

Workshop: Kinney County Groundwater Model

Bill Hutchison

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1. Summary of Groundwater Model
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 - c. Pumping Impacts on Las Moras Spring Flow
 - d. Simulations of Drought Conditions and Potential Management Response
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3. Discussion of Suggested Schedule
 - a. Model Development (May 2023)
 - b. Model Calibration (June 2023)
 - c. Model Application (Simulations) (August 2023)
 - d. Final Report and Presentation (September 2023)
 - e. Integration of Model Results into Rules Update (October to December 2023)

1a. Model Objectives

- Developed to address issues and questions related to groundwater management in Kinney County:
 - Management zones
 - Pumping impacts on Las Moras Spring
 - Drought management (reduced pumping to achieve a defined result)
 - Provide a basis to simplify permitting process for “small” wells (define what is pumping is considered to have minimal impacts)

1b. Documentation

- Main report when completed
- Technical Memoranda (TM) document each model package
 - Draft TMs are emailed to Genell Hobbs as they are completed
 - Draft TMs and associated data uploaded to Google Drive folder accessible to view and download:

https://drive.google.com/drive/folders/1mpyv5T2_CcDl5CLMDIFeYOwvpPLudW2H?usp=share_link

- TMs will be appendices in main report

My Drive > Kinney MODFLOW 6 

Name 	Owner	Last modified 
 TM 23-01 (Grid)	 me	Mar 22, 2023 me
 TM 23-02 (Simulation Name File)	 me	Mar 22, 2023 me
 TM 23-03 (Initial Conditions)	 me	Mar 23, 2023 me
 TM 23-04 (Output Control)	 me	Mar 23, 2023 me
 TM 23-05 (NPF)	 me	Mar 27, 2023 me
 TM 23-06 (STO)	 me	Mar 27, 2023 me
 TM 23-07 (CHD)	 me	Mar 29, 2023 me
 TM 23-09 (DRN)	 me	Apr 28, 2023 me
 TM 23-10 (RCH)	 me	Apr 18, 2023 me
 TM 23-12 (CalData)	 me	Apr 16, 2023 me
 TechMemoList.pdf 	 me	Apr 29, 2023 me

Kinney County Groundwater Model Technical Memoranda

Technical Memorandum (TM) Number	Pages	Subject	Version 1 Completion Date	Most Recent Version and Completion Date	Notes
23-01	14	Model Grid and Unstructured Discretized Input File (DISU)	3/23/2023		Grid numbering and cell geographic attributes (old model row and column, top and bottom elevations, county, GMA, watershed, faults, model edges).
23-02	5	Simulation Name File, Time Discretization, Model Name, and Solver (mfsim.nam, TDIS, NAM, and IMS)	3/23/2023		Quarterly stress period (3 months each).
23-03	3	Initial Conditions (IC6)	3/23/2023		Set initial conditions to land surface for initial run. Will add steady state output as initial conditions after initial run.
23-04	3	Output Control (OC6)	3/23/2023		Saves head and cell by cell flows for each stress period
23-05	28	Node Property Flow (NPF6)	3/27/2023		Initial values based on assumption of preferential flow paths due to karst
23-06	10	Storage (STO6)	3/27/2023		Initial values are based on constant storativity and specific yield for each layer
23-07	13	Time-Variant Specified Head (CHD6)	3/29/2023		Initial = Layer specific. Need to add geographic areas for each layer
23-08		Well (WEL6)			4 instances (Ag, Non Ag Non Exempt, Municipal, Exempt)
23-09	14	Springs (DRN6)	4/28/2023		3 instances (Las Moras and other seep/spring areas in Edwards, alluvial gaining stream)
23-10	20	Recharge (RCH6)	4/18/2023	v2: 4/18/2023	6 instances based on recharge zone. V2: Included map of recharge zones
23-11		Evapotranspiration (EVT6)			Hold for now (using net recharge initially)
23-12	68	Calibration Data	4/17/2023		TWDB groundwater levels, KCGCD groundwater levels (EcoKai and Goebel), Las Moras Spring
23-13		Initial Model Run			To verify that all input files are working and plan for initial calibration steps. Includes post-processor documentation.
23-14		Calibration Results			Summary of Calibration. Each TM will be updated as appropriate with details
23-15		Initial Predictive Simulations			Pumping and recharge sensitivity to scope alternative management simulations

1c. Progress

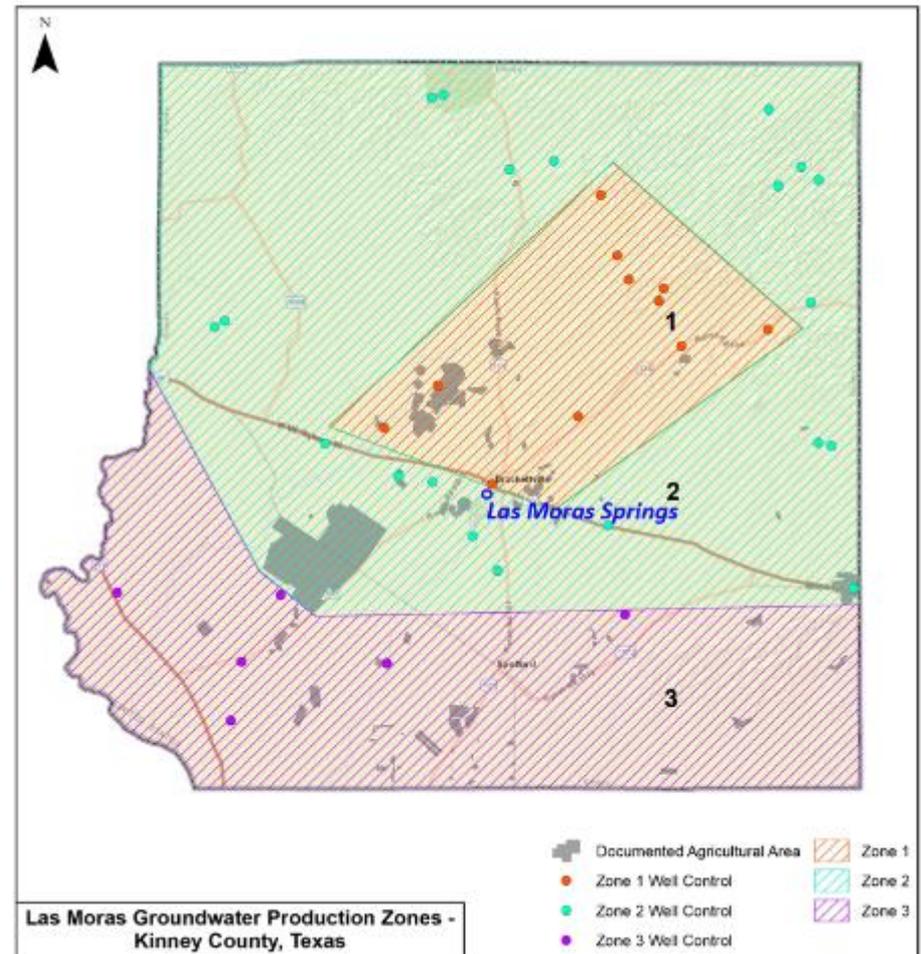
- Completed initial drafts of 10 of 12 TMs
 - TM 23-10 (RCH) is version 2
 - TM 23-05 (NPF) will have version 2
 - TM 23-02 (NAM) will have version 2
- TM 23-08 (WEL) is almost done
 - Needed to meet with Jim Burton and Genell Hobbs to clarify permitted well issues prior to completion
- All initial drafts (and any updated versions) will be completed in mid-May
 - TM 23-13 (Initial Runs) signals that development is complete (includes all post-processors used in calibration)

2. Discussion of Management Questions

- a. Management Zones
- b. Simulations of Increased and Decreased Pumping
- c. Pumping Impacts on Las Moras Spring Flow
- d. Simulations of Drought Conditions and Potential Management Response
- e. Establishing a Threshold Pumping Level (i.e. below threshold = fewer permitting requirements)

2a. Management Zones

- Current management plan shows zones based on correlation of groundwater levels (KCGCD monitoring data) and Las Moras Spring flow
 - Recognized as a “placeholder”
- Discussion of objectives of zones
- Discussion of potential simulations to evaluate alternative objectives



2b. Simulations of Increased and Decreased Pumping

- Objective: provide stress/response data for other analyses
- Overall pumping
- Pumping by “group”
 - Agricultural
 - Municipal
 - Commercial/Industrial
 - Domestic/Livestock
- Can be extended to simulate 1950s drought conditions

2c. Pumping Impacts on Las Moras Spring Flow

- Analysis of calibrated model groundwater budgets
- Analyses of simulations of increased/decreased simulations model groundwater budgets

2d. Simulations of Drought Conditions and Potential Management Response

- Simulations to test reducing pumping when a specified condition is “triggered”
 - Specified spring flow
 - Specified rainfall
- Specify alternative pumping reductions (simulated regulatory response)
- Evaluate results of reduced pumping
 - Increased groundwater levels
 - Increased spring flows
- Test alternative triggers/reductions

2e. Threshold Permit Pumping Level

- Current rules treat all permit requests the same regardless of pumping amount
- Below some level of pumping, impacts are minimal
 - Should not require aquifer test or one-year pumping alternative
- Simulations will provide information to KCGCD Board to “draw the line”

2f. Other Concepts/Questions

- Open discussion

3. Suggested Schedule

- a. Model Development (May 2023)
 - Completion: TM 23-13 (Initial Model Run)
- b. Model Calibration (June 2023)
 - Completion: TM 23-13 (Calibration Results)
- c. Model Application (Simulations) (August 2023)
 - First step: TM 23-14 (Pumping and Recharge Sensitivity)
 - Subsequent Runs: TM for each group of simulations
- d. Draft Final Report and Presentation (September 2023)
 - Final report will be relatively short and not highly technical
 - All TMs will be appendices to main report
- e. Integration of Model Results into Rules Update (October to December 2023)