

Using GIS-based Tools for Streamlining the Corridor Planning Process

Washington Transportation Planning Symposium

November 15, 2007

Spokane, Washington

Problem Statement

Complete the National Environmental Policy Act (NEPA) process, draft and final environmental impact statement and record of decision for a new interstate on new location.

Background Information

Project Description - New interstate on new location

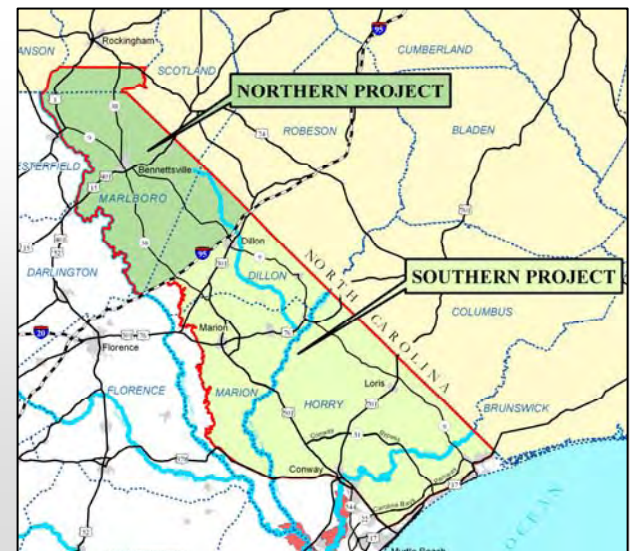
Project Need

- System Linkage
- Economic Development
- Hurricane Evacuation
- Relieve Local Traffic Congestion
- Multimodal Planning

Schedule: Three (3) years

Study Area: 1,600 square miles

Project Length: 40 miles



Background Information (cont.)

Study Area Description

- Rural in nature
- Agriculture based economy

Public Perception - Overall project perceived as positive

Major Issues

- Population consisting primarily of minority and low income populations
- Numerous small rural communities
- Several historic structures and districts
- Extensive agricultural areas
- Unique wetlands
- Major river crossing and associated wetlands.

Challenges

- Identify and develop streamlining approaches early in project development
- Address a “range of alternatives”, including all “reasonable alternatives” considered and “other alternatives” eliminated
- Strong public and stakeholder involvement process
- Proactive natural resource and regulatory agency coordination

The Challenge - The Solution

The Challenge

Identify, Evaluate and
Quantify Roadway
Corridors

The Solution

Geographic Information
System

- Defensible Process
- Inclusive Process
- Standardized Process
- Large Geographical Areas
- Quick / Flexible / Cost Effective
- Numerous Data Types
- Large Data Sets

System Concept

**Geographic Information Systems
(GIS)**



**Combined Existing GIS Functionality
Developed New GIS Functionality
Added User Interface**



**Automated the Corridor Selection Process
Alignment Alternatives Research Tool**

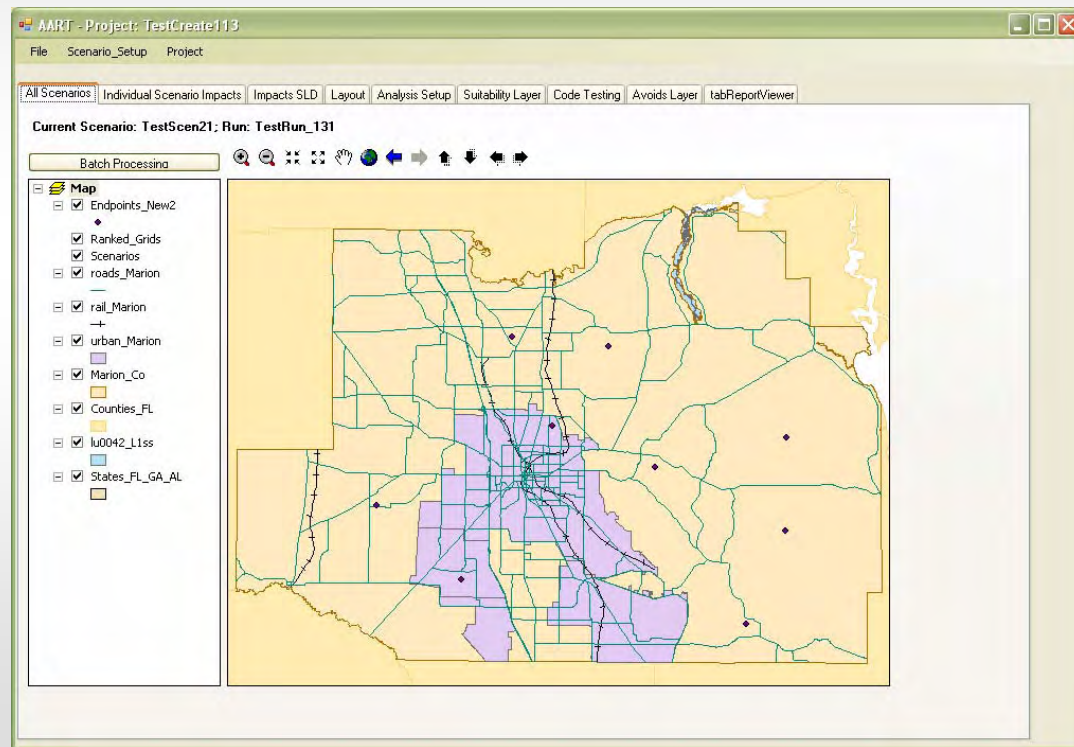
System Components

- Scenario Setup
- Model Run Setup
- Optimal Path Generation
- Impacts Calculation & Reporting



Scenario Manager

- Create, Delete or Open a Scenario for processing
- Document Scenario Information



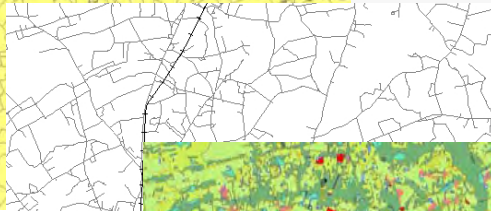
Data Layers



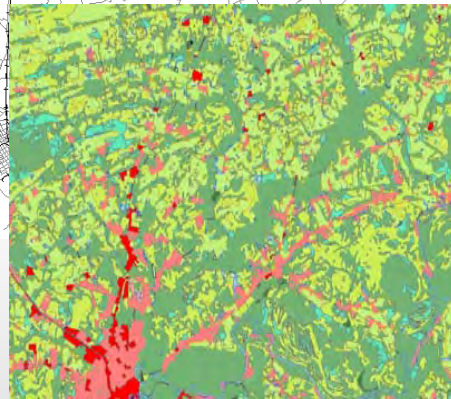
Cultural Features



Socioeconomic / Demographic



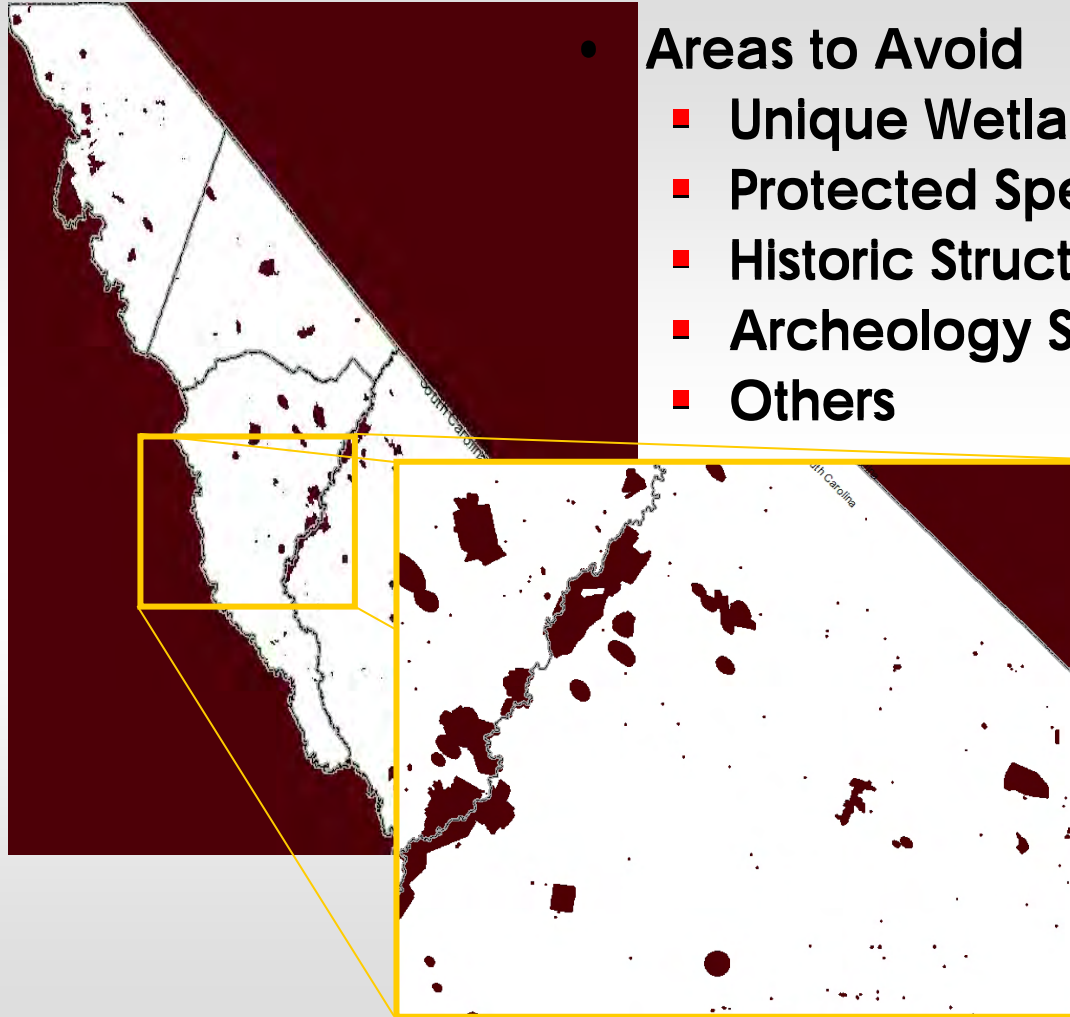
Existing Transportation Infrastructure



Wetlands / Species of Concern

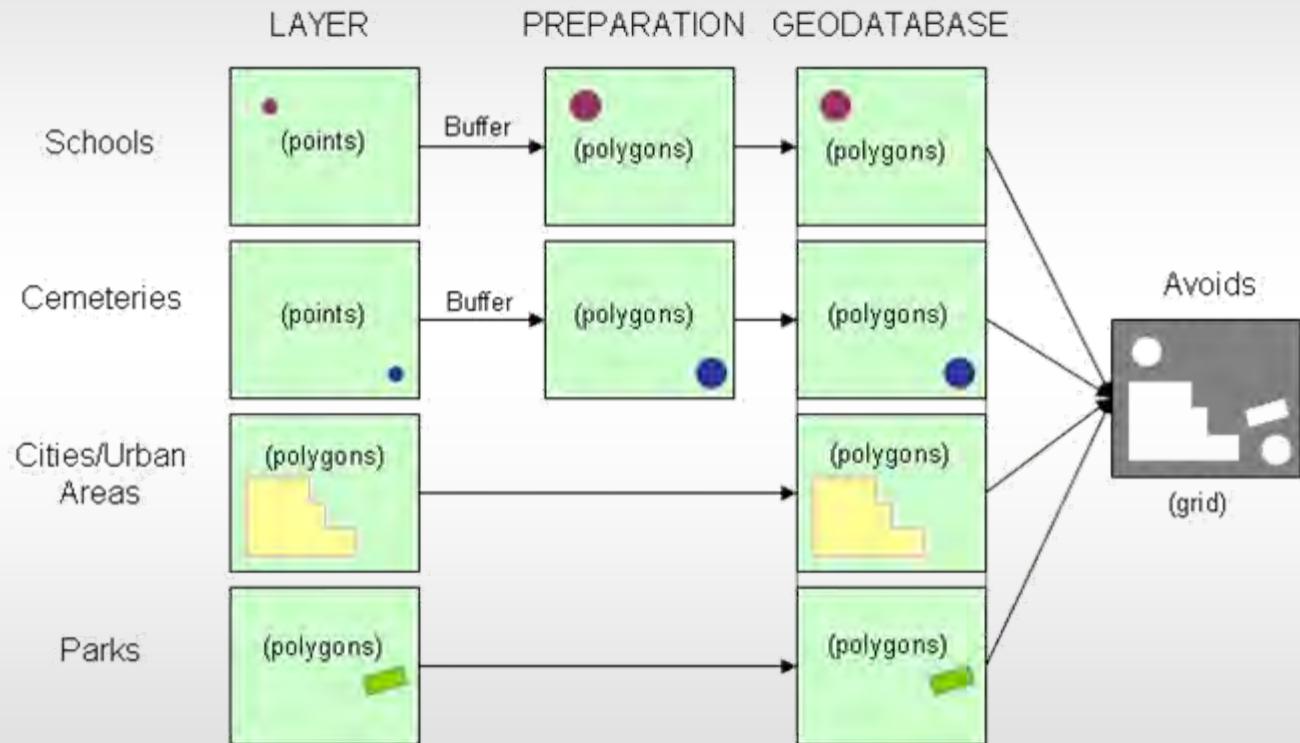
...and Many Other GIS Data Layers

Constraints Layer



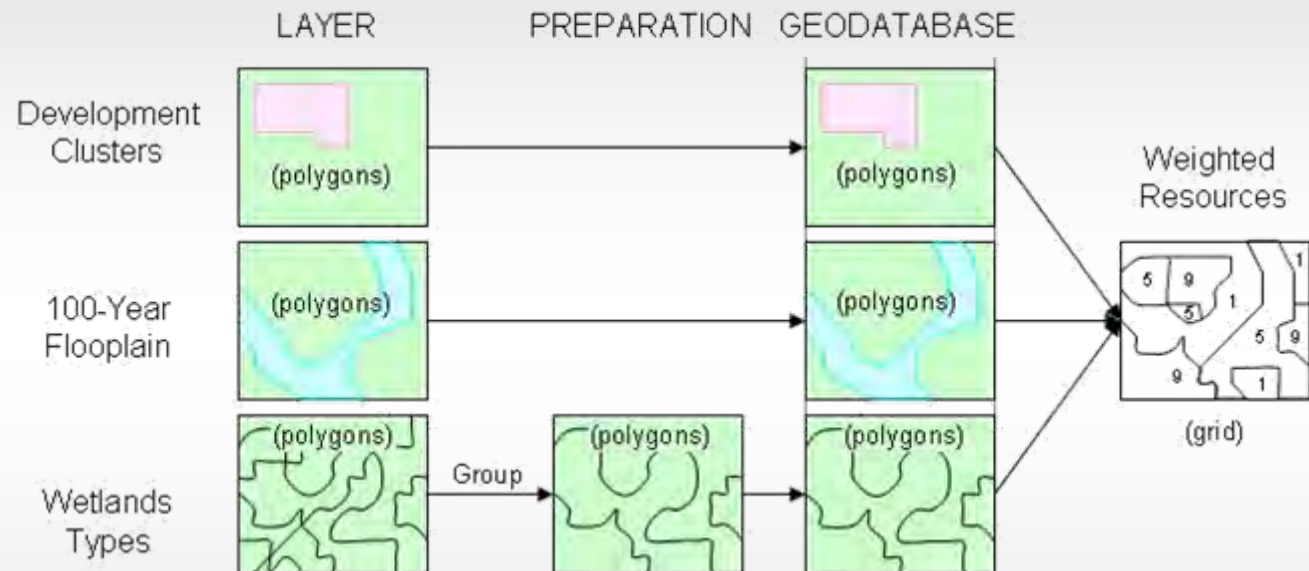
Putting it all Together

Avoids Data Processing



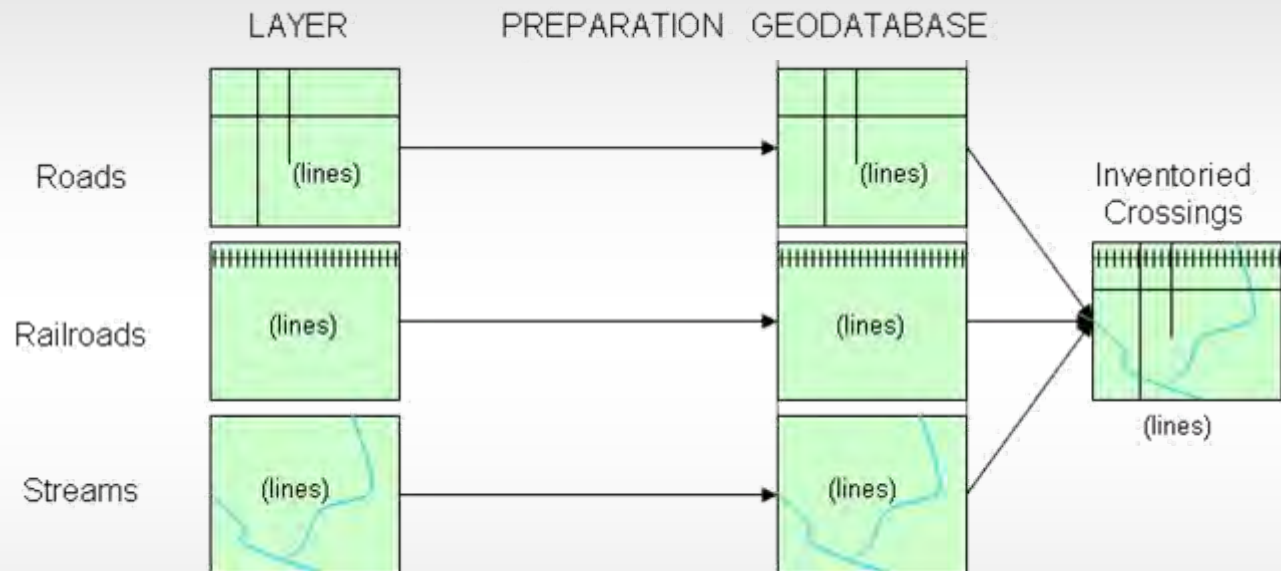
Putting it all Together

Weighted Resources Data Processing



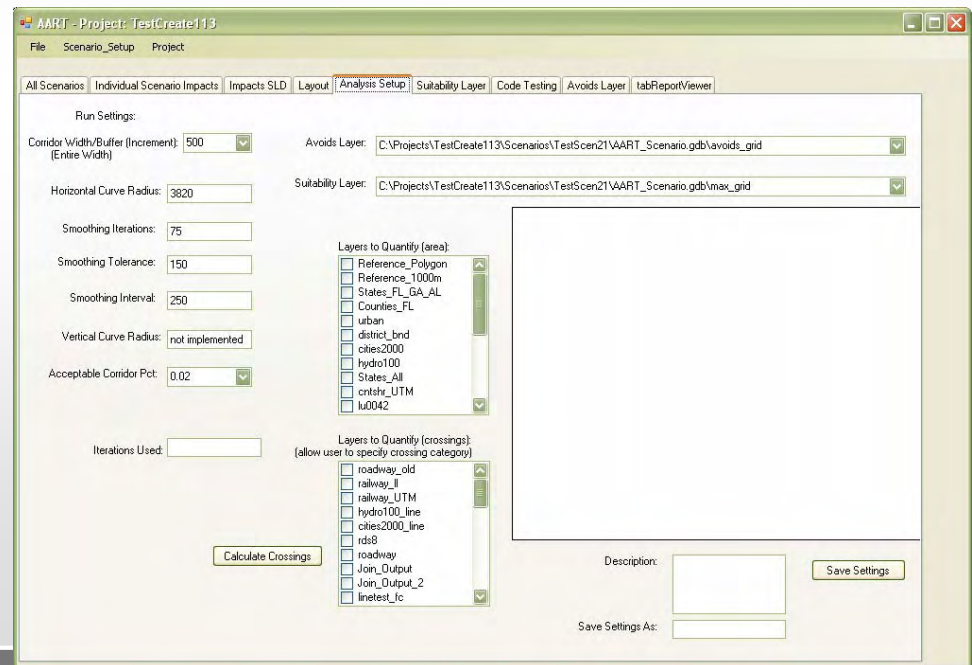
Putting it all Together

Inventoried Crossings Data Processing



Scenario Setup

- Define Analysis Criteria
 - Layers to include
 - Define Layer Influences
 - Define Attribute Weights



Criteria Ranking Example

Layer Name	Layer Influence	Attribute	Attribute Ranking
Environmental	80%		
		Bottomland/Hardwoods	9
		Beaver Ponds	3
		Upland Agriculture	1
Infrastructure	20%		
		Hospitals	8
		Fire Stations	5

Suitability Scoring

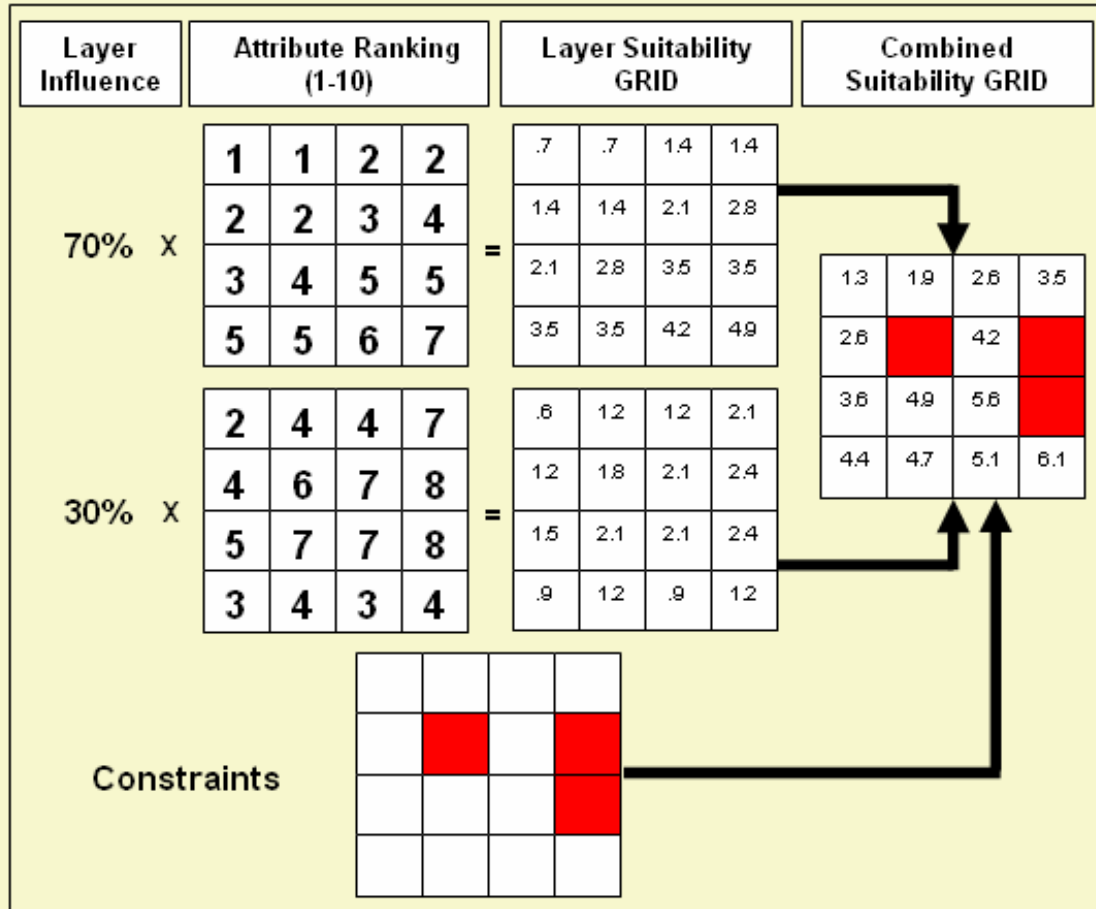
Scenario Setup

The Scenario Setup Screen allows the user to choose which layers will be included in the analysis and the level of impact each layer and attribute value will have in determining the overall suitability rating for each GRID cell.







Each layer should be given a level of influence to the scenario run. It is important that the sum of influence percentages for all included layers always equals 100.

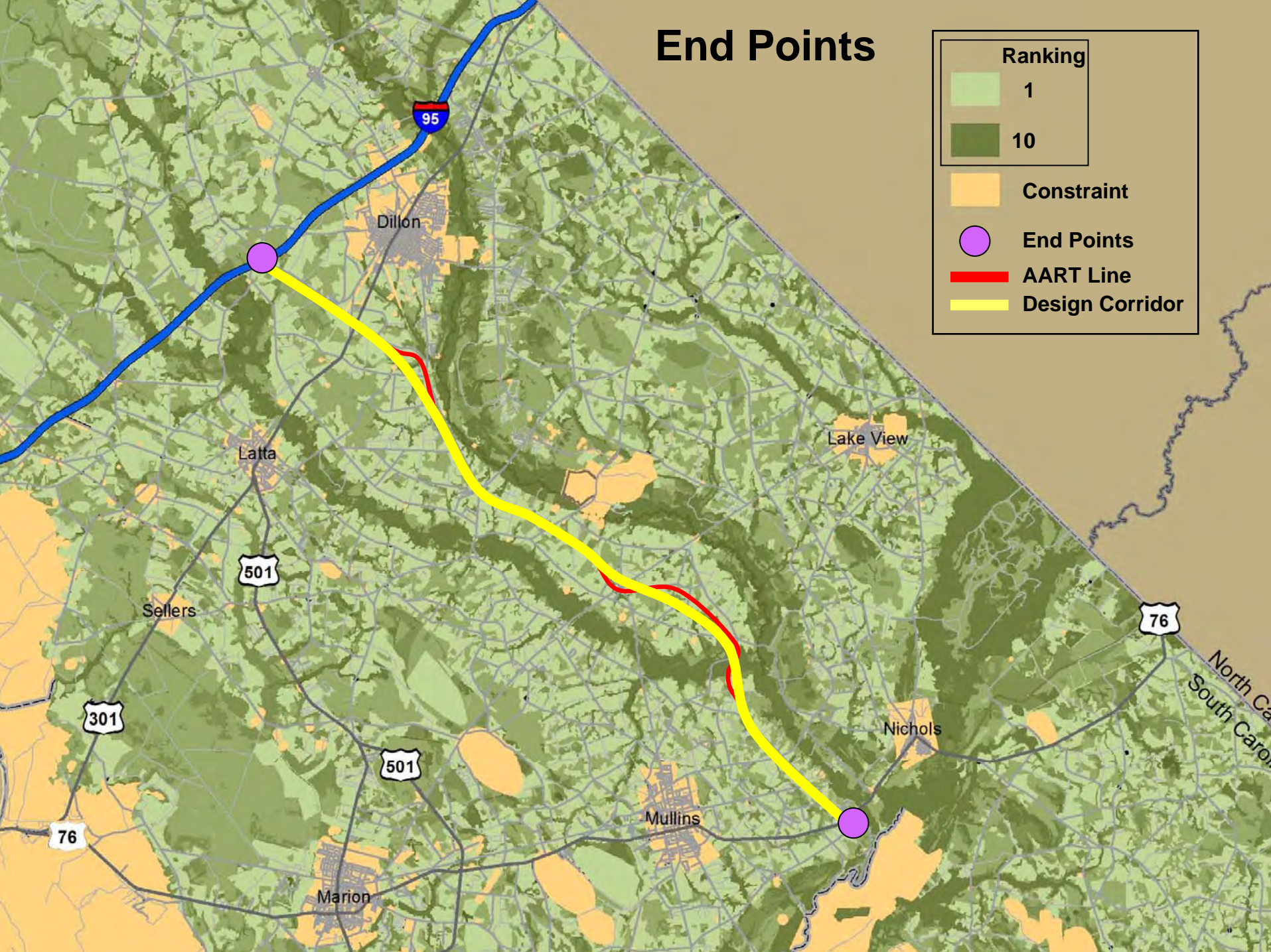
Within each layer, attributes should be given rankings between 1 and 10. Ten is considered the most costly in terms of unwanted impacts while a ranking of 1 should be assigned to those attributes of least impact.

Constraint areas are included to effectively 'mask out' any areas where development should not be considered.

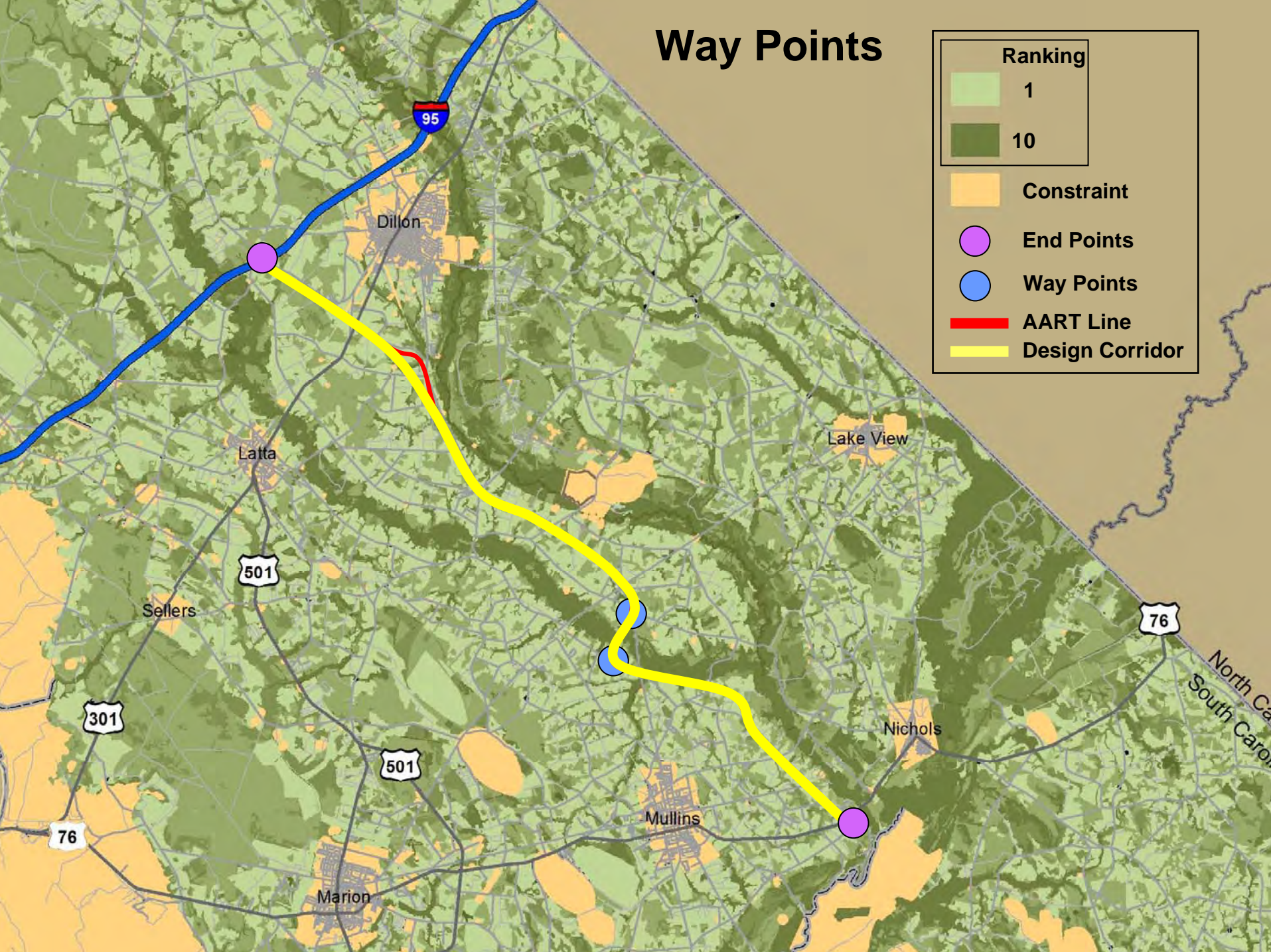


End Points

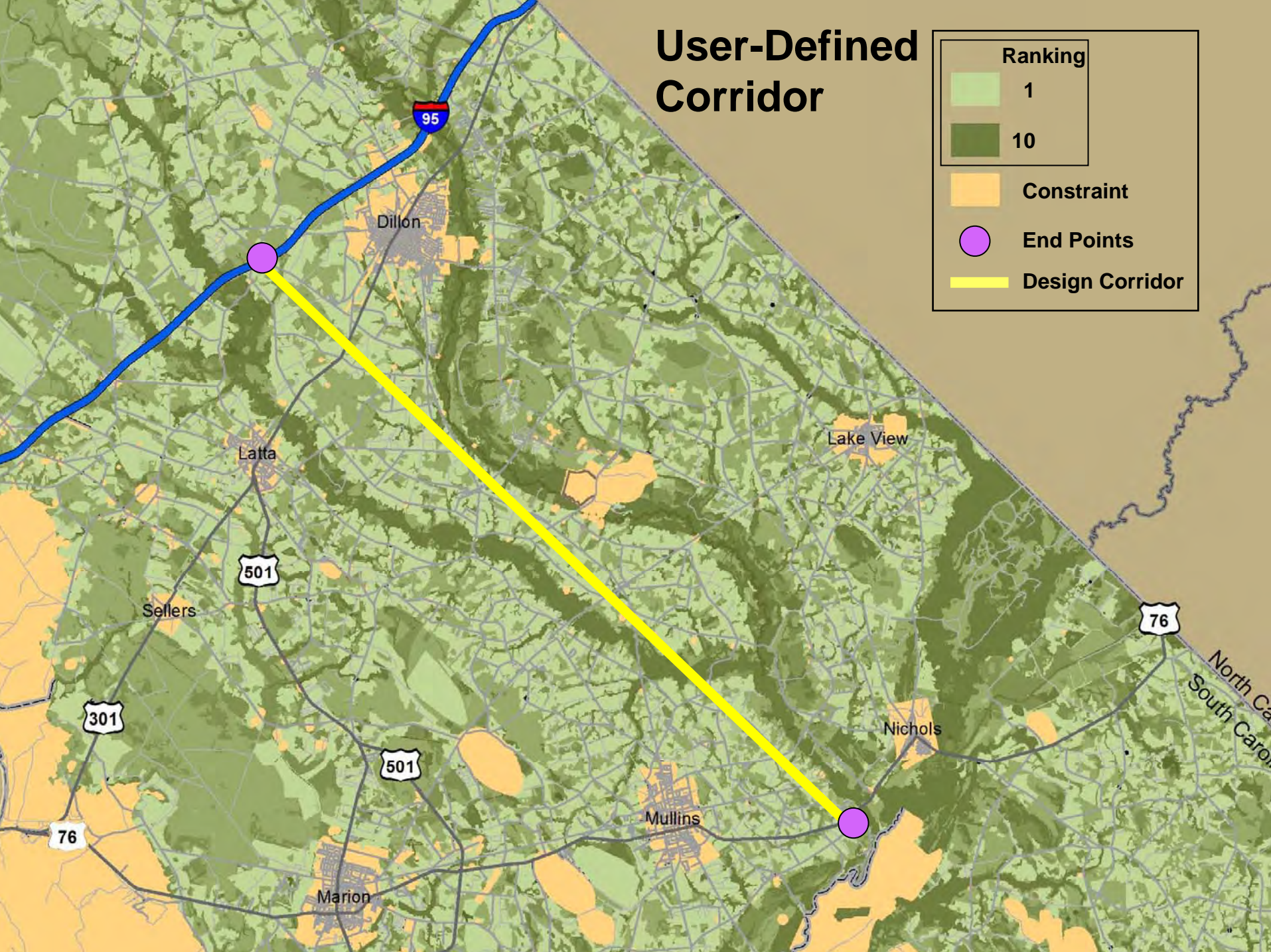
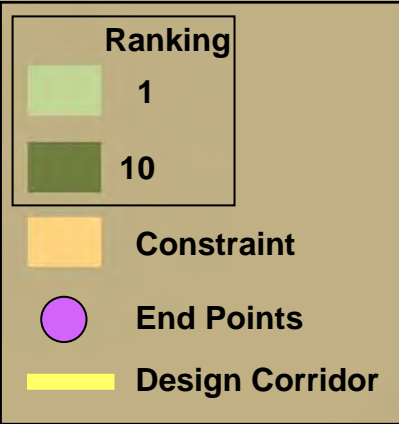
Ranking	
	1
	10
	Constraint
	End Points
	AART Line
	Design Corridor



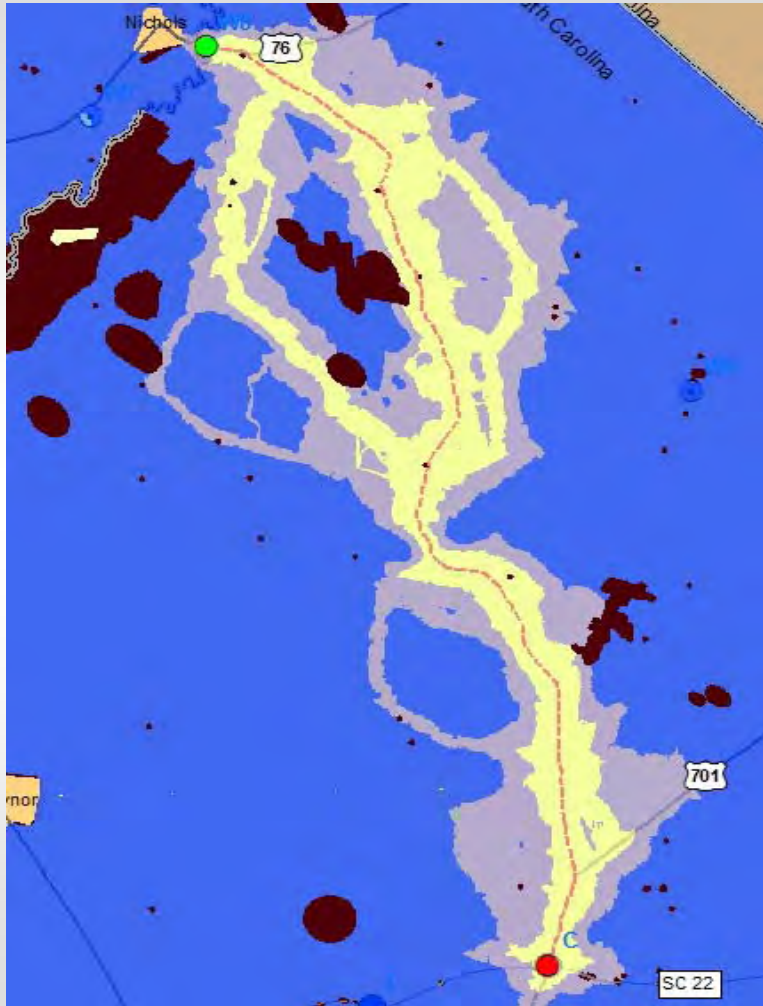
Way Points



User-Defined Corridor



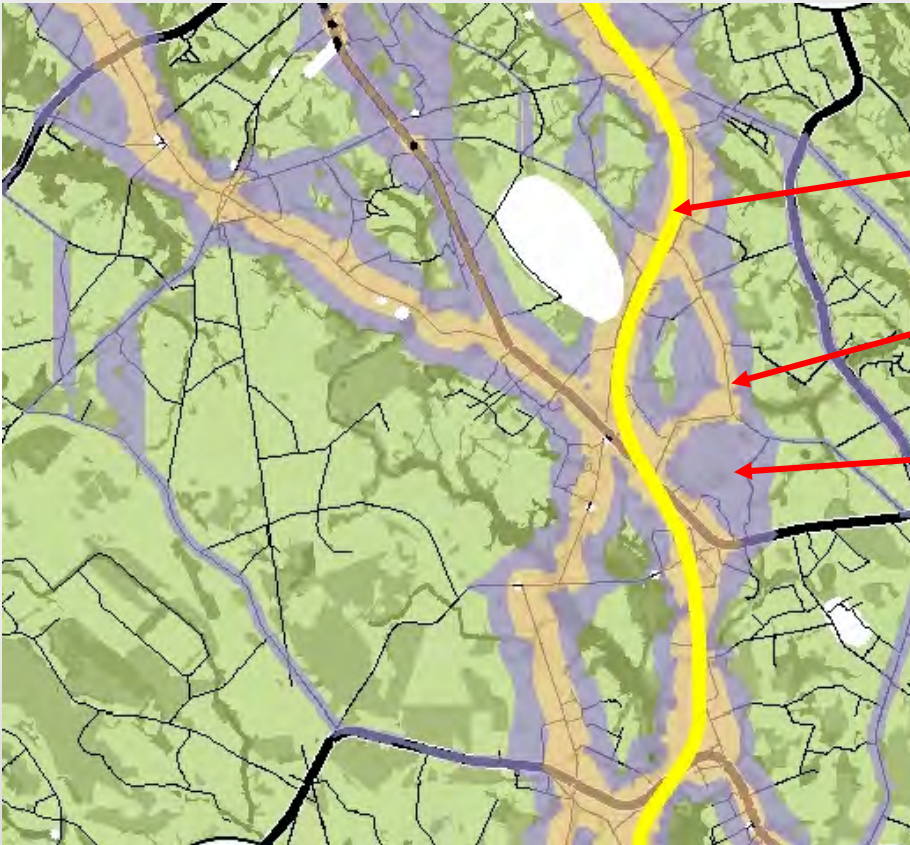
Result – Suitability Surface



- Preferred route
- 1% and 2% Corridors showing suitable areas

Suitability Surface

Identifies Other Potentials



Least Impact Path

Next Best Potential Corridors

Other Potential Corridors

Corridor Definition

- Specify Corridor Widths
- Apply Engineering Design Criteria

Run Settings:

Corridor Width/Buffer (Increment): 500 (Entire Width)

Horizontal Curve Radius: 3820

Smoothing Iterations: 75

Smoothing Tolerance: 150

Smoothing Interval: 250

Vertical Curve Radius: not implemented

Acceptable Corridor Pct: 0.02

Iterations Used:

Avoids Layer: C:\Projects\TestCreate113\Scenarios\TestScen21\AART_Scenario.gdb\avoids_grid

Suitability Layer: C:\Projects\TestCreate113\Scenarios\TestScen21\AART_Scenario.gdb\max_grid

Layers to Quantify (area):

- Reference_Polygon
- Reference_1000m
- States_FL_GA_AL
- Counties_FL
- urban
- district_bnd
- cities2000
- hydro100
- States_All
- cntshr_UTM
- M0042

Layers to Quantify (crossings):
(allow user to specify crossing category)

- roadway_old
- railway_ll
- railway_UTM
- hydro100_line
- cities2000_line
- rds8
- roadway
- Join_Output
- Join_Output_2
- linetest_fc

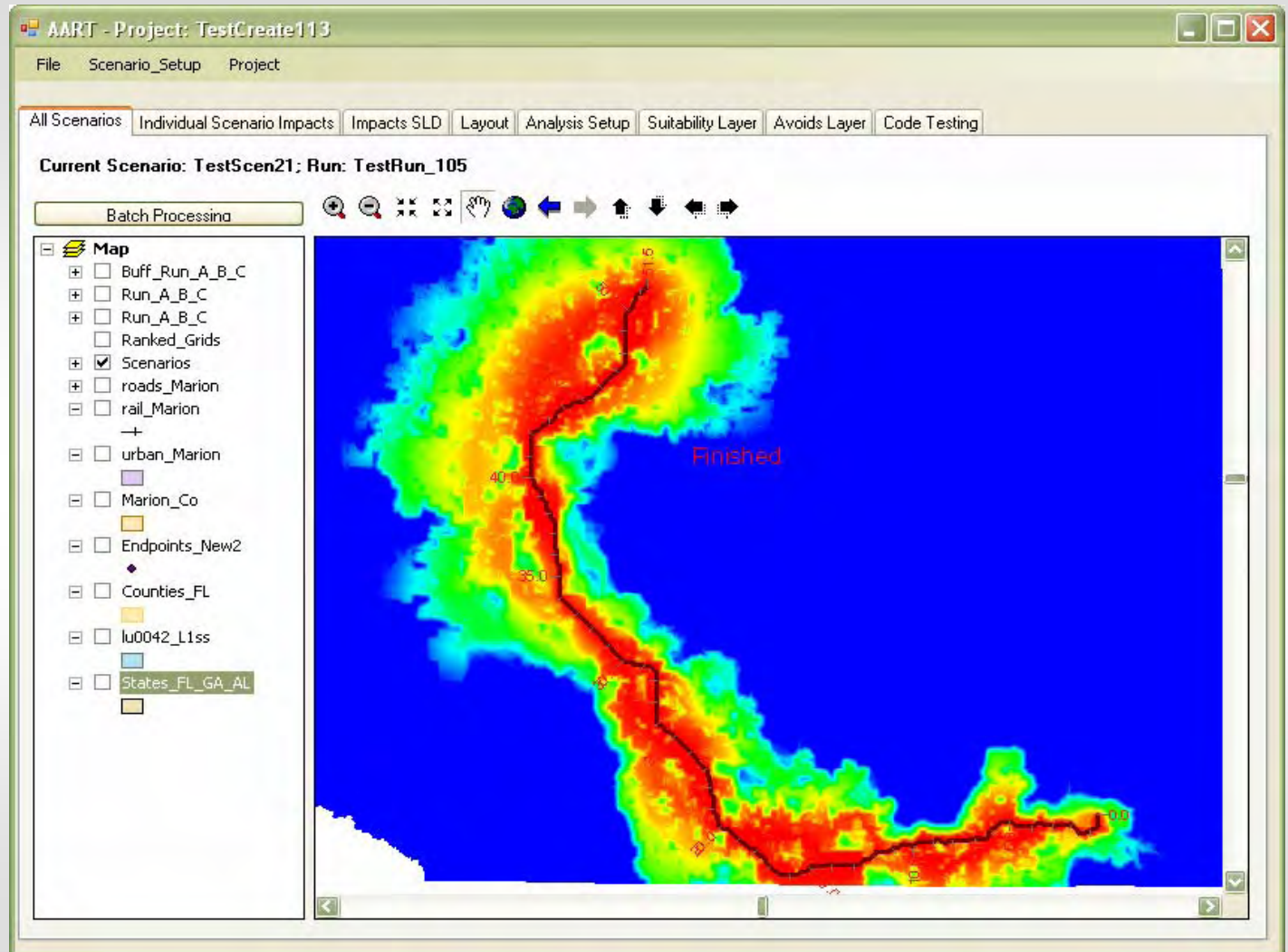
Calculate Crossings

Description:

Save Settings As:

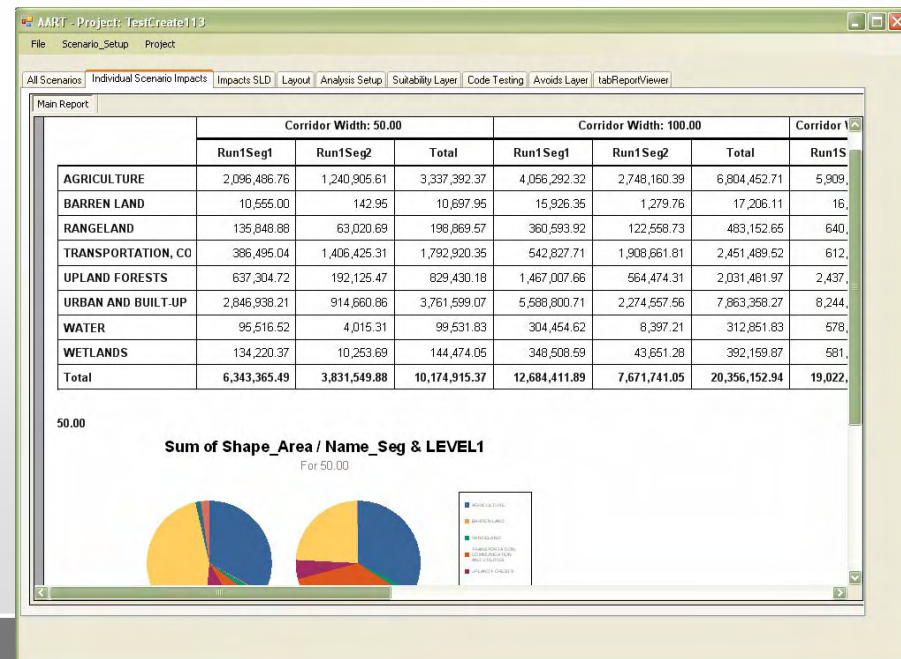
Save Settings

Scenario Impacts



Scenario Impacts Summary

- Detailed Impacts Documentation
 - Acreage by Layer and Layer Attribute
 - Feature Counts (churches, cultural resources, etc.)
 - Road, Rail & River Crossings



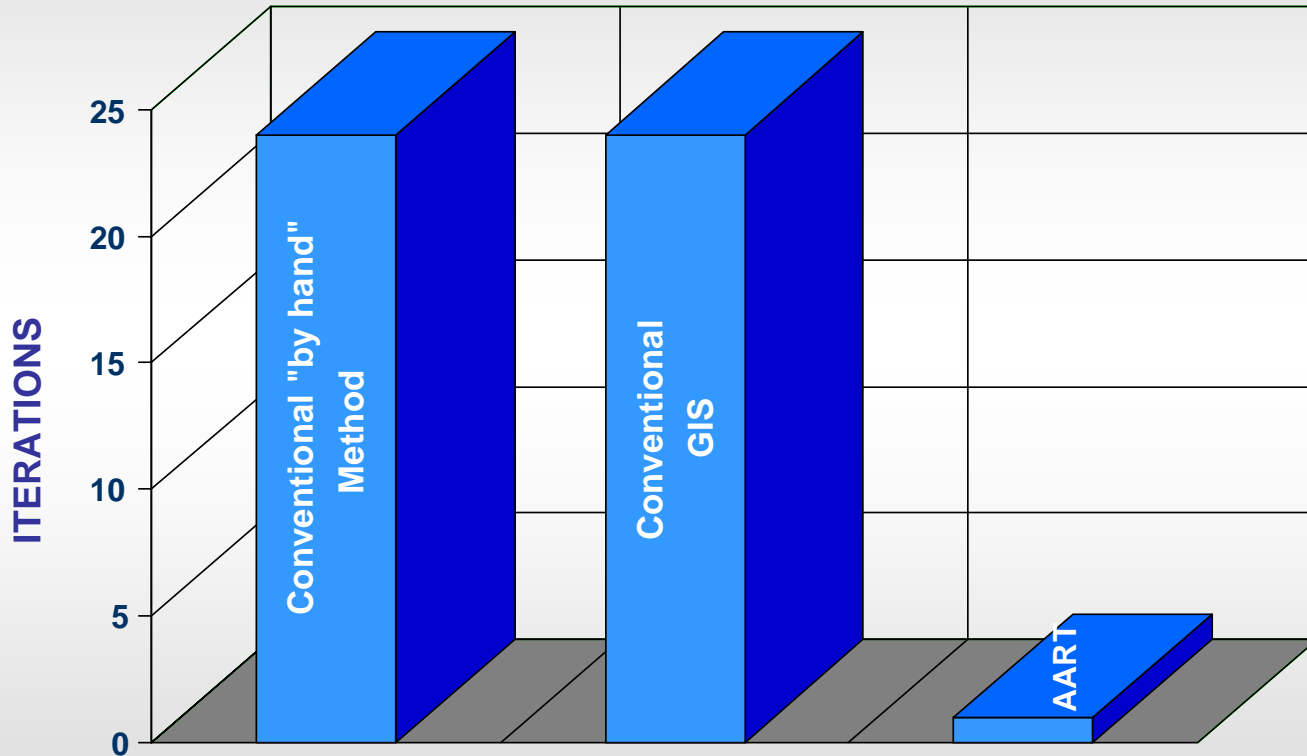
Benefits of AART

- Meets NEPA Requirements
- Identifies Corridors with Least Impacts
- Detailed Quantification of Impacts
- Integrates People into the Process
 - Trust and Buy-In (public, stakeholders, agencies)
- Saves Time – Streamlines Process
- Reduces Project Costs



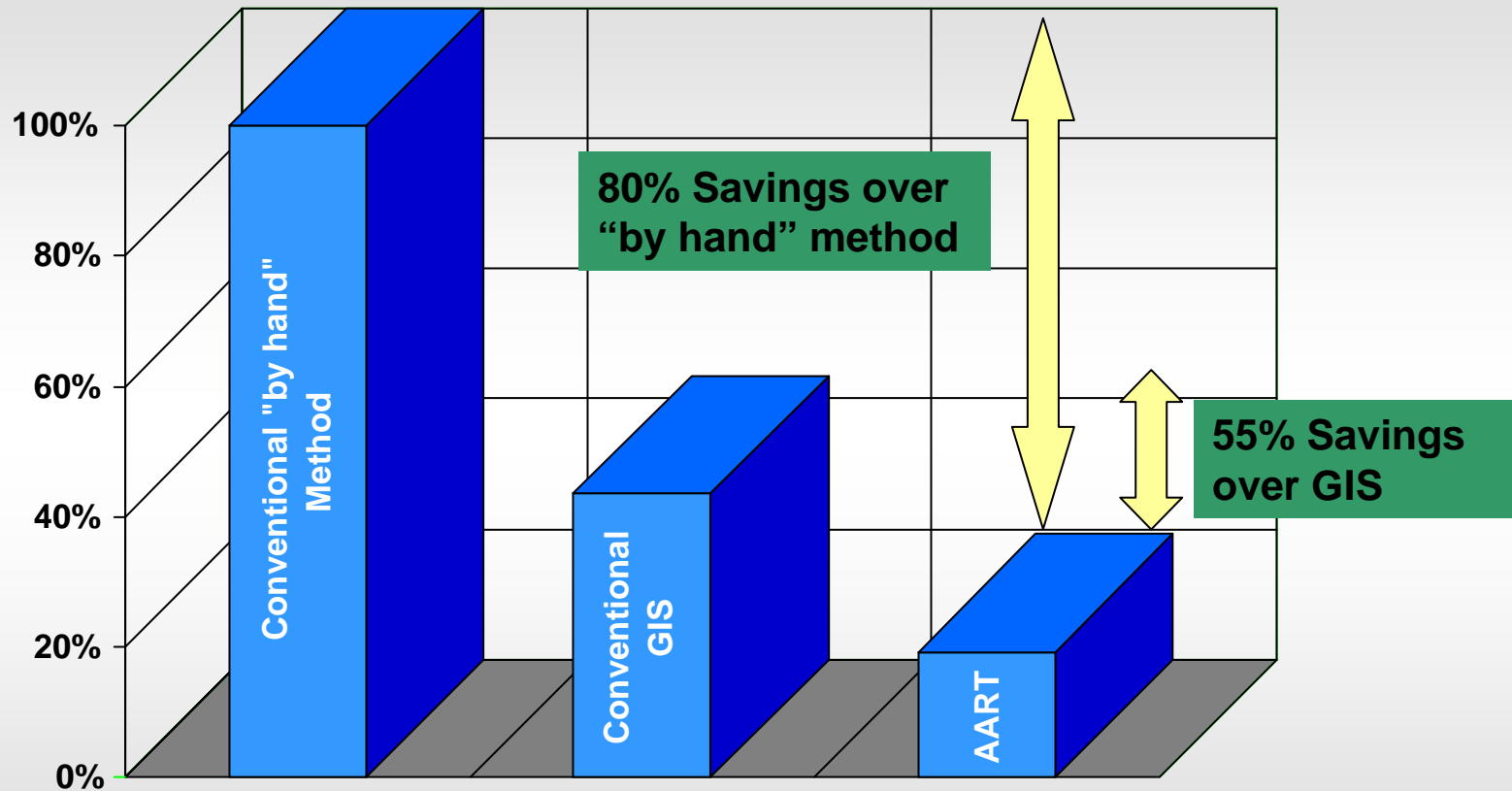
Identification of Least Impact Corridor Evaluation Iterations

(Assumes a 1,000 square mile study area)



Time Savings for Single Corridor Analysis

(time savings assumes database completed)



Savings using AART: 80% Savings over "by hand" method
55% Savings over GIS method

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Questions?

