



**Using a Geographic Information System (GIS)
as a Tool in Identifying, Documenting, and
Investigating Abandoned Underground Mines.**

Presented to
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Abandoned Underground Mines
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- ◆ Roch Player
- ◆ Iowa State University Graduate
- ◆ Married to Sherene
- ◆ Daughters Laura and Clarissa



Preliminary Site Investigations

◆ Purpose

- **Develop Preliminary Conceptual Site Model**
- **Place project into context**
- **Identify potential barriers to project completion**



Preliminary Conceptual Site Model

- ◆ **Working model from which site activities are planned and conducted**
- ◆ **Refined as more information collected**



Project Placed in Context

- ◆ No project exists in a vacuum



Identify Potential Barriers to Project Completion

- ◆ Potential Barriers
 - Community sensitivities
 - Historic considerations
 - Geologic hazards
 - Environmental hazards
 - Man-made hazards, e.g. abandoned mines
- ◆ Identify prior to major commitment and expenditure of resources



GIS as a tool in investigations at abandoned underground mines sites



What is GIS?

A fundamental and universally applicable set of value-added tools for capturing, transforming, managing, analyzing, and presenting information that are geographically referenced.

U.S. Tim, 1995



GIS Program Utilized

- ◆ ArcView GIS 3.2a (ESRI, Redlands, CA)
- ◆ Used “out of box” - No new interface created



GIS in Site investigations

- ◆ Data Integration
- ◆ Data Visualization and Analysis
- ◆ Site Activities (Planning and Results)
- ◆ Data Presentation

Continual refinement of site model



U.S. Highways 63/34 Ottumwa Bypass

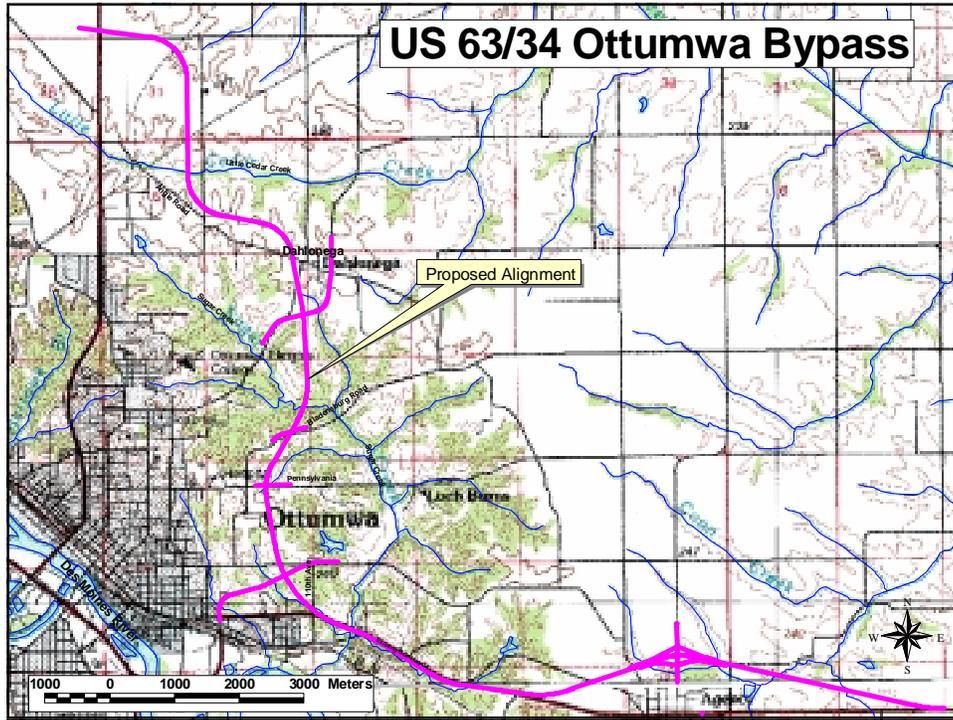
Illustration of GIS use in site investigations



The Ottumwa Bypass

- ◆ ~25 km of new 4-lane divided highway
- ◆ ~8 km of side road reconstruction
- ◆ 4.5 interchanges, 16 bridges
- ◆ Historic coal mining area





Data Integration



Existing Data Sets

- ◆ Iowa Natural Resources Geographic Information System (NRGIS)
- ◆ Illinois Natural Resources Geospatial Data Clearing House
- ◆ USDA Soil Surveys
- ◆ USGS data (DEMs, DRGs, DOQs)
- ◆ <http://www.gisdatadepot.com/catalog/>



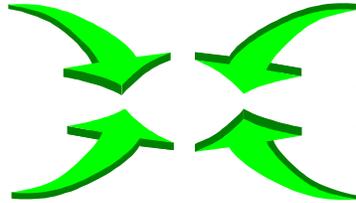
Project Specific Data Sets

- ◆ DTM
- ◆ Aerial photos
- ◆ CADD
- ◆ Survey points
- ◆ Site investigation results
- ◆ Soil borings



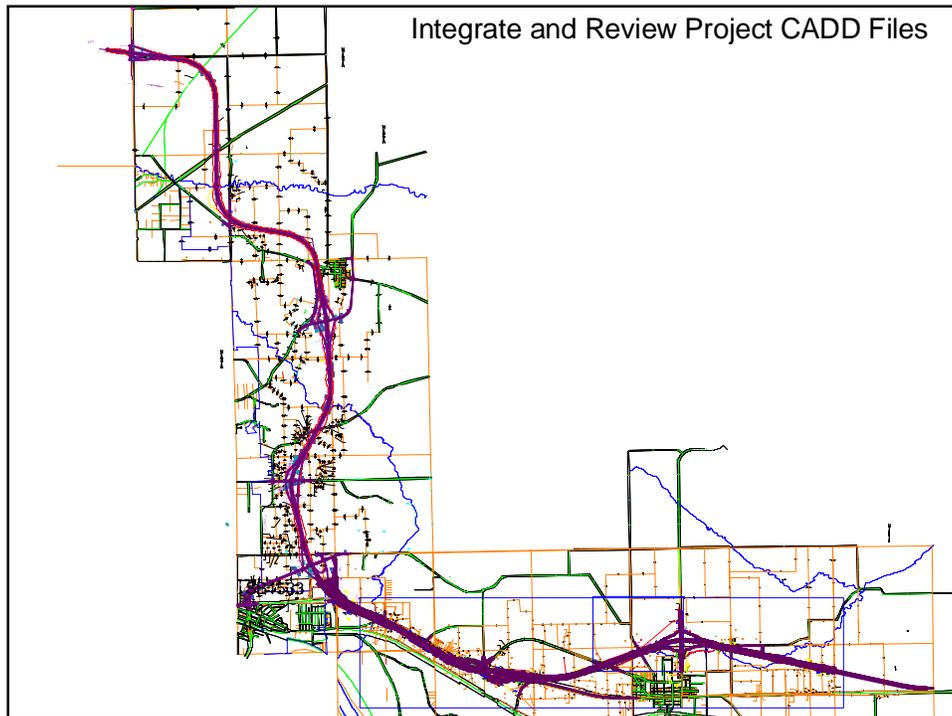
Data Integration

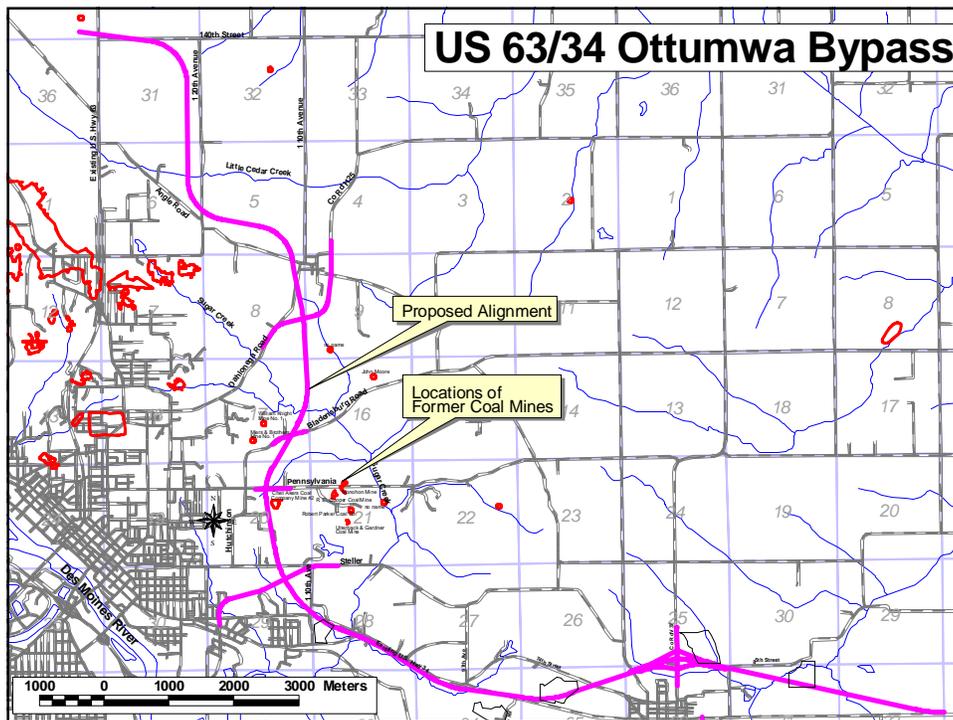
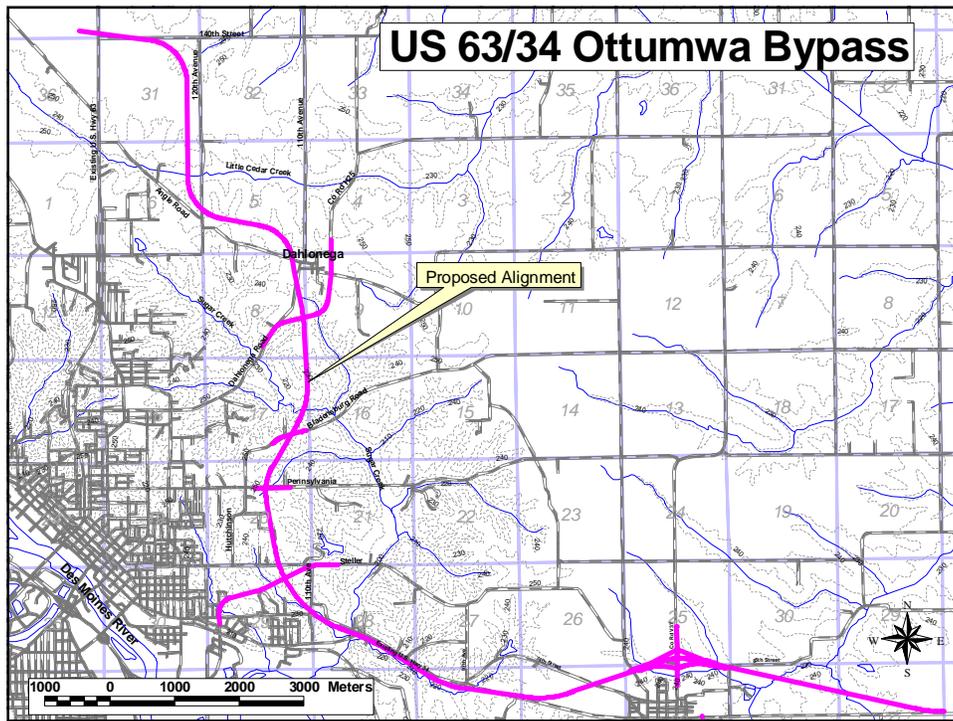
- ◆ Existing data sets



Initial Site
Model
(ArcView Project)

- ◆ Project specific data sets



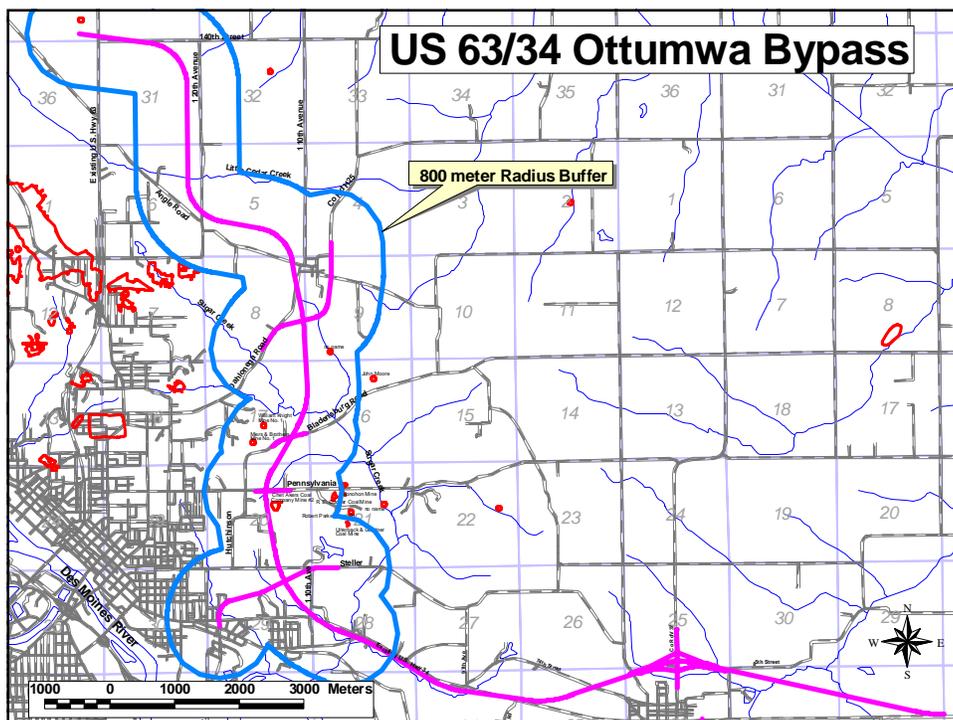
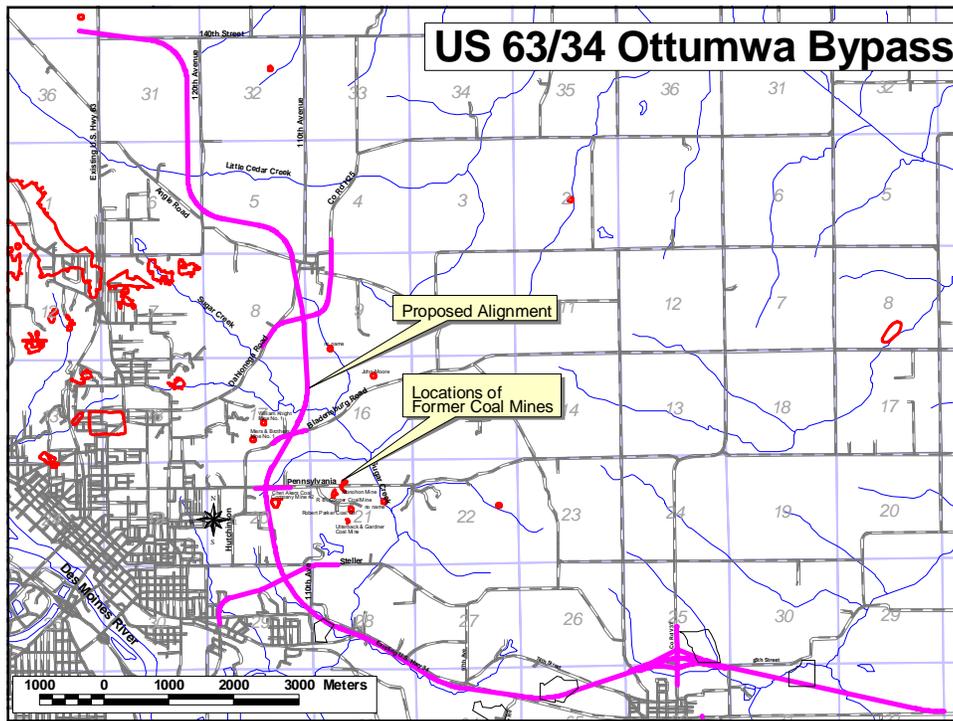


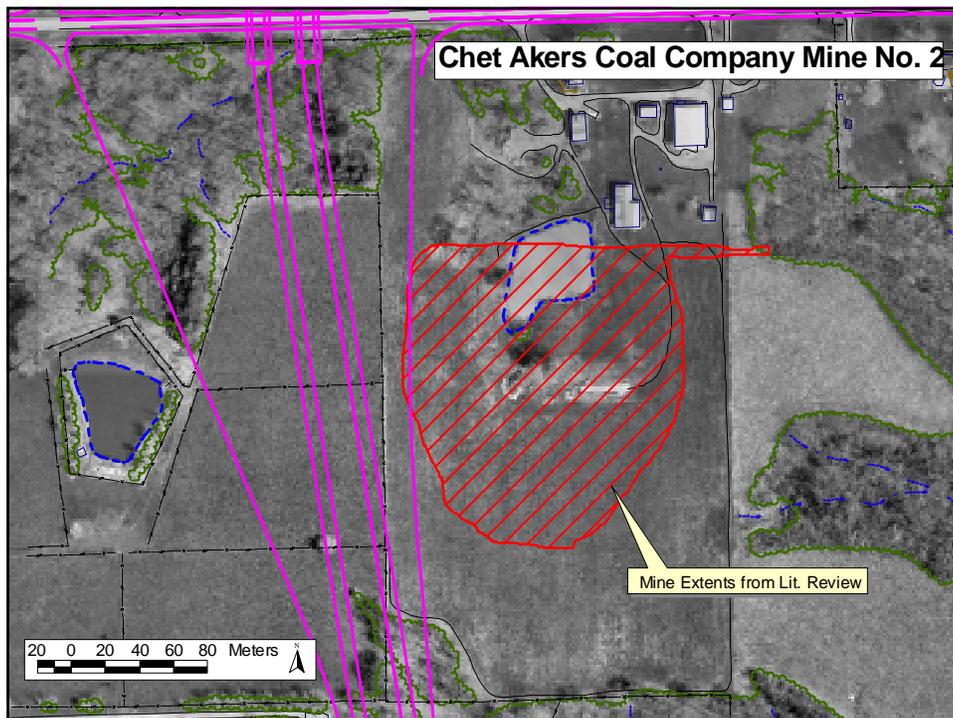
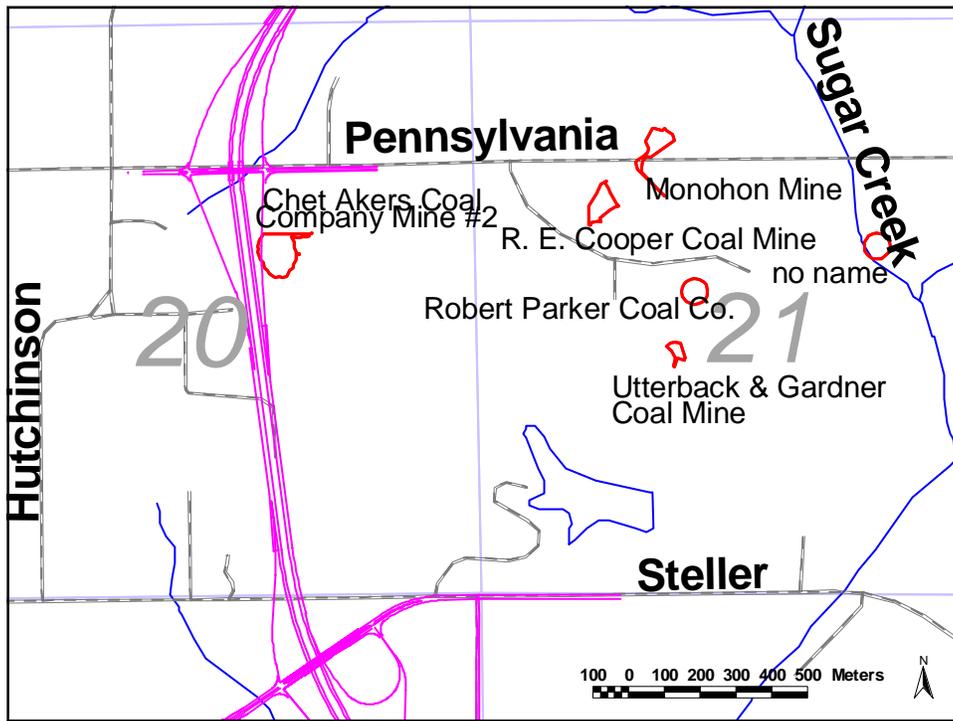
Data Visualization and Analysis



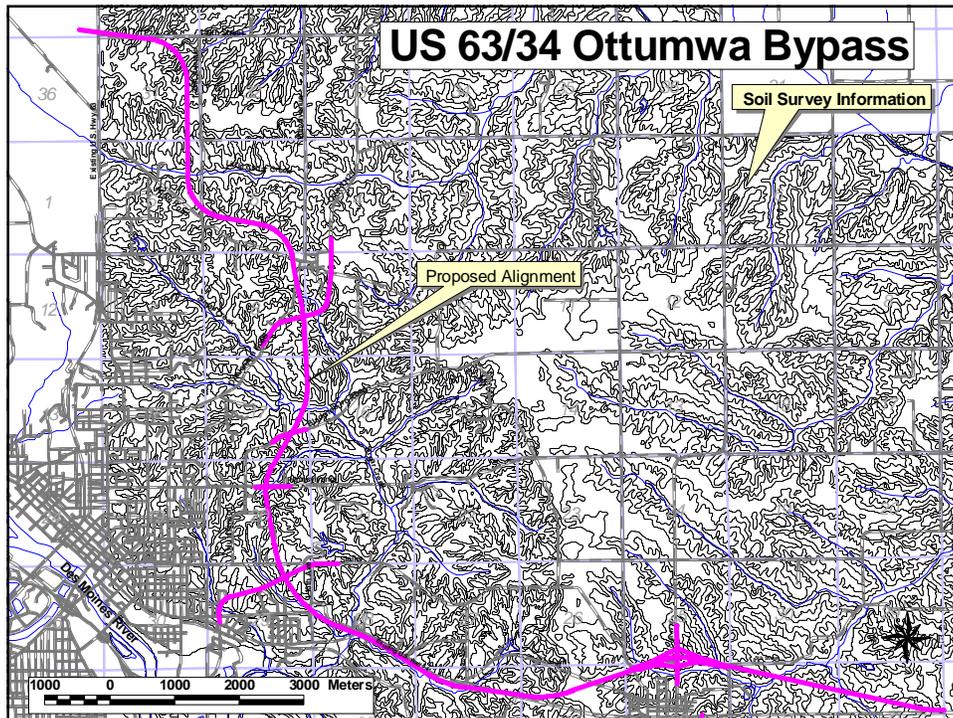
Coal Mines

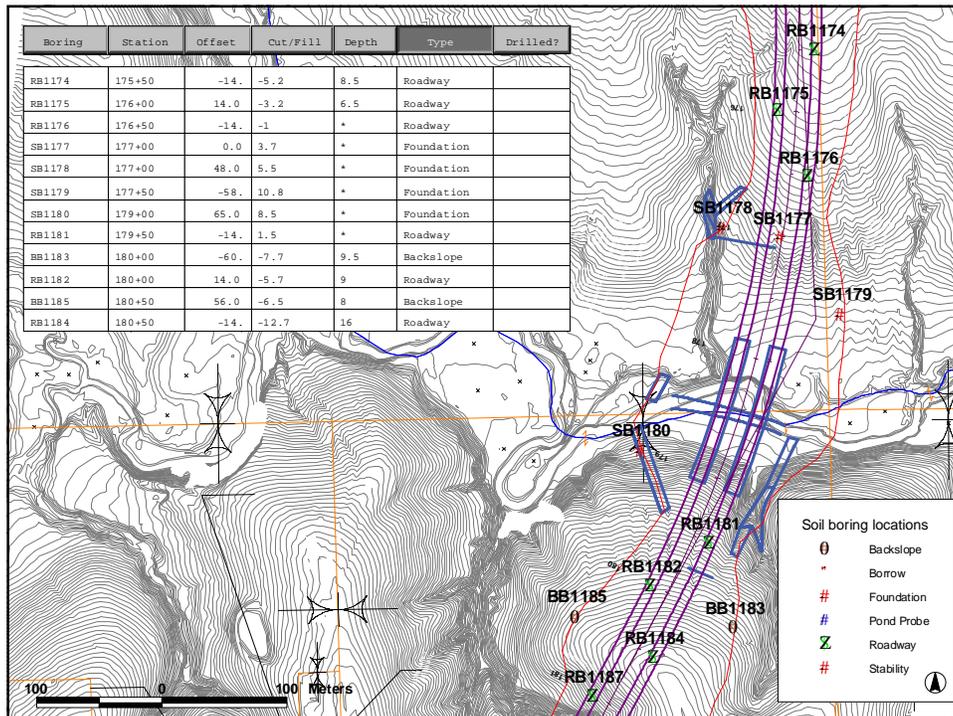
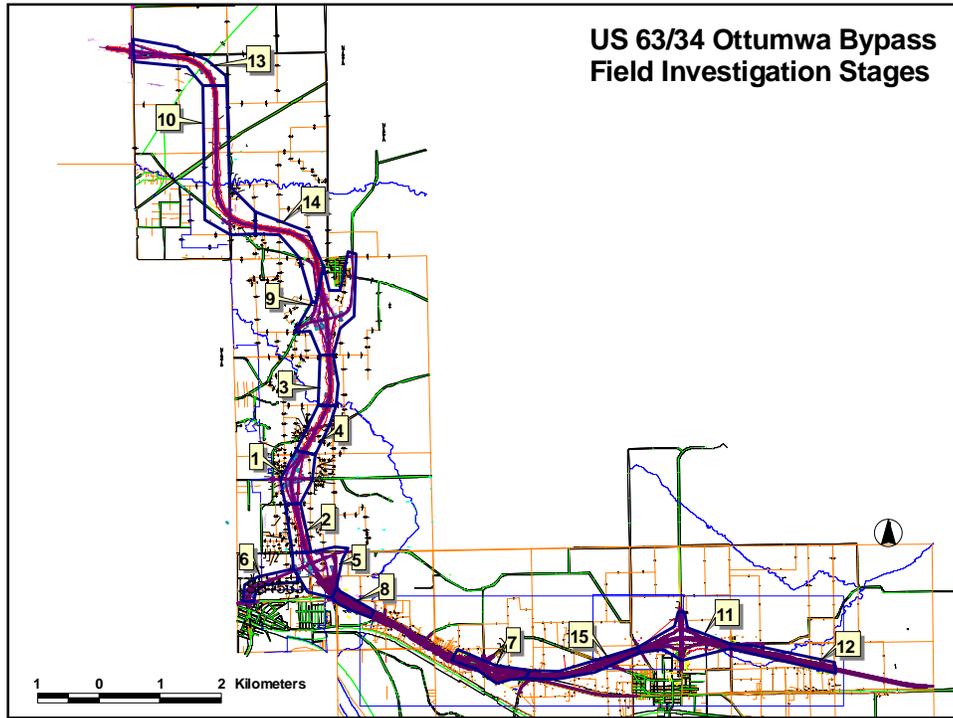






Site Activities (Planning and Results)





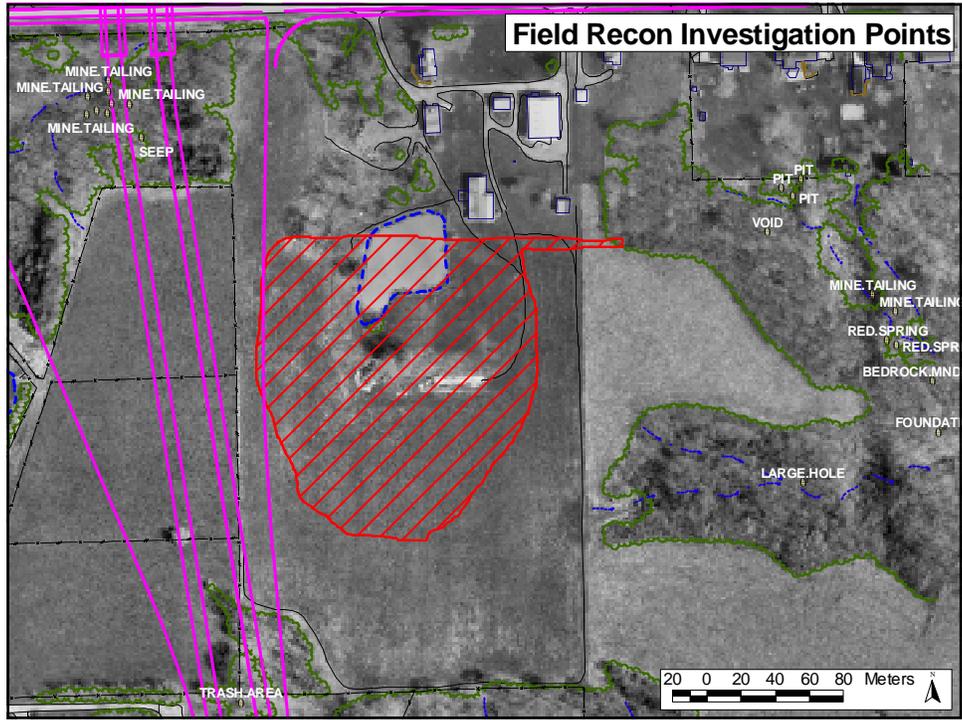
Coal Mine Site Activities

- ◆ **Field reconnaissance visit**
- ◆ **Geophysical investigation**
- ◆ **Targeted soil borings**



Field Reconnaissance Visit

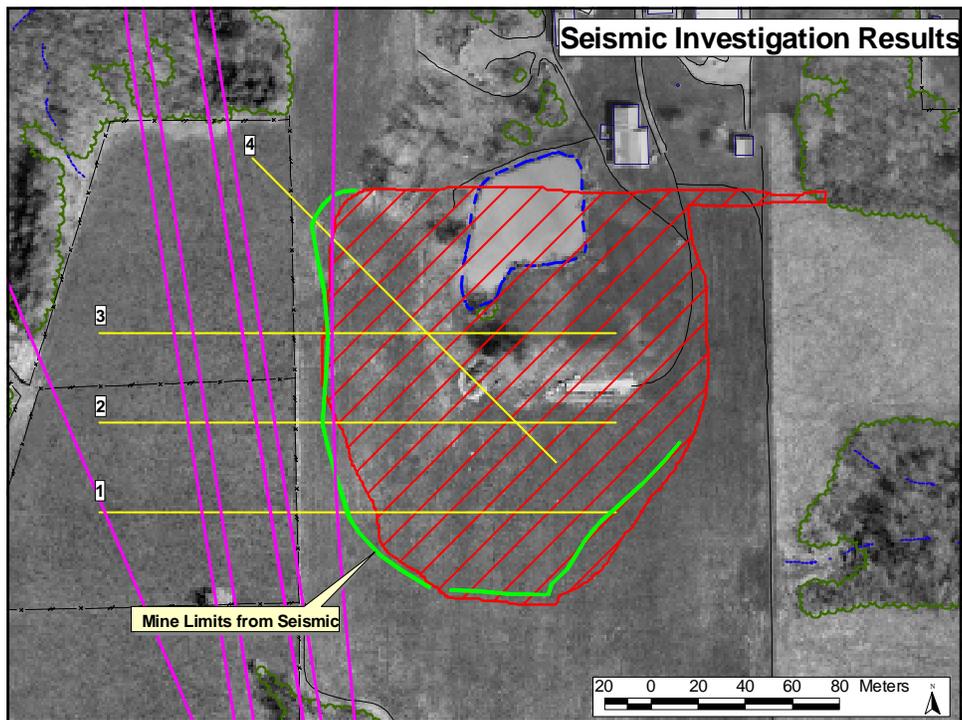
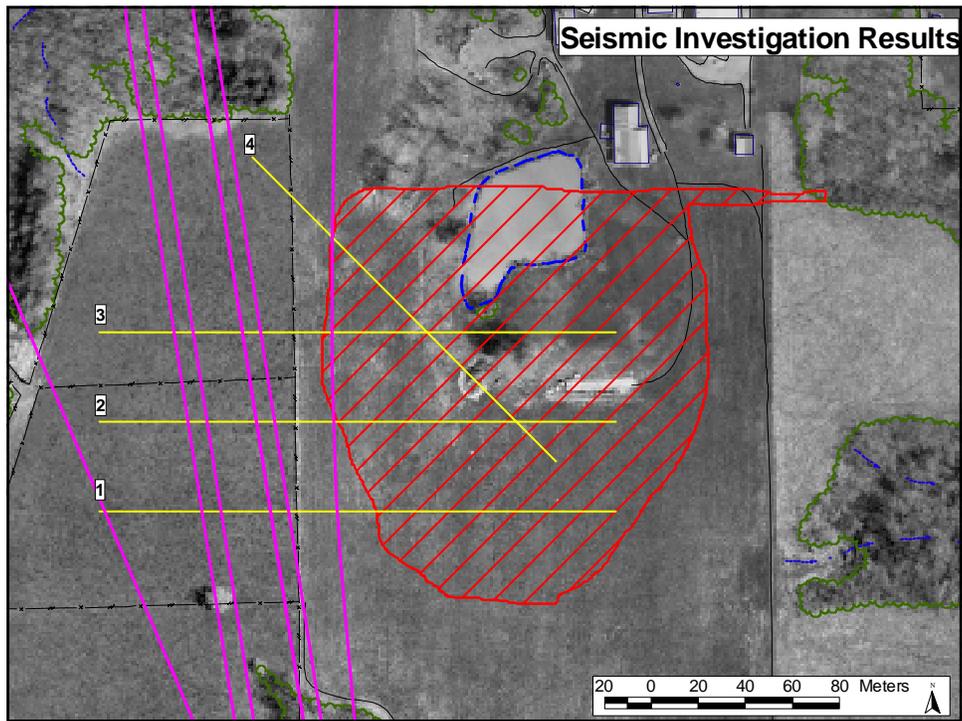




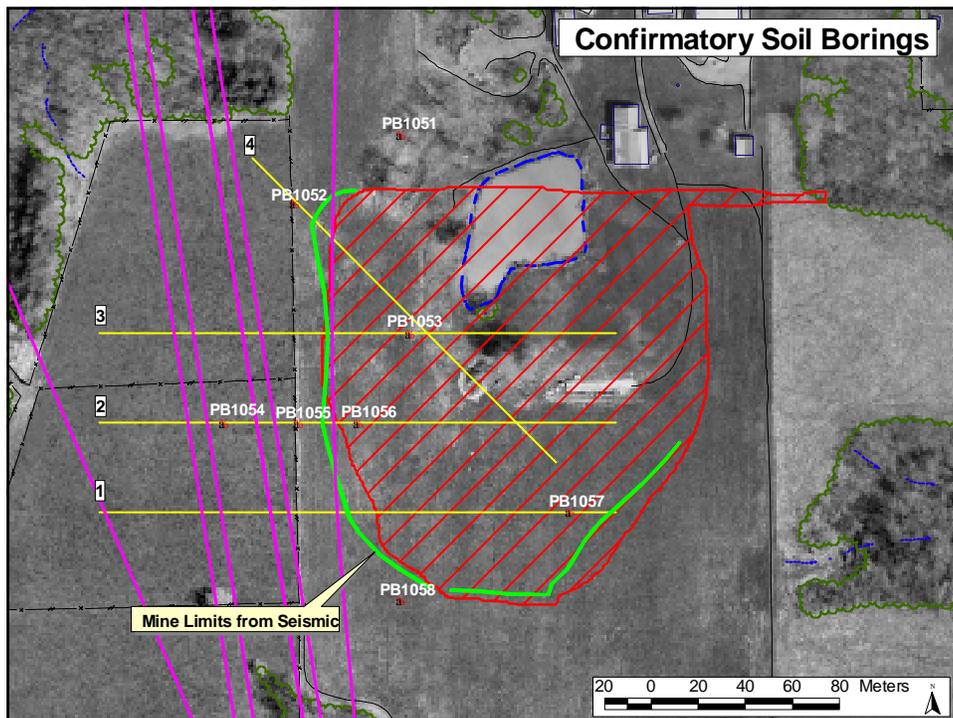


Geophysical Investigation





Targeted Soil Borings



Results of using GIS

- ◆ **Potential mine location identified**
- ◆ **Plans for further investigation developed**
- ◆ **Field results integrated with existing data**
- ◆ **Further investigation conducted**
- ◆ **Impact of coal mine to alignment determined**



Data Presentation



Data Presentation

- ◆ This presentation
- ◆ Figures for reports and memos
- ◆ Maps
- ◆ Soil boring layouts
- ◆ Site investigation plans
- ◆ Export to .DXF files



Demonstration of GIS Capabilities



Conclusion



Advantages of using GIS

- ◆ Data from various sources can be integrated
- ◆ Analysis can be expedited
- ◆ Site activities can be planned
- ◆ Site model can continually be updated
- ◆ Maps, figures, layouts, etc. can be produced



Questions?

