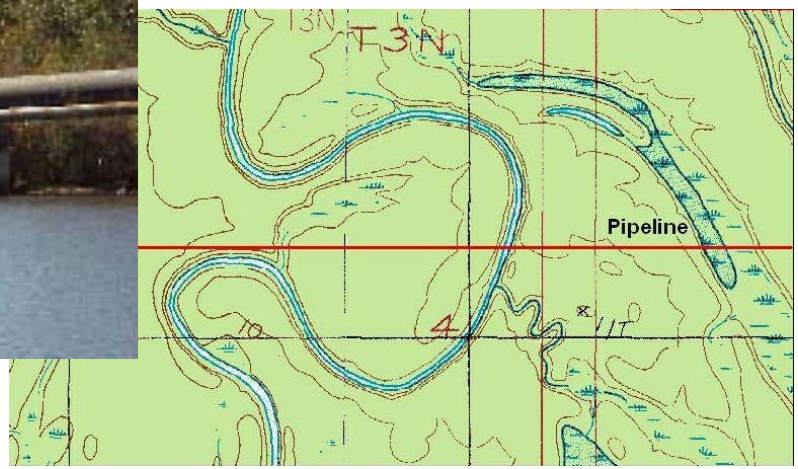
PAYNE ENVIRONMENTAL SERVICES

U.S. Environmental Protection Agency

Fifth Biennial Freshwater Spills Symposium

Utilization of Geographic Information Systems (GIS) in Pipeline Management and Spill Response



Presented by:

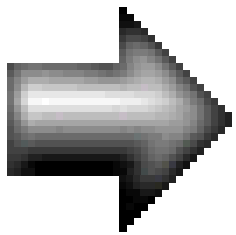
Payne Environmental **Services**

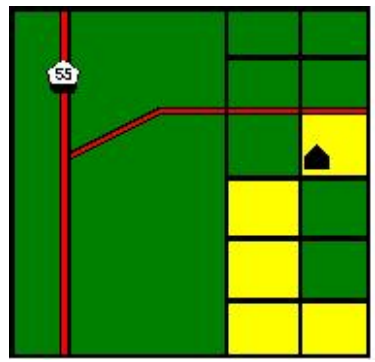
Mobile, Alabama

Topics of this Presentation:

- What is GIS?
- Pipeline Integrity Management Planning Possibilities
- Identifying Potential Problem Areas using GIS
- Using GIS in Spill Response
- Automated Infrastructure Management
- Why Use GIS in Pipeline Management and Spill Response?

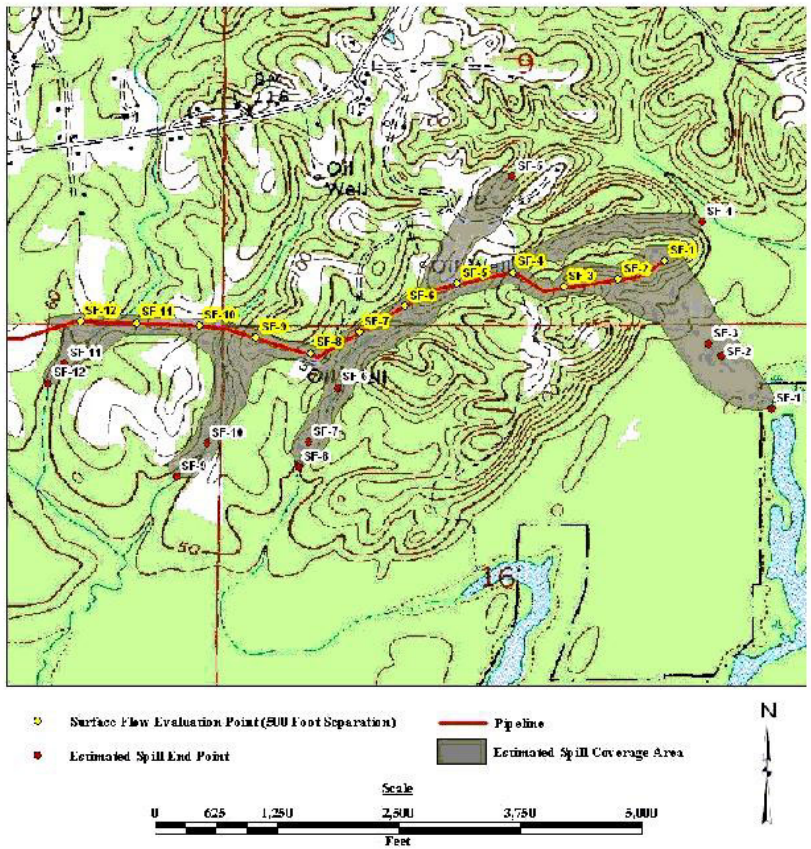
What is a Geographic Information System (GIS)?



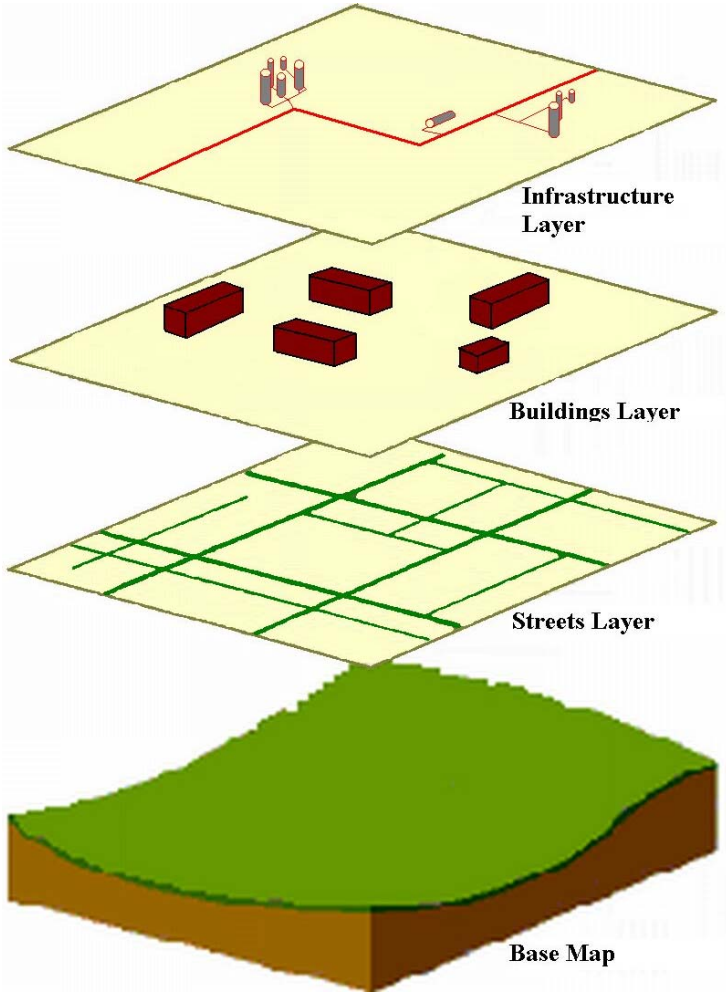


Geographic Information System (GIS) is a system of software, hardware, data and personnel used to analyze information tied to a spatial location.

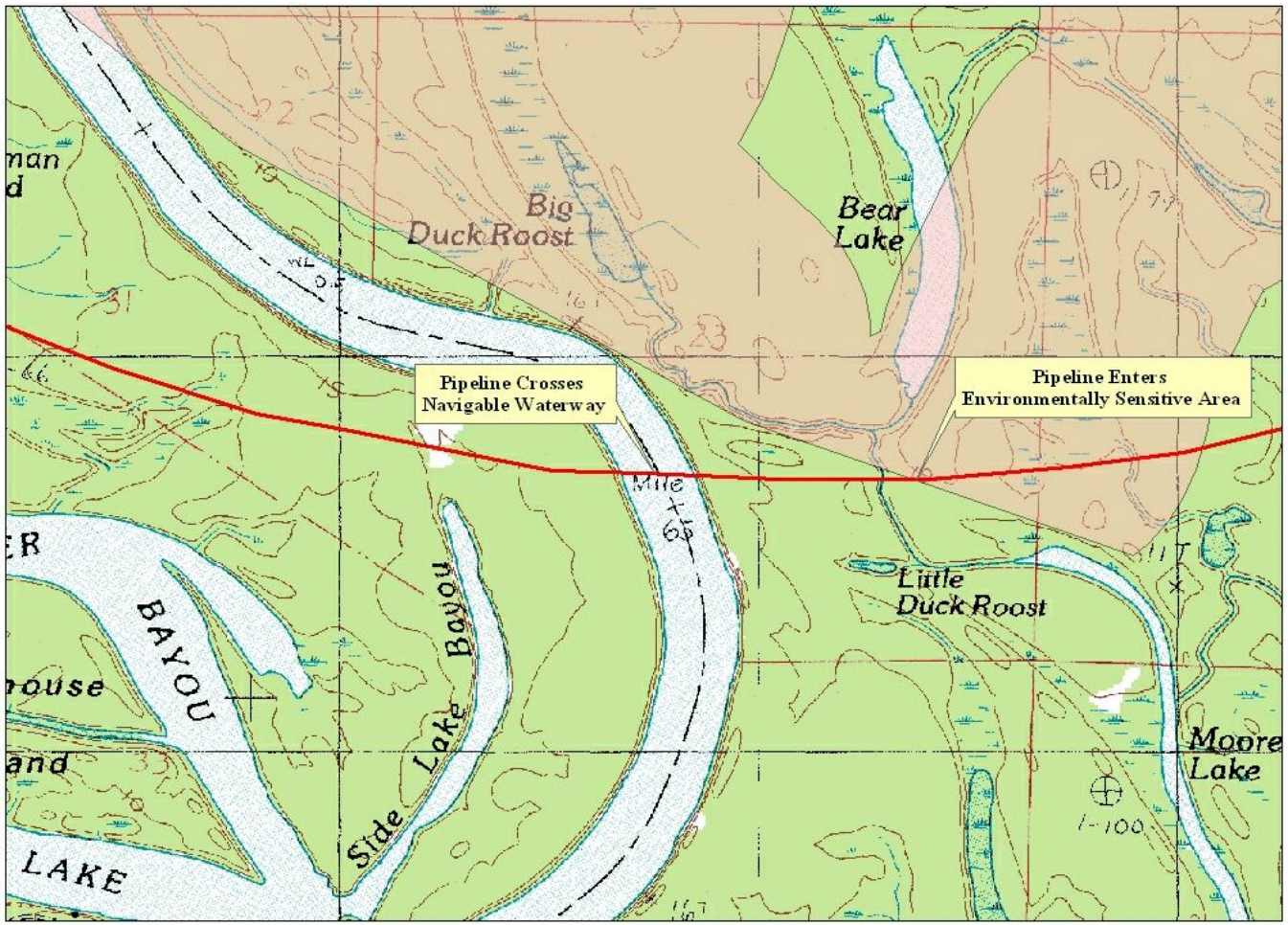
Geographic Information Systems (GIS) allows available data (e.g., pipelines, environmentally sensitive areas, valves, etc.) to be represented in a geographic visual format.



This information is organized and placed into layers (shapefiles), which are placed on top of a base map.



Typical Base Maps are USGS Quadrangles and Aerial photographs.

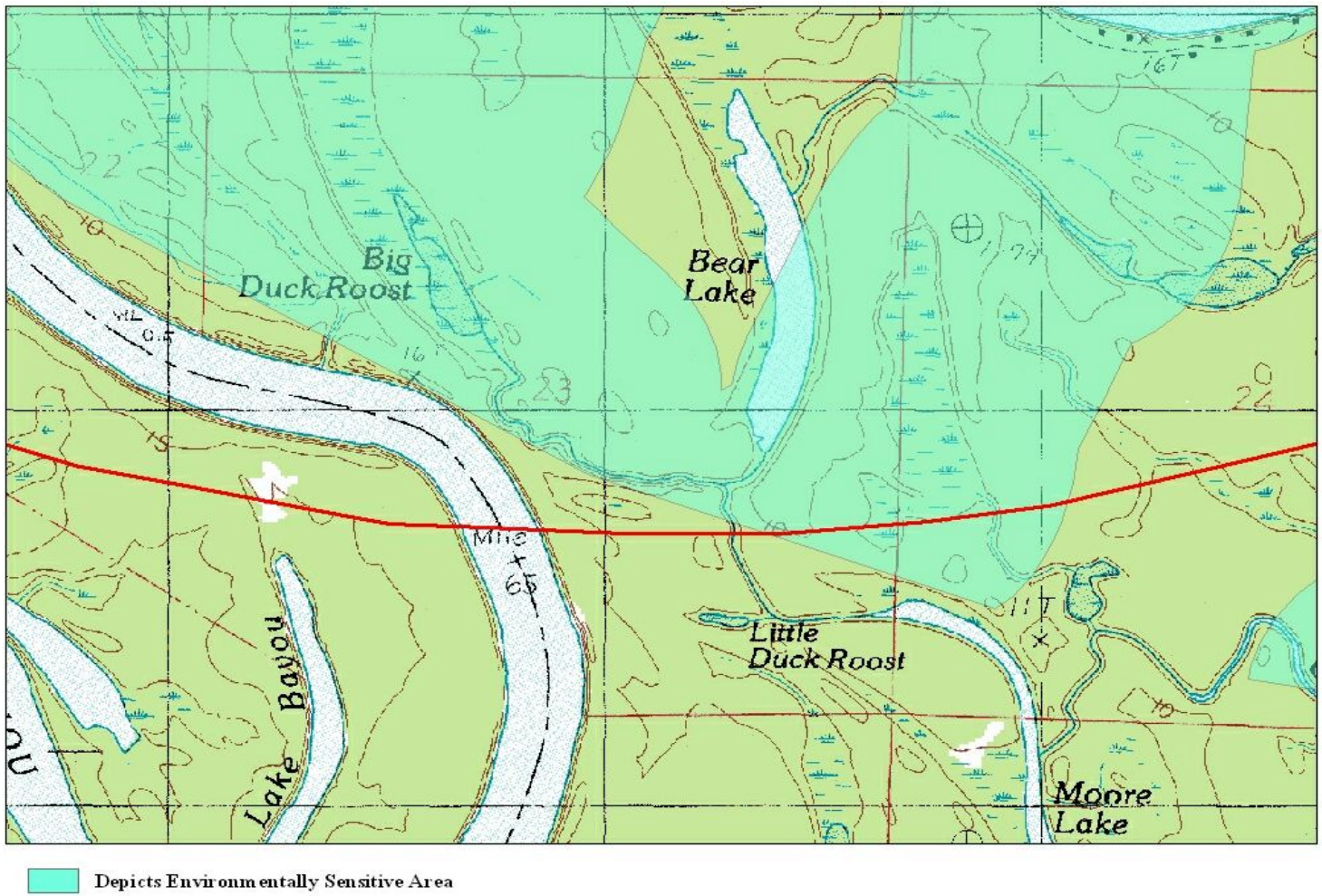


Being able to control which layers are viewed can reveal hidden trends or problems not visible before.

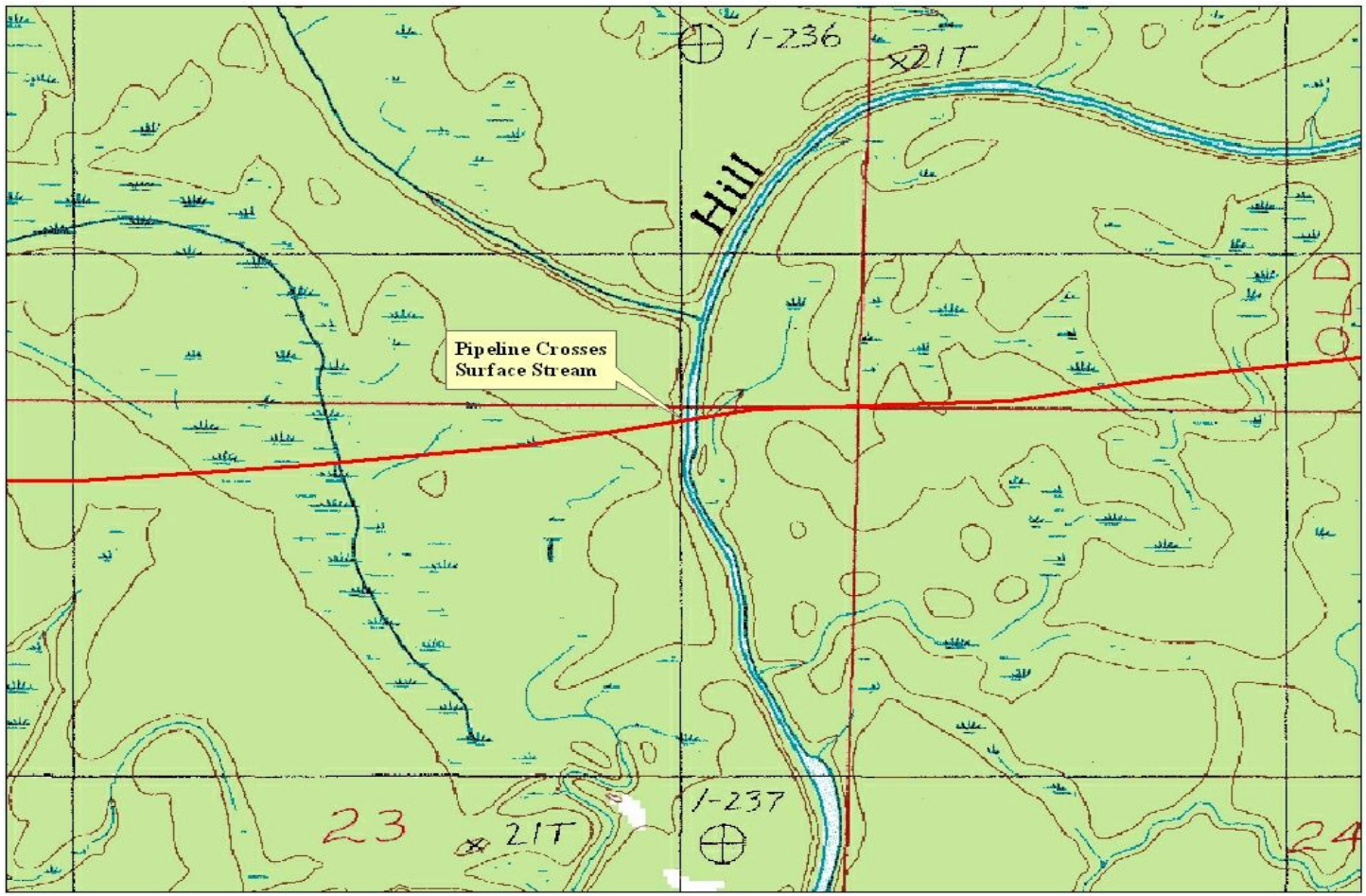
Integrity Management Planning Possibilities

GIS is useful in many areas of Integrity Management Planing including:

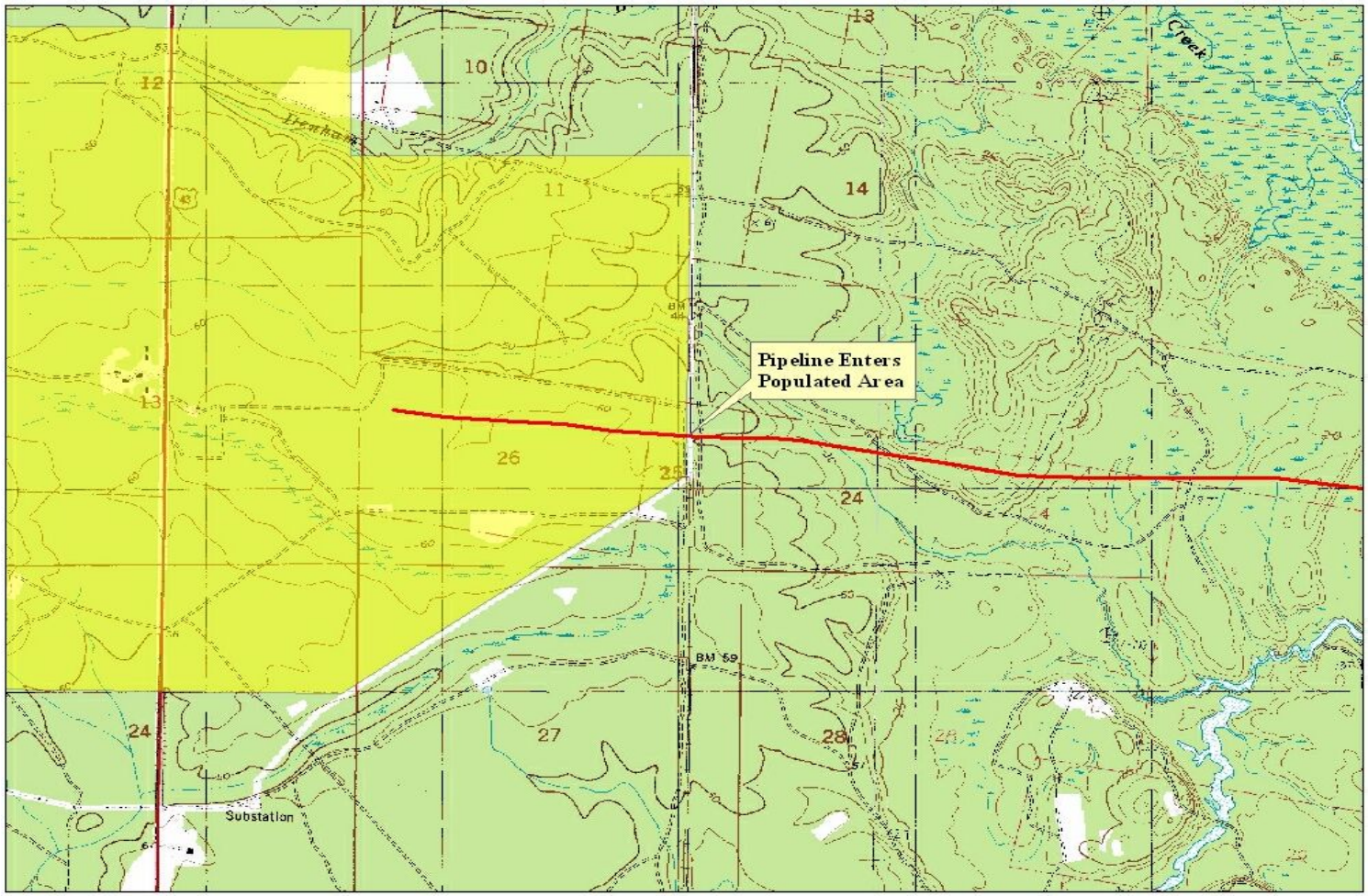
- High Consequence Areas (HCA) Evaluations,
- Risk Assessments,
- Maintenance Reviews and Scheduling, and
- Emergency Response Equipment Evaluations.



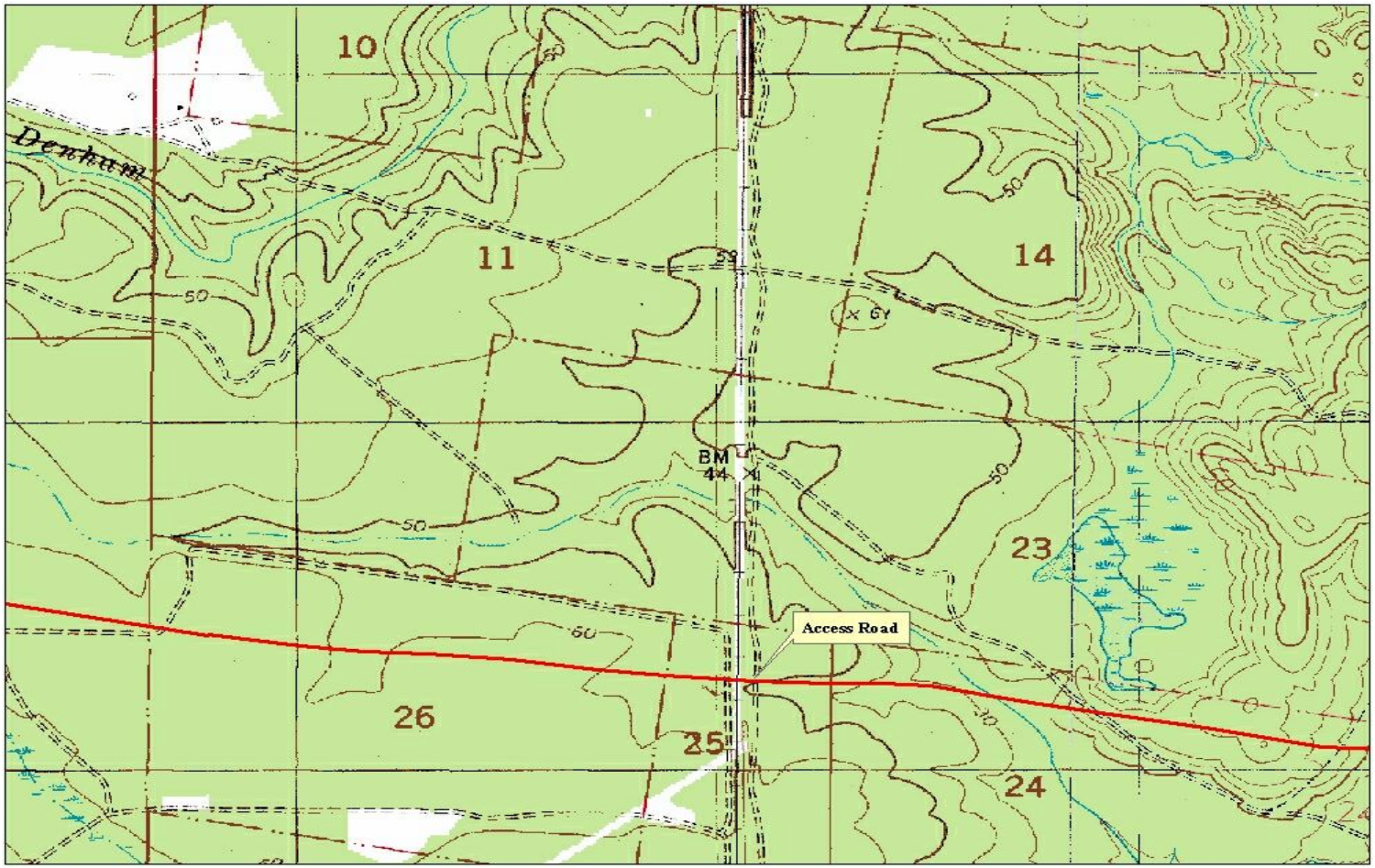
GIS allows for easy visual evaluation of High Consequence Areas (HCA).



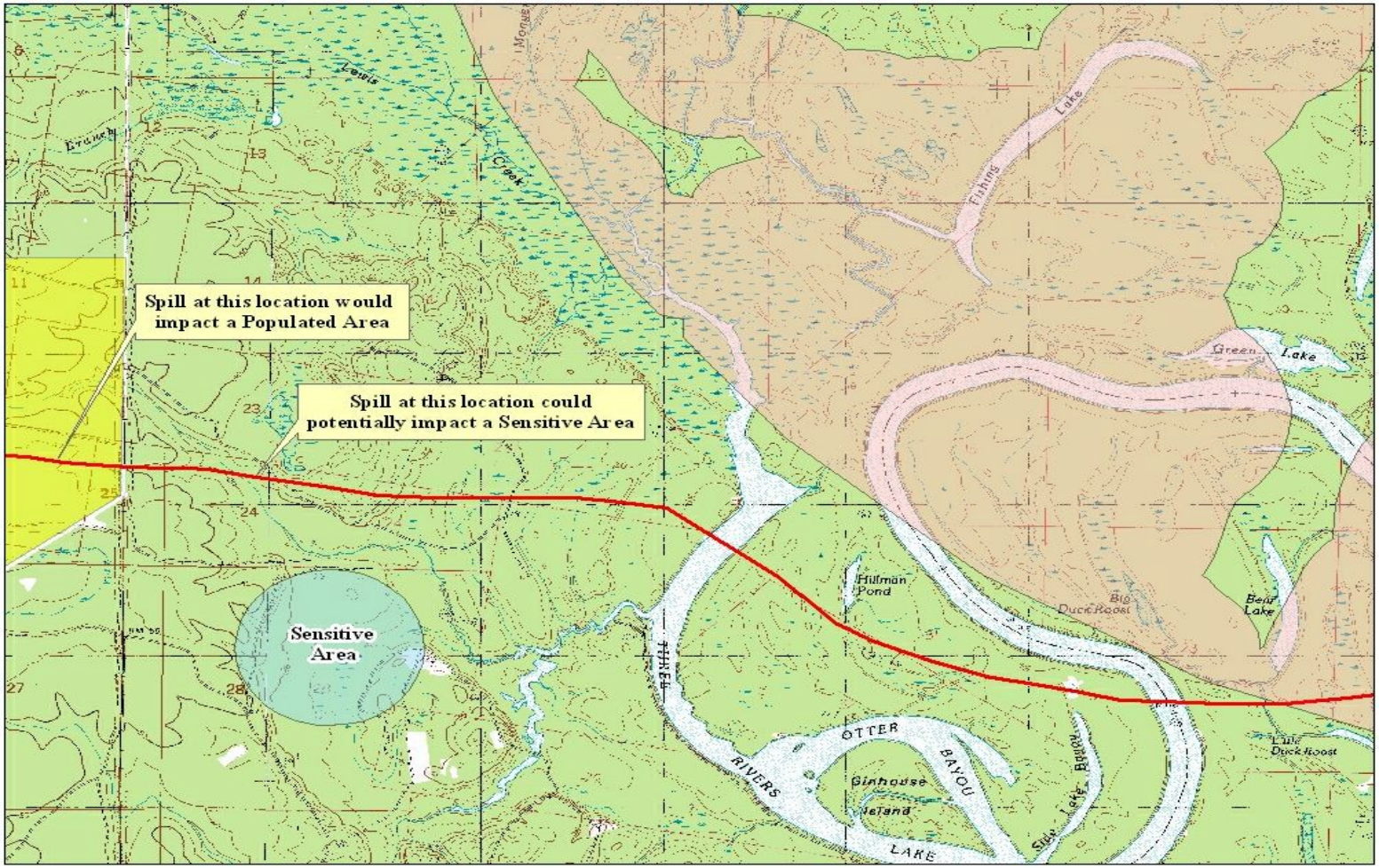
Stream and water crossings are much more visible utilizing a graphic display format.



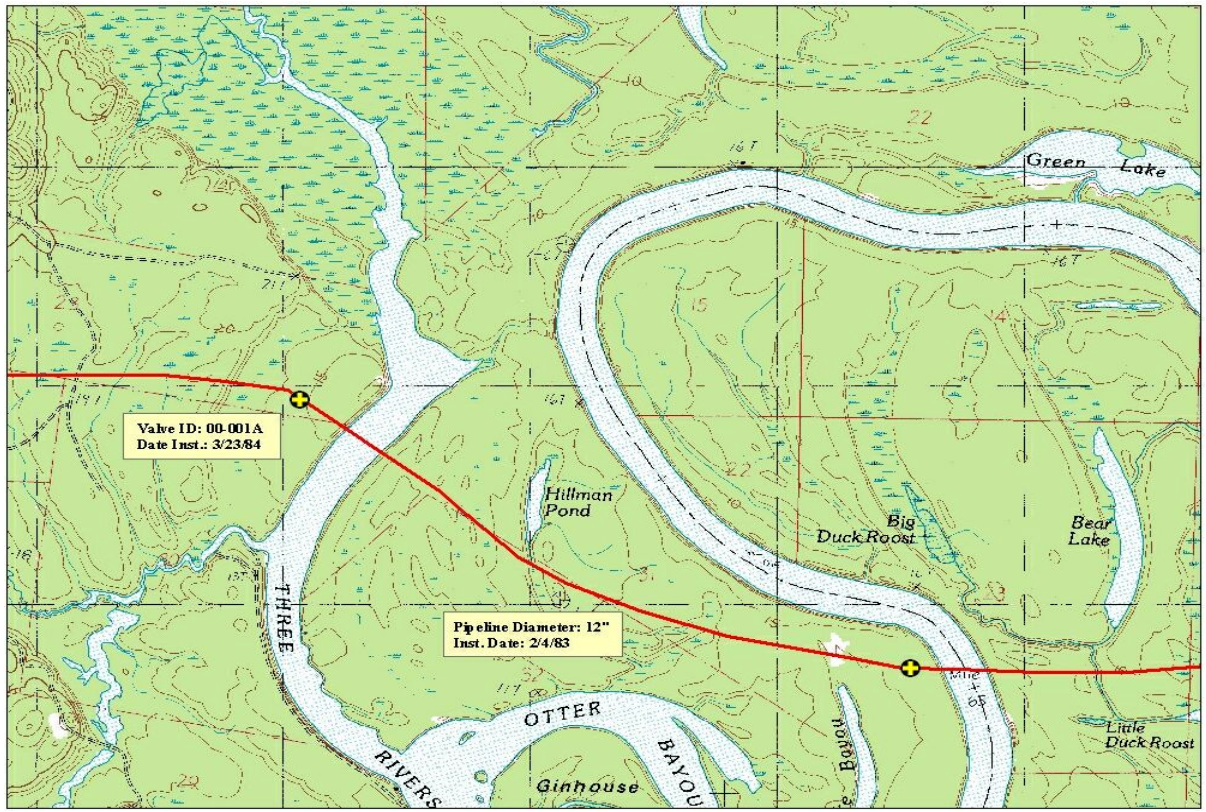
Populated area boundaries and their distances from the pipeline are more easily understood in a graphic format.



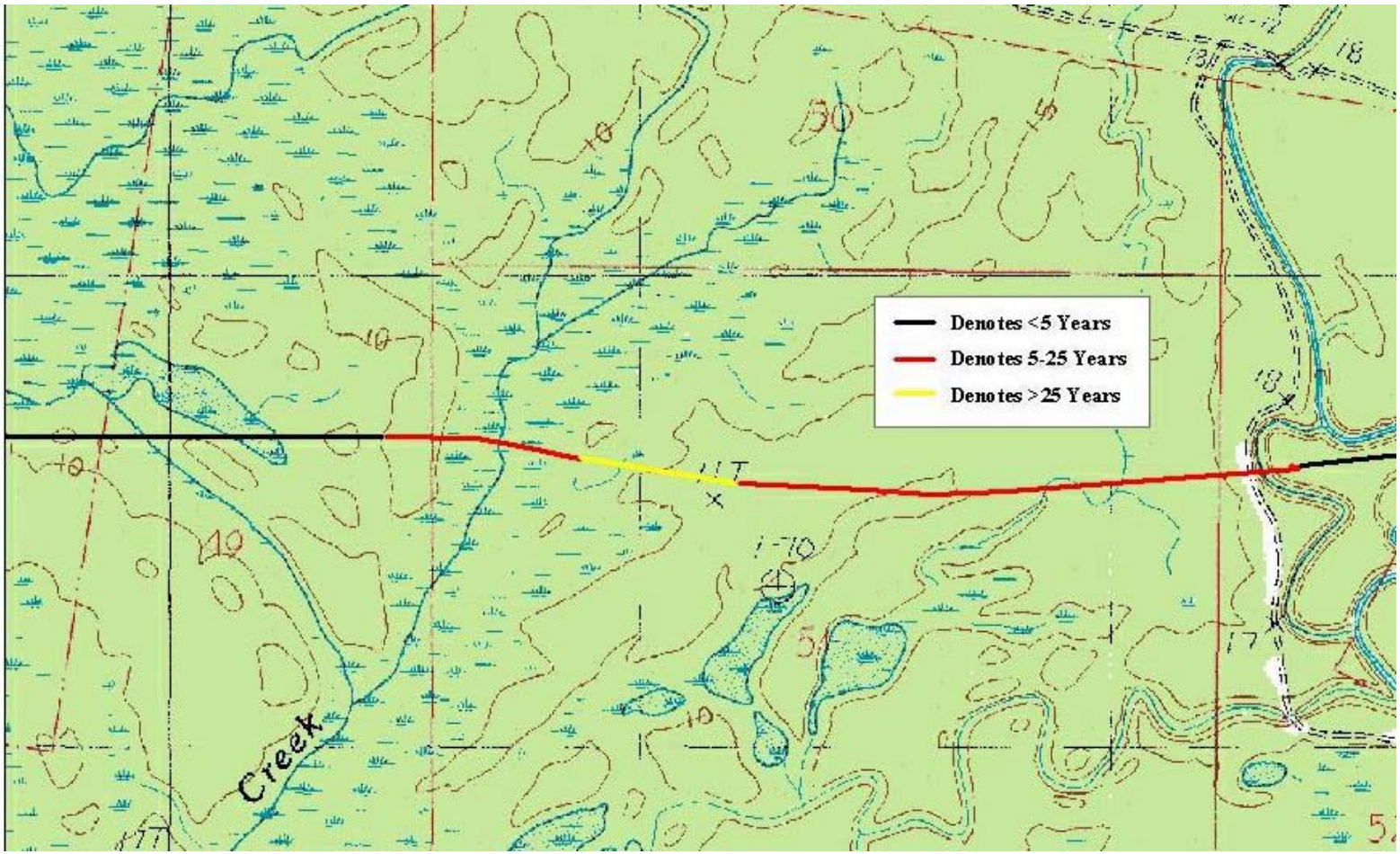
Graphic depiction of roads, trails, and other access locations along the pipeline are easily displayed.



Potential impacts to HCAs are more easily understood when displayed on topographic maps.

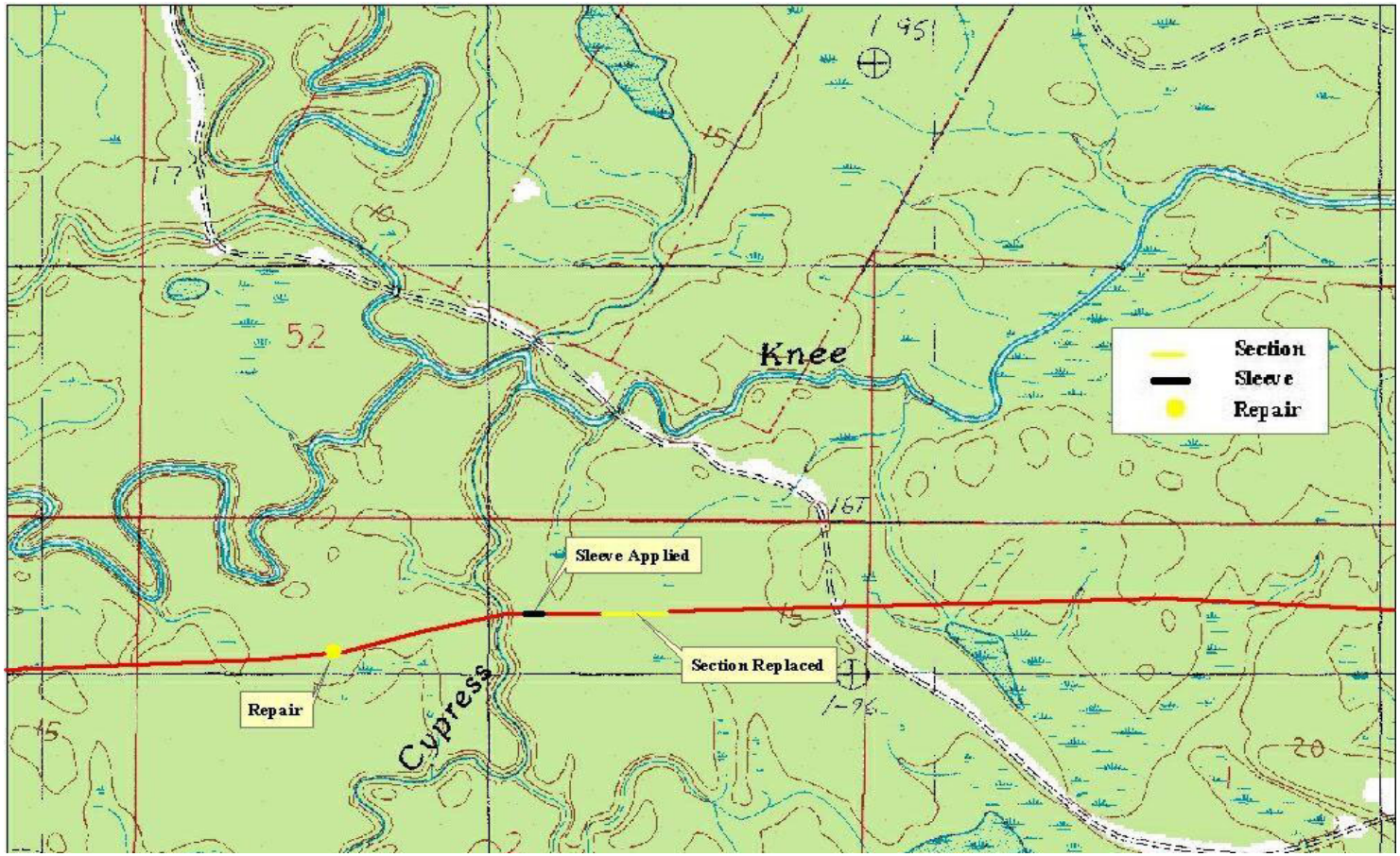


After the data is mapped geographically into shapefiles, the attributes or information about the shapfiles (e.g., pipeline age, date of valve installation, etc.) can be added to the map allowing for a more detailed analysis of the pipeline system.



Pipeline segments can be displayed in terms of age, pressure, type of material, number of past leaks, etc.

Areas with increased construction activities that might present problems can be identified and mapped utilizing aerial photographs.



Types of maintenance can be compared to pipeline conditions and problems encountered during the life span of the pipeline.

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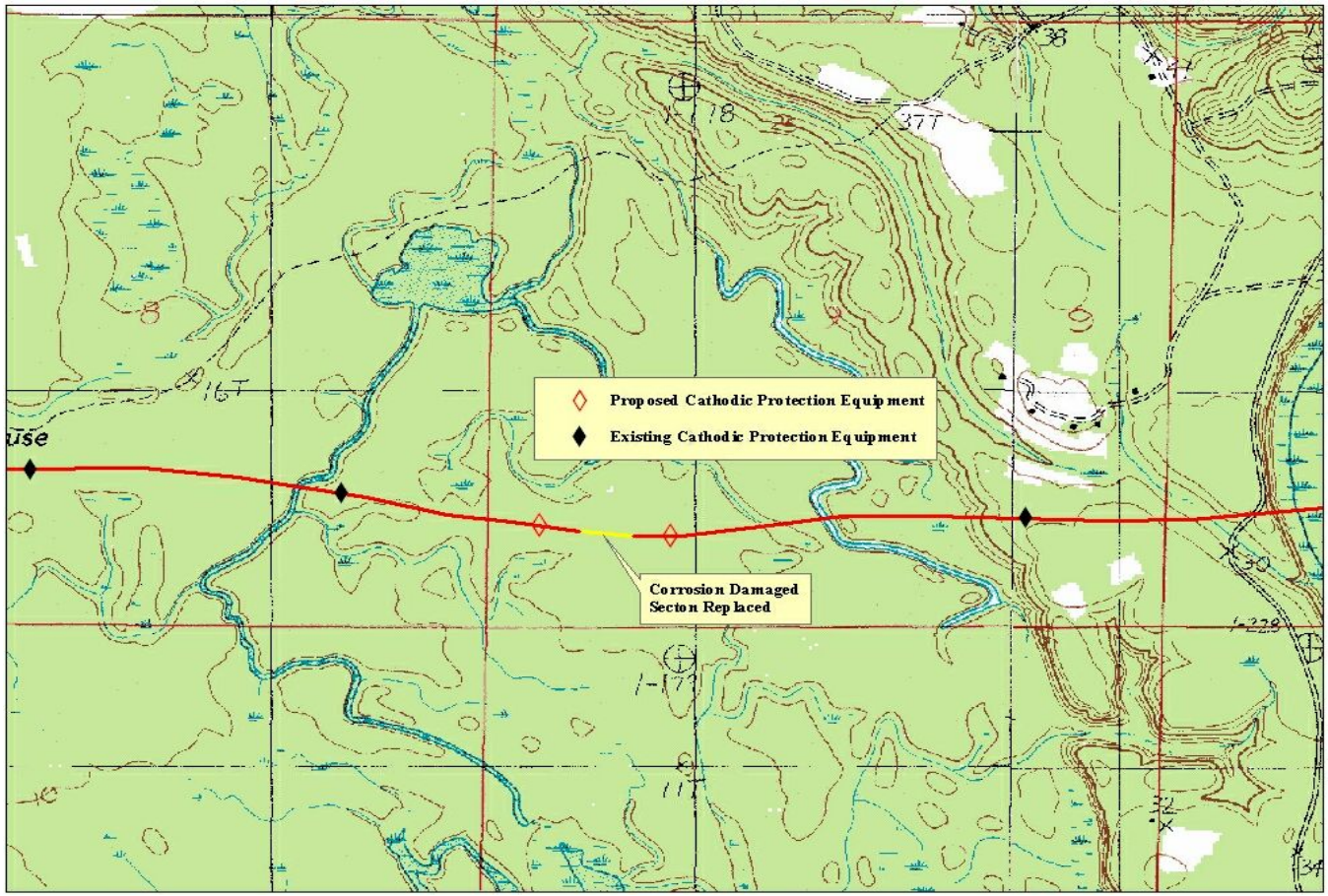

Cathodic protection locations can be mapped and compared to corrosion data from maintenance and pigging to help determine the effectiveness of the cathodic protection equipment and locations.

Identifying Potential Problem Areas Using GIS

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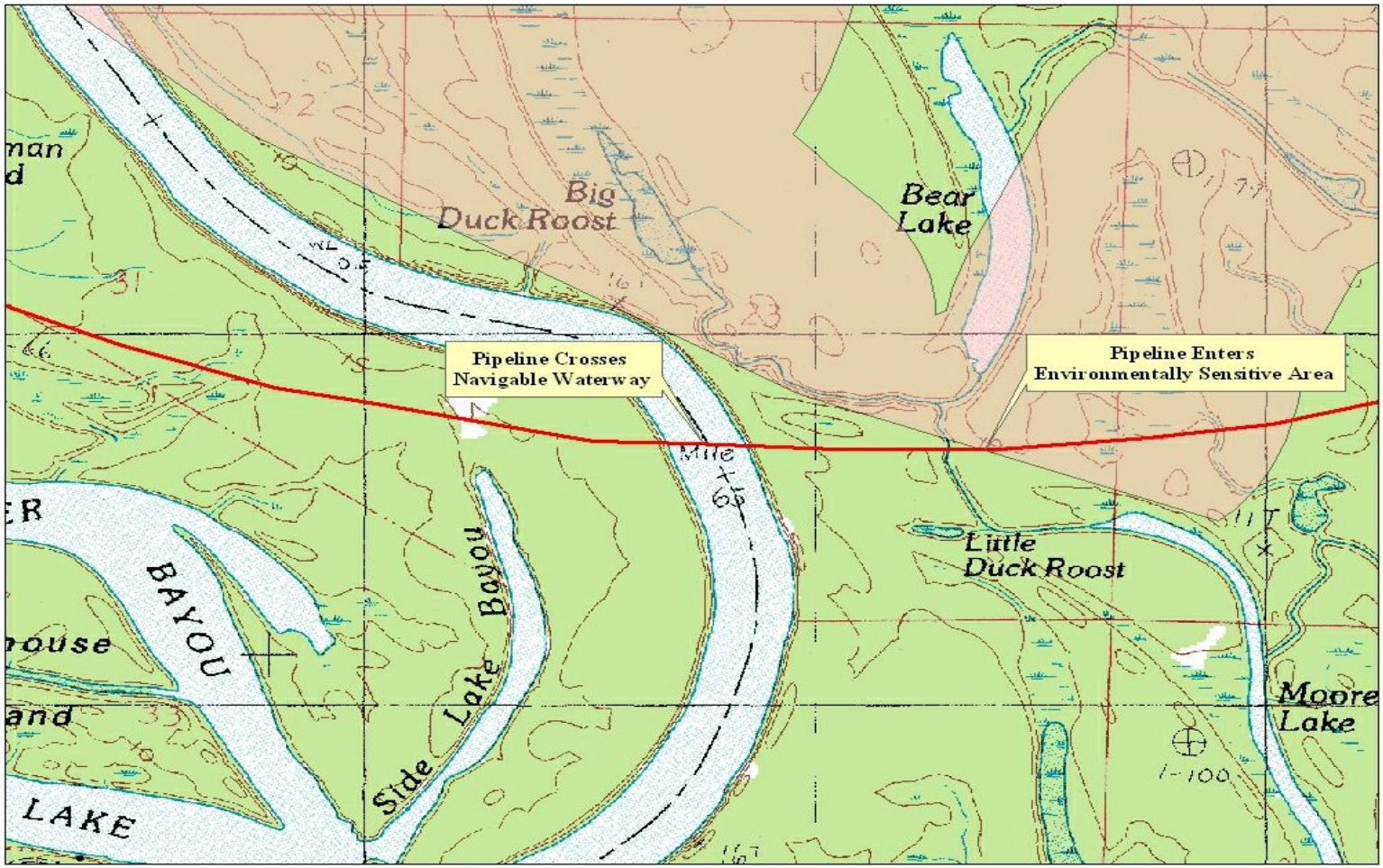
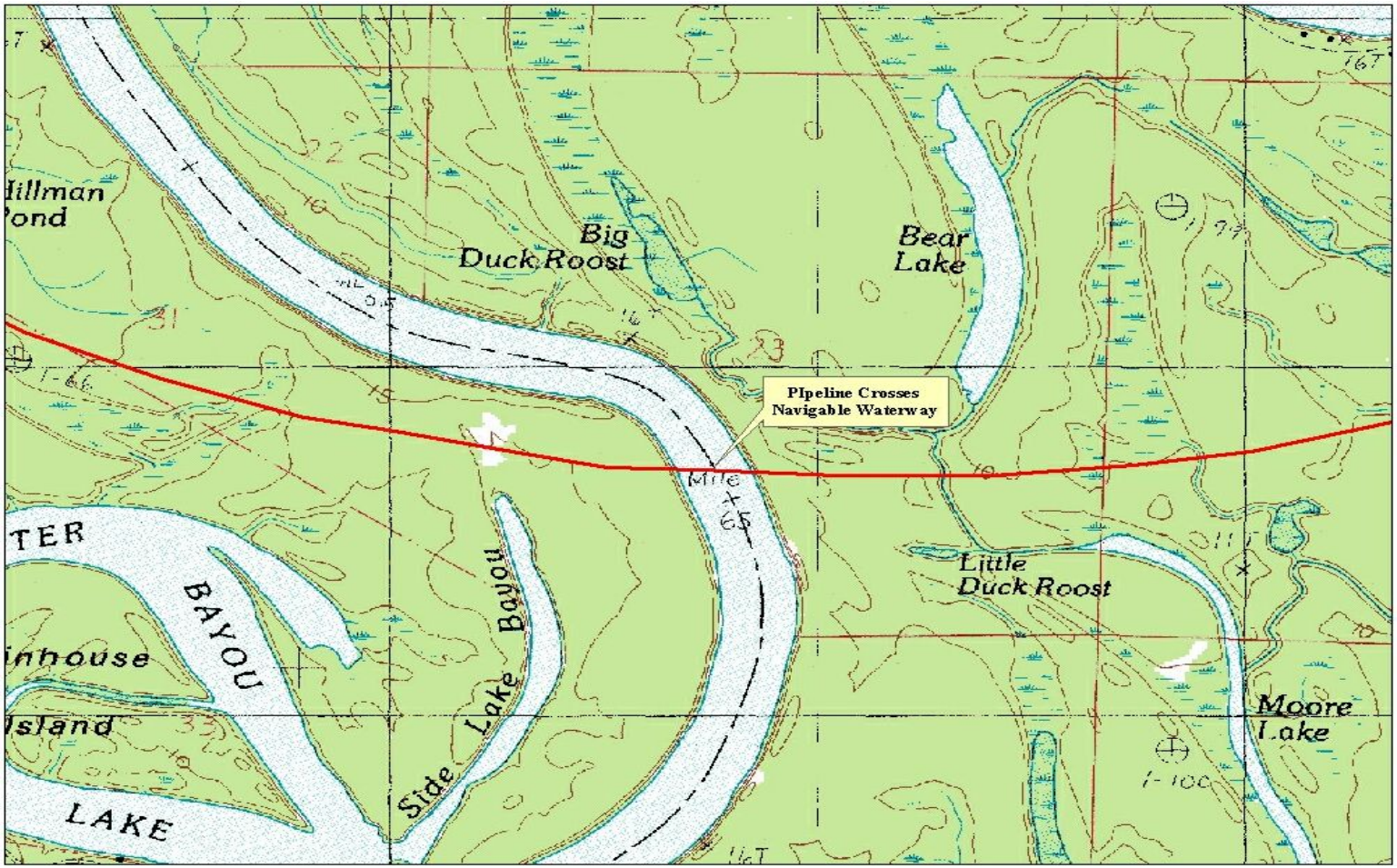
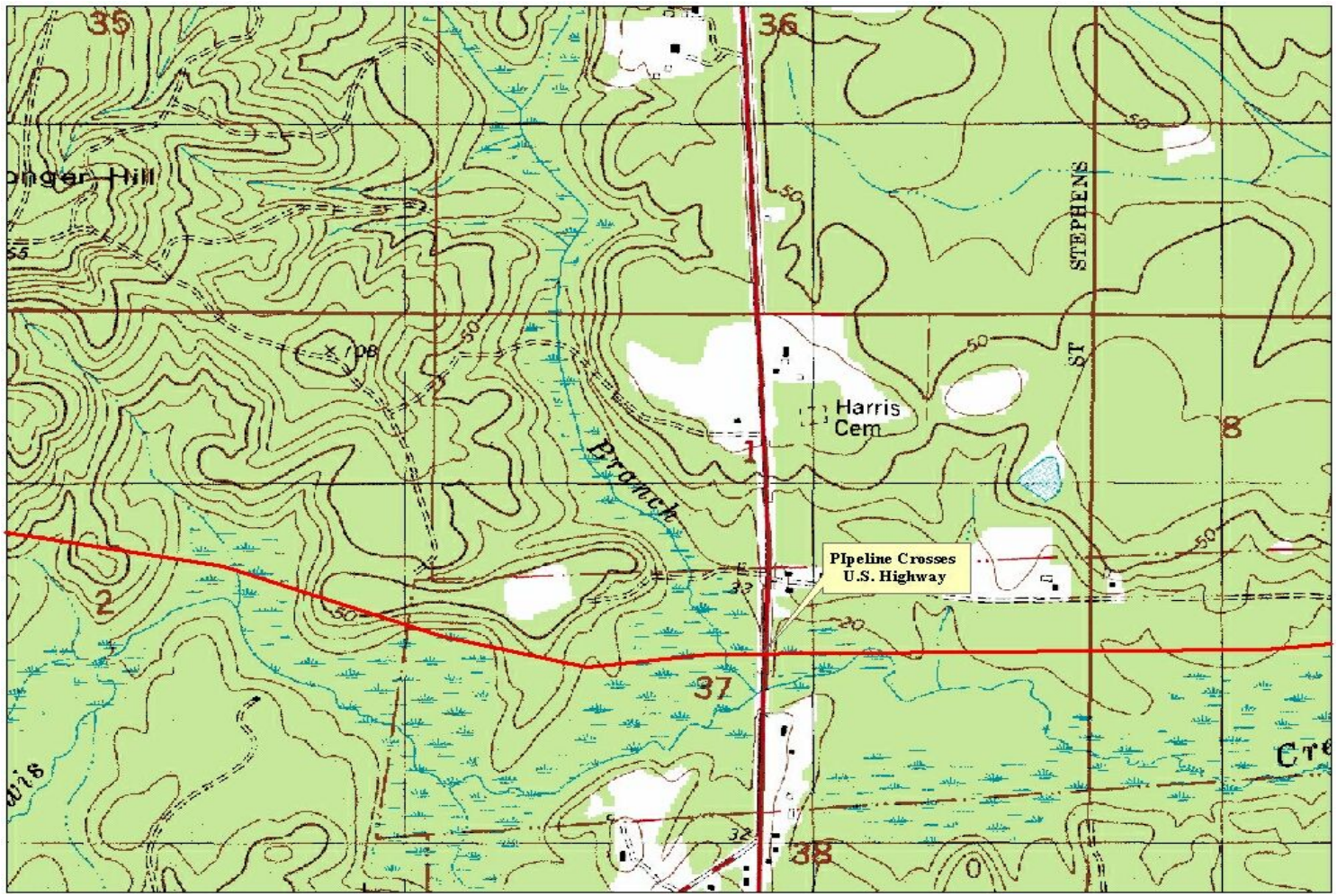


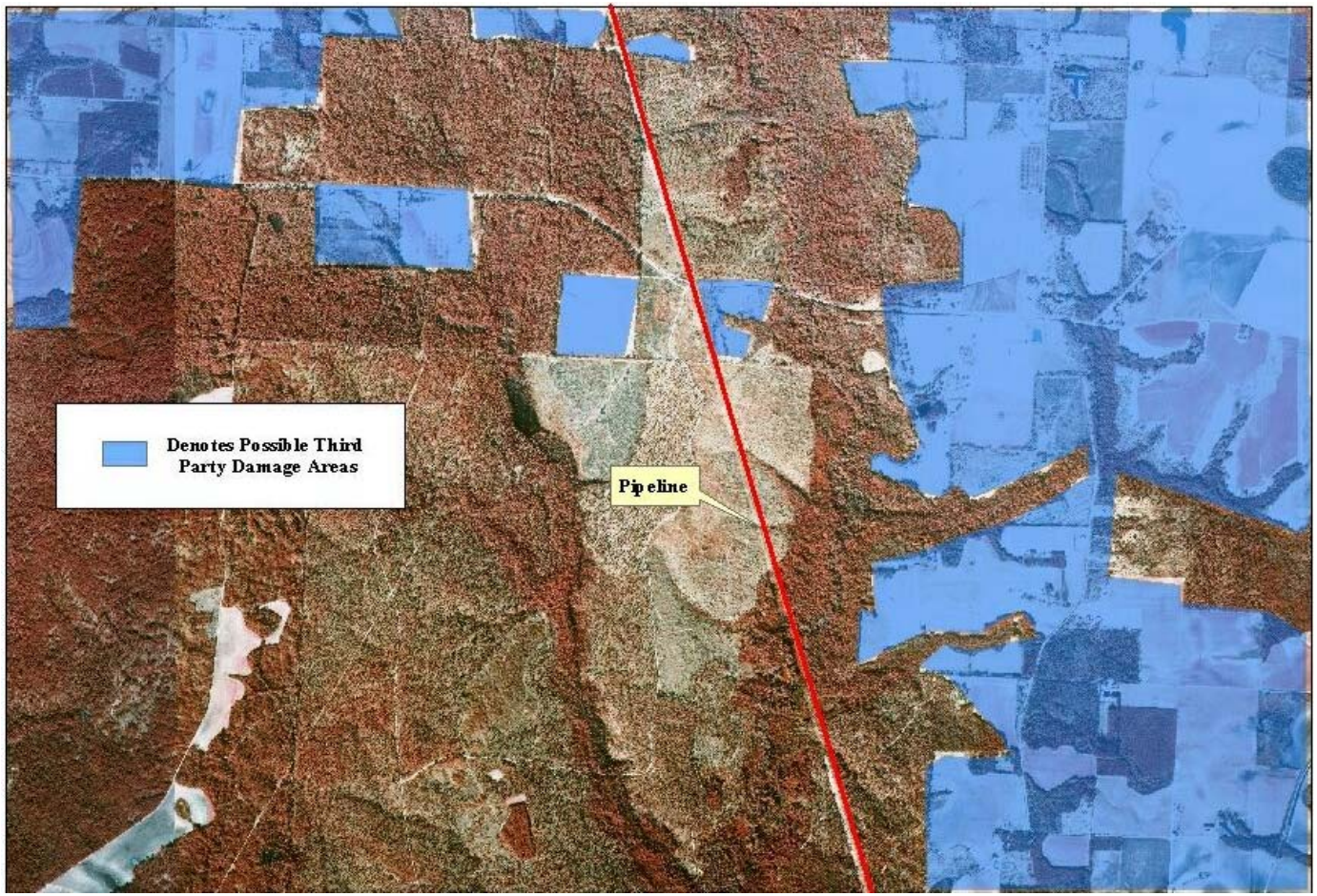
Pipelines traverse the U.S. through many different climates and terrain. Potential problem areas can be displayed in relation to the pipeline route.



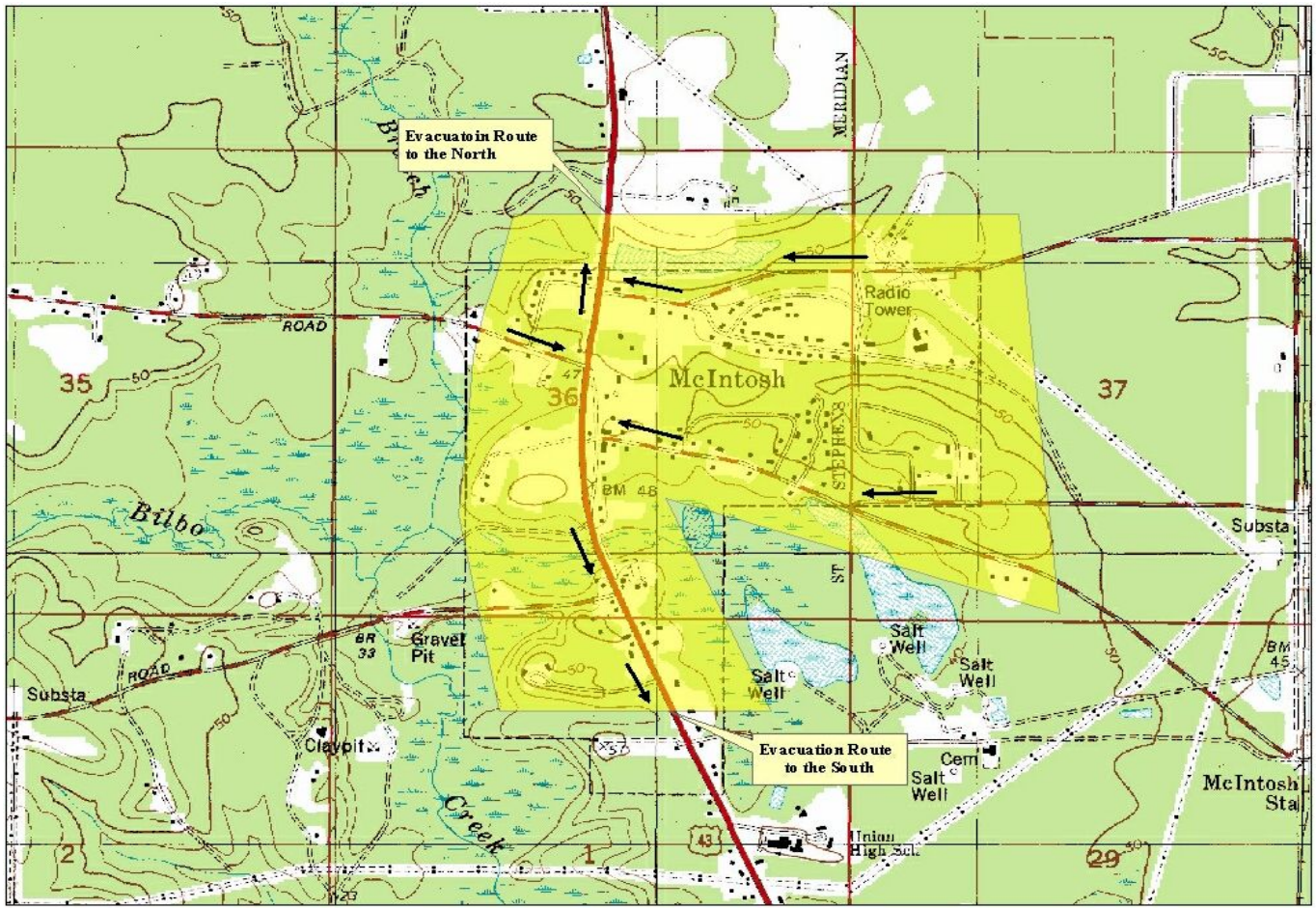
Navigable waterways with commercial traffic that can pose a threat to pipeline integrity can be identified.



Major roads, highways and interstates frequently cross pipeline routes.



GIS can be useful in recognizing areas susceptible to third party damage from farming and construction activities.



Geographic depiction of populated areas can be useful in determining possible evacuation routes.

Once problem areas have been identified, solutions for the problems can be studied through visual analysis.

Using GIS in Spill Response

Responding to a spill along a pipeline is a difficult task. GIS can be useful in visualizing and identifying:

- Boom deployment locations
- River/Stream access locations
- Staging Areas
- Local emergency responder locations
- In-house response equipment locations

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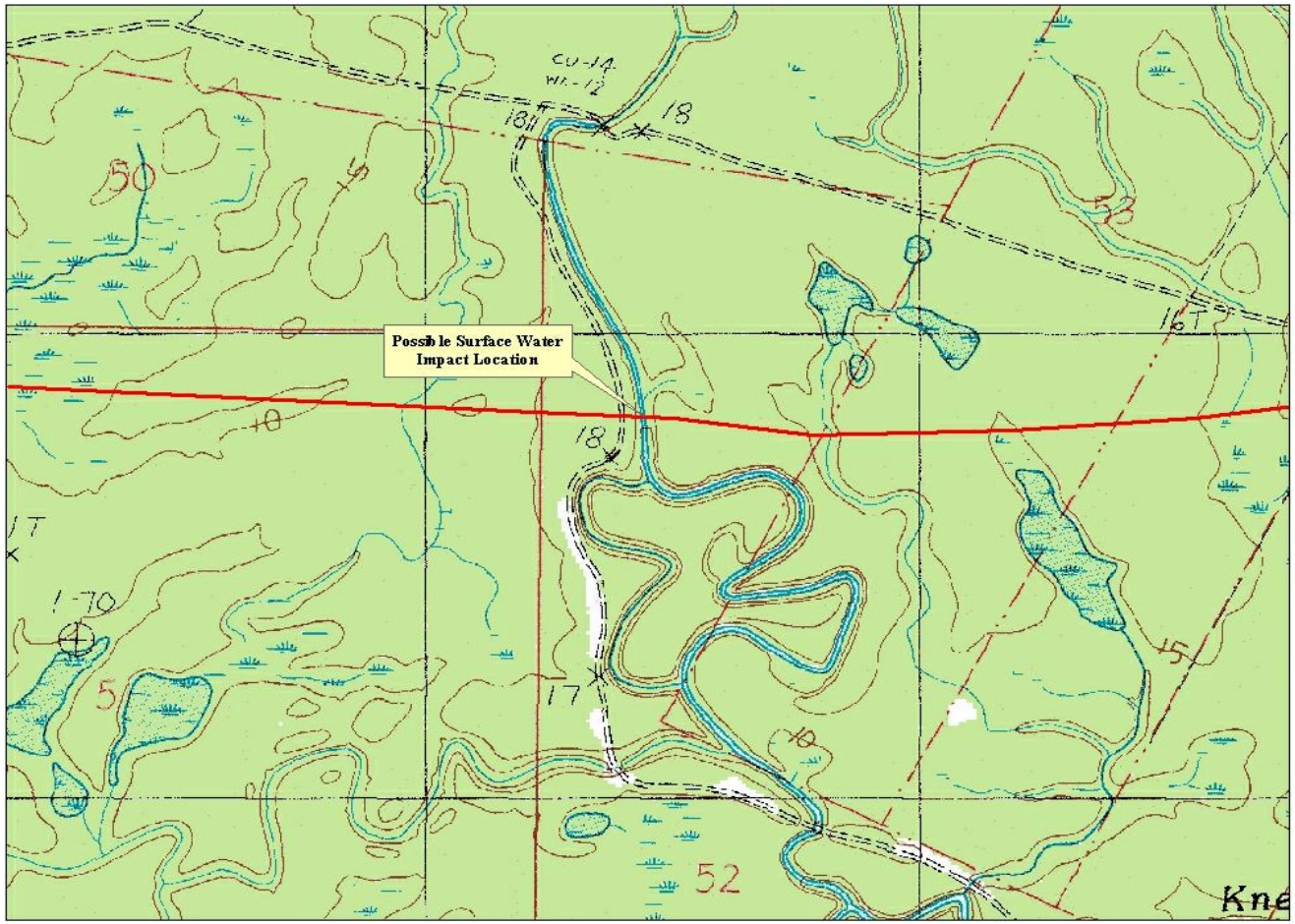
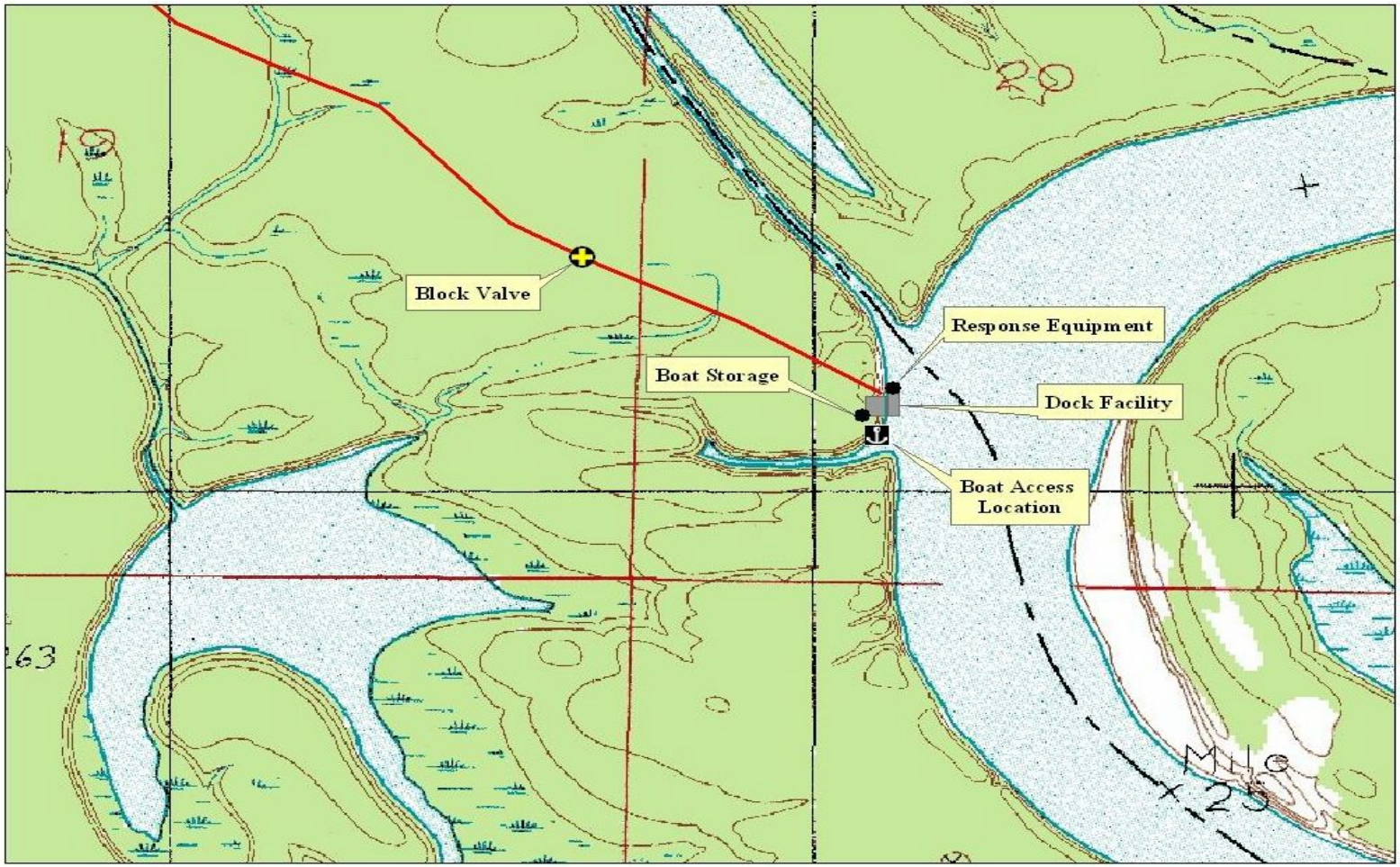
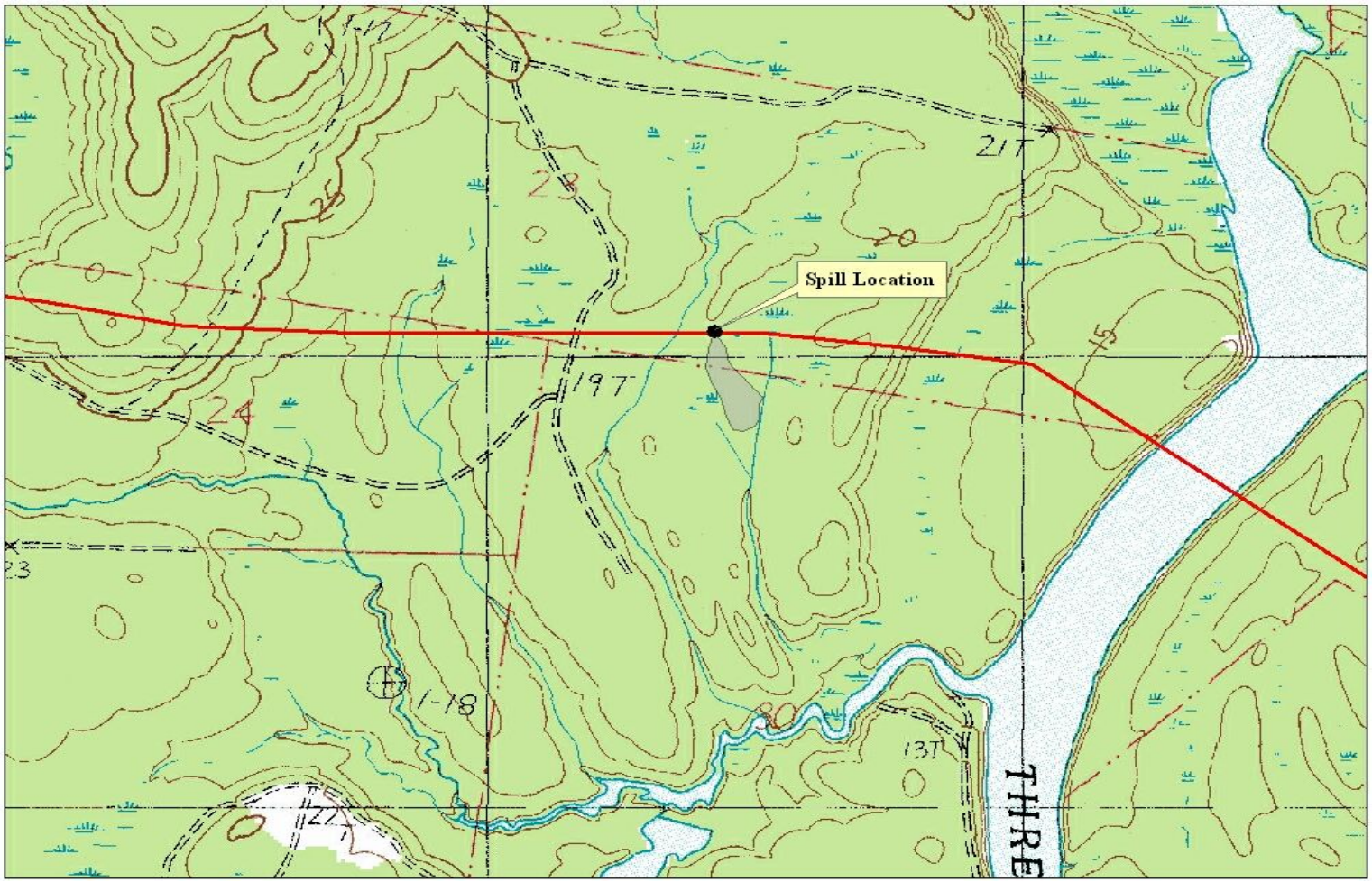


GIS is useful in identifying areas where a spill could impact surface water.



Locations of block valves, safety equipment or other emergency response resources can easily be identified on area maps.



A simulated spill location can be selected for effective spill response training.

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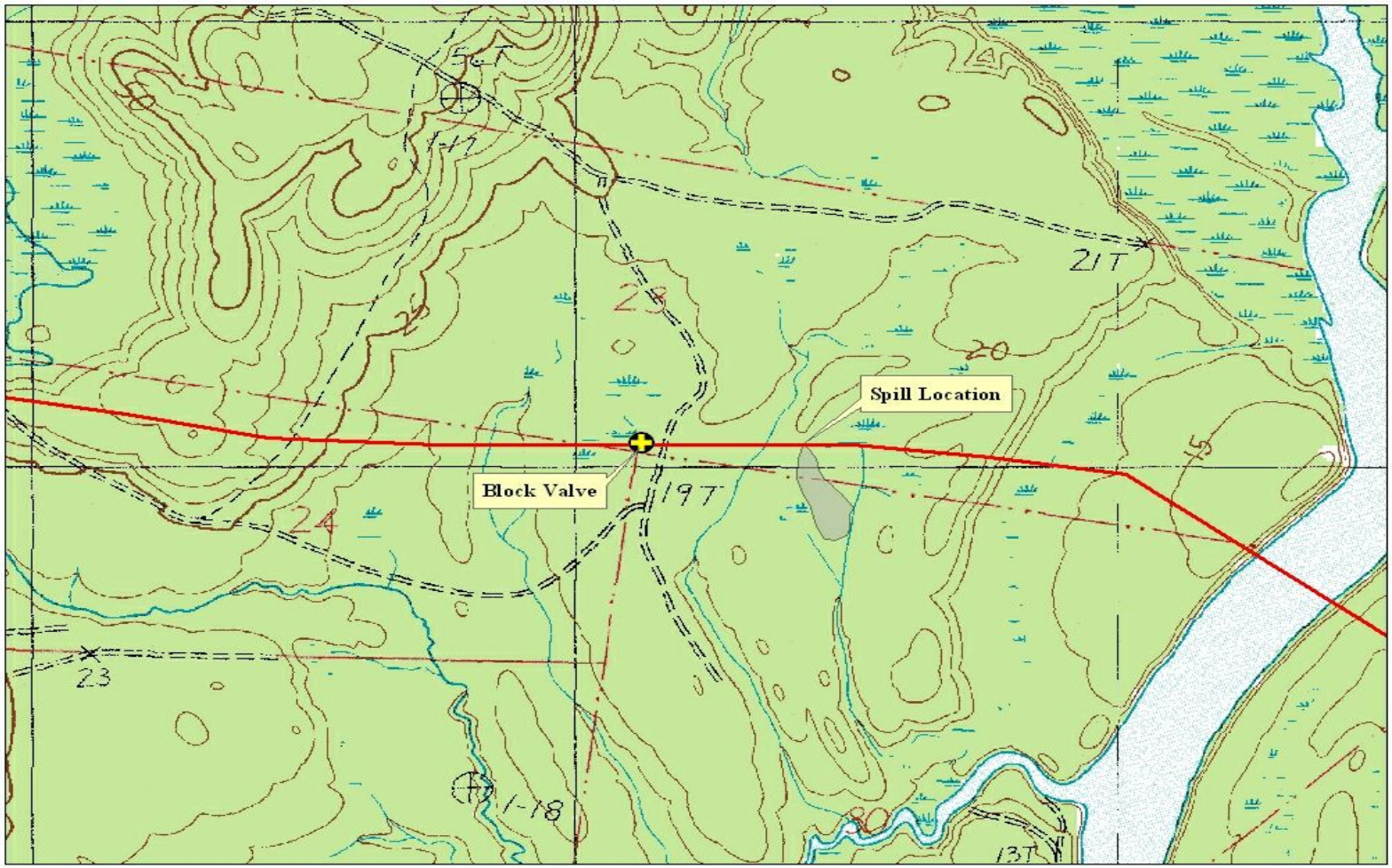
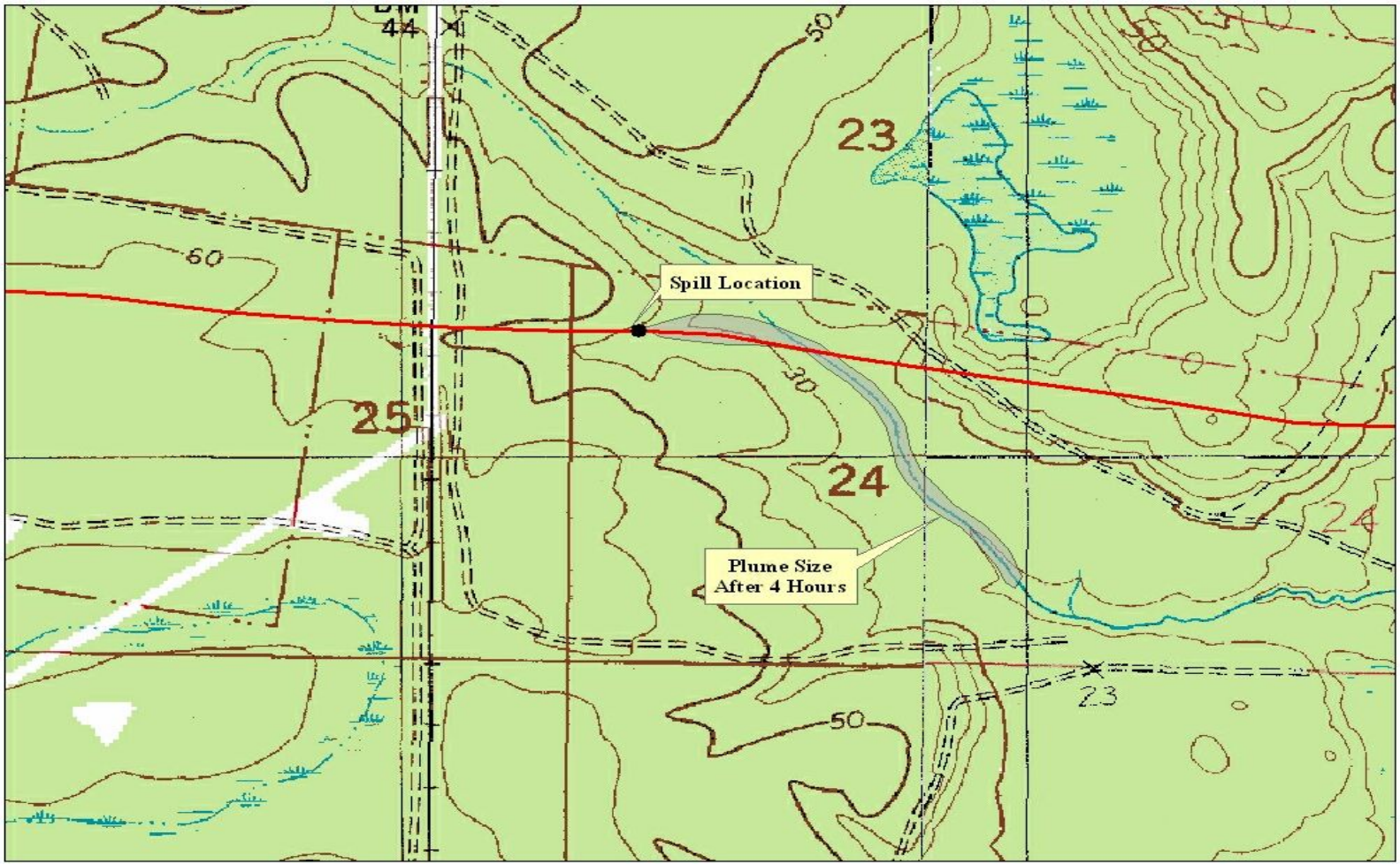
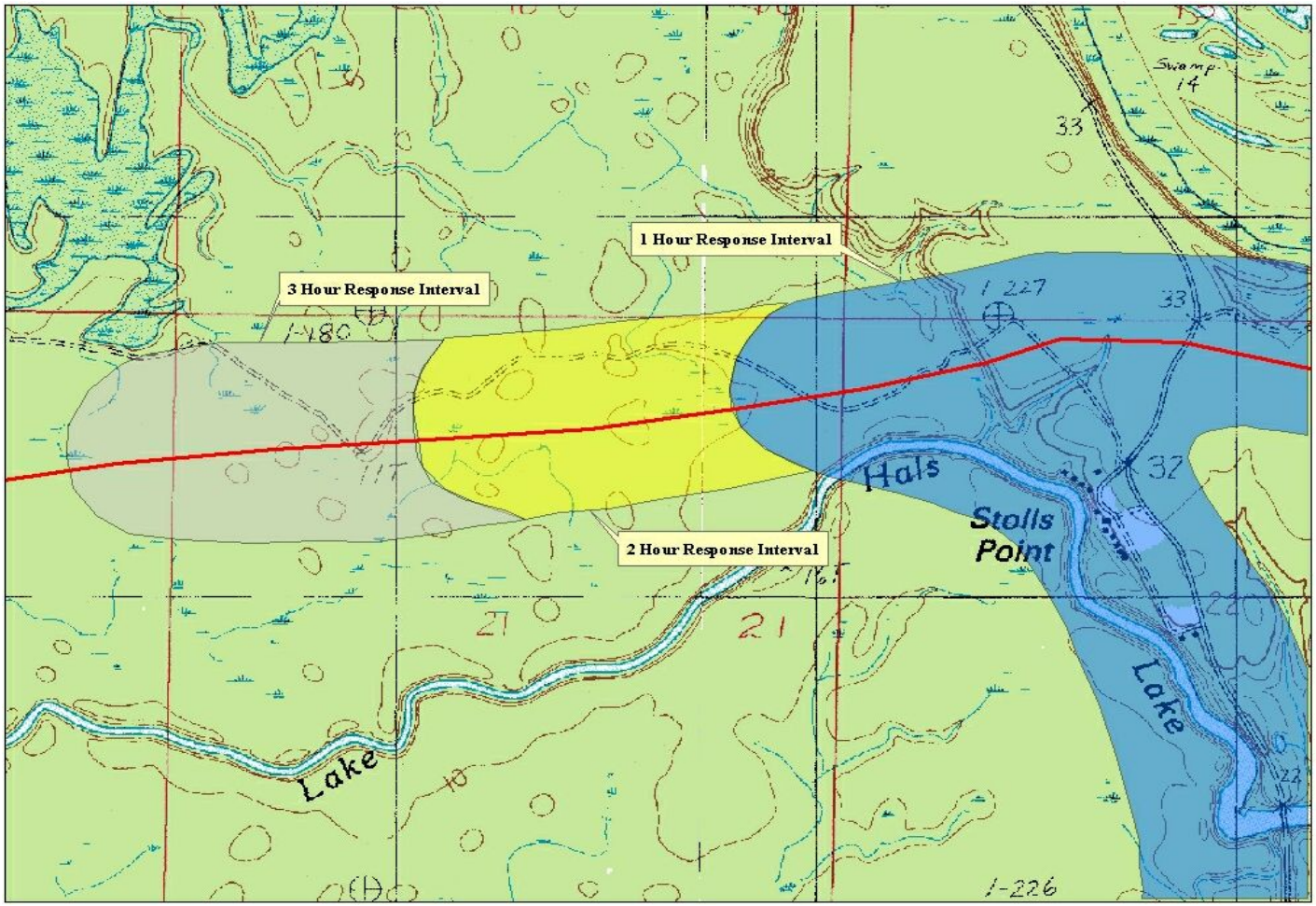


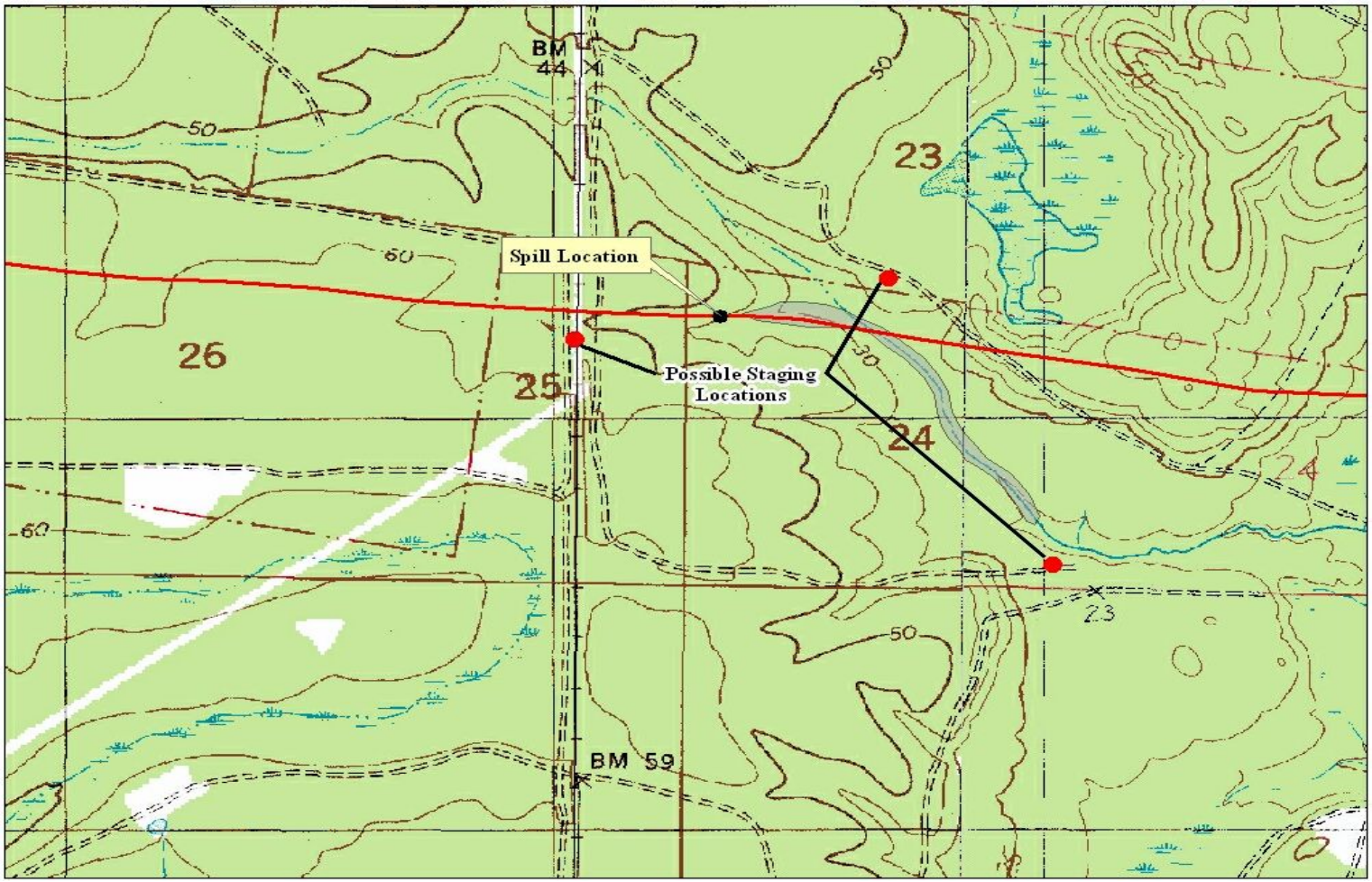
GIS can assist in locating block valves to contain any further loss of product.



GIS can be useful in predicting possible oil spill pathways and identifying effective access locations.



Response times for emergency response personnel can be easily mapped.



GIS maps can be used to determine the most efficient location for equipment staging areas.

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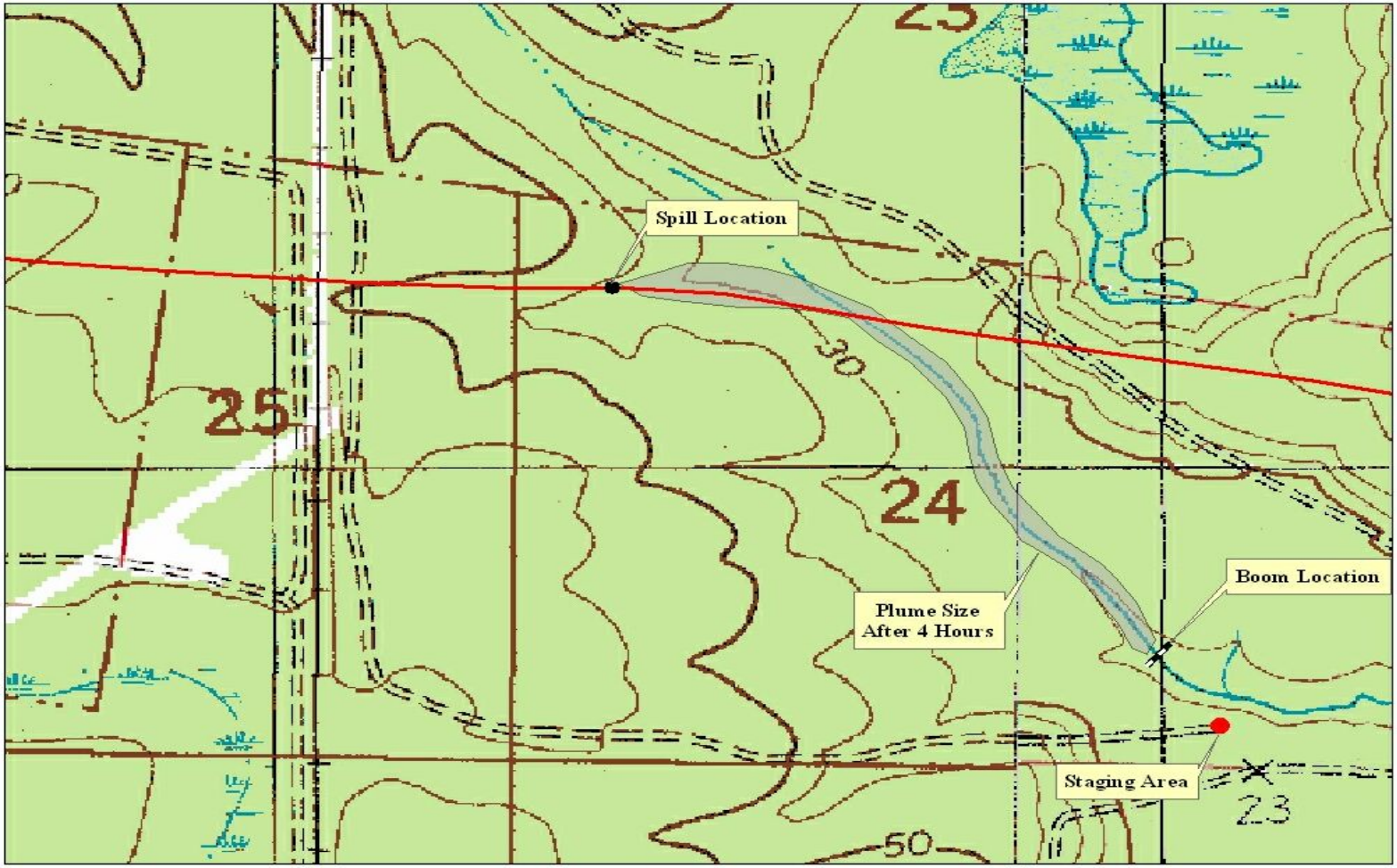

Once the spill travel distance is determined for various time intervals, boom deployment locations can be identified and appropriately positioned.

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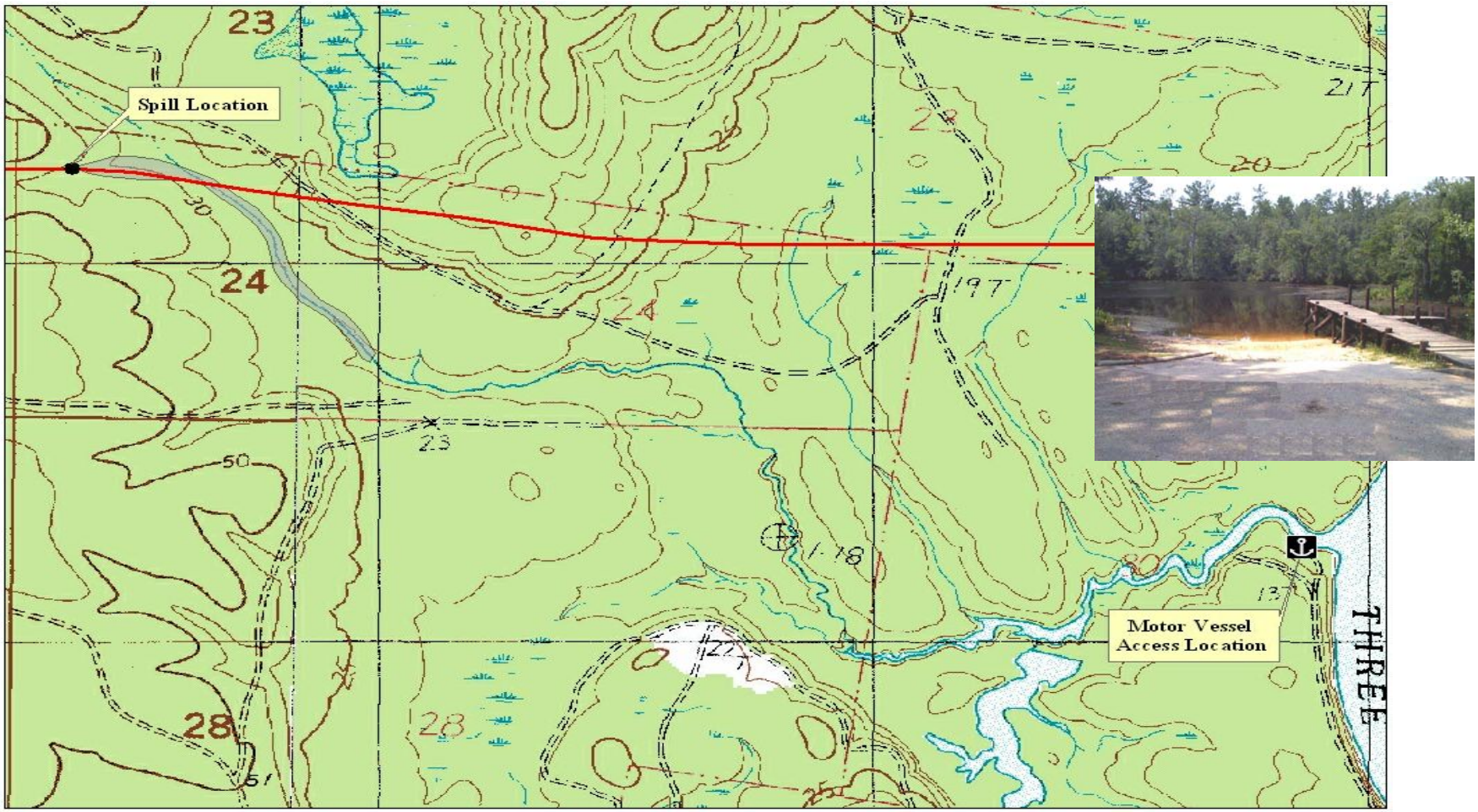
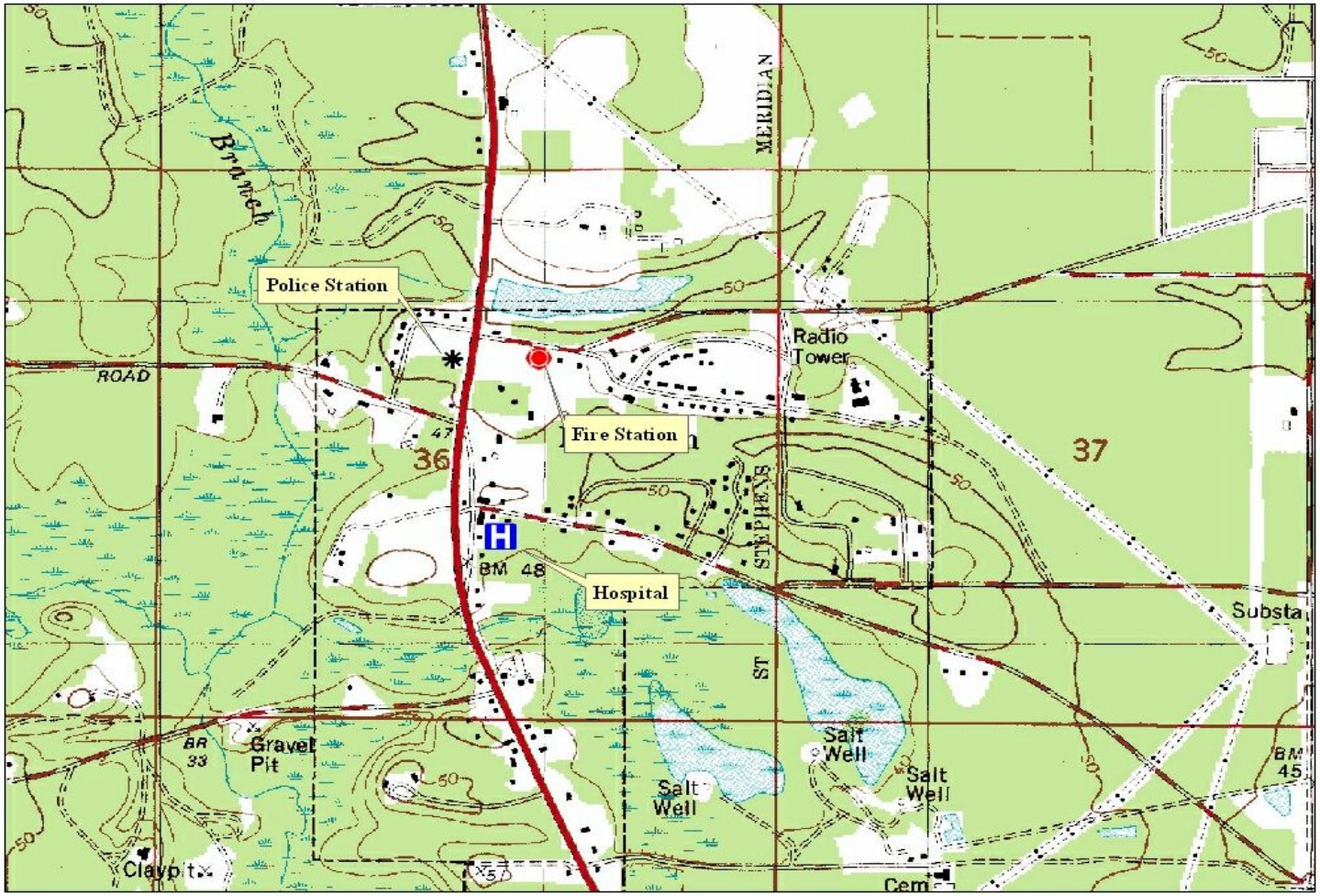


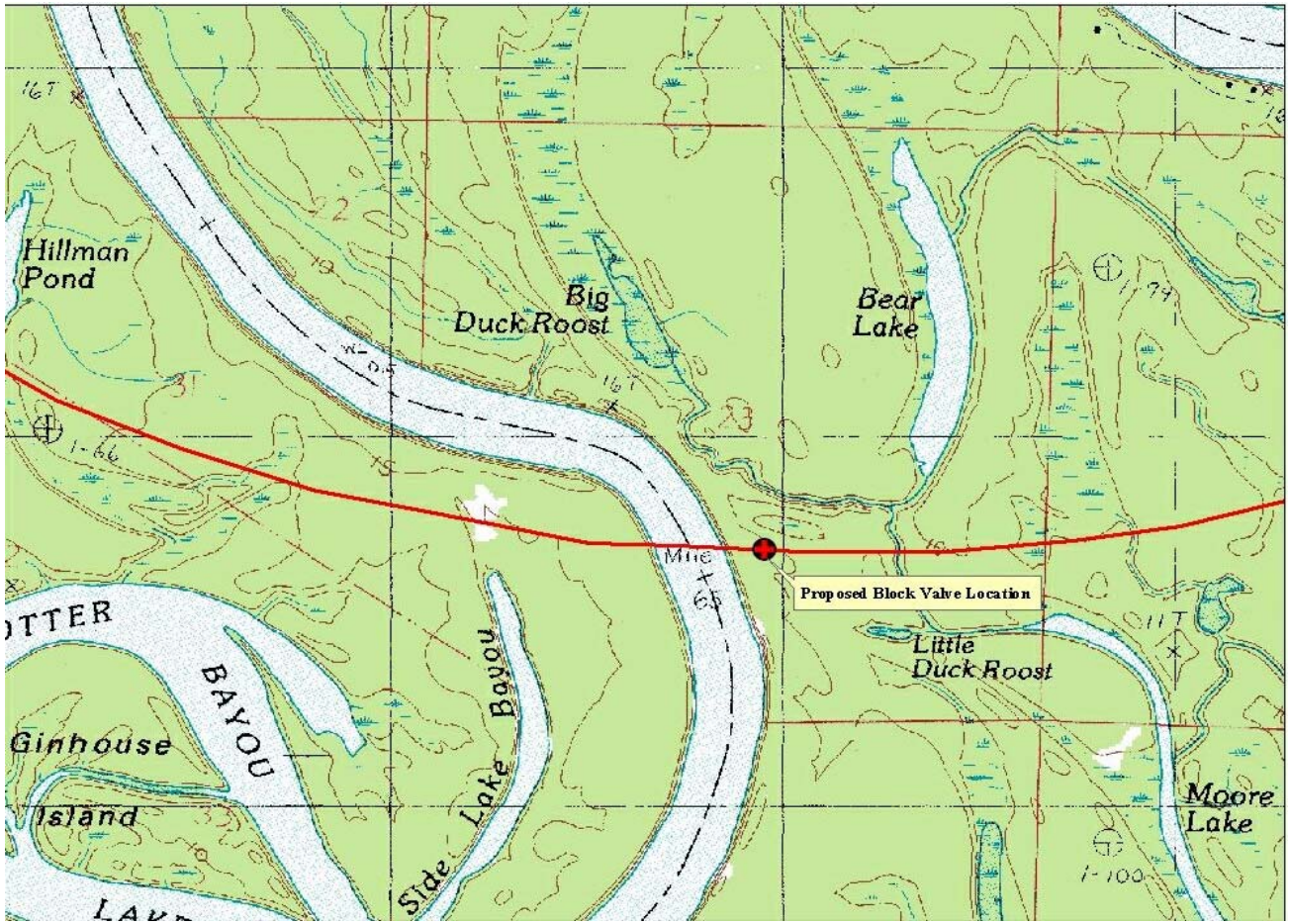
Access points for motor vessels used in boom deployment can be selected.



Local emergency responders (e.g., fire, police, medical, etc.) can be mapped for effective planning.

Local logistical support resources (heavy equipment dealers, food service, etc.) can be added to the map for evaluation.

Using GIS for Infrastructure Management



A pipeline mapped in GIS can reveal infrastructure needs or deficiencies.

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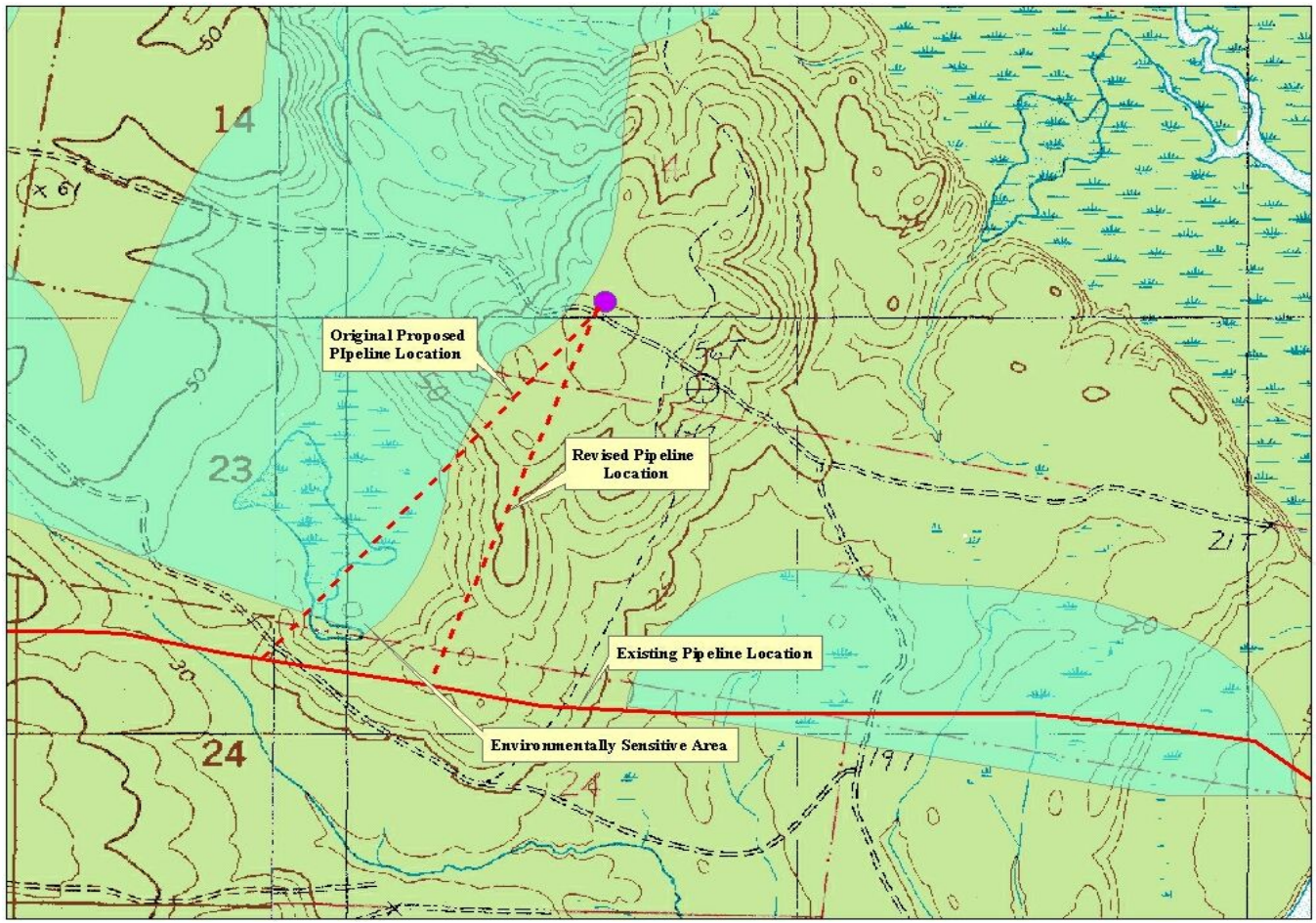
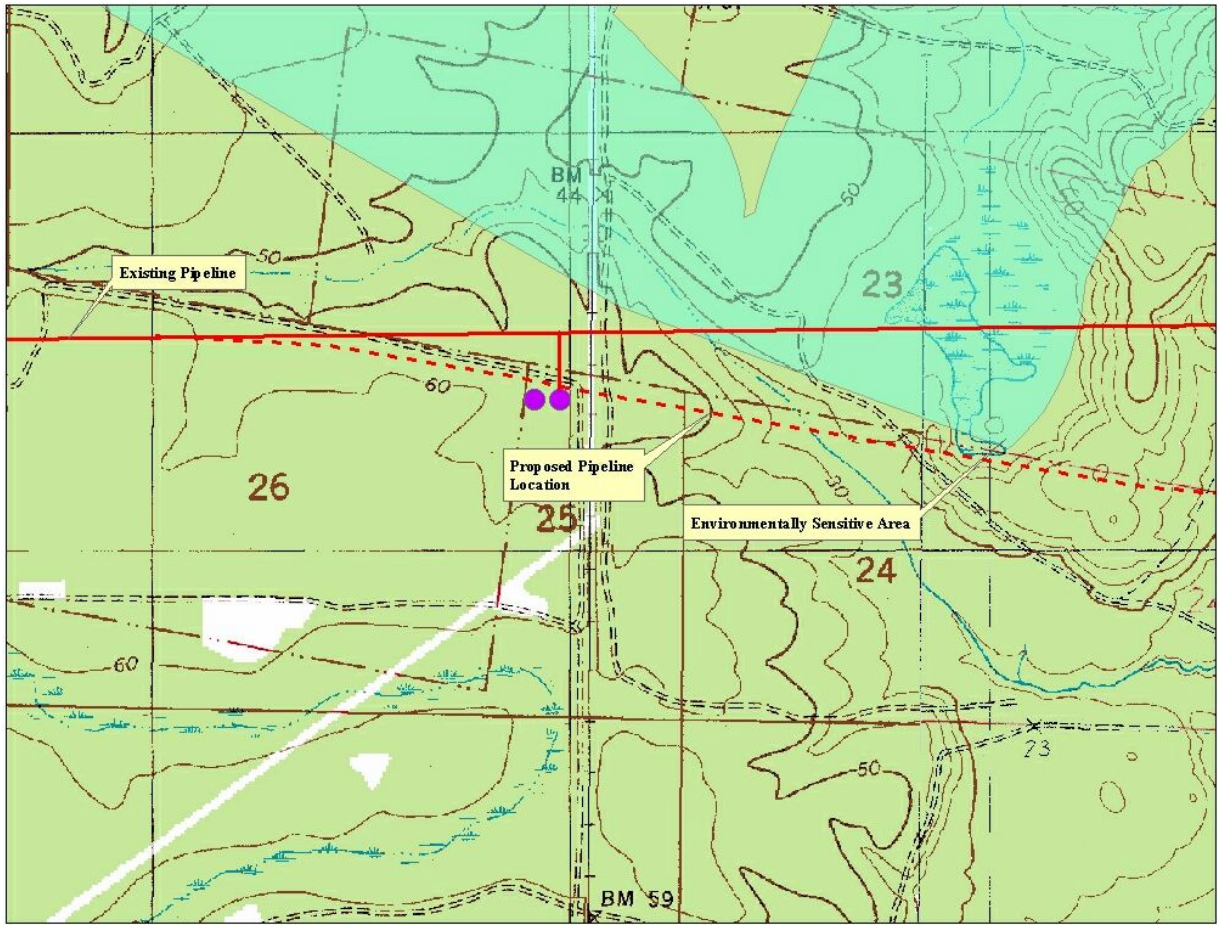
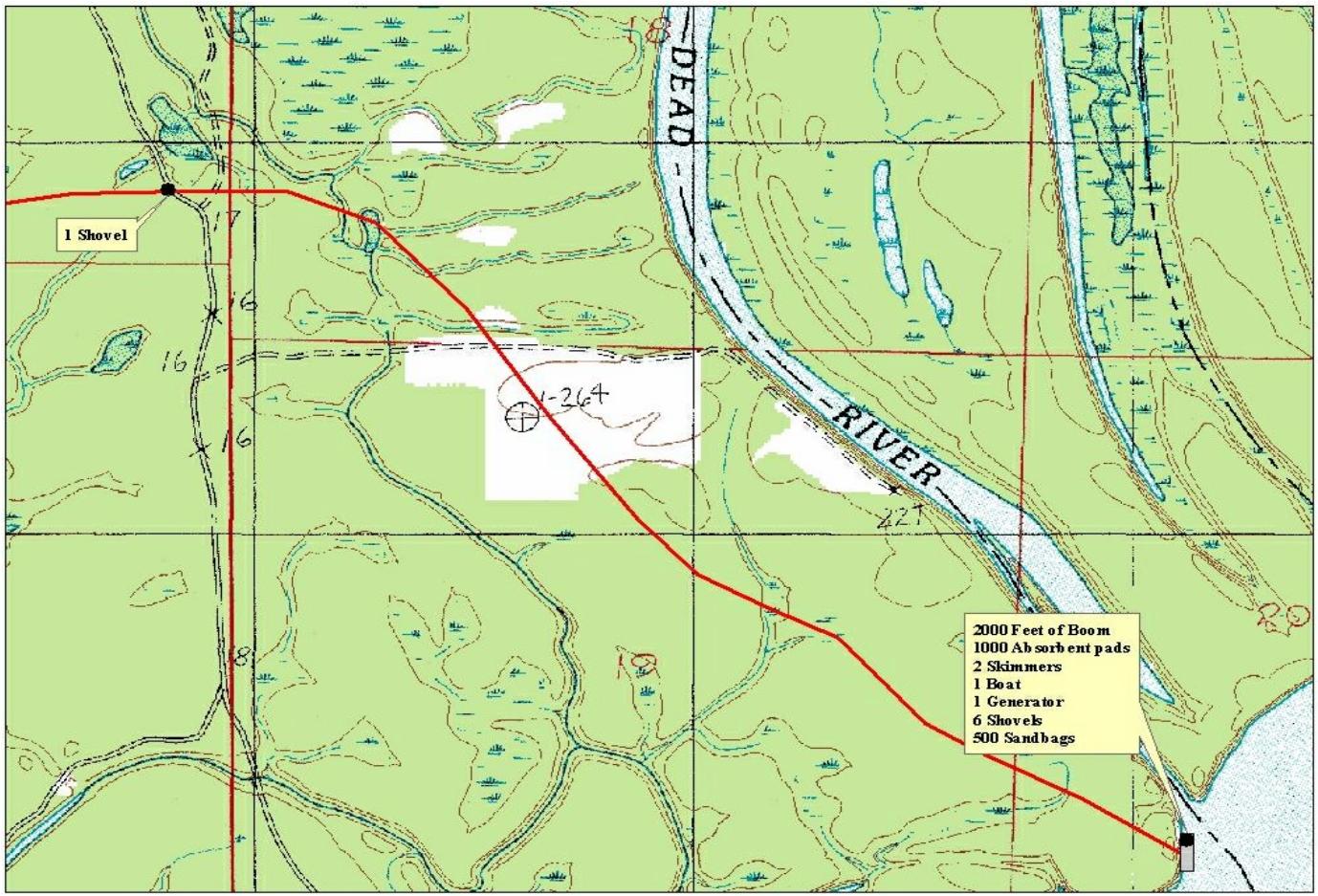


GIS can be utilized to plan future pipelines or pipeline segments.



Areas in the pipeline system that are inefficient can be easily identified.



More efficient resource allocation can be easily identified using GIS.

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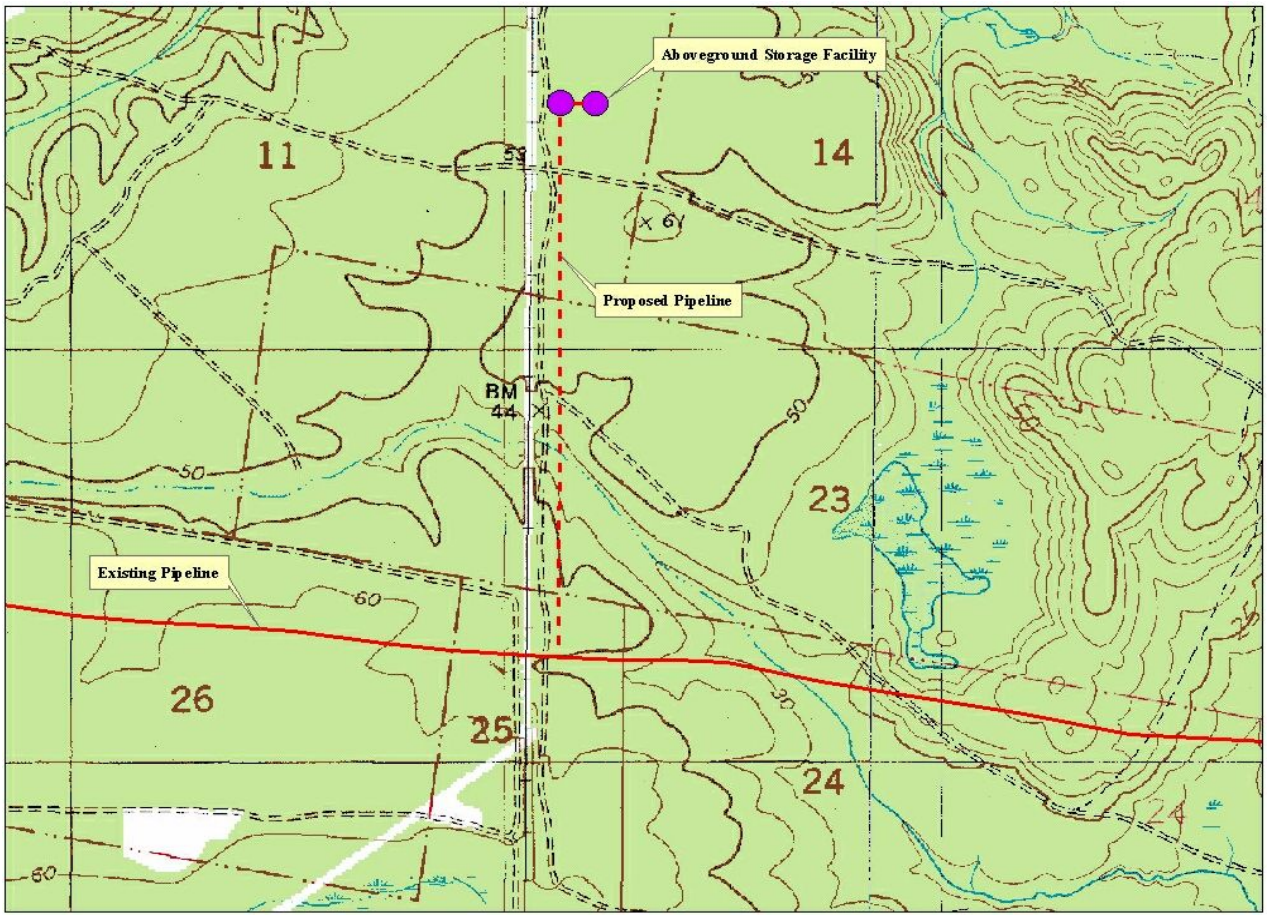
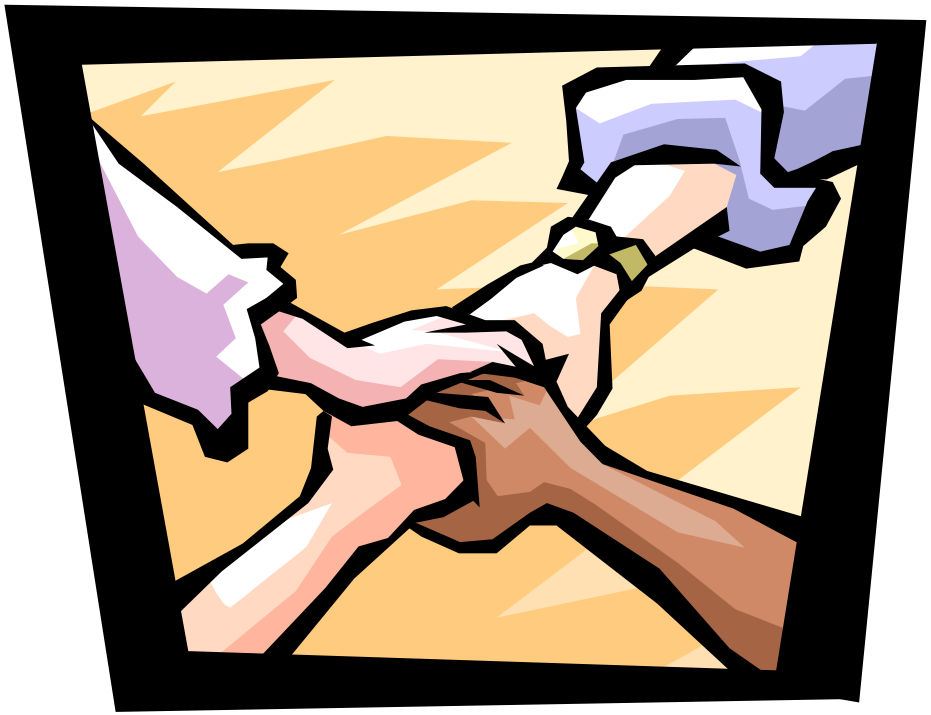


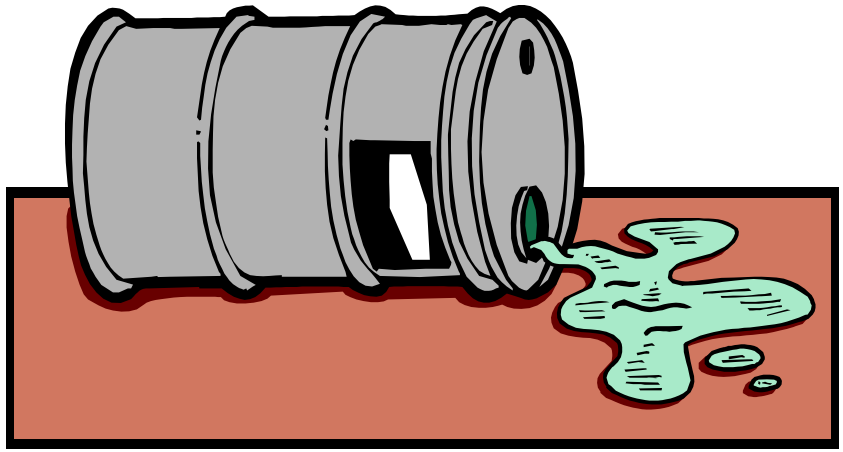
Areas can be identified where additional resources such as pipeline segments, could be utilized to save transportation costs.

Why use GIS in Pipeline Management and Spill Response?

GIS improves the management of limited resources through an easily understood map format.



GIS can be used as a tool to share map information for better business decision-making throughout the organization.



Spill scenarios can be mapped and analyzed to plan possible emergency response actions.

GIS can be used to catalog maintenance activities allowing the owner/operator to properly allocate needed upgrades and repairs.

Questions and Comments ?

Our Other Services:

- **Permits**:
  - Air (Operator, Title V)
  - Stormwater NPDES
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- **Assessments**:
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  - Underground Storage Tank
  - Environmental Impact
  - Landfill Design/Monitoring
- **Plans**:
  - Stormwater (SWP3, BMP, PAP)
  - Facility, Vessel and Pipeline OPA 90
  - Recycling and Waste Minimization
  - Pipeline Integrity Management
  - Pipeline Operator Qualification
  - Pipeline Operations and Maintenance
  - Pipeline Risk Assessment Model
  - Marine Dock Operations
  - Facility SPCC

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