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June 21, 2007

Ms. Kristen Andersen, Senior Planner
Tallahassee-Leon County Planning Department
300 S. Adams Street
Tallahassee, FL 32301

RE: Leon County Aquifer Vulnerability Assessment Progress Report #4: BC-06-21-06-53

Dear Ms. Andersen:

We are pleased to present you with the fourth progress report for the LAVA project detailing work we have completed during the fifth month of the project. An invoice for work completed to date is attached. Please refer to http://adgeo.net/lava.php for additional project information. Please call if you have any questions.

Best regards,

Alex Wood, President
Advanced GeoSpatial Inc.

AW/aw

attachments

LEON COUNTY AQUIFER VULNERABILITY ASSESSMENT PROJECT
PROGRESS REPORT #4 –JUNE 21, 2007

As agreed upon between Leon County and Advanced GeoSpatial Inc., AGI will provide progress reports along with invoices and deliverables every month throughout the six-month project period. Each report is intended to detail the progress and metrics of the LAVA project. This third report details work completed between May 19 and June 19 per contract timeline. Work includes final modeling completed during the fifth month.

Final Modeling

As mentioned in previous progress reports, evidential themes representing soil hydraulic conductivity, soil pedality, thickness of Floridan Aquifer System overburden, thickness of the Intermediate Confining Unit, and effective karst features were developed for the LAVA model. These were then tested to determine association with model training sites. Results of this testing and final modeling are discussed below. This task is approximately 100% complete.

Soil Hydraulic Conductivity and Soil Pedality Themes

Models were developed using either the soil hydraulic conductivity and soil pedality themes. Weights calculated for the soil hydraulic conductivity were stronger predictors of vulnerability (i.e., had higher absolute value) than weights calculated using soil pedality. As a result, the soil hydraulic conductivity was chosen as the better controller of aquifer vulnerability because it shares the strongest association with training points.

Input	Contrast (weights combination)	Studentized T value (Confidence)
Soil Hydraulic Conductivity	**1.0615**	**2.1694 (99%)**
Soil Pedality	0.7184	1.3397 (90%)

Intermediate Confining Unit/Overburden on the Floridan Aquifer System

Models were developed using either the Intermediate Confining Unit or the overburden on the Floridan Aquifer System. As revealed in the sensitivity analysis, both inputs share a very similar association with the training points (contrast value). However, the confidence value associated with the weights calculated for the thickness of overburden layer indicates that this layer is a stronger predictor of vulnerability than Intermediate Confining Unit theme. As a result, the overburden thickness was chosen as the better controller of aquifer vulnerability because it shares the strongest association with training points.

Input	Contrast (weights combination)	Studentized T value (Confidence)
Overburden Thickness	**0.947**	**1.9488 (97.5%)**
Intermediate Confining Unit	0.952	1.8017 (95%)

Final modeling also revealed that minor improvements were needed on the overburden evidential theme. Minor adjustments were made to the raster extent and cell size of the evidential theme. The results of these improvements and subsequent modeling indicate that areas underlain by zero to 49 feet of overburden are more associated with the training points, and therefore higher aquifer vulnerability. Areas underlain by 49 to 215 feet overburden thickness are less associated with the training points, and therefore lower aquifer vulnerability. Based on this analysis, the evidential theme was re-generalized into two classes as displayed in Figure 1.

Response Theme

Results of the modeling phase have allowed statistical determination of the most appropriate inputs for generation of final vulnerability response themes, or model output. Combining evidential themes representing soil hydraulic conductivity, overburden thickness, and effective karst features using the weights of evidence technique results in generation of a response theme, or relative aquifer vulnerability map across the study area (Figure 2). It should be noted that though the final modeling phase is complete, the response theme displayed below should be considered 'draft' form until the model validation has been completed and the final project report is complete.

Based on the probability distribution of the model output, it is possible and justifiable to break final vulnerability maps into either three or four relative vulnerability classes (based on probability values plotted against model area as in Figure 3). Further, there are two ways to break the response theme into three classes. These optional break patterns for the three class schemes are displayed below in Figures 4 and 5. Any one of these classification schemes is justifiable based on model results; the most appropriate one will be one that provides Leon County staff with the best and most usable tool for implementation. Currently, the advisory committee is reviewing these figures to determine which scheme will best meet these needs. It is recommended that only a single classification scheme be finalized as having multiple maps may reduce the credibility and/or defensibility of the final vulnerability map.

Model Confidence

Confidence is calculated for the response by dividing each posterior probability class by the total uncertainty for the class (standard deviation). The results of this calculation allow the estimation of how confident one can be in interpreting the results of the final model across the study area. Areas with high posterior probability values typically correspond to higher confidence values and as a result have a higher level of certainty with respect to predicting aquifer vulnerability. The confidence map for the LAVA project is displayed below in Figure 6.

Remaining tasks

Overall, the LAVA project is on schedule. The project final report will serve as final progress report and will be delivered on July 19, 2007, at project termination. The final report will be submitted in draft form to the TAC for review and comment on or about June 29, 2007. The final advisory committee meeting took place on June 19, 2007 and results of the sensitivity analysis and the final modeling phase were presented to the group for feedback and suggestions. For reference, the task schedule as in the scope of work is included below.

Table 1. Task schedule for the LAVA project.

Month 1: January 19 – February 19	***Percent Complete***	
Project Kickoff Meeting	100	
LAVA Scientific Advisory Committee Meeting #1	100	
LiDAR implementation and conversion	100	
Training Point Theme and Statistical Analyses	100	
Invoice amount		$ 7,871
Month 2: February 19 – March 19		
Intermediate Aquifer System/Overburden Thickness Theme	100	
Invoice amount		$ 9,850
Month 3: March 19 – April 19		
LAVA Scientific Advisory Committee Meeting #2	100	
Other Evidential Themes under Consideration and Testing	100	
Soil Permeability Theme	100	
Karst Features Theme (to be completed by Client)	100	
Invoice amount		$ 7,963
Month 4: April 19 – May 19		
Preliminary Modeling/Sensitivity Analysis	100	
Invoice amount		$ 12,428
Month 5: May 19 – June 19		
Final Modeling	100	
Board of County Commissioners Meeting		
Invoice amount		$ 13,347
Month 6: June 19 – July 19		
Model Validation	100	
Map and Report Development	100	
LAVA Scientific Advisory Committee Meeting #3	100	
QA/QC of input data and model output	100	
Project Results Presentation and Meeting	100	
Training Session #1 and 2[1]	100	
Invoice amount		$ 21,541
		$ 73,000

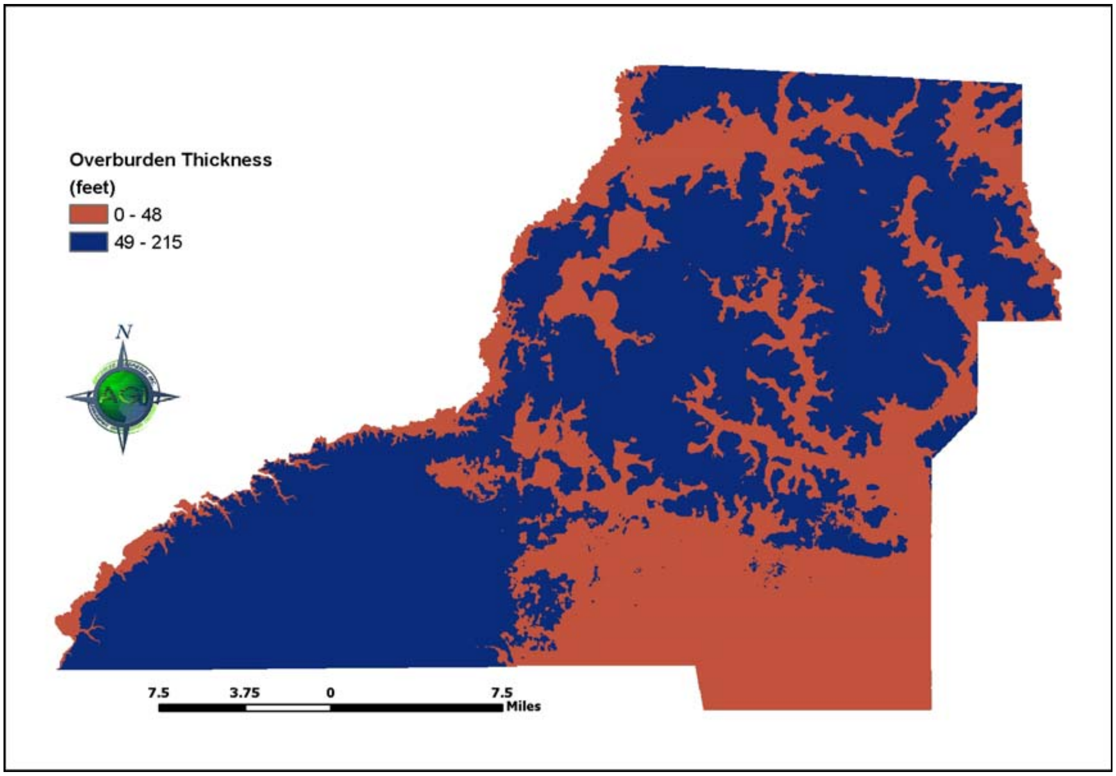

Figure 1. Re-generalized theme representing thickness of overburden overlying the FAS.

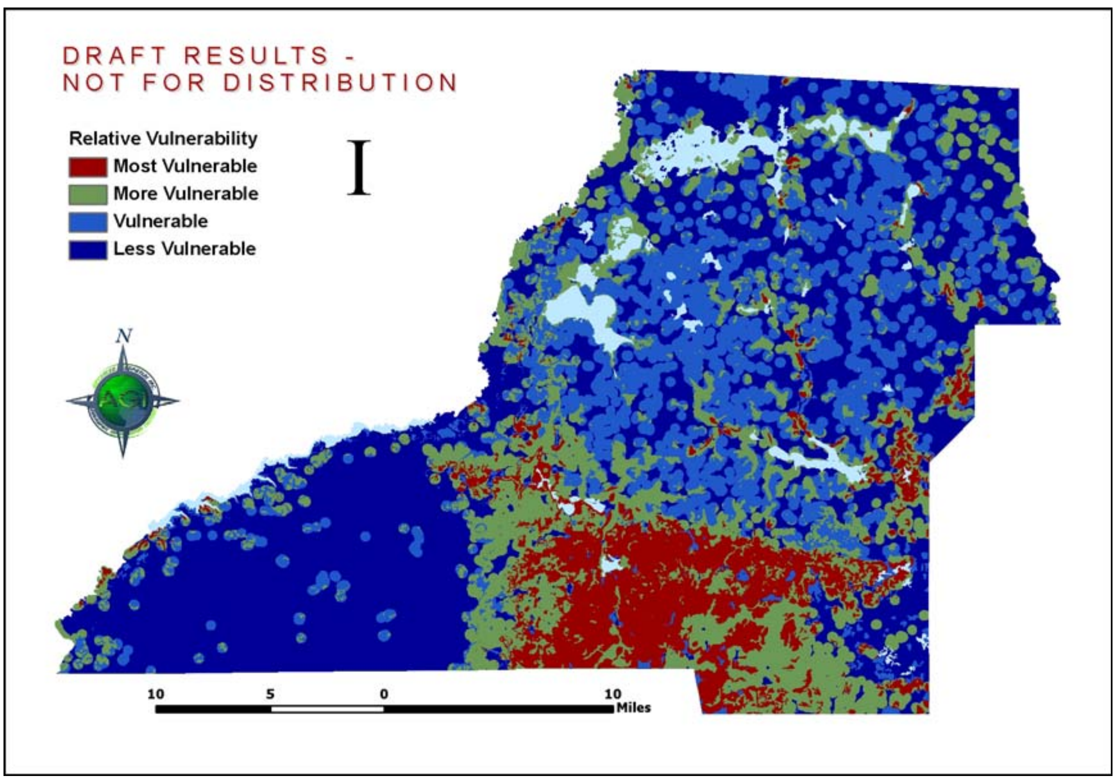

Figure 2. Four-class relative aquifer vulnerability model results. Classes based on chart below.

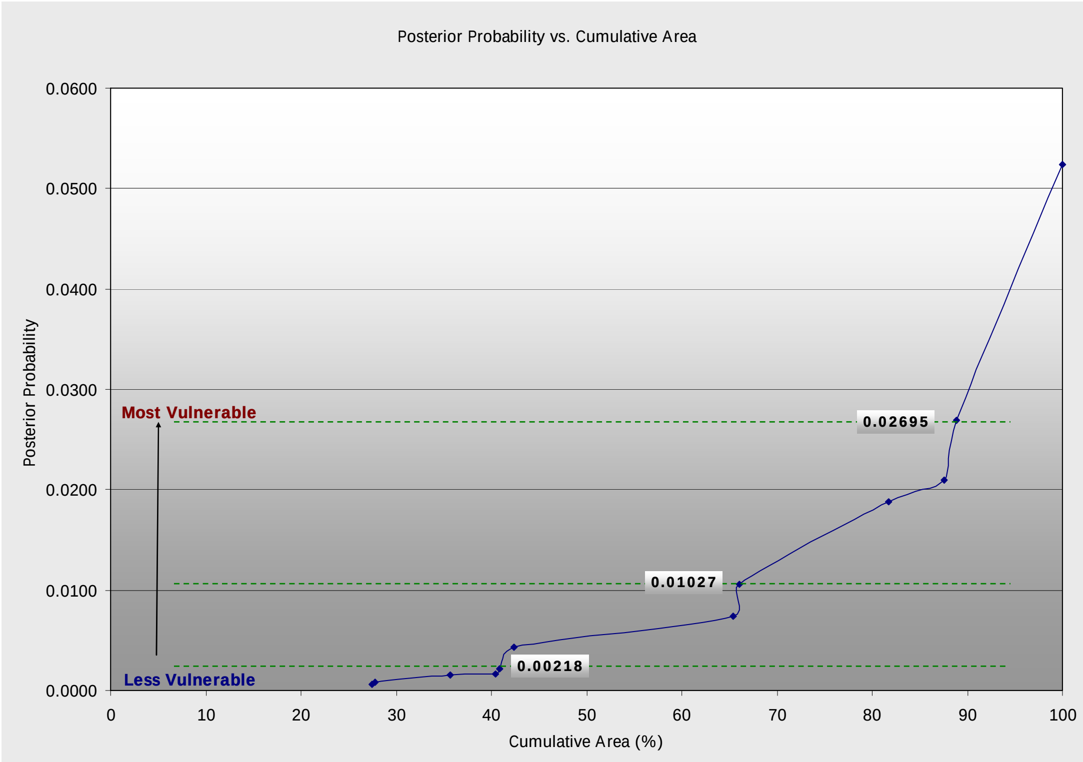

Figure 3. Vulnerability class breaks are defined by selecting where a significant increase in probability and area are observed.

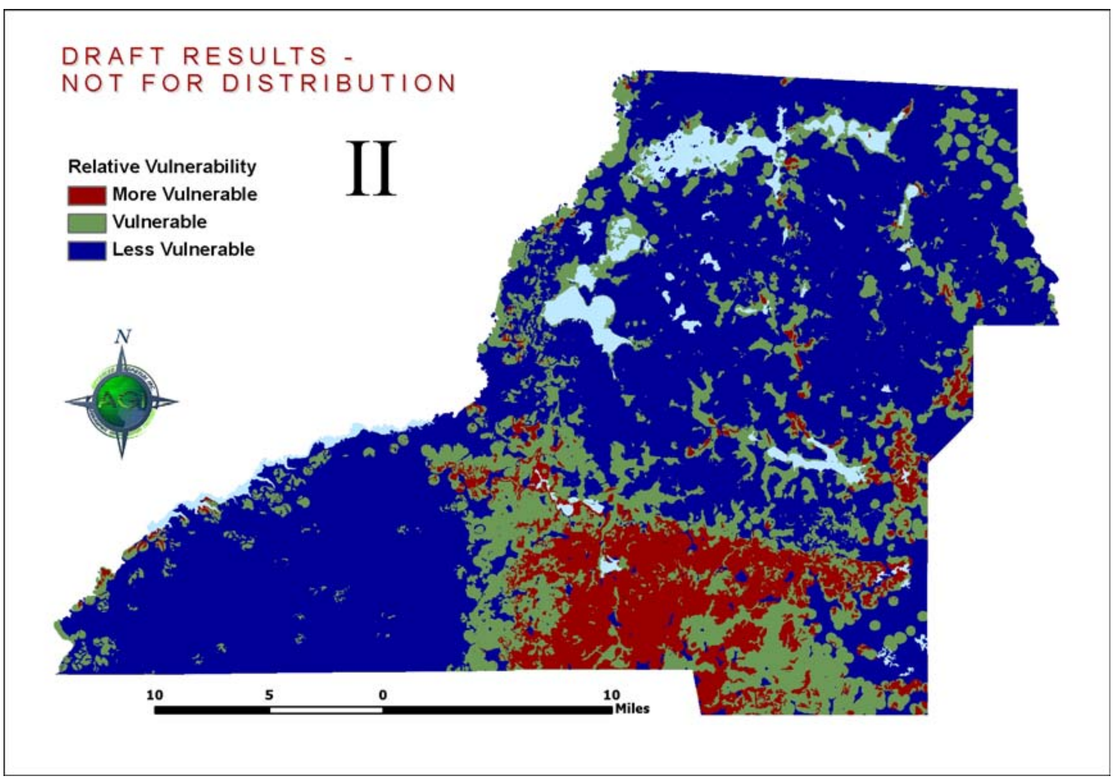

Figure 4. Three class relative aquifer vulnerability model results, based on removing lower break in chart above.

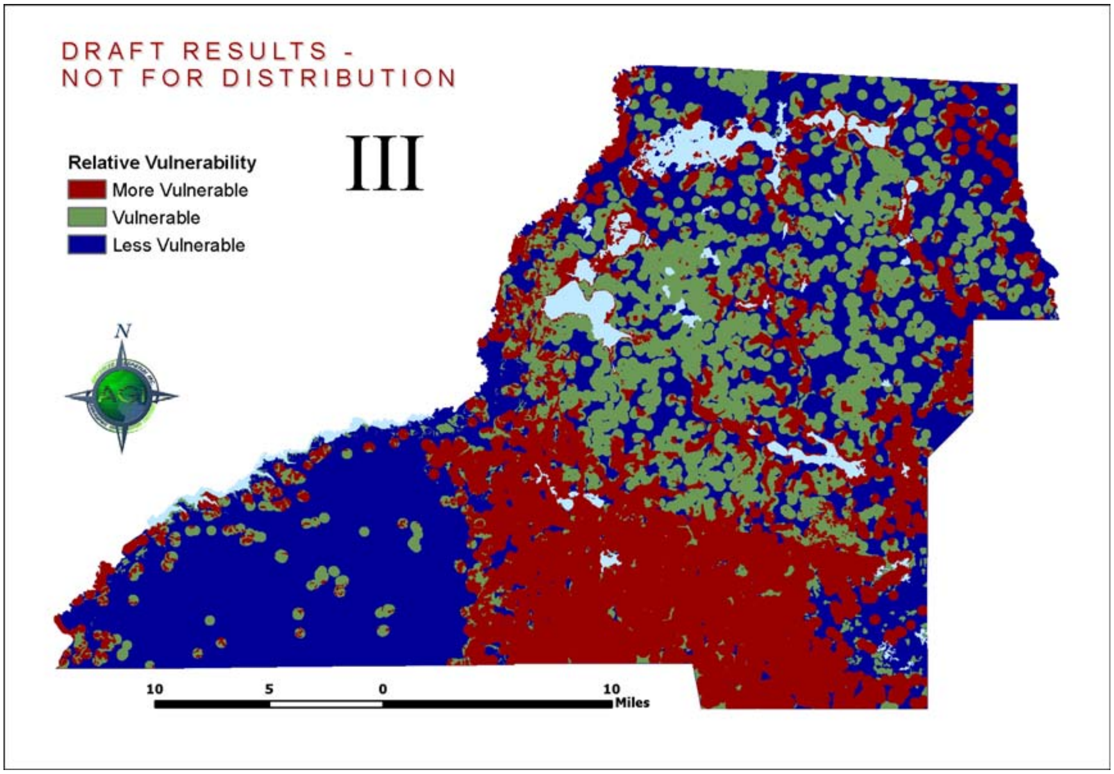

Figure 5. Three class relative aquifer vulnerability model results, based on removing upper break in chart above.

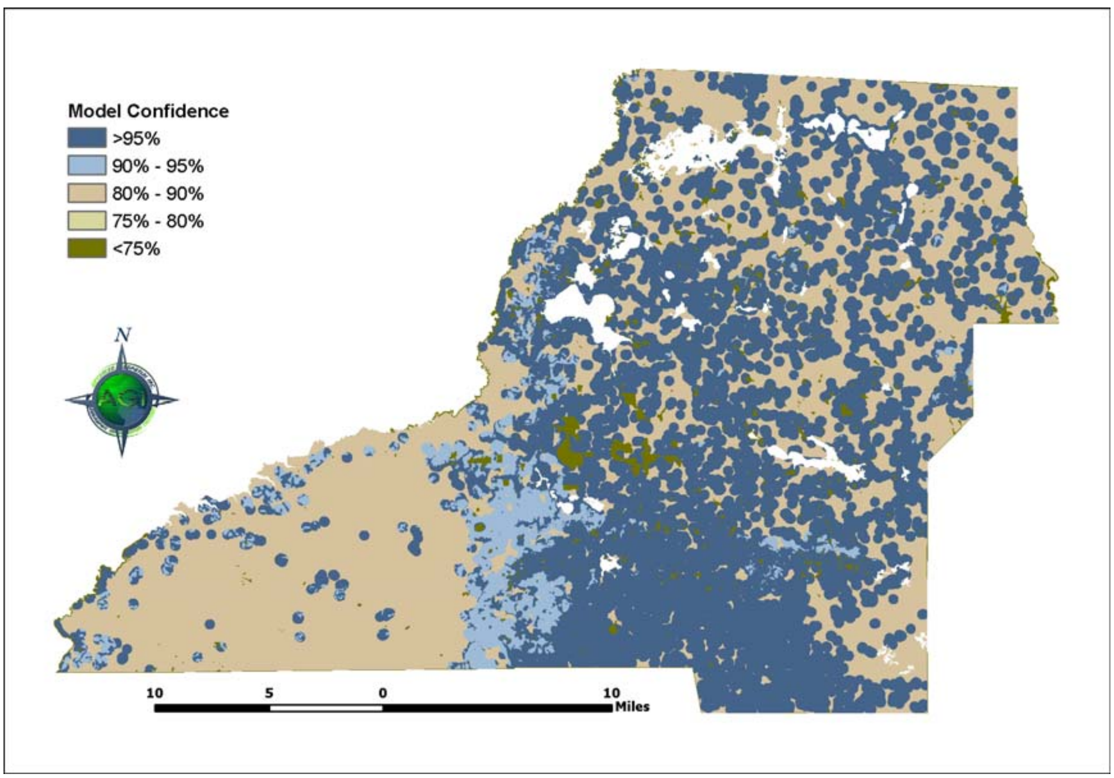

Figure 6. Confidence map for the LAVA model calculated by dividing the posterior probability values by the total uncertainty for each class to give an estimate of how well specific areas of the model are predicted.