

	Project Title	Status	Student Level
Contract 12064 - Aquitard Study			
	Year 1 Deliverables	Final Deliverable Date	
1	Assess impact of known breaches in the Sheahan well field; determine presence of unidentified breaches in the well field; and assess impact of the former Custom Cleaners site.	Completed	Master's
2	Determine potential breach locations proximal to the Wolf River focusing on the section from Collierville-Arlington to Highway 51. Methodologies to be examined include riverbed seepage measurements, detailed discharge measurements, thermal imaging surveys, and developing well transects to monitor groundwater/surface water exchange.	Completed	Master's
3	Continue aquifer characterization across Shelby County to better constrain numerical model parameter estimation.	Completed	Master's
4	Continue geophysical surveys of aquitard breaches on President's Island and Pigeon Industrial Park (a.k.a., Ensley bottoms) with impact to the Davis and Allen well fields.	Completed	Master's
5	Continued research using stochastic modeling to determine the effectiveness of using groundwater pumping optimization to minimize contaminant movement from the water table aquifer to Memphis Aquifer.	May 2022	PhD
	Year 2 Deliverables	Final Deliverable Date	
1	Use of geophysical well records to investigate hypothetical paleo-drainage network atop the Upper Claiborne confining unit to help identify additional breach locations and better inform numerical groundwater flow simulations.	June 2023	PhD
2	Subsurface mapping of geologic units to identify the presence of aquitard breaches and characterize the hydraulic properties of identified breaches using geophysical techniques in conjunction with other traditional methods.	June 2023	PhD
3	Conduct multi-scale investigation of surface water-groundwater interactions along the Loosahatchie River and Nonconnah Creek using a variety of methodologies to identify breaches. Incorporate these findings plus those of the Wolf River (ongoing research) into Shelby County numerical groundwater model.	June 2023	PhD
4	Development of hypothetical groundwater models focusing on groundwater sustainability including modeling the fate and transport of various contaminants and conducting bench scale testing of retardation reactions.	June 2023	PhD

5	Build upon existing Davis well field age-dating data to further refine and quantify source waters to the Memphis aquifer at the Davis well field through sampling water chemistry, groundwater age-dating, characterization of the hydrogeologic properties of a known breach impacting Davis, and development of a conceptual model of groundwater flow for later incorporation into a numerical model.	Delayed until August 2021 (COVID impacted H3/He3 laboratory)	Master's
6	Determine <i>in-situ</i> riverbed properties (hydraulic conductivity and thickness) for the Loosahatchie River, Wolf River and Nonconnah Creek to further constrain the Shelby County numerical groundwater model and for site-scale hydrogeologic analyses.	Delayed until December 2021 (Waiting on wet season deployment results, huge amounts of samples and data still to process)	Master's
7	Investigate Shaw well field to determine source waters and potential for modern water migration into the Memphis aquifer, development of unconfined conditions and vulnerability to nearby contaminated sites.	Delayed until Dec 2021 (COVID impacted H3/He3 laboratory)	Master's
8	Determine numerical modeling best practice for simulating groundwater conditions in the shallow aquifer that better represent groundwater levels and flow direction, vertical leakage through aquitard breaches, and avoiding inherent cell flooding (too much recharge) and drying (thin saturation depths).	Delayed until August 2021 (Student taking longer than expected)	Master's
9	Determine recharge mechanisms and rates to the shallow aquifer within Shelby County that contributes to its replenishment and source of additional inflow to the Memphis aquifer through aquitard breaches.	Delayed until August 2022 (1st student removed from effort, COVID delayed VISA and arrival of replacement student was a semester late)	Master's
10	Use numerical modeling to correlate age-dating and geochemical observations to known/potential breaches that will include possible paleo-drainage atop the Upper Claiborne confining unit.	June 2023	PhD
11	Formulate and test methodology(ies) to reduce or eliminate preferential inter-aquifer exchange	June 2023	PhD
Year 3 Deliverables		Final Deliverable Date	
1	Investigate McCord well field to determine source waters and potential for modern water migration into the Memphis aquifer field through sampling water chemistry, groundwater age-dating, mapping of the subsurface stratigraphy, and development of a conceptual model of groundwater flow for later incorporation into a numerical model.	Delayed until Dec 2022 (COVID caused delay in VISA and student arriving a semester late)	Master's
2	Investigate Mallory well field to determine source waters and potential for modern water migration into the Memphis aquifer field through sampling water chemistry, groundwater age-dating, mapping of the subsurface stratigraphy, and development of a conceptual model of groundwater flow for later incorporation into a numerical model.	May 2022	Master's

3	Incorporate more complete age-dating of Sheahan production wells into numerical model to resolve the probable location of breach(es) in the southern portion of the well field with attempted validation through geophysical techniques or drilling of an observation well.	May 2022	Master's
4	Conduct a county-wide water level survey of the shallow aquifer.	May 2022	Master's
Year 4 Deliverables			
		Final Deliverable Date	
1	Develop lithologic database of well logs for Shelby County for 3D representation and use for stratigraphic mapping and other upscaling tasks	June 2023	
2	Fly AEM (airborne electromagnatism) over section of north Shelby County that includes a suspected breach location	Dec. 2021	
Year 5 Deliverables			
		Final Deliverable Date	
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