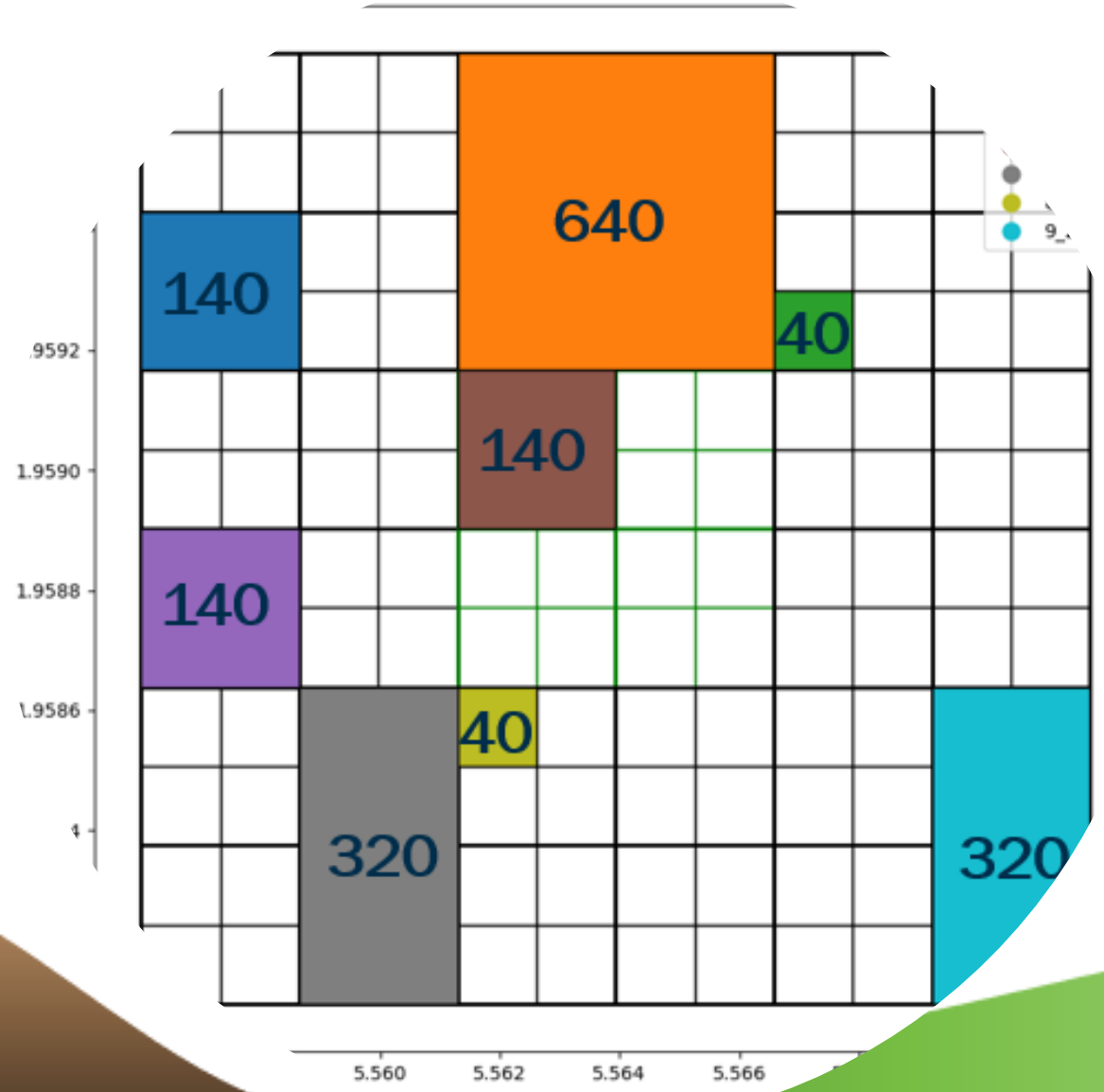


Drawdown Sensitivity Study in the Briggs – Oakalla Area

Presented to:

Burnet County
Commissioners Court

December 10, 2024

INTERA

Background

- Objective: assess vulnerability of Trinity Aquifer in Briggs-Oakalla area to dewatering from increased groundwater development
- Approach
  - Characterize available drawdown
  - Characterize hydraulic properties
  - Create simple groundwater model
  - Assess potential drawdown due to known developments
  - Perform sensitivity analysis of drawdown impacts based on additional developments
    - Single development
    - Multiple adjacent developments
  - Consider potential effects of recharge on drawdown

INTERA

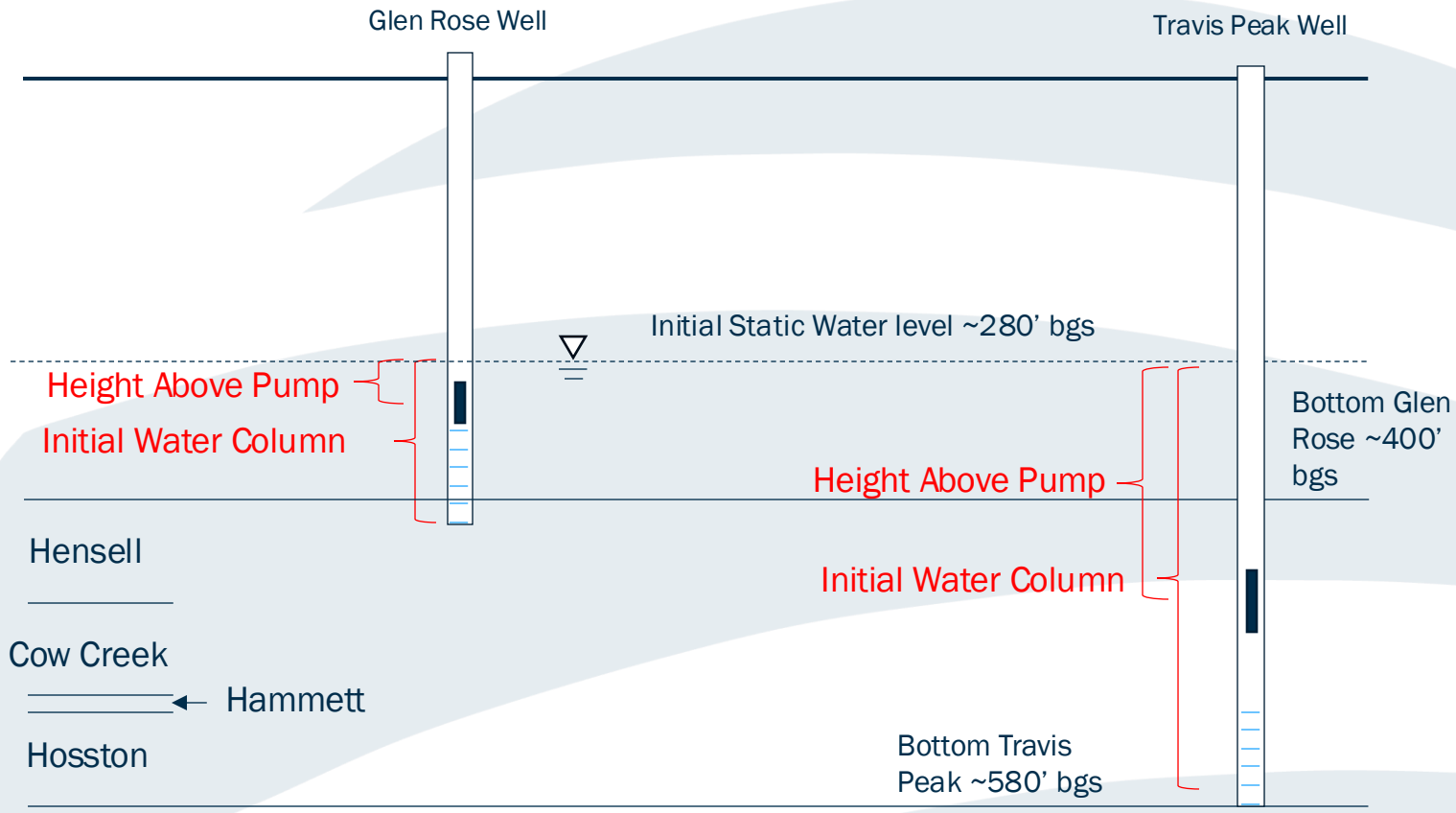
Example of Available Drawdown

Available drawdown is the difference between the static water level and some defined **critical limit.**

Critical Limit	Impact
Pump Setting	Pump starts to suck air, leading to loss of prime.
Top of the Aquifer	Transmissivity decreases and yields decline.
Bottom of the Aquifer	Yield is zero; no more water can be pumped.

To state the obvious:
the critical limit is less for a Glen Rose well than a Travis Peak well

Example Near Dominion Development



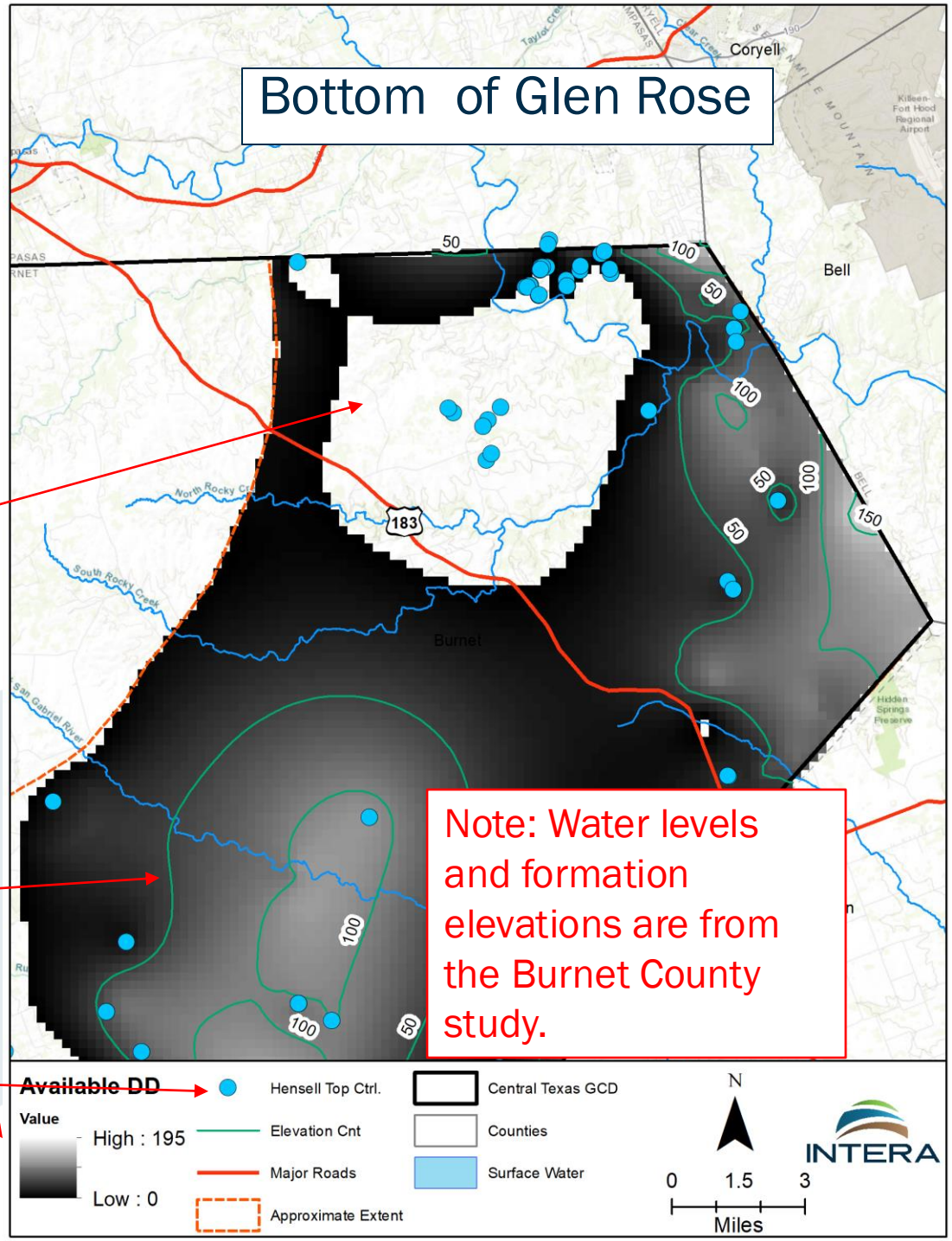
- The following slides show the distance between the estimated static water level in 2023 and the bottom of the formations that comprise the Trinity.

- So the **critical limit** is defined as the bottom of a particular formation.

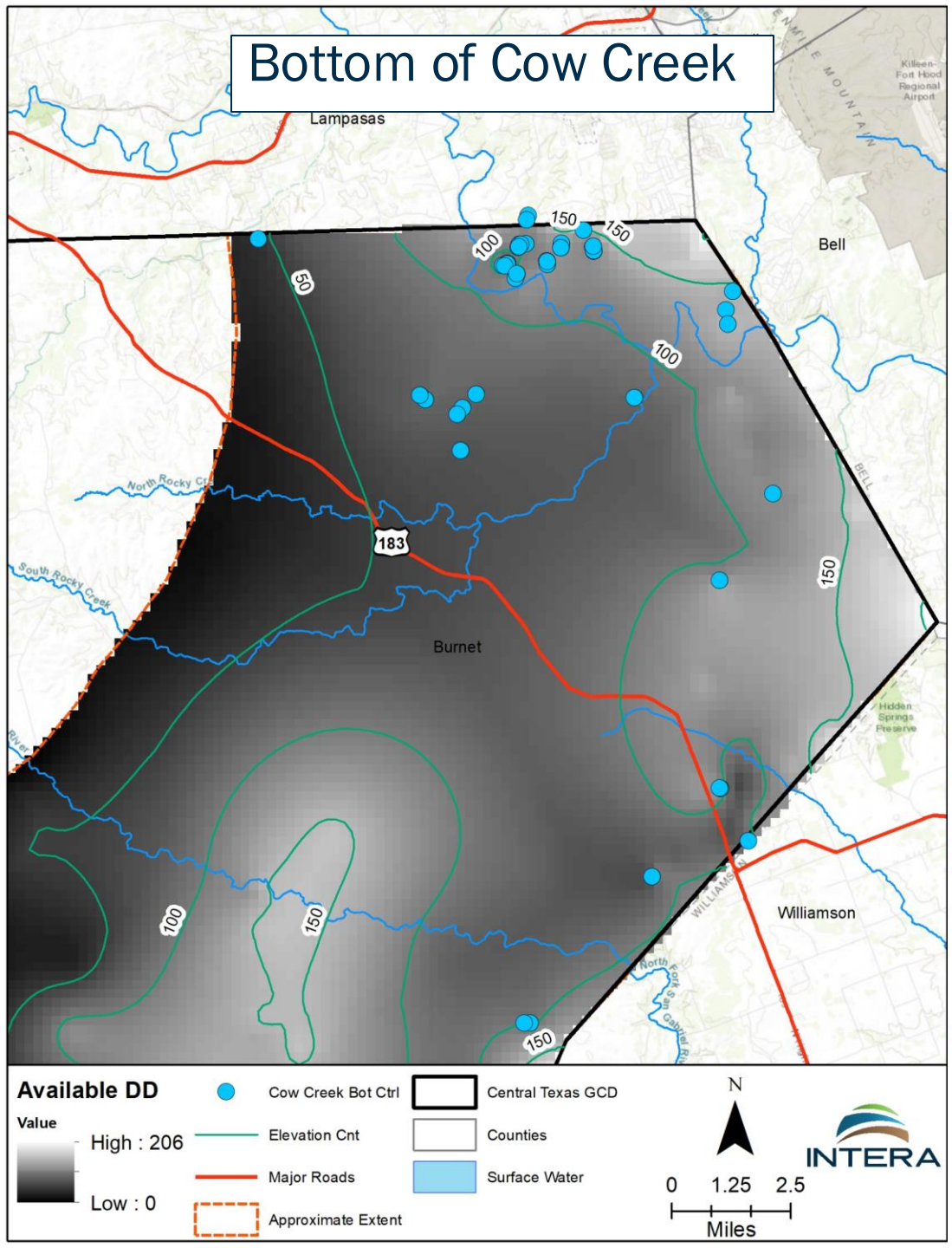
Blank areas indicate zero available drawdown (water level below bottom)

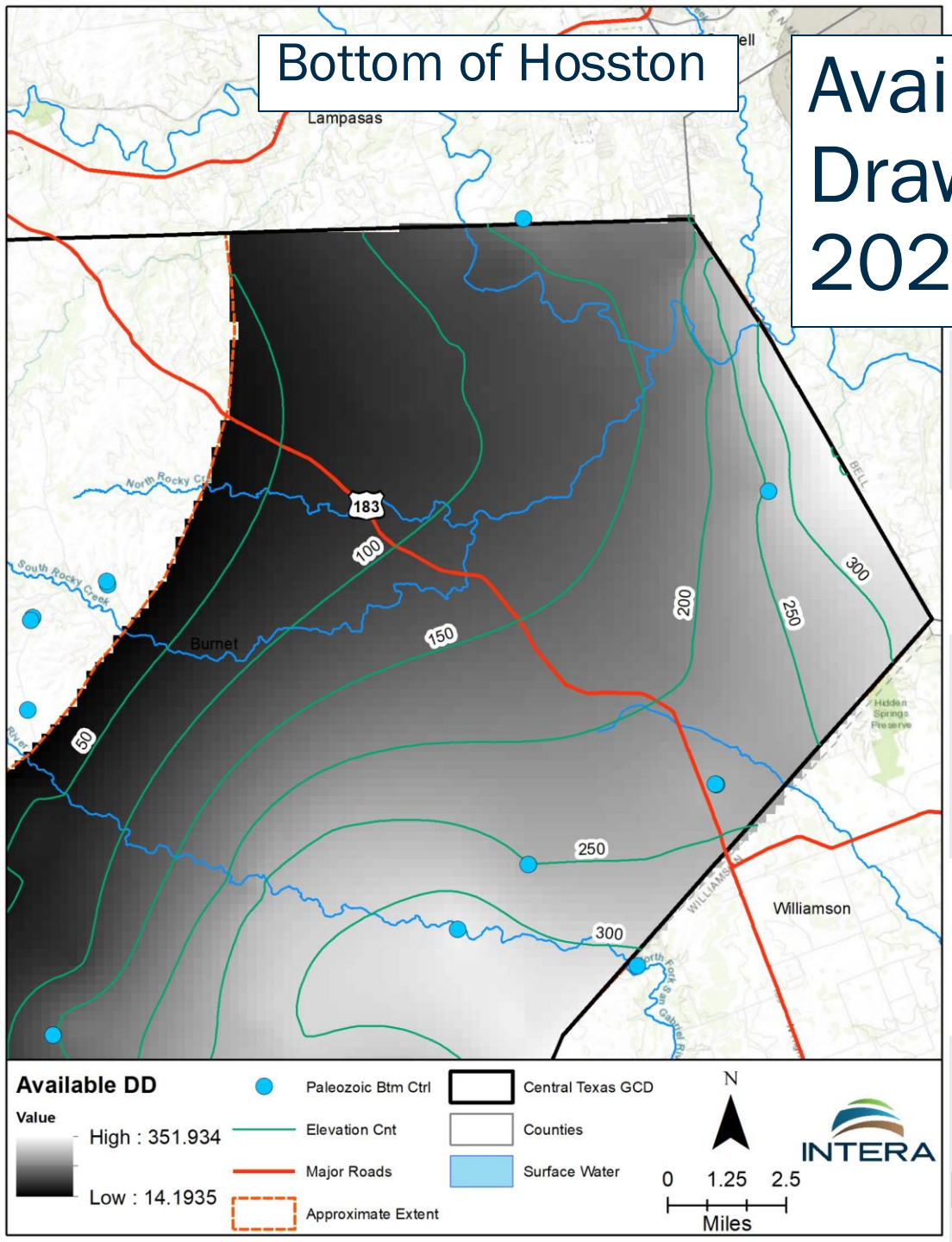
Dark to white color flood and contours both illustrate available drawdown

Symbols show formation bottom control points



Available Drawdown 2023

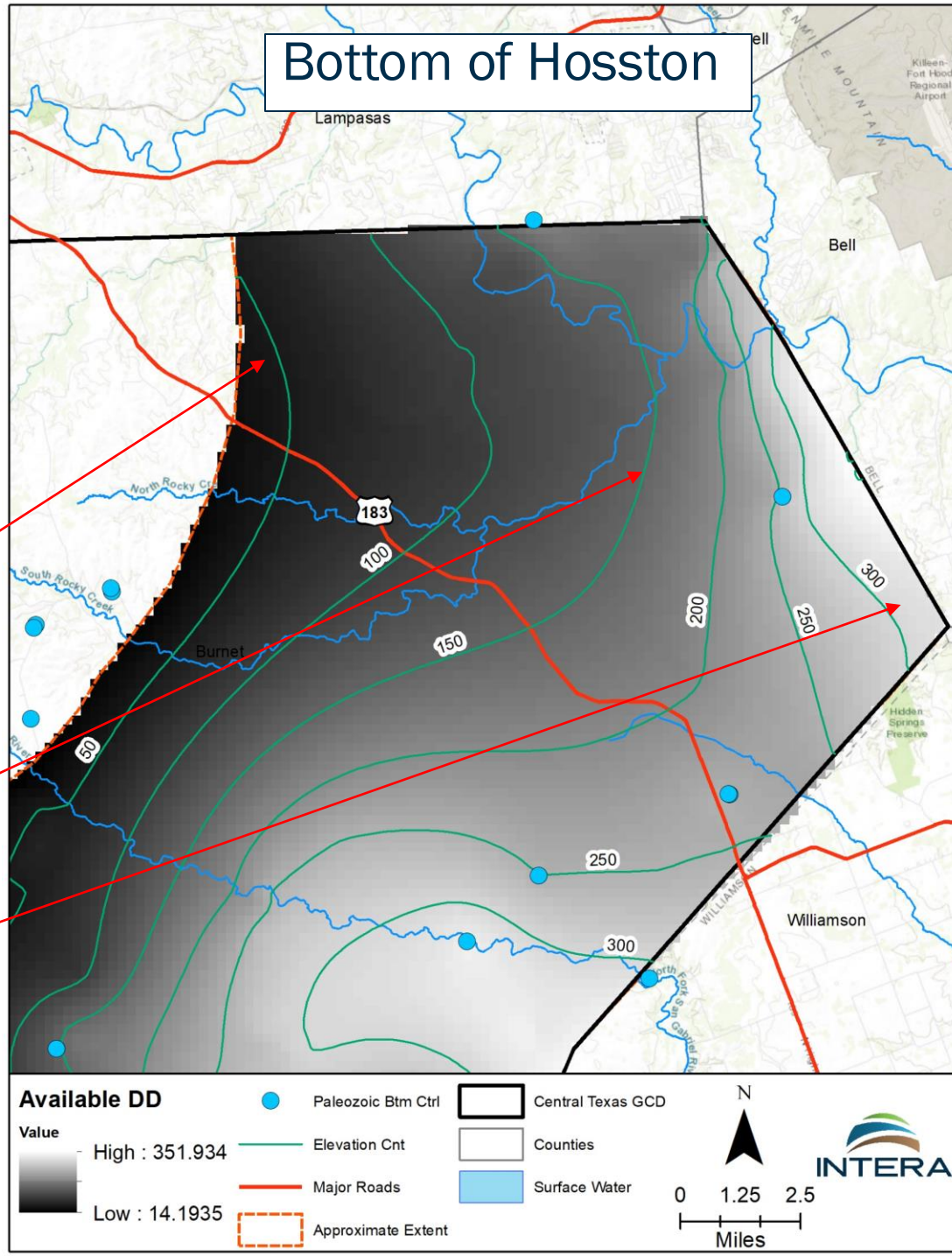




INTERA

Summary of Available Drawdown

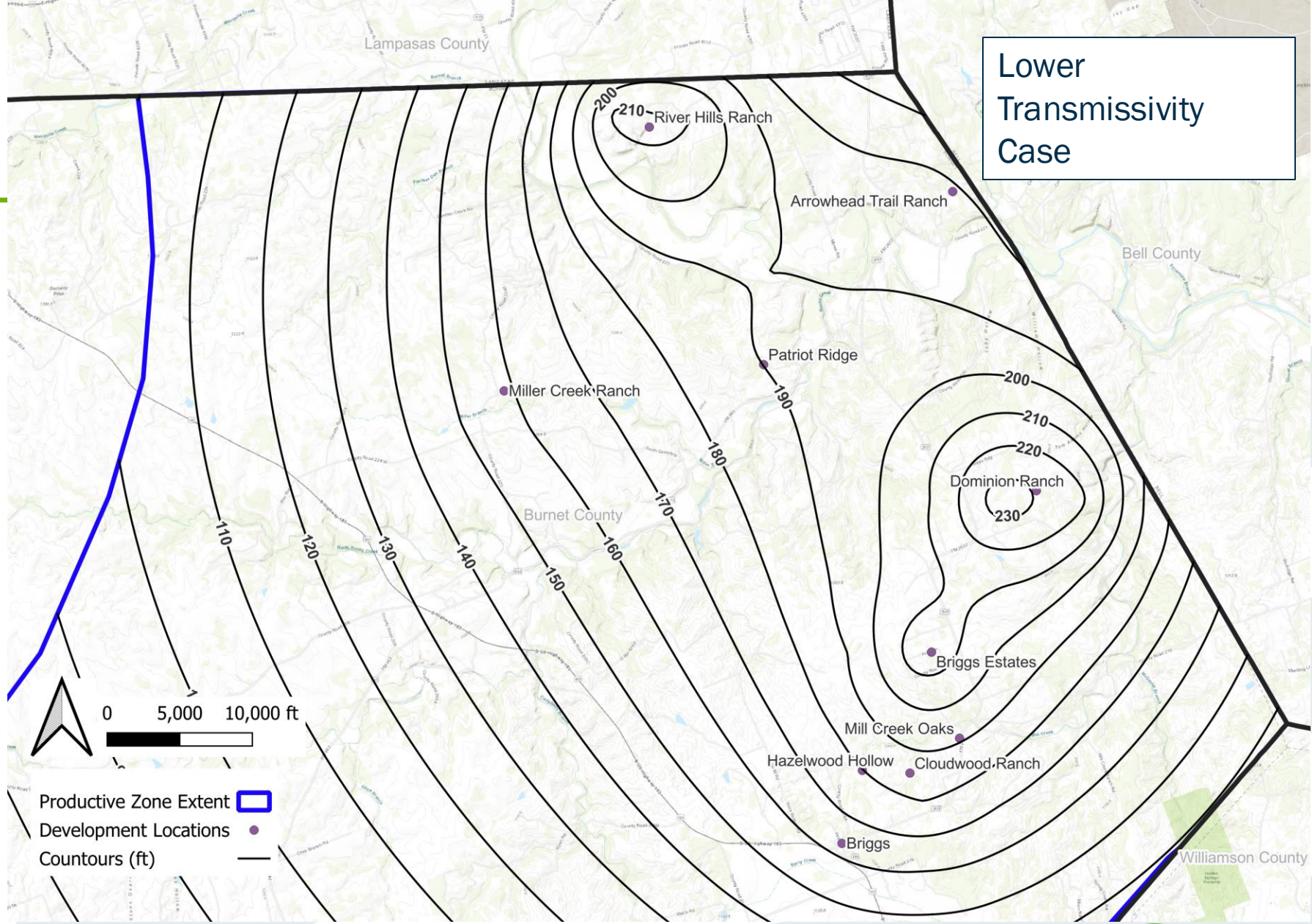
	Region		
Formation	**Updip**	**Middle**	**Downdip**
Glen Rose	0	<50	100+
Hensell	<25	50	150
Cow Creek	30	75	200
Hosston	50	150	300+



Known Development Simulation

Single “Travis Peak” Layer
Transmissivity = **55** ft^2/d
Storativity = $6.7x10^{-5}$
Duration = 30 years

Name	Number of Wells	Pump Rate (gpm)
Arrowhead Trail Ranch	41	10.3
Briggs	17	4.3
Briggs Estates	63	15.8
Cloudwood Ranch	51	12.8
Dominion Ranch	210	52.6
Mill Creek Oaks	21	5.3
Miller Creek Ranch	23	5.8
Patriot Ridge	17	4.2
Prairie Acres	19	4.8
River Hills Ranch	214	53.5



Modeling: a note about our assumptions

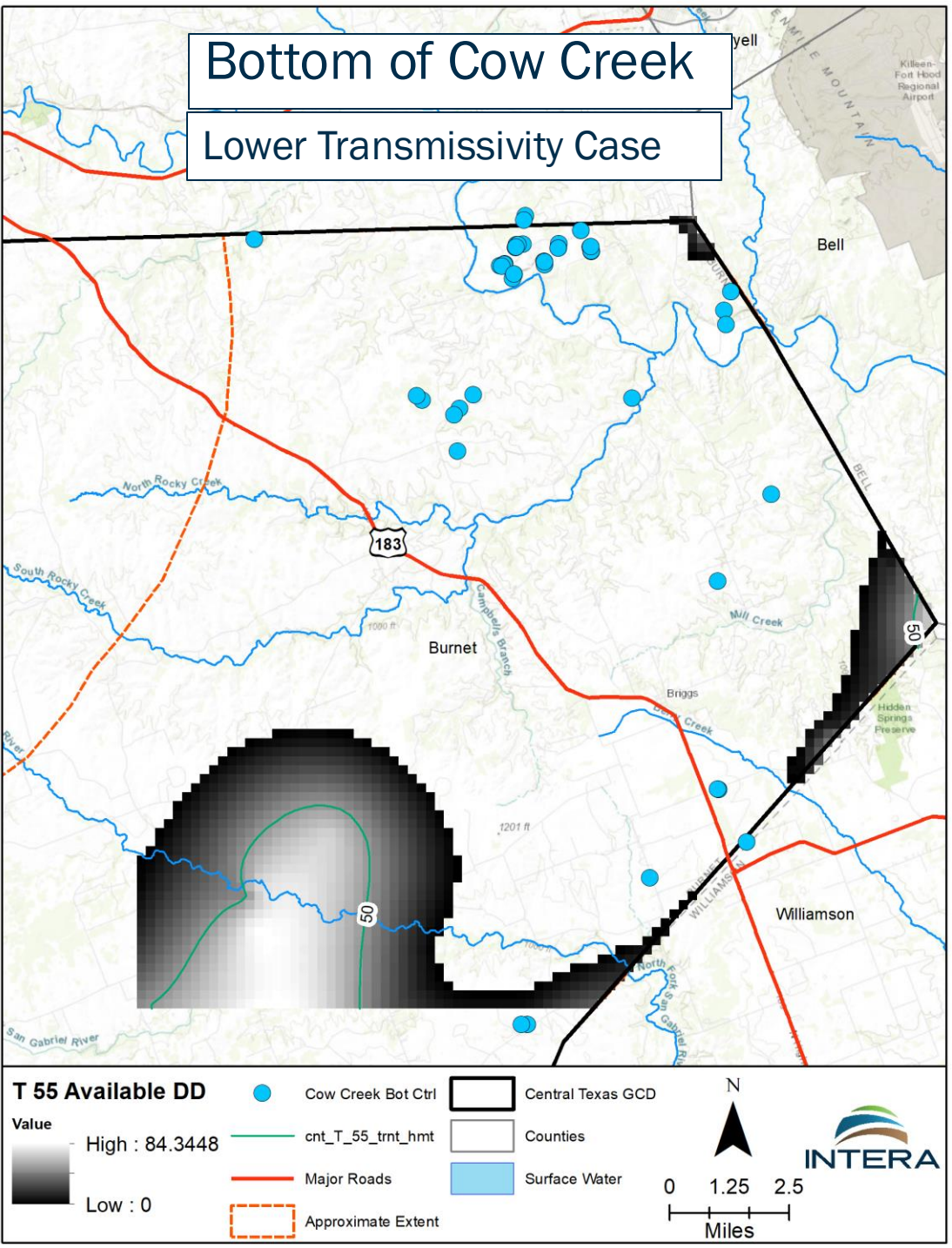
- Conservative
  - Assume that each platted lot will have a well (may be one well for multiple lots)
  - Assume all wells are active immediately, whereas buildout may occur over time
- Non-conservative
  - Does not consider existing wells outside the known developments
    - The majority of these existing wells are not drilled to the bottom of the Travis Peak

INTERA

Available Drawdown (known developments)

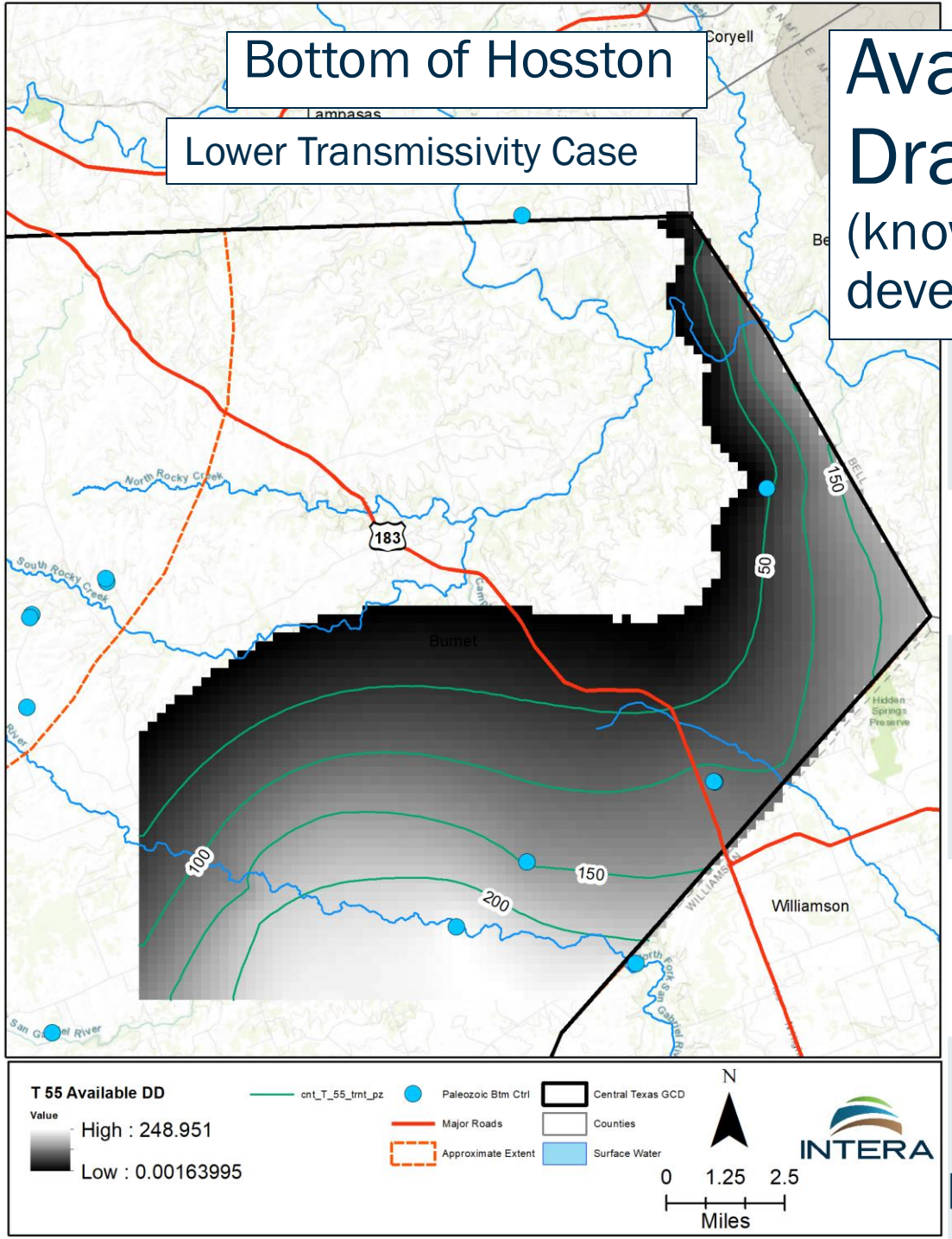
Bottom of Cow Creek

Lower Transmissivity Case



Bottom of Hosston

Lower Transmissivity Case

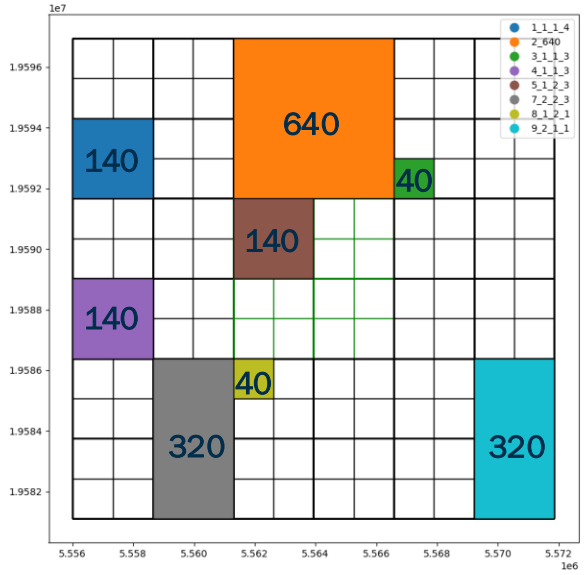


INTERA

Sensitivity Analysis for Predictions

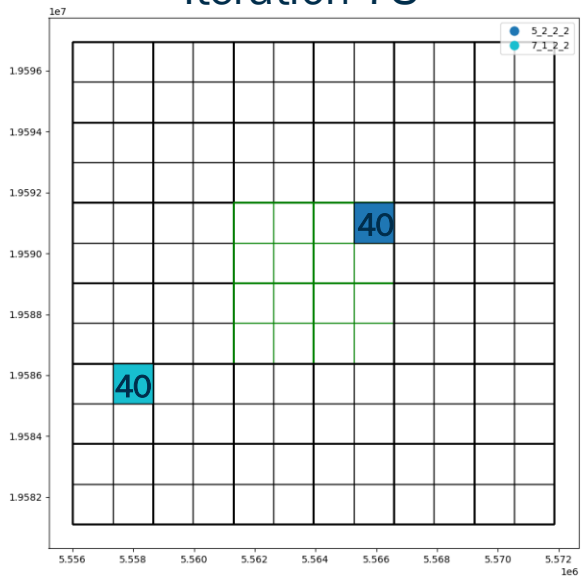
- Randomly selected a development size in the center development and one or more of the 8 surrounding developments (40, 160, 320, 640 Acres)
- Randomly assigned a property size (2, 3, 5, 7, 10 Acres) to each development
- Ran 500 randomized iterations
- Calculated Mean and Max Drawdown (DD) for each iteration

Iteration 484



Num Wells = 829
Mean DD = 366
Max DD = 401

Iteration 78



Num Wells = 10
Mean DD = 7.1
Max DD = 7.3

Conclusions and Recommendations

- Conclusions
  - Groundwater resources are limited due to low transmissivity and available drawdown.
  - Private wells in developments could significantly reduce long-term yields by lowering water levels.
  - Recharge from the Glen Rose may help but has limited effects under current assumptions.
  - The number of wells in a region (increasing with larger developments, smaller lots) is the key factor in assessing development impacts
- Recommendations
  - Testing model predictions as developments grow is crucial for confirming these findings.
  - Tracking new wells and monitoring water levels in the region should be top priorities.