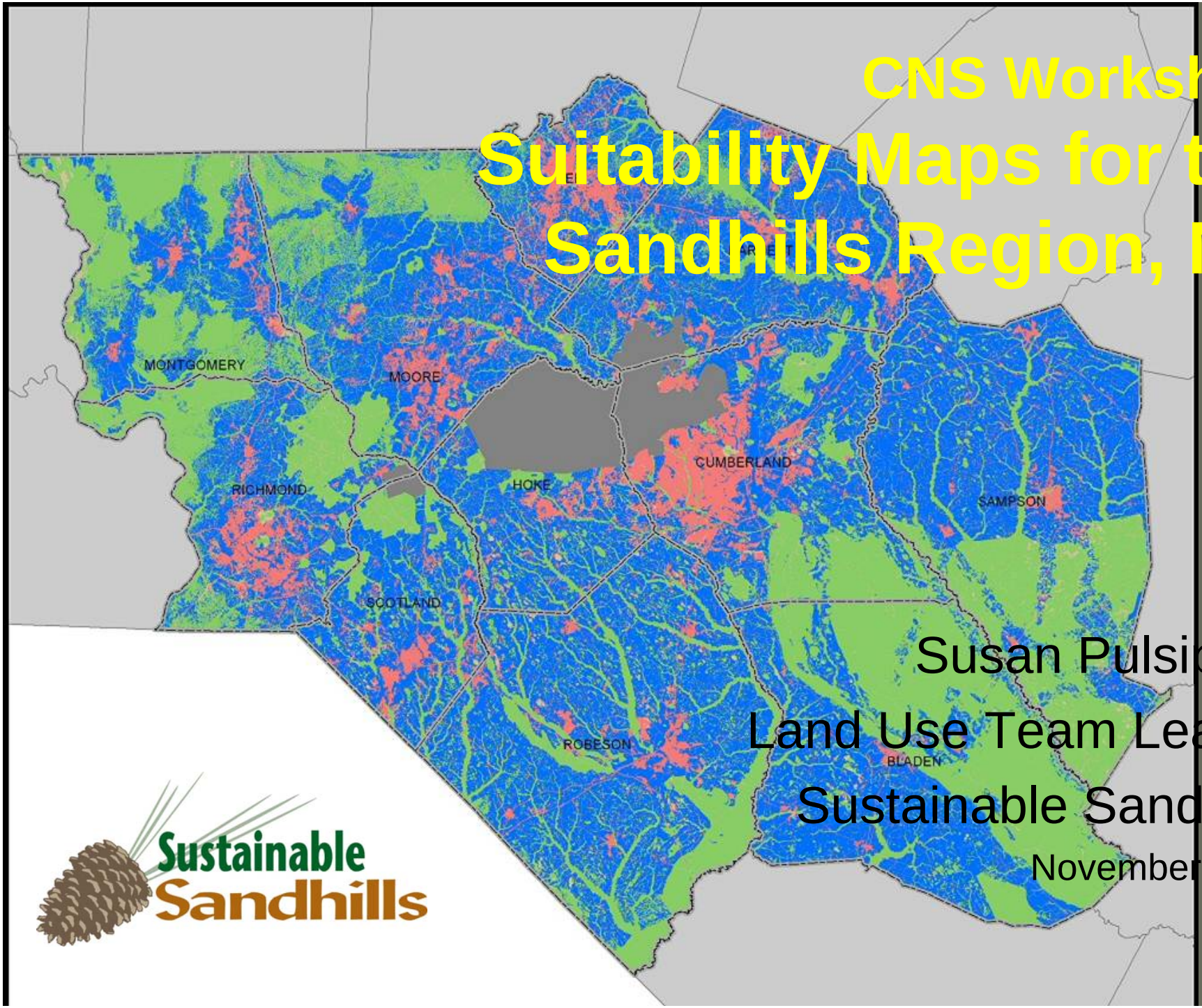
CNS Workshop

Suitability Maps for the Sandhills Region, NC



Susan Pulsipher

Land Use Team Leader

Sustainable Sandhills

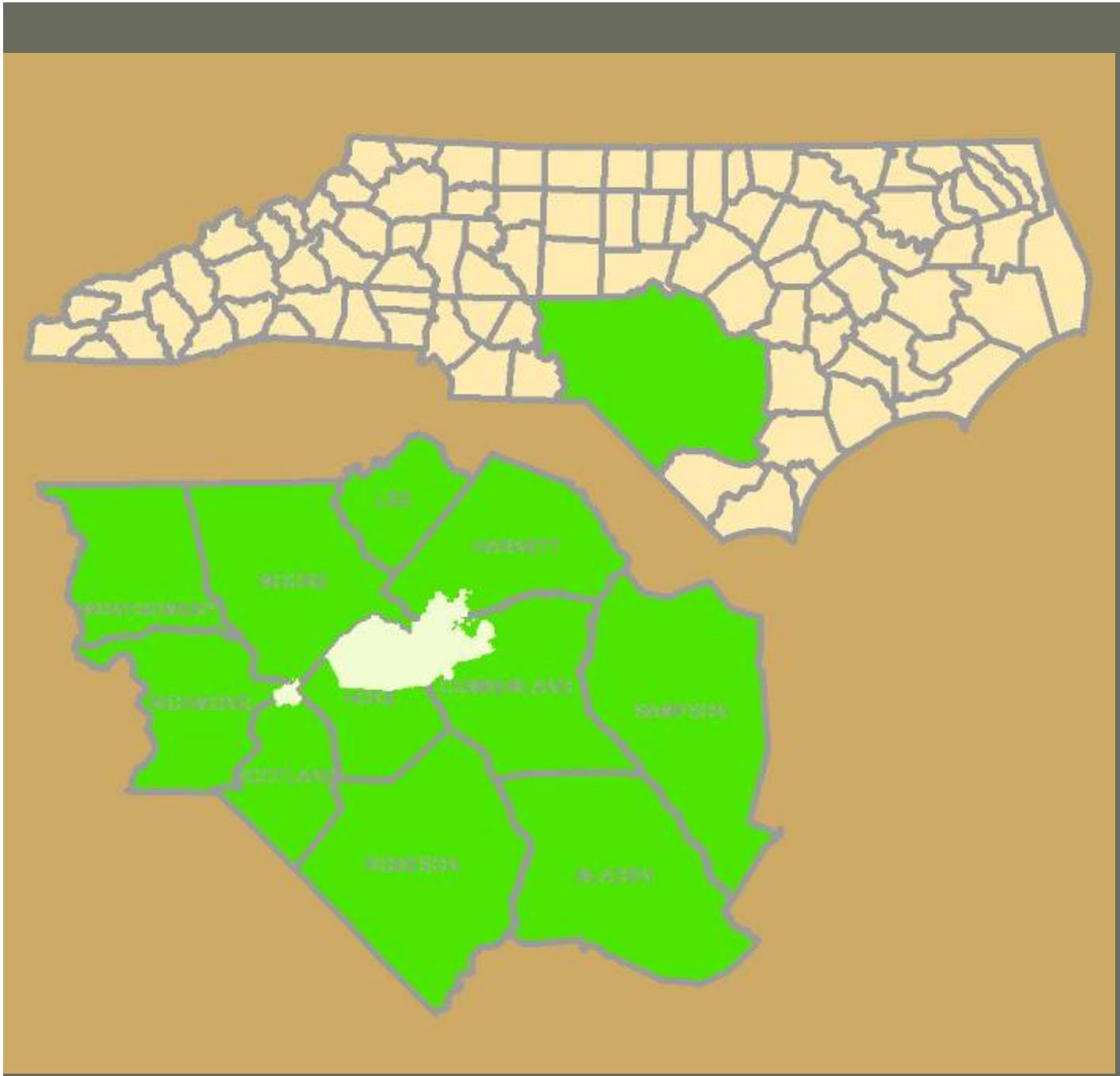
November 2007

Presentation Outline

- Who are we?
- What is the problem?
- Solutions
- Technical side
- Application examples
- Collaborations & spin-offs

Sustainable Sandhills promotes consensus, cooperation, shared visions and collaborative actions.

Sustainable Sandhills is a model for regional sustainability planning that preserves natural resources and enhances economic development, improving the quality of life in the region for current and future generations.



North Carolina counties in project

Bladen

Cumberland

Harnett

Hoke

Lee

Montgomery

Moore

Richmond

Robeson

Sampson

Scotland

Participants

CORE TEAM

- Jon Parsons, Sustainable Sandhills
- Jeff Brown, CGIA
- Susan Pulsipher, DCA
- Pete Campbell, US F&WS

List of all participants on Sustainable Sandhills website http://www.sustainablesandhills.org/

- Land Use Team, Sustainable Sandhills (volunteers from many agencies)
- Concerned citizens
- Local jurisdiction officials and staff
- Experts on suitability factors for different landscapes

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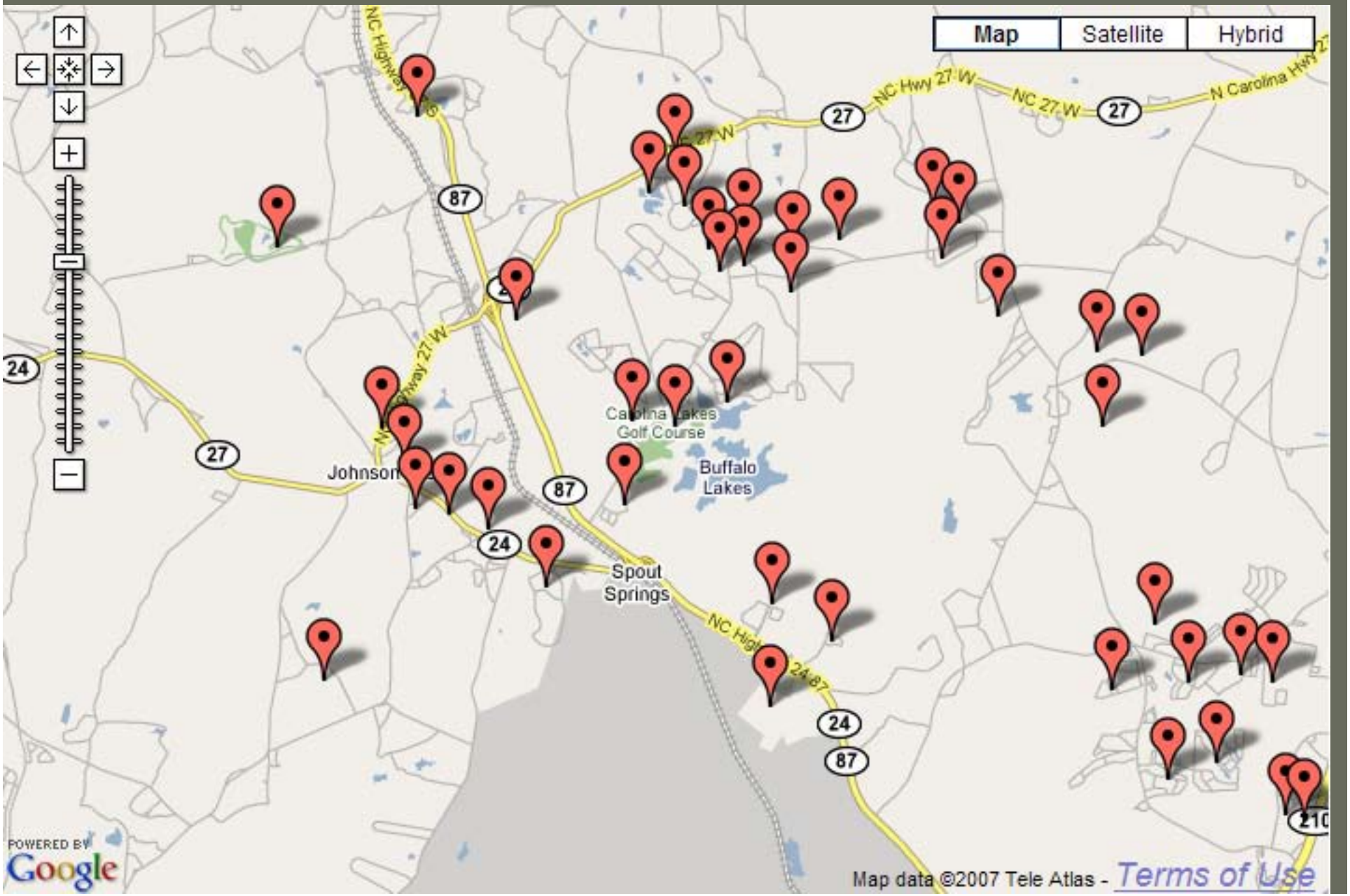
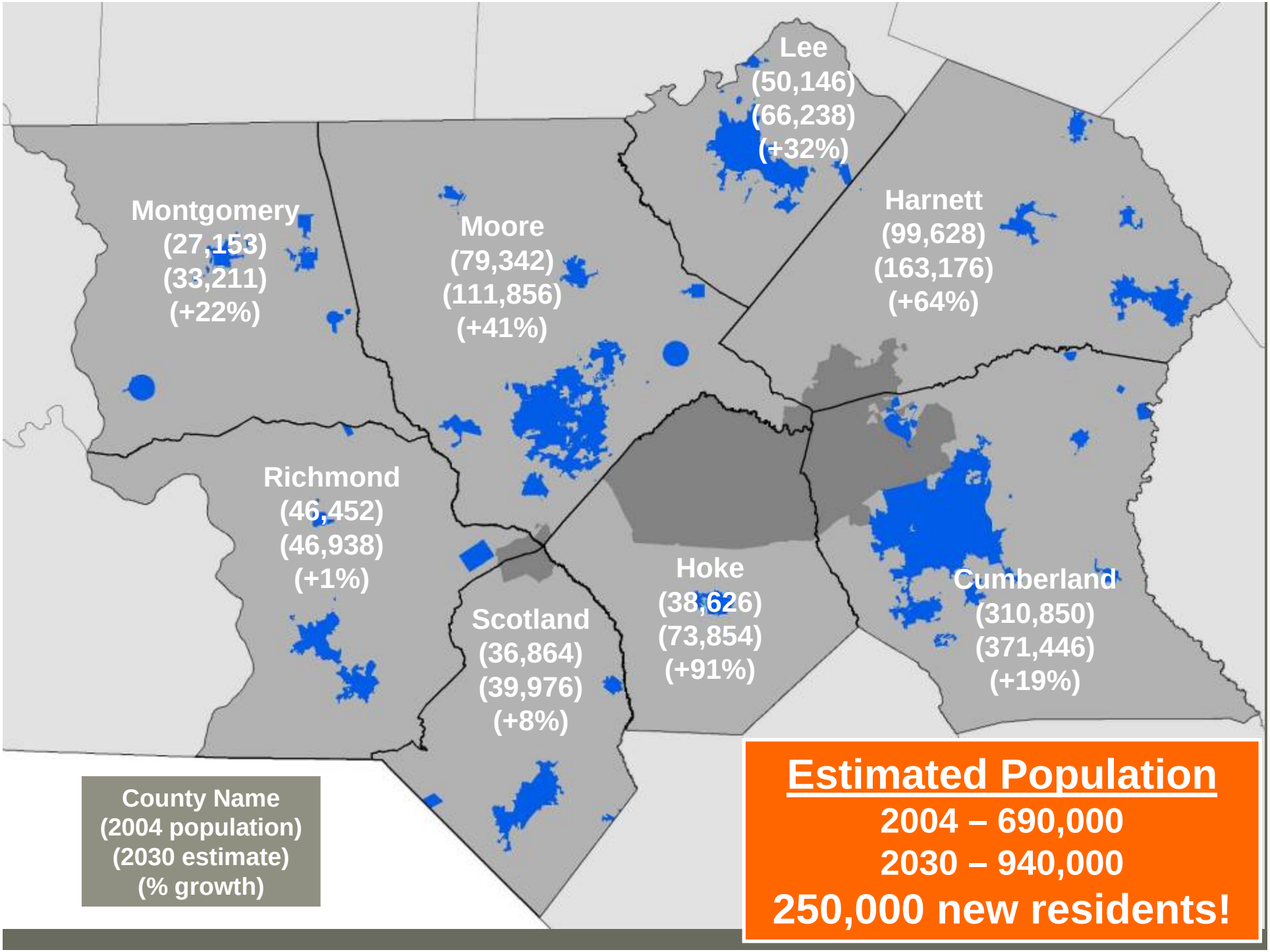
RLUAC lead agency on JLUS

No longer able to drop tanks from planes on this drop zone.

Houses are too close.

Subdivision sprawl – just north of base





Base Realignment & Closure

- Relocation of Forces Command (FORSCOM) & U S Army Reserve Command (USARCOM) to Fort Bragg
  - Military, DoD civilians, family members, defense contractors
  - Older military personnel, already have degrees
  - 25,000 plus people
- Additions to regular troops

BRAC-RTF lead agency on military realignment effects

Sustainability in the Sandhills

- Sustaining Fort Bragg as a viable military installation
  - Also important to economic health of surrounding communities
- Sustaining the local ecosystem so that people continue to enjoy living here
- Managing population and economic growth to sustain (and improve) existing environment

- Who are we?
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Industrial Development

Uwharrie Lumber, Troy

What Are Land Suitability Maps?

- Suitable = potential to have sustainable value for a type of use
- Based on criteria
- Relative values / low to high
- All locations rated

What Are Land Suitability Maps?

- Not current land use
- Not predicting land use
- Suitability for different uses
- Competing values

- Best available data
- Simple and transparent models

Sandhills Objectives

- Best available data
- Simple and transparent models
- Relative values now
- Alternative futures next
- Maps and statistics
- Tools for supporting decisions

Criteria for Suitability

- Framework (previous projects)
- Workshops and score cards
  - What makes an area suitable?
  - How do we represent it on a map?
  - Relative importance?
- Focus groups
  - How near is near?
  - Ratings 1 to 9

Suitability models

⇦ Commercial

Working Forest ⇨

⇦ Residential

Farm land ⇨

⇦ Industrial

Natural Values ⇨

Meeting needs

Created a set of tools that

- Graphically illustrate the competing potential uses of land from a variety of viewpoints
- give developers and planners a way to assess a lot of factors quickly before spending a lot of time and money on a piece of land or project
- Can be used in public hearings to inform the public of relationships and possibilities
- Provide elected officials, developers & planners with the same set of base data to work from when assessing how land is best utilized for the well-being of a community and region

Project timeline

Refresh GIS Data, Rerun Models

Gather Feedback, Revise Models

Distribute Other Stakeholders

Review with other Stakeholders

Oct – Dec 2007 Deliver Grids to Planners, Training

Sept 2007 Regional Planners Meeting

Sept 2007 GIS Models Revised

Feb to June 2007 Expert Focus Groups

Jan 2007 Suitability Models Complete

May to Oct 2006 Stakeholder meetings

Sept 2005 Kickoff Meeting

Aug 2005 EPA Grant Awarded

- Who are we?
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Industrial Development

Uwharrie Lumber, Troy

Some of the data layers used

	Industrial	Commercial	Residential	Natural Areas	Farm Lands	Working Forest
City limits	A	A	A	C	C	C
Parcel size	A	A	A			
Value land				C	C	C
Primary roads	A	A	A	C	C	C
Active rail	A					
Wetlands	C	C	C	A		
Public sewer	A	A	A	C	C	C
Woodland soils						A
School rating			A			
100 yr flood	C	C	C			

A = ASSET C = CONSTRAINT

Modeling process

- Data – obtained & merged
- Criteria buffers created from feature classes
- Converted to grid on 30-meter cell size
- Used ModelBuilder for as much of data preparation and manipulation as possible
- Map algebra

Constructing a suitability map

- Industrial
- **Commercial**
- Residential
- Natural areas
- Working farmland
- Working forests

Commercial Development
Downtown Rockingham

Rule-Based Criteria

- Markets and infrastructure (satisfying all four is highest rating)
  - Near urban density and higher income
  - Near primary road
  - In or near public water service area
  - In or near public sewer service area

Rule-Based Criteria

- Land constraints (any one of four lowers the rating)
  - Steep slope
  - In floodplain
  - Soils are wet (hydric)
  - In wetlands

Rule-Based Criteria

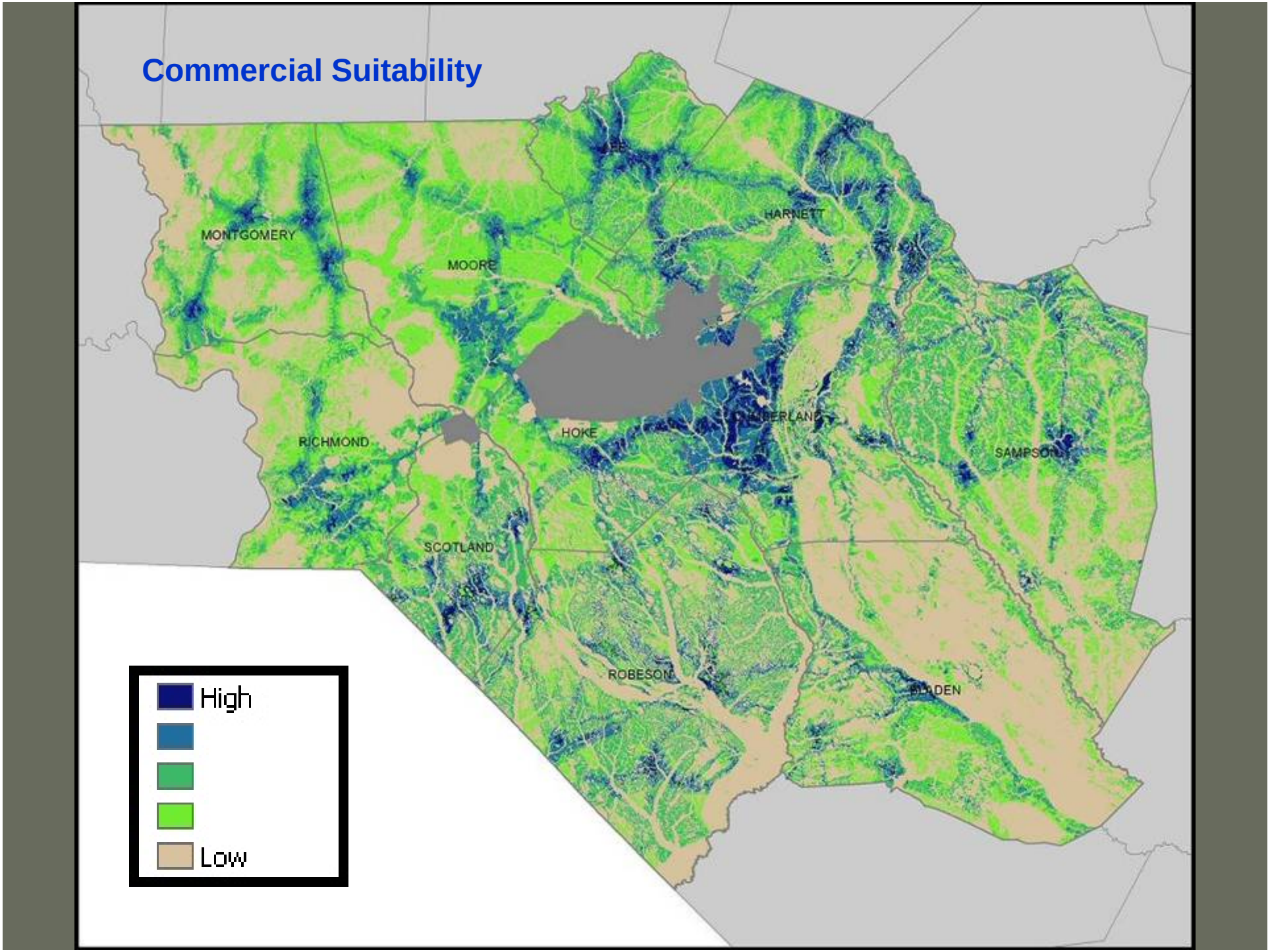
- Out of bounds for development (not counted in map results)
  - Conservation lands
  - Water supply watershed critical and protected areas
  - In large water bodies
  - Inside military installations

Layer values or location related to ratings – Commercial

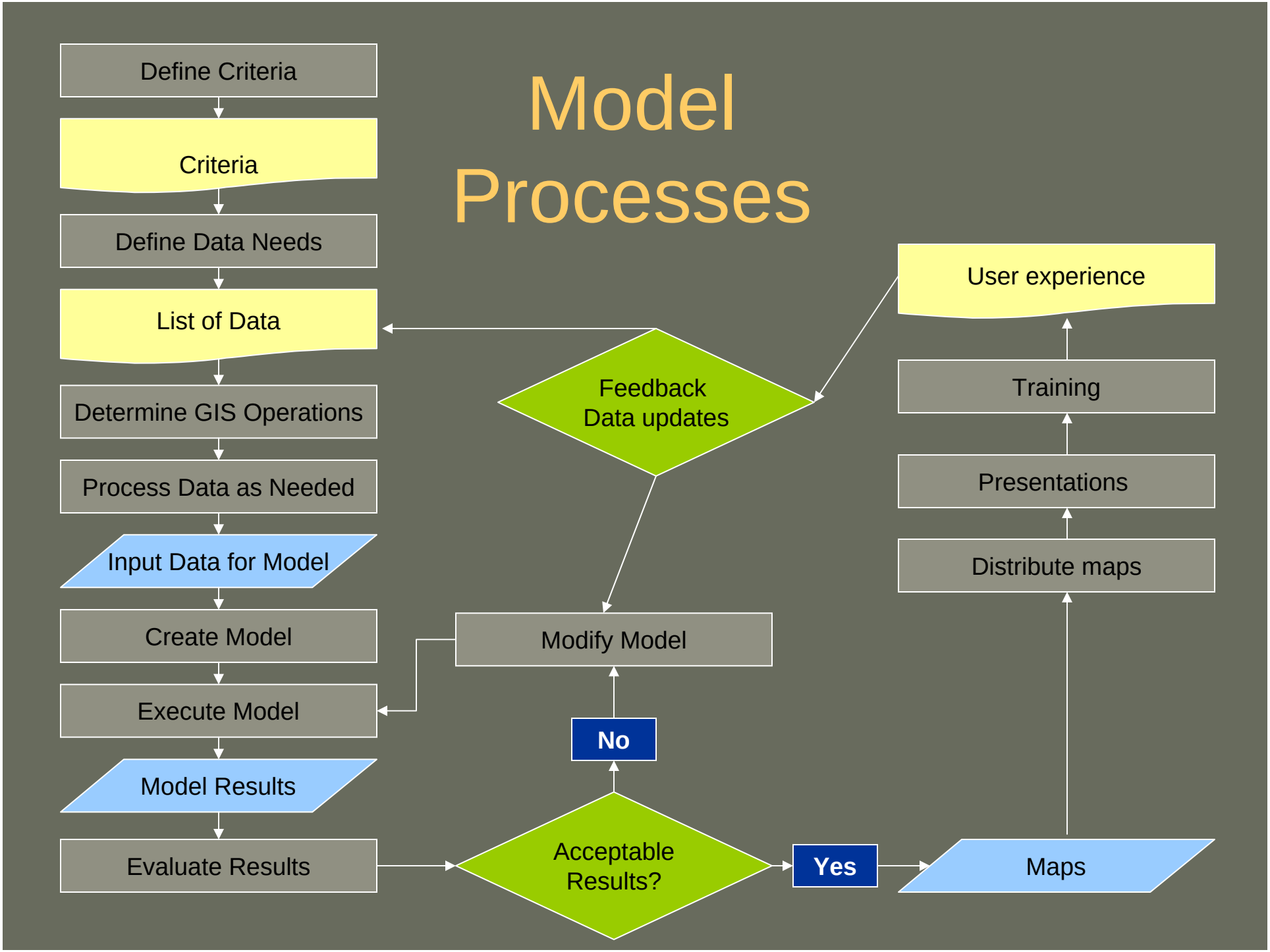
	A	C	D	E	F	G	H	I	J	K
1	**Commercial Development**	----------Criteria and Rating----------								
2		**Lowest Value**				**Neutral**				**Highest Value**
3	**Markets and infrastructure -- Group 1**	1	2	3	4	5	6	7	8	9
4	**Population density**	rural-lower-income	rural-mid-income	rural-upper-income		transition-lower-income	urban-lower-income	transition-mid-income	urban-mid-income and transition uppper	urban-upper-income
5	**Primary roads**		<5000 ft			4000- 5000 ft	3000-4000 ft	2000-3000 ft	1000-2000 ft	< 1000 ft
6	**Public sewer service**			>4000 ft		3000-4000 ft		2000-3000 ft	1000-2000 ft	<1000 ft
7	**Public water service**			> 5000 ft		4000- 5000 ft	3000-4000 ft	2000-3000 ft	1000-2000 ft	<1000 ft
8	**Total Group 1**									
14		**Lowest Value**				**Neutral**				**Highest Value**
15	**Land factors -- Group 3**	1	2	3	4	5	6	7	8	9
16	**Slope (percent)**	>25%				15-25%		10-15%	4-10%	<4%
17	**Soils (hydric)**			hydric A				hydric B		not hydric
18	**Floodzone 100-year**	100-yr		future 100-yr				500-year		outside zone
19	**Wetlands**			inside						outside

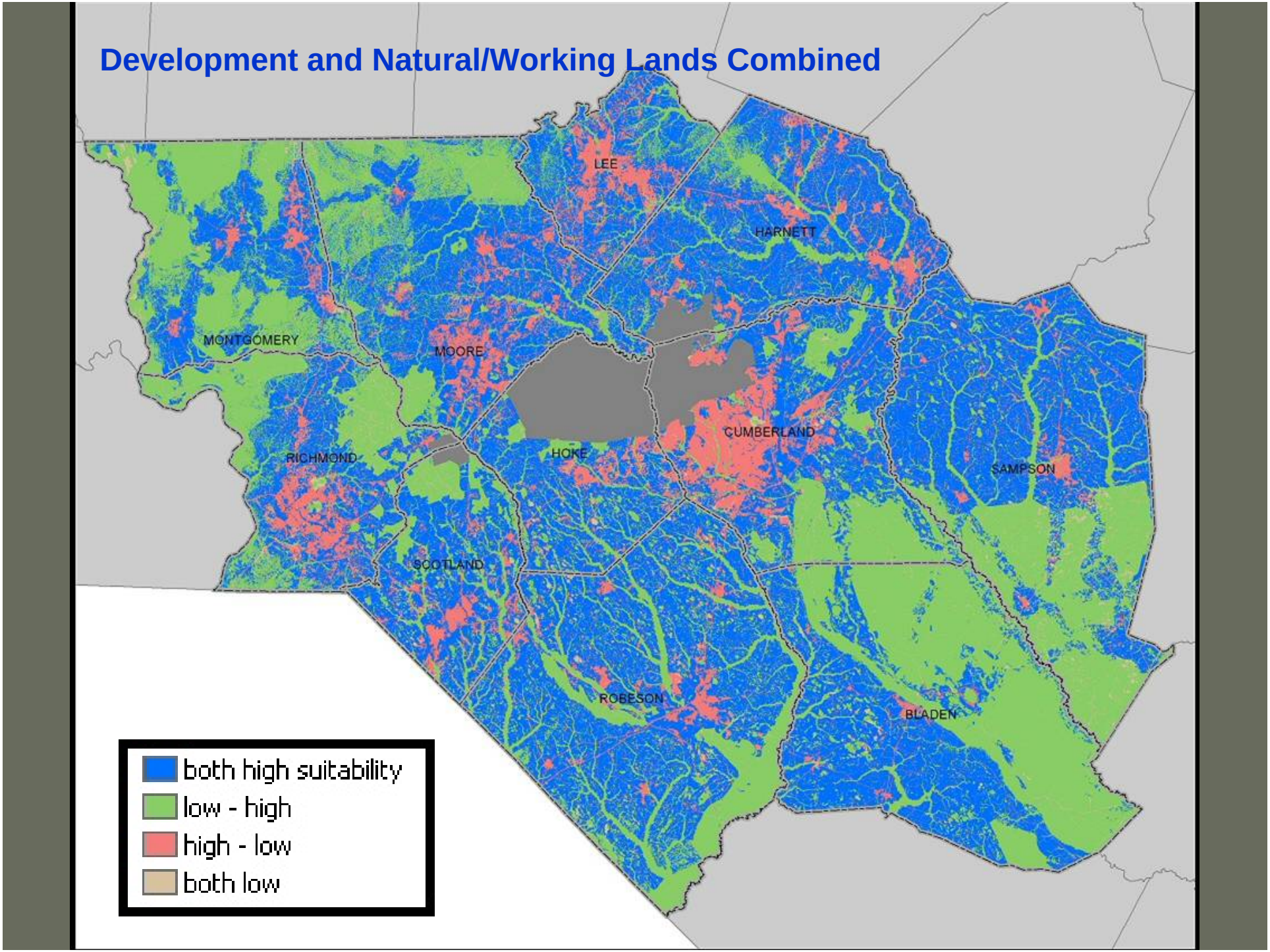
Operations to combine the Commercial layers; assumptions noted

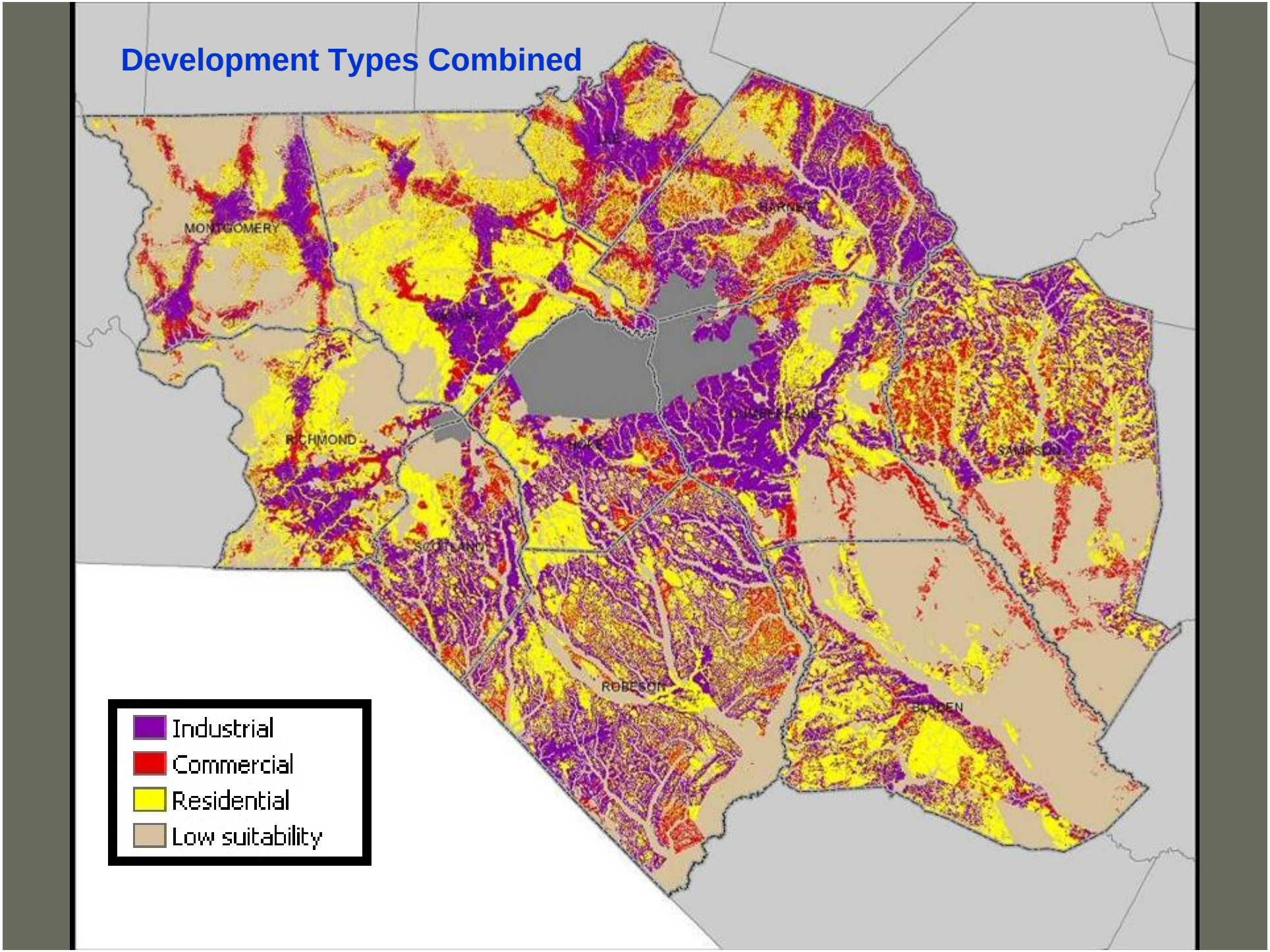
	A	C	D	E	F	G
1	**Commercial Development**		---Relative Weights---			
2			Workshop Score	Assigned Weight	Percent Weight	Comments
3	**Markets and infrastructure -- Group 1**	Operation	1 to 5	1 to 5		
4	**Population density**	Group 1 Overlay	4.1	5	27.8	Population density by block (3 classes) and median household income (3 quantiles) by block group (Census 2000) were grouped to represent market areas.
5	**Primary roads**	Group 1 Overlay	4.3	5	27.8	Assume cost advantages for projects closer to US and NC highways. Distances based in part on analysis of distance to nearest primary road using point locations of businesses in the Sandhills.
6	**Public sewer service**	Group 1 Overlay	4.5	4	22.2	Assume cost advantages for projects within or near public wastewater service areas
7	**Public water service**	Group 1 Overlay	4.5	4	22.2	Assume cost advantages for projects within or near public water service areas.
8	**Total Group 1**			18	100.0	
14			Workshop Score	Assigned Weight	Percent Weight	
15	**Land factors -- Group 3**		1 to 5	1 to 5		
16	**Slope (percent)**	Map Algebra A (minimum of group)	3.3			Assume cost advantages for gentle slopes and constraints on steep slopes
17	**Soils (hydric)**	Map Algebra A	3.7			Wet (hydric) soils are less suitable for development.
18	**Floodzone 100-year**	Map Algebra A	4.0			Floodzones are less suitable for development or would be a cost disadvantage
19	**Wetlands**	Map Algebra A	4.3			Wetlands are problematic for commercial development
20	**Lands managed for conservation & open space**			0		Out of bounds for development
21	**Water supply watershed critical protection area**			0		Rules restrict development
22	**Lakes and ponds**			0		Water out of bounds for development
23	**Military bases**			0		Long-term public ownership and restricted use



Model Processes







Feedback

- Modeling process designed to obtain feedback which was immediately used to modify models
- Model design steps, documentation, and presentation methods monitored and altered by members of Sustainable Sandhills Land Use Team
- Beta version distributed to two planners for detailed analysis against local knowledge. Feedback incorporated into models and documentation
- Workshop with regional planners designed to obtain feedback. Feedback incorporated into data utilized for creation of Release 1; into release schedule and approach with different stakeholder groups

Surprising Results / Lessons

- Enthusiasm of representatives from different stakeholder groups
- Frustration of local data holders and regional transportation planners with GIS-based state level transportation data; people KNOW their local road systems
- Delight when first planner to use maps tried the maps on projects on her desk and the information was relevant and informative

- Who are we?
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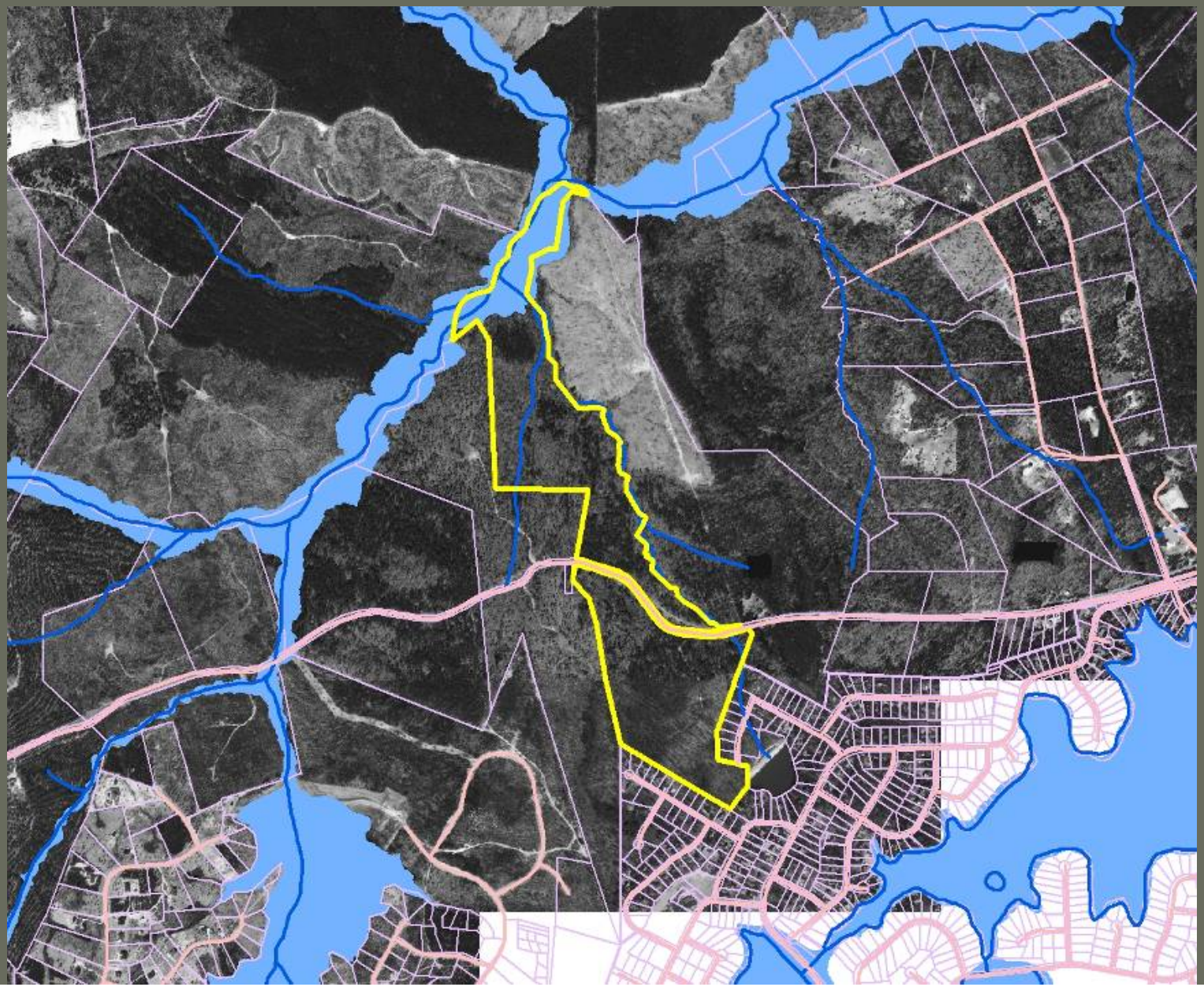
Industrial Development

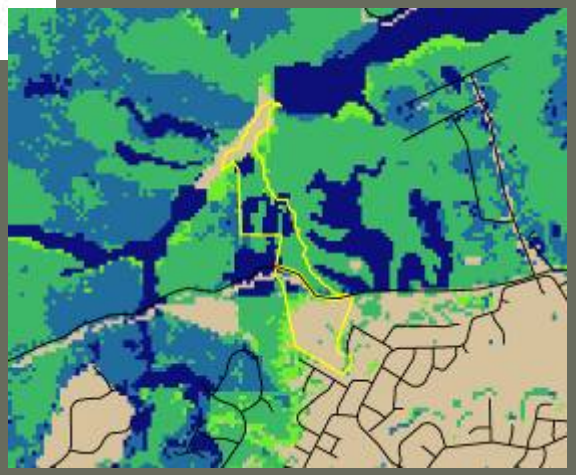
Goodyear Plant – Fayetteville

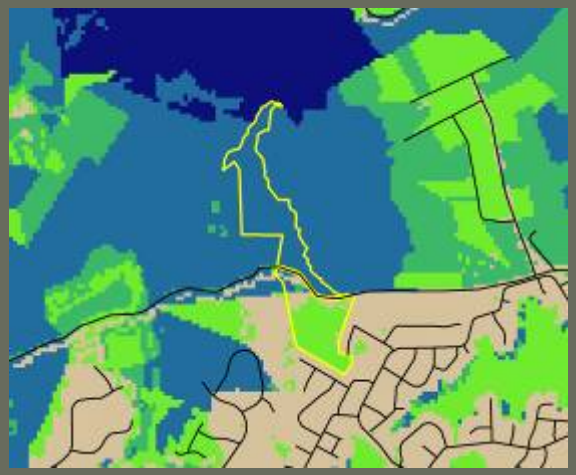
Example 1 – subdivision proposal



Suitability of land at proposed subdivision site

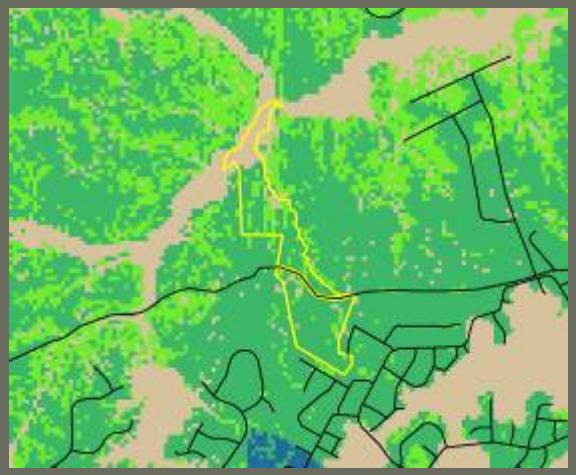
Farmland





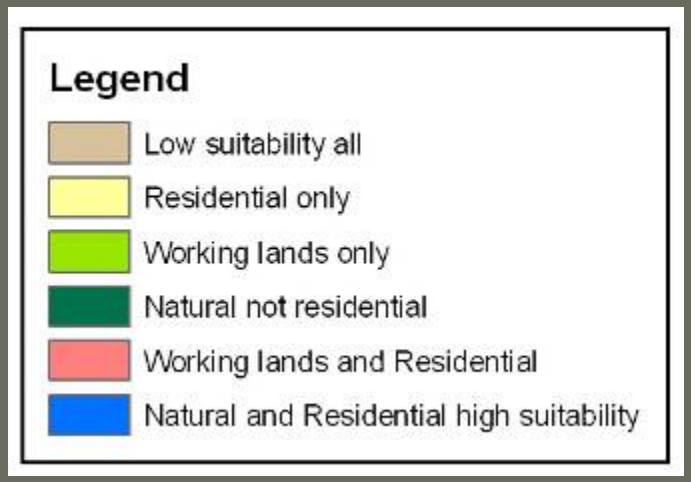
Working forest

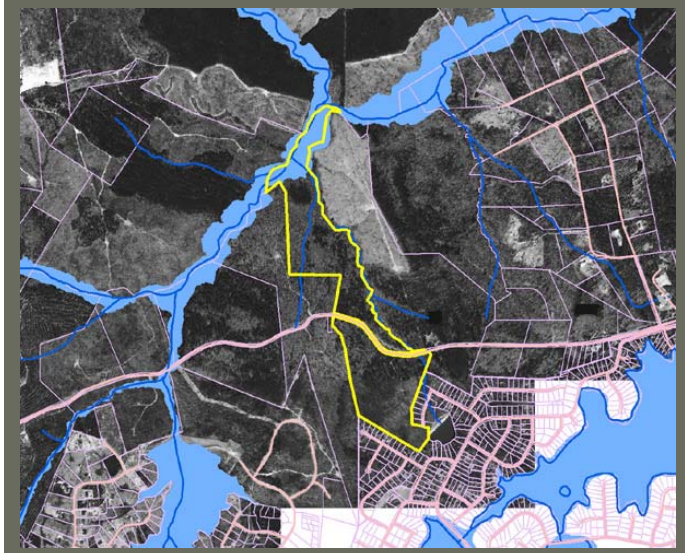
Natural Values

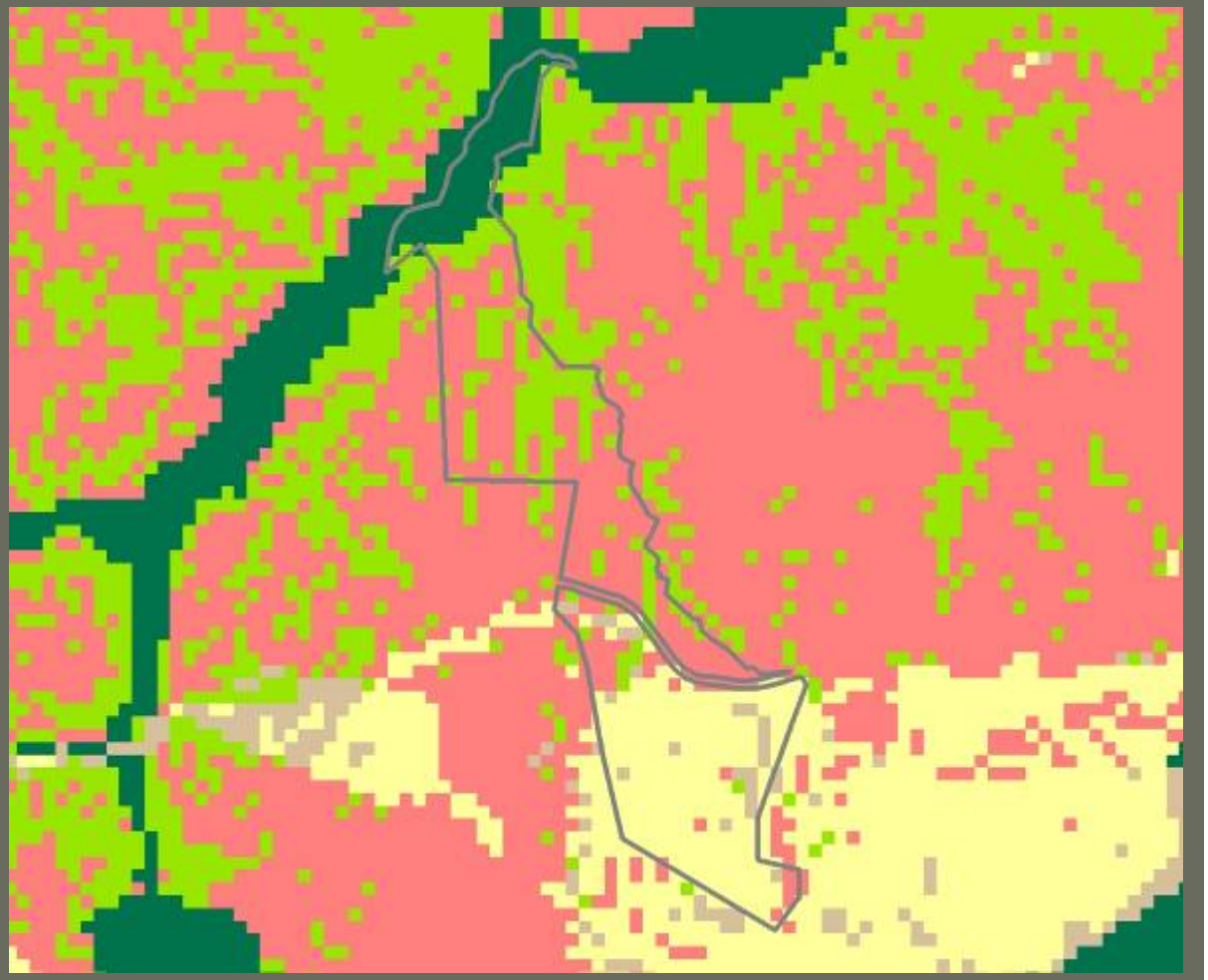


Residential

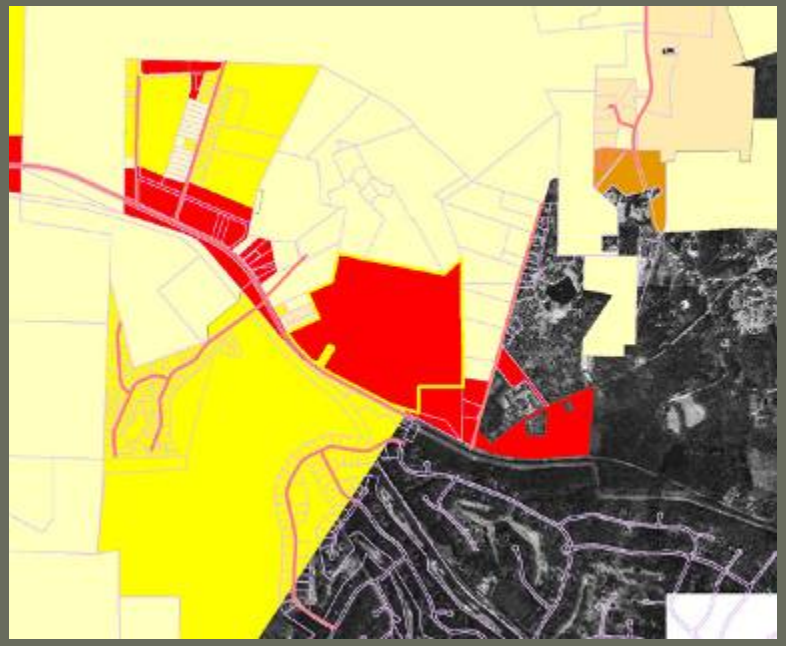
Combination suitability map

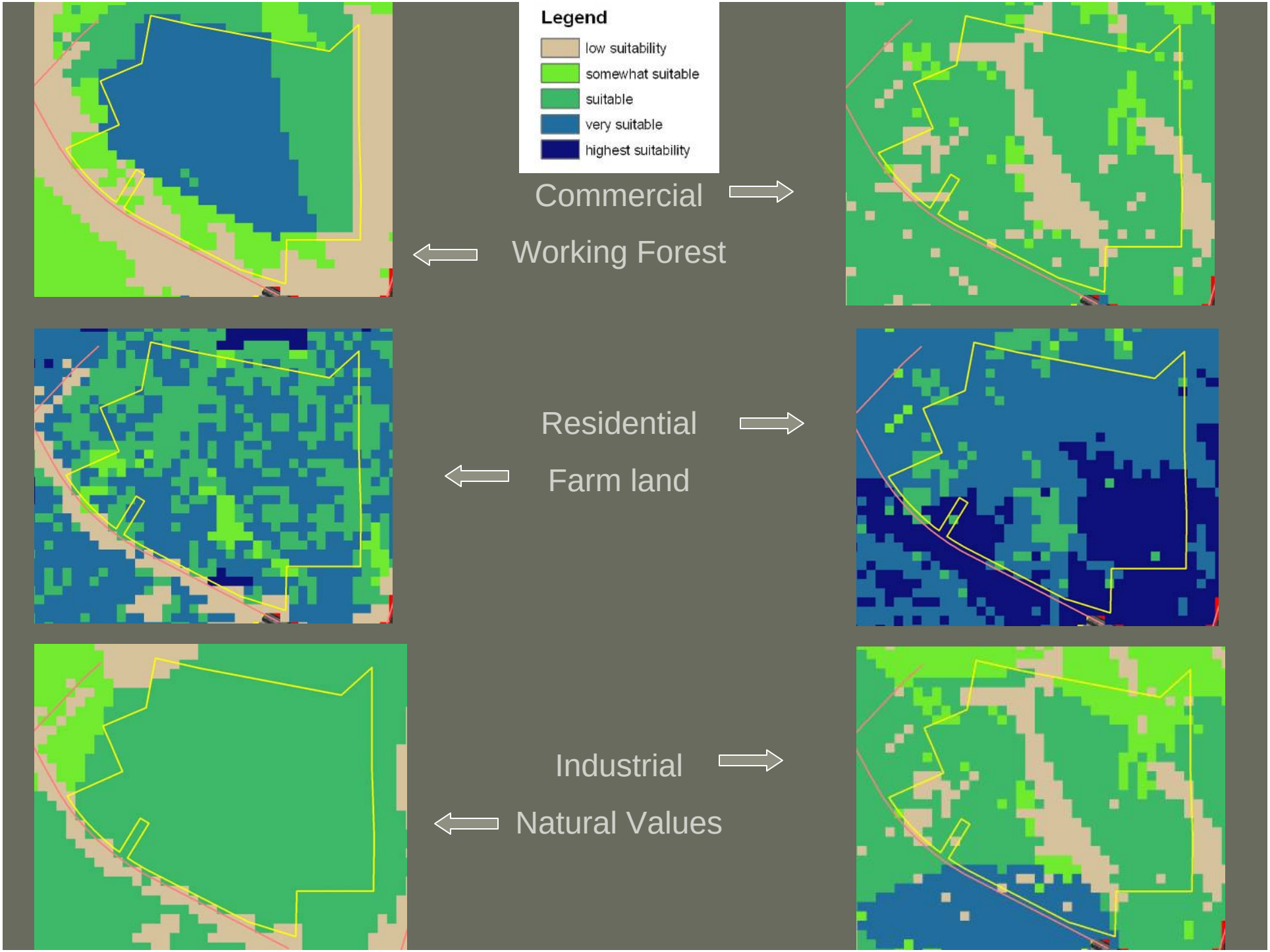


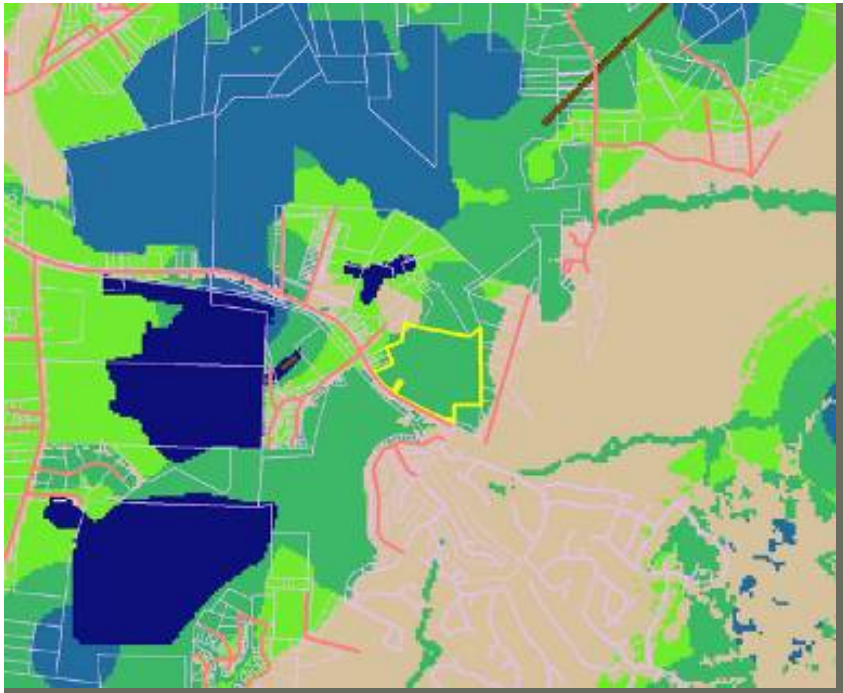




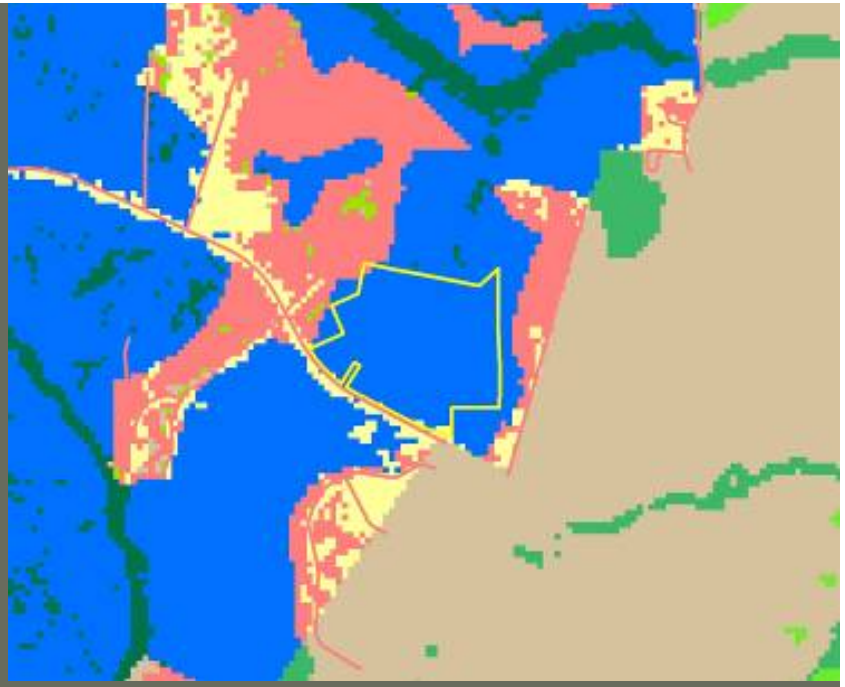
Example 2: is existing zoning appropriate?



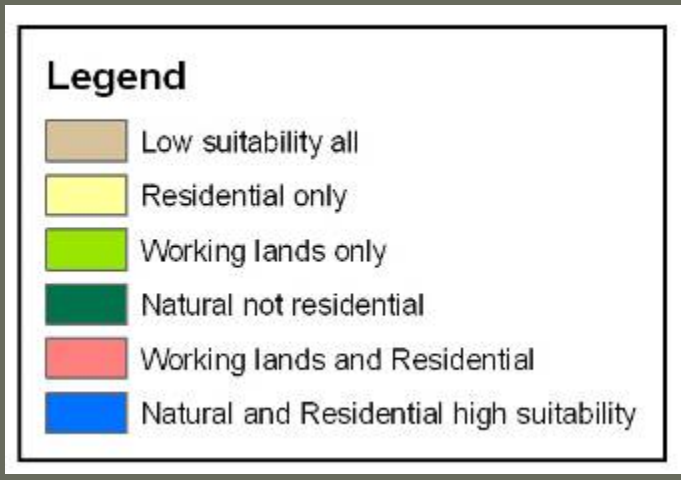




Natural values – wider area



Combination map



Factors consider:
long range planning / trails / open space

Constraint on commercial & industrial use?
-- hydric soils

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BRAC-RTF

NC DOT

Local jurisdictions

SECCURE / SERRPAS

This research is funded by
U.S. EPA - Science To Achieve Results (STAR) Program
Grant # X3 83220801

SUSTAINABLE SANDHILLS EPA GRANT PROJECT

Lead organization on this regional land use planning project.

RLUAC

RESULTS WILL BE:
used in 2008 JLUS update (5 mile study area)

BRAC RTF

RESULTS WILL BE:
incorporated into Comprehensive Regional Growth Plan

Additions to project

- From BRAC-RTF
  - Added data for 3 new counties
  - Predictive modeling
  - New data layers for Release 2 (under review)
- From NC DOT
  - cultural data
  - Revise models for Release 2

Collaboration

- Development of suitability models involved many individuals from different stakeholder groups
- Feedback on beta version obtained from planners at workshop in September; Release 1 run
- Now distributing grid maps to planning offices
- Preparing presentations for developers and related groups
- Providing information on project to elected officials by short presentations at their regional meetings
- Future
  - formal presentations to agricultural community & elected officials
  - feedback gathered for future Release 2

Other collaboration & spin-offs

- Results being used in 2008 Joint Land Use Study update (by RLUAC) of five mile area around Fort Bragg
- Results will be incorporated into the Comprehensive Regional Growth Plan of the BRAC-RTF
- Both RLUAC and BRAC-RTF participating in suitability map development & assisting with meeting logistics
- SS project & models forming basis for military funded land use modeling project covering another 13 counties in SE NC (SECCURE, part of SERPPAS)
- Original plan was to include the location of cultural resources in model; data not available; grant just funded; new partner - NC Dept of Transportation
- Forming a Cultural Resources Team

Future

- Use by planners, conservation groups, all types of developers, extension agents, & elected officials to inform decision-making
- Release 1 findings incorporated into 2007 JLUS and BRAC-RTF growth management plan
- Annual update of data and redistribution of maps (grid & PDF formats)
- Development of Release 2 with cultural data and predictive modeling added; feedback on data layers & weighting incorporated

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