U.S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement
Mid – Continent Region

Mobile Computing / ArcPad 8.0

ISMR Conference
Jasper, IN

Early Mobile Computing prototype

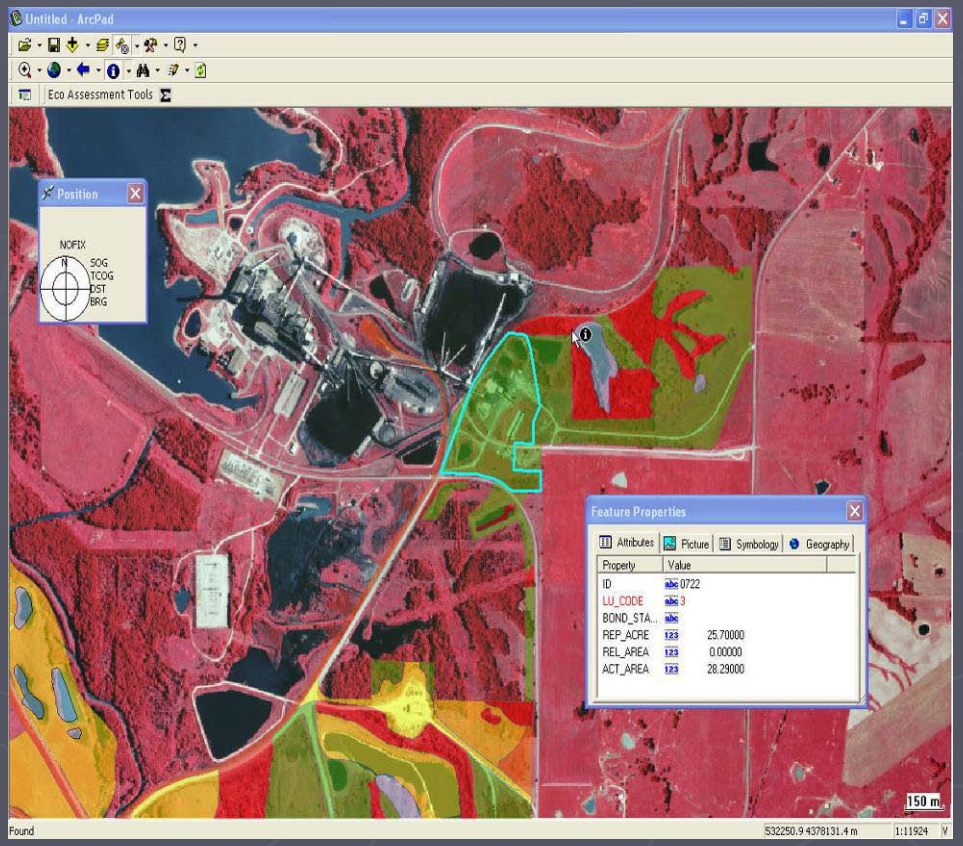
Mobile Computing Now

Mobile Computing – Integration of Four Technologies

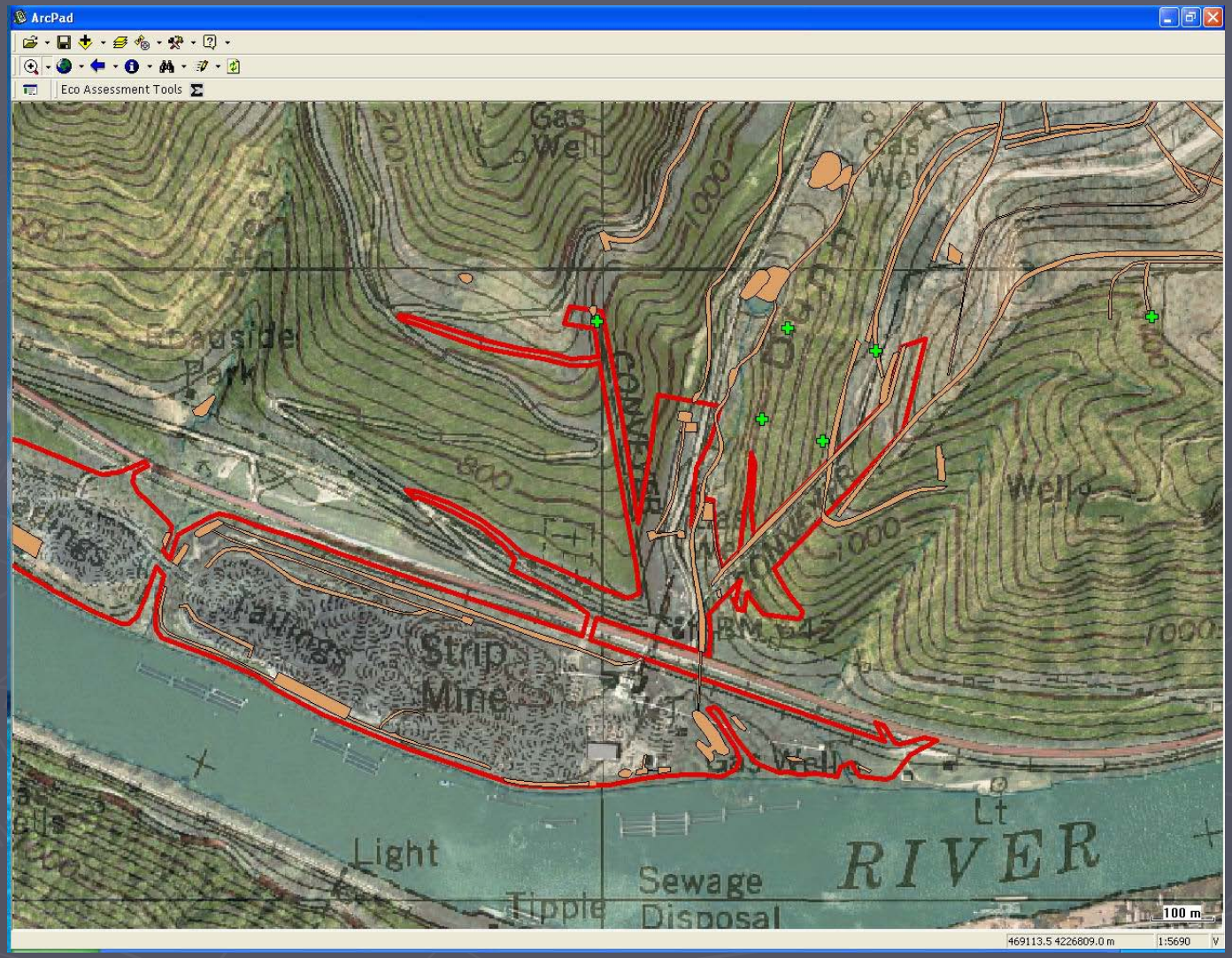
- Geographic Information Systems (GIS)
- Lightweight Hardware
- Global Positioning System (GPS)
- Wireless “unthethered” Communication (Bluetooth)

Mobile Computing

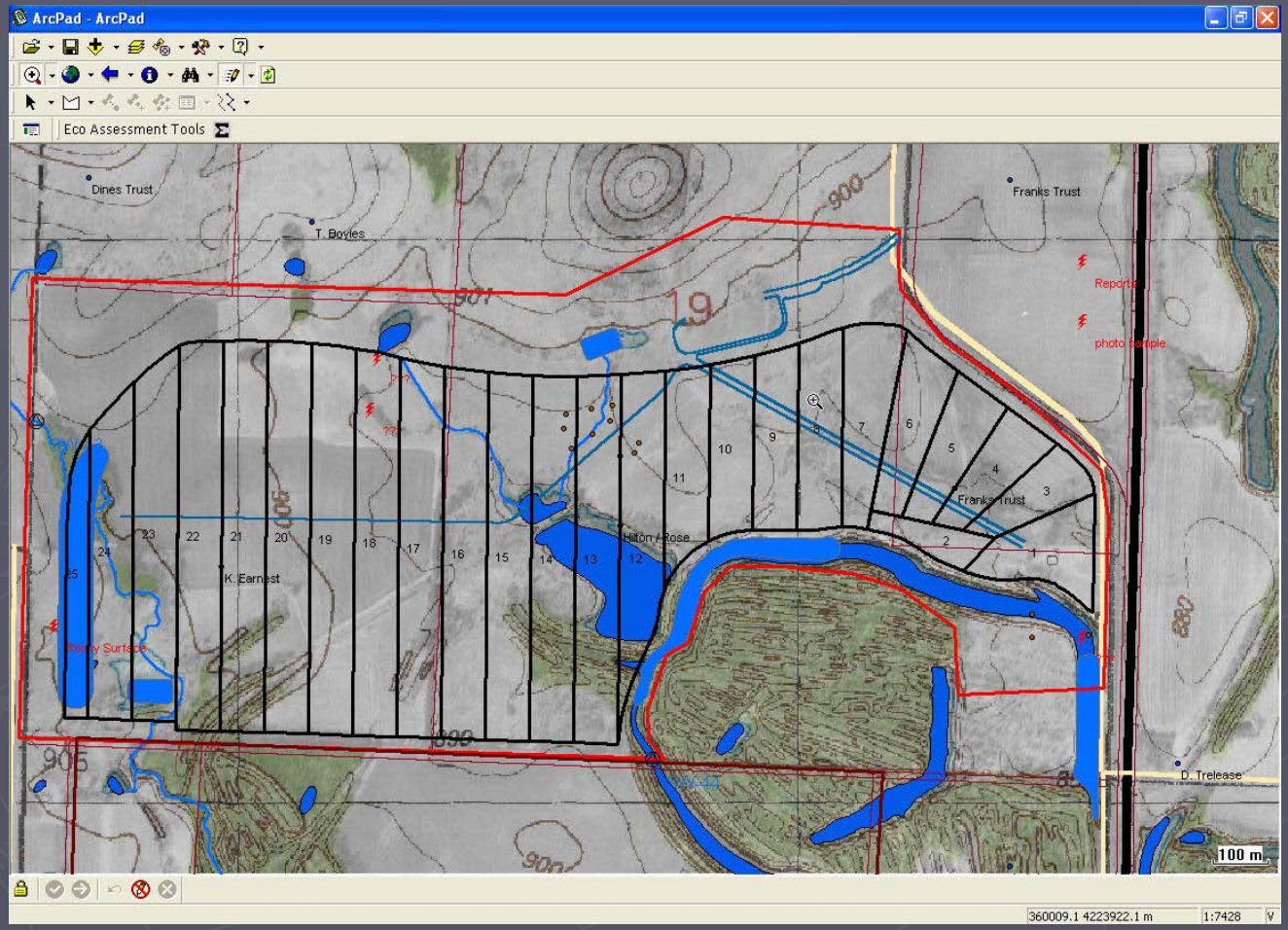
- Next step beyond basic GPS data collection
- Field CAD and GIS Solutions
- Real time mobile mapping and data collection
- Integrates GPS with mobile GIS



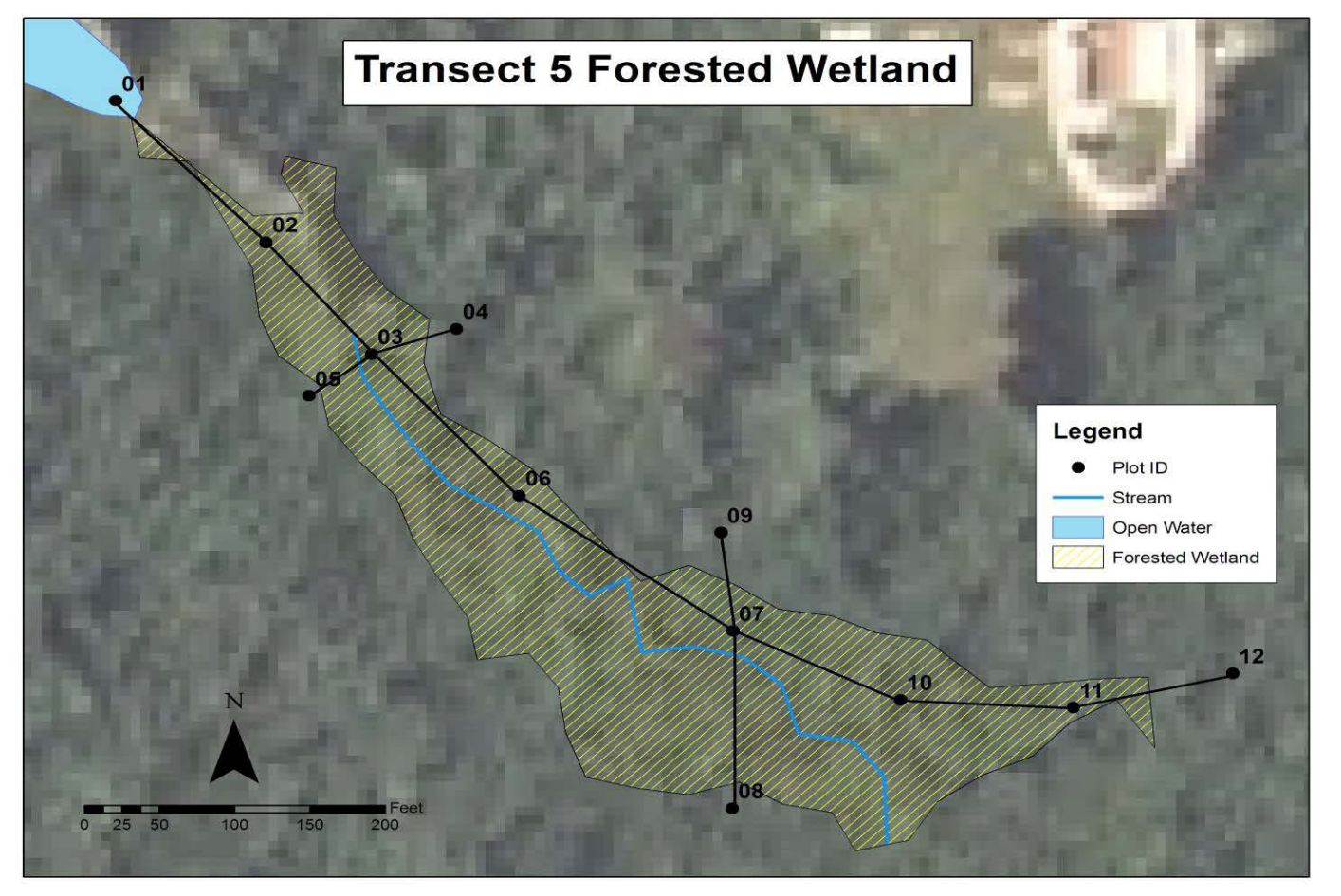
Navigation


ArcPad
Eco Assessment Tools
Gas Well
Roadside Park
Strip Mine
Light
Sewage Disposal
RIVER
100 m
469113.5 4226809.0 m
1:5690

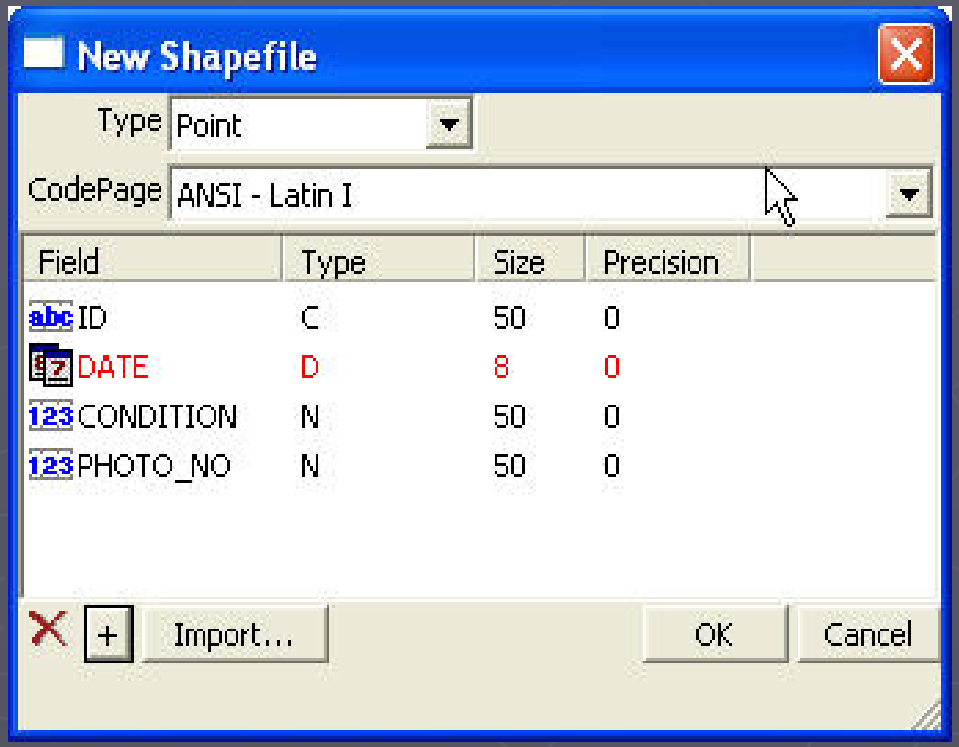
Pre-Plan Site Visits Using Existing GIS and CAD Data



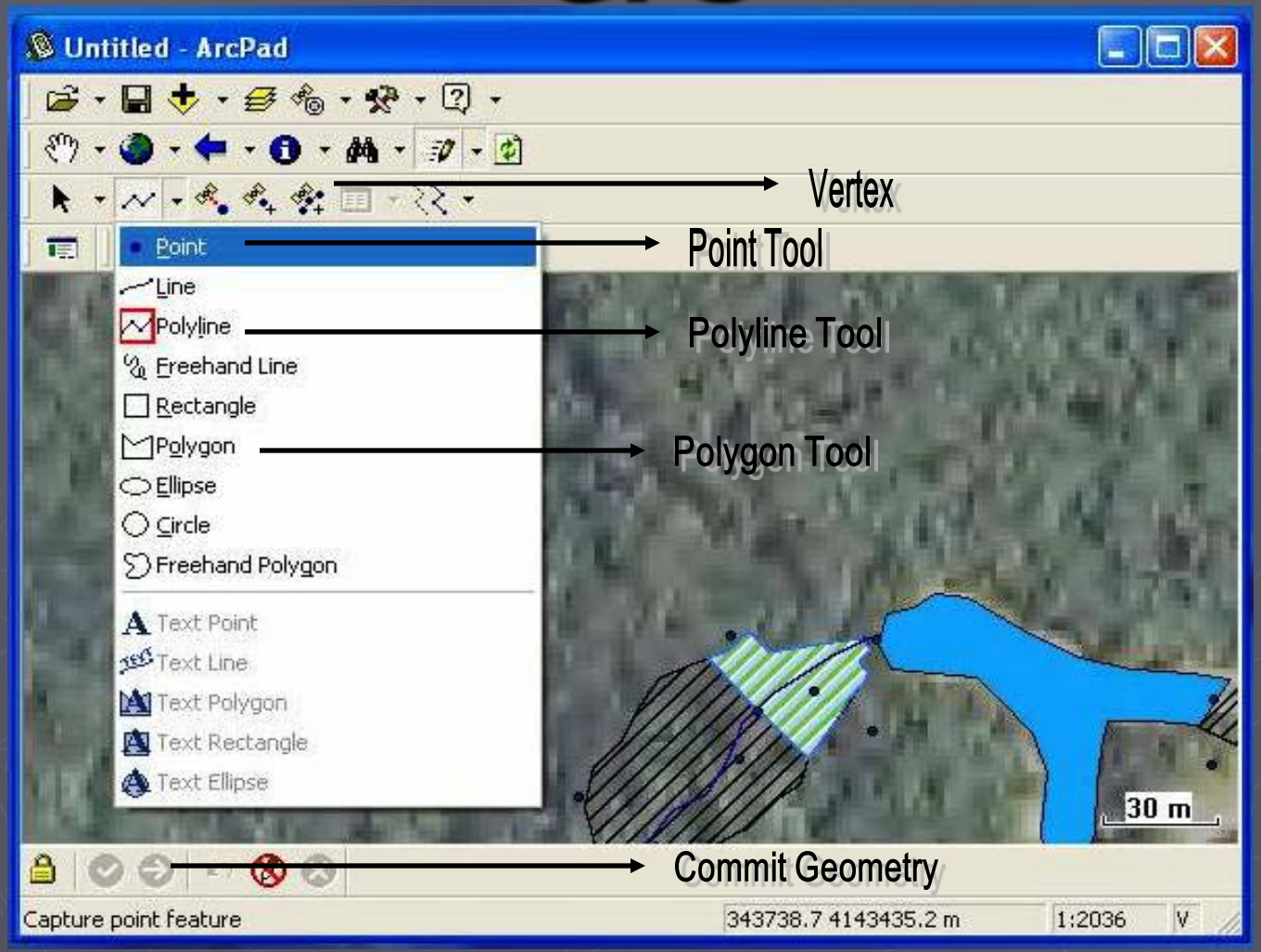
Collect Points, Polylines, and Polygons



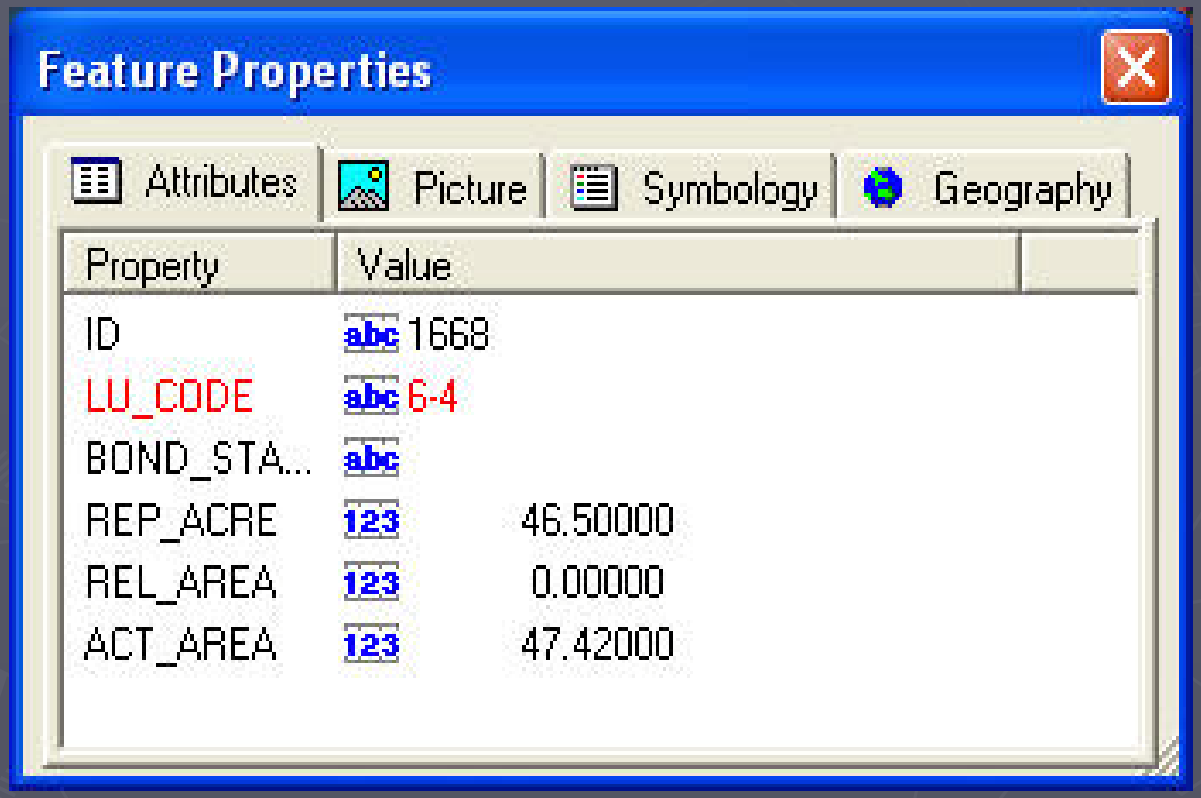
Create a New Layer – Adding Fields



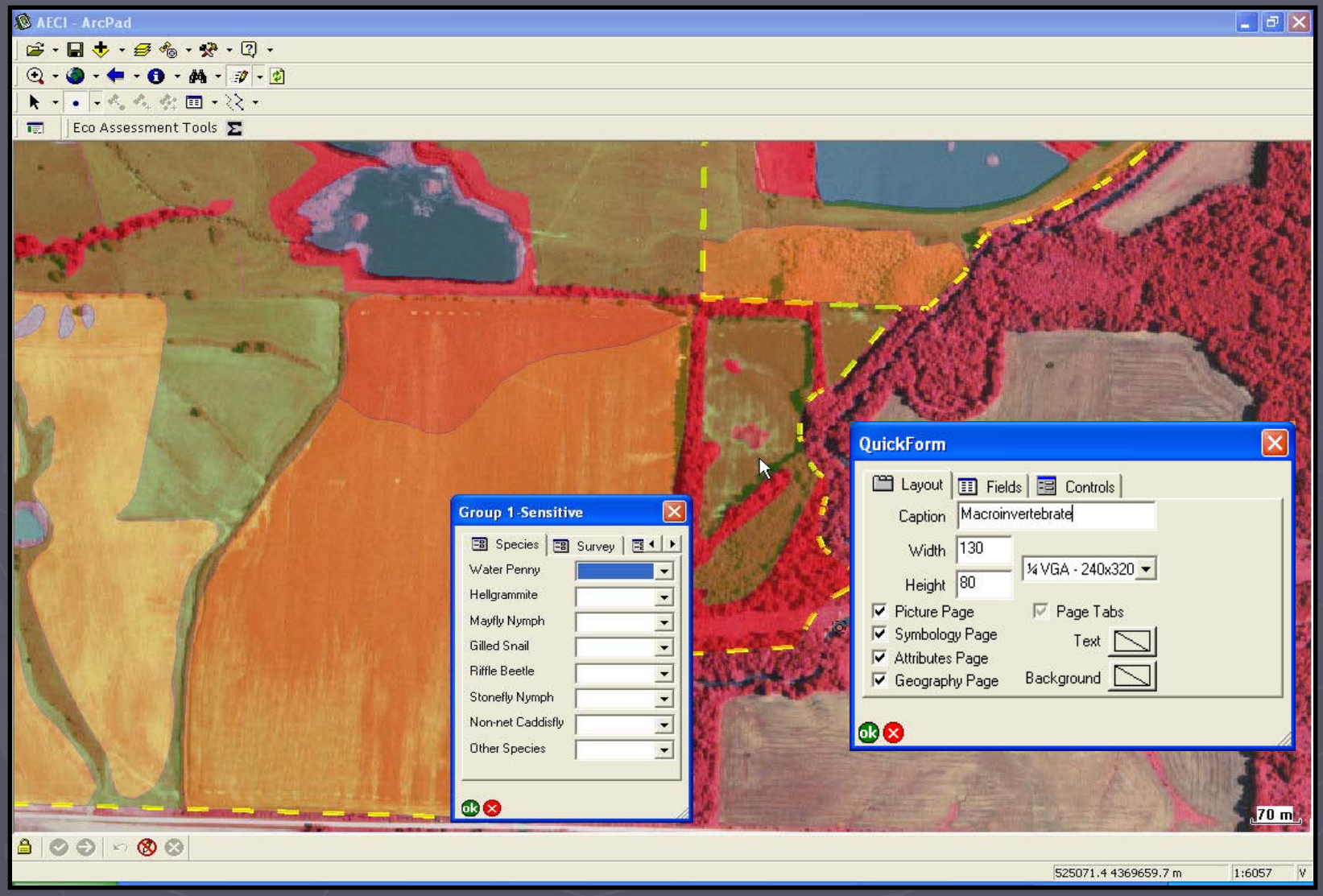
Capture New Features - GPS



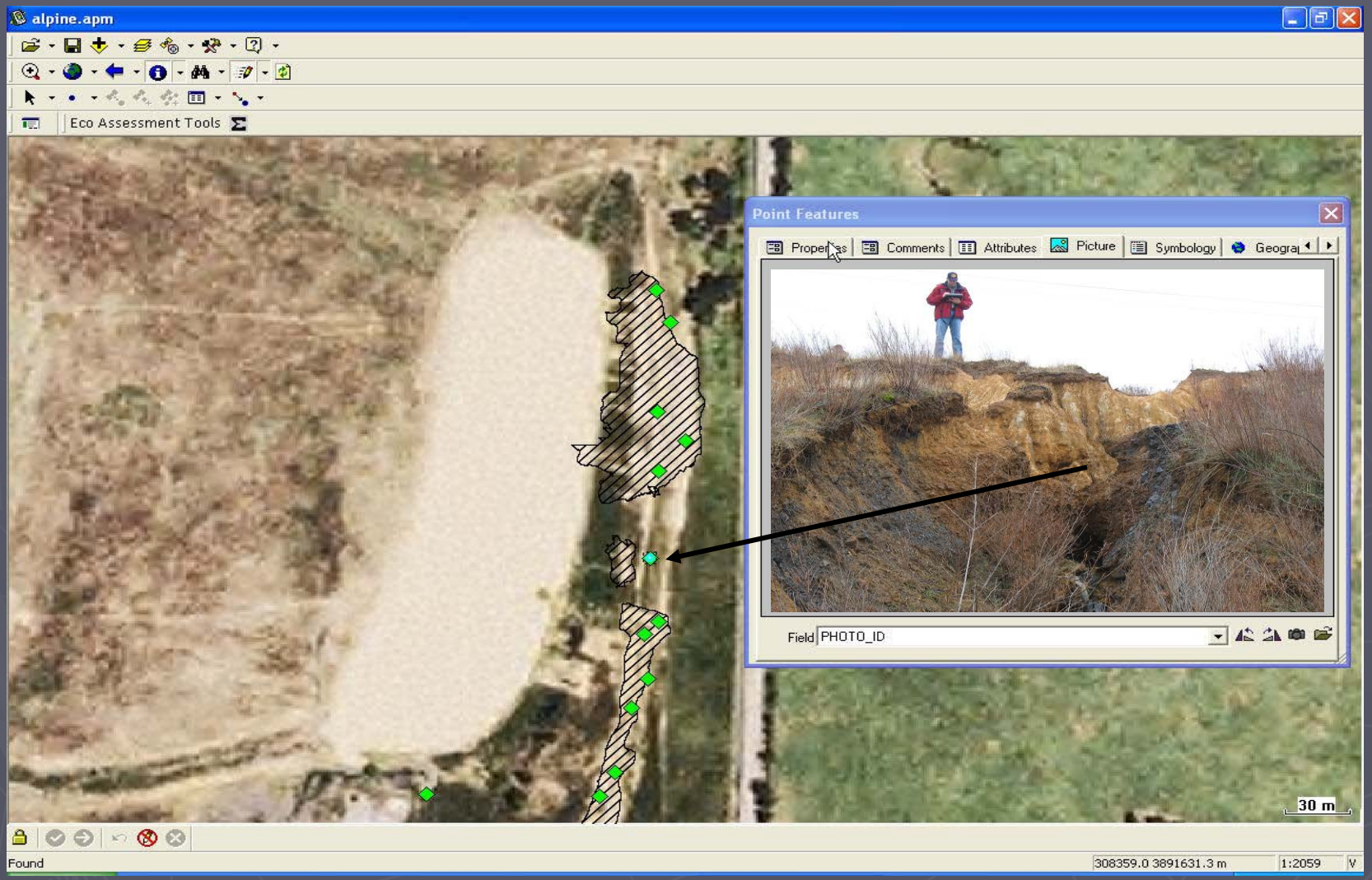
Collecting Attribute Data



Collecting Attribute Data – Customized Form



Associate Photos with ArcPad 7.0



GIS Interface

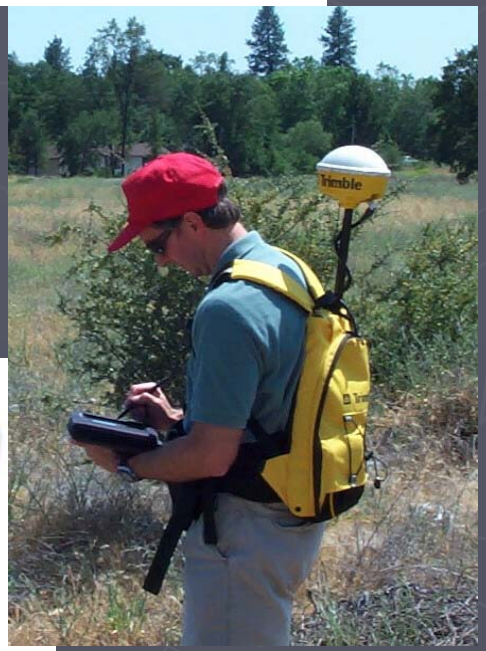
- Use existing mapping and software systems
- Support raster and vector data
- Check in and check out spatial data
- Update and leverage geographic databases
- Create custom solutions
- Clip data from desktop GIS applications

Hardware


Trimble
ProXH


Trimble


WorldNavigator
GPS


Trimble


GMS-2
TOPCON


Trimble

Software

- ArcPad v. 8.0 by ESRI
- ArcMap by ESRI
- Terrasync by Trimble
- Pathfinder Office by Trimble
- GPS Correct and GPS Analyst by Trimble
- Carlson Software Field Running on Autodesk Map and Field Viewer

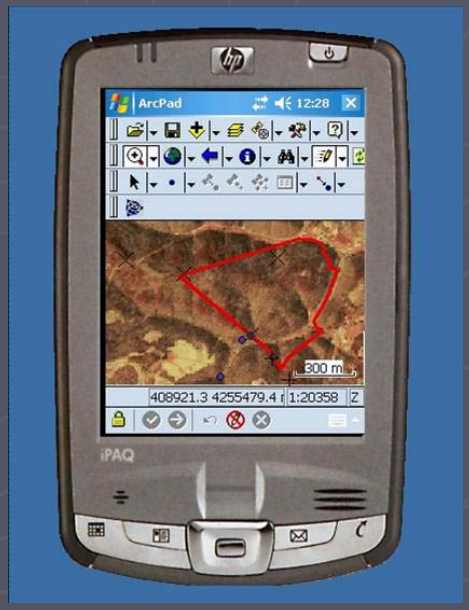
Case Study 1
Wildlife Habitat Assessment

- Evaluate effects of KY-31 Tall Fescue at AECI Prairie Hill Mine
- 10 Parcels of wildlife habitat (133.75 acres) was inadvertently seeded with a fescue ground cover
- Permit revision with the State of Missouri
- AECI wildlife mitigation areas
- Several tools utilized to assess reclaimed wildlife habitat:

  GIS, ArcPad, Mobile Computing, and Wildlife Habitat Models

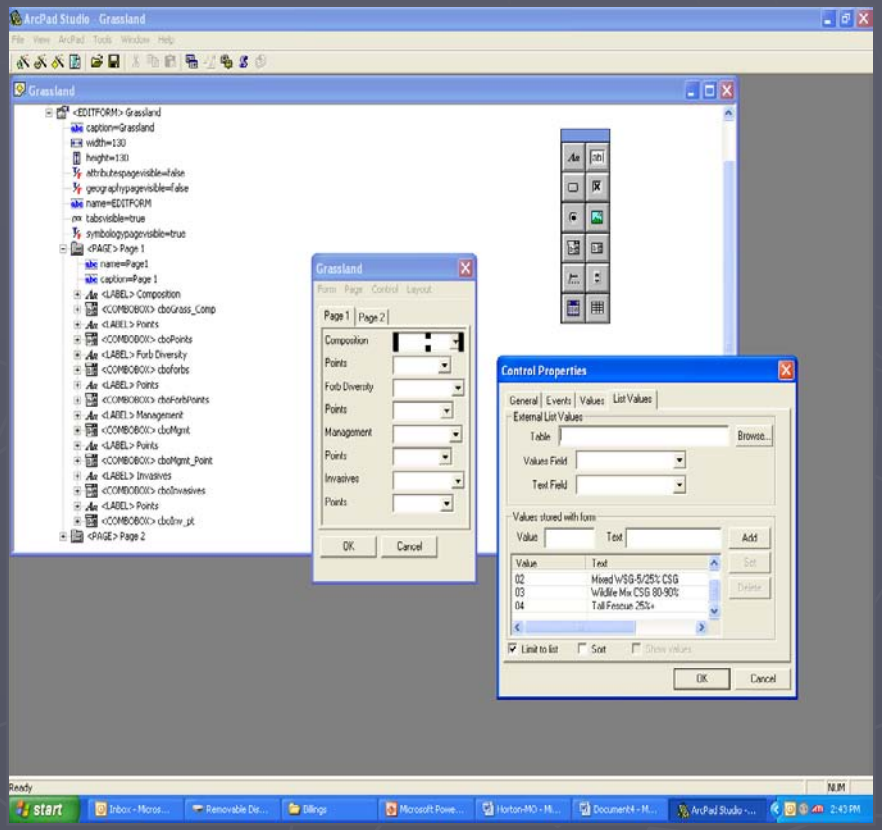
Mobile Computing

- Field data was captured using Bluetooth GPS Technology
- Wildlife models were digitally created using the ArcPad Form Builder and Application Builder
- ArcPad software along with the digital models were downloaded to an iPAQ Pocket PC
- Land Use Lines, Permit Boundaries, and Digital Aerial Photos were also downloaded

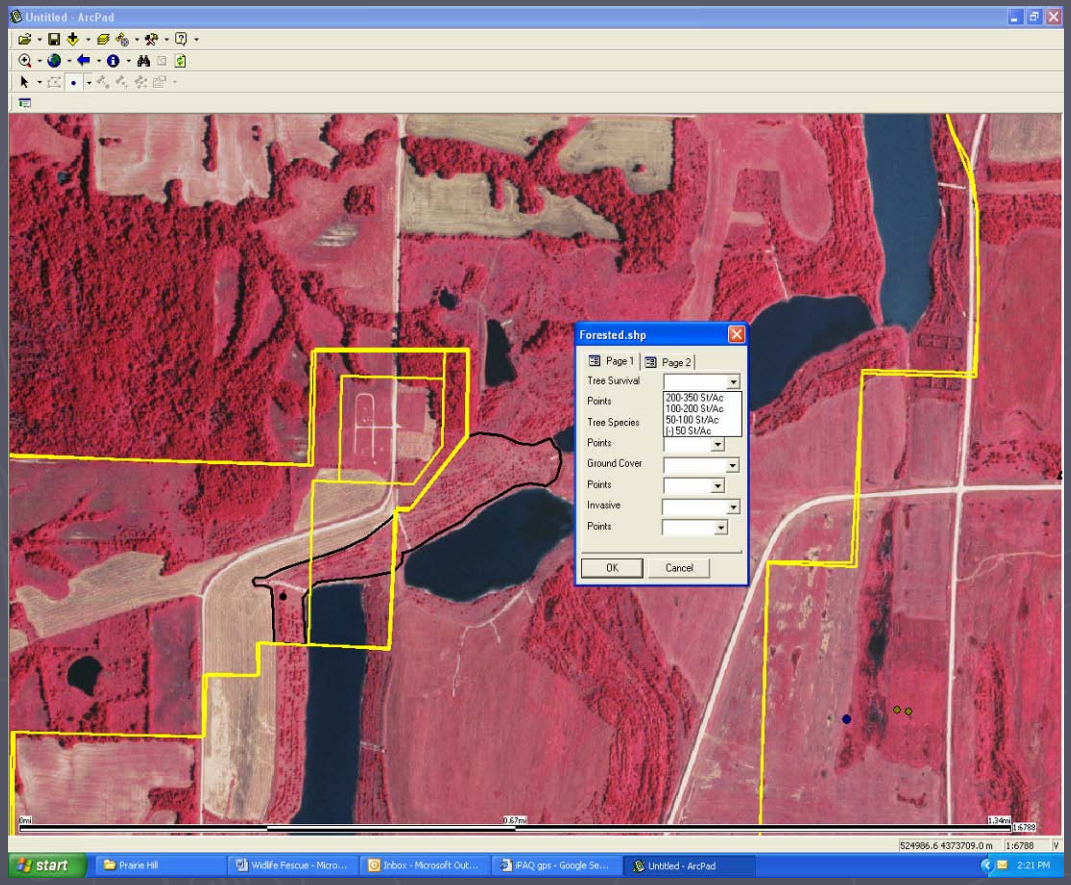


Mobile Computing

- Shapefiles projected and created using ArcGIS Desktop
- Tabular fields (wildlife quality factors) created in ArcGIS for form customization
- Downloaded to ArcPad
- Application Builder and Quick Form Applet
- Quality factor variables and scoring system created in ArcPad Form
- Imported to iPAQ for field data collection



ArcPad Wildlife Models



Case Study 2
Kansas Wetland Determination

- AML Project
- Extensive project site with open water, stream, and wetland impacts
- Mobile computing assisted with Wetland and Stream Mapping
- ArcGIS Interface for site analysis and 404 permit submittal to USACE

iPAQ and xplore iX104

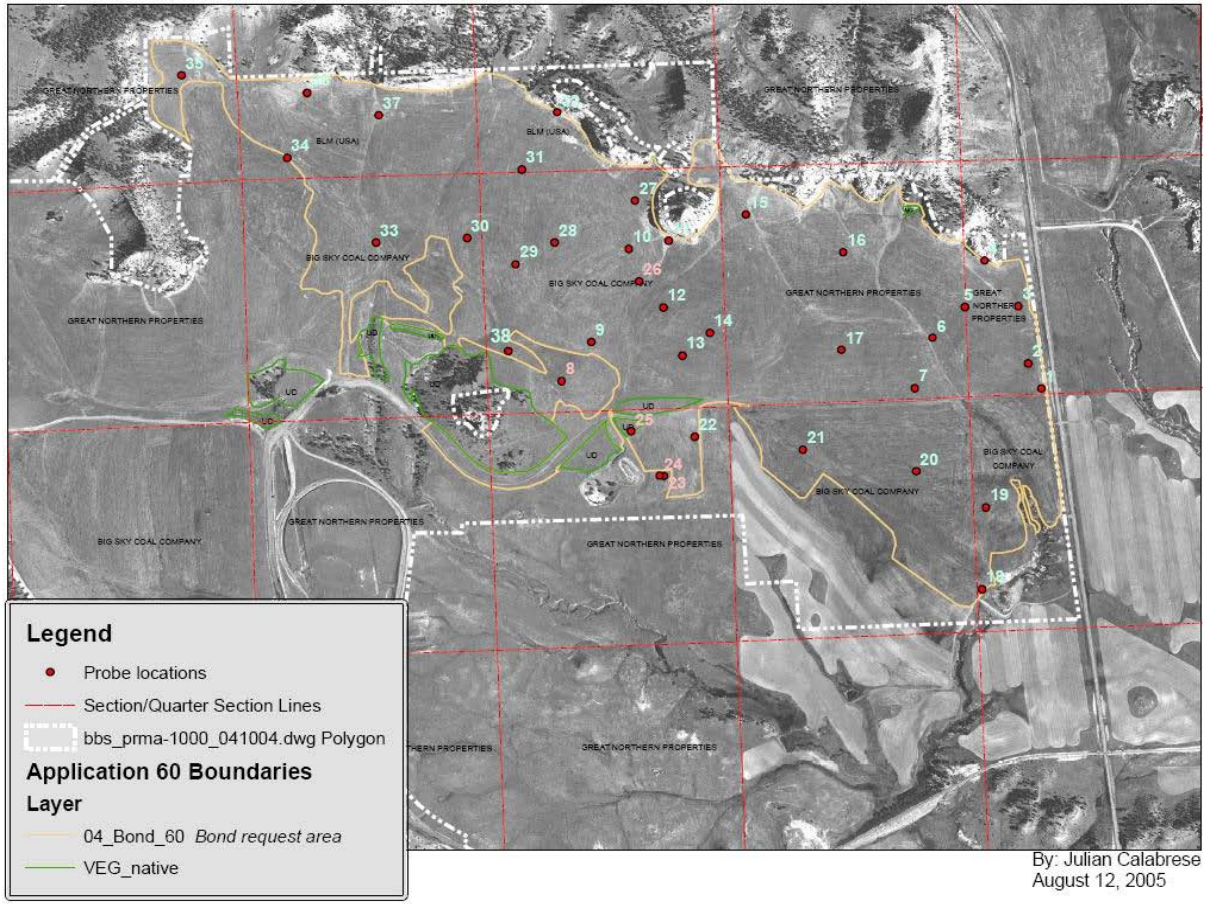
Wetland Transects

- Wetland Points were taken at specific length intervals
- Wetland Delineation Forms – Vegetation, Soils, Hydrology
- Wetland boundaries and stream courses were mapped
- GIS Interface to quantify impacts to waters of the US
- Assisted in Section 404 Permit Application with USACE

Case Study 3
Big Sky Mine Montana

- ArcPad QuickForm used to collect soil probe data
- Soil probe data points taken in the field
- Soil depths recorded
- Vegetation noted
- Land use
- ArcPad data imported into ArcMap for further analysis
- Aided in bond release

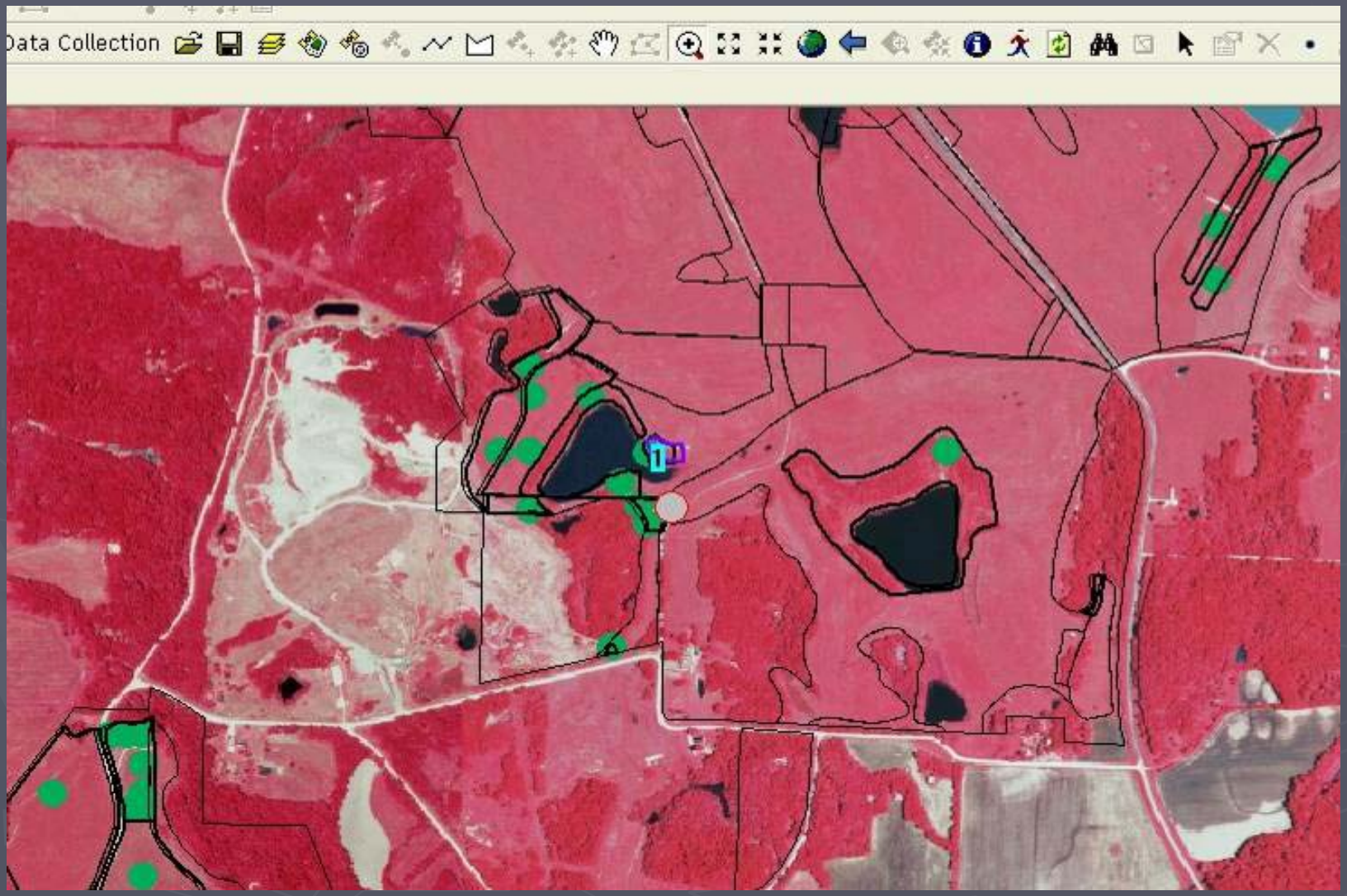
Big Sky Mine Montana



Case Study 4
AECI Vegetation Assessment for Bond Release

- Assess validity of Phase 3 Bond Release Requests on 10,000 acres
- Permits as old as 1982
- Compare veg. sample data to actual on-ground conditions
- Data was developed in AutoCAD
- Opened .dwg in ArcMap
- Converted to Shapefiles and exported for ArcPad

AECI Vegetation Analysis



Cost Savings

- Resource Analysis:

With Mobile Computing Technologies:

-- 2 days for various resource professionals to conduct field data collection

-- 10 days for various GIS data collection and analysis

Total = 12 days

With Traditional Existing Methods:

-- 60 days for GPS/Survey specialists to flag and orient maps for resource professionals

-- 10 days for resource professionals to conduct field data collection

-- 15 days for GIS data input and analysis

Total = 85 days

Net result with Mobile Computing Technologies is 85% less time and resources needed to complete this task.

AutoCad (Field Module) Case Study 5: RTK GPS Surveying

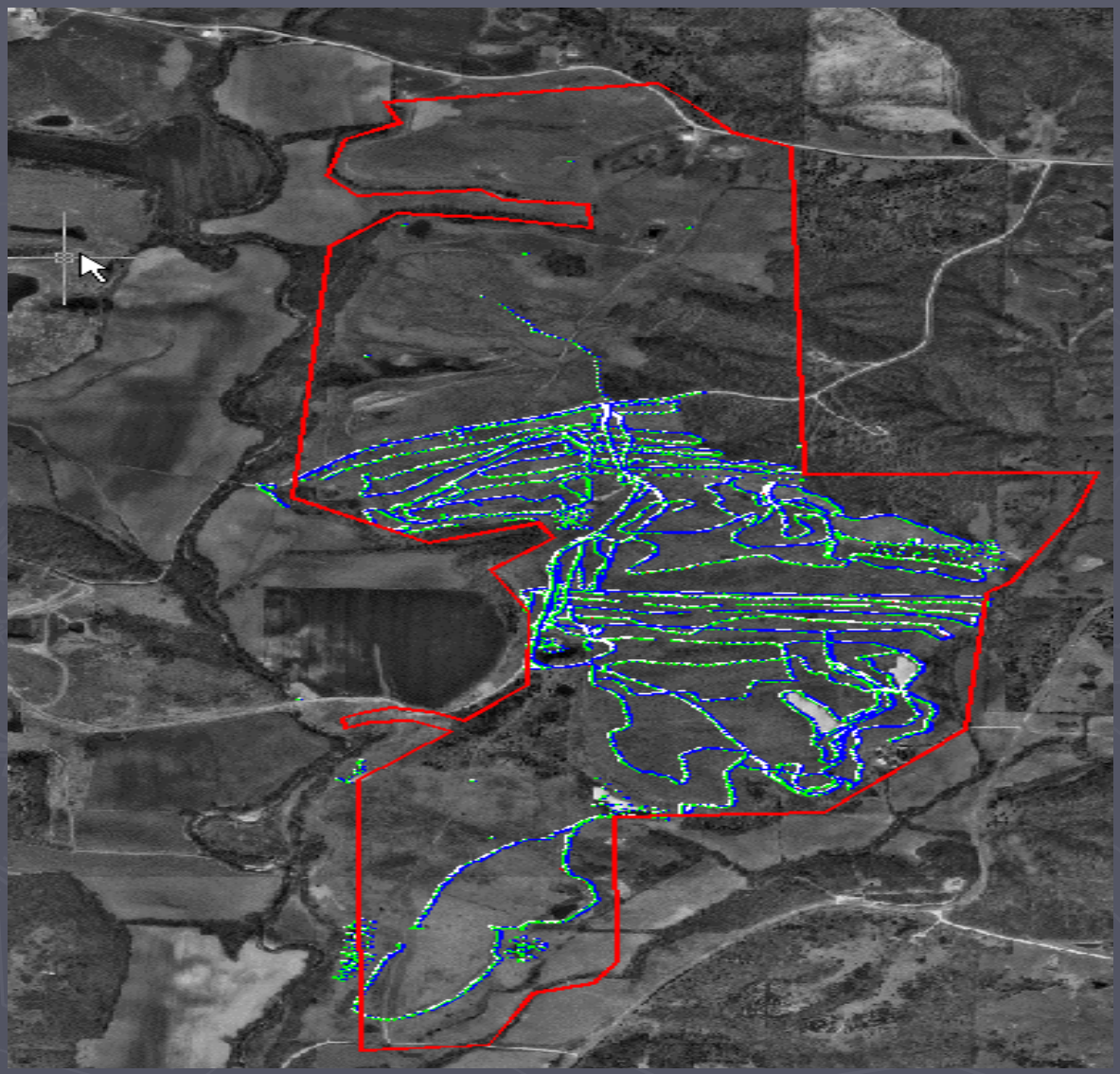
- MCR and Missouri staff surveyed 700 acre bond forfeiture site.
  - Goal – To obtain a topographic survey and document bare spots, slides, gullies, etc. to be used to prepare reclamation designs.
  - Equipment used – Leica SR 530 RTK GPS base station and rover, Fujitsu Stylistic 3500R computer, John Deere Gator 4x6 vehicle

Equipment

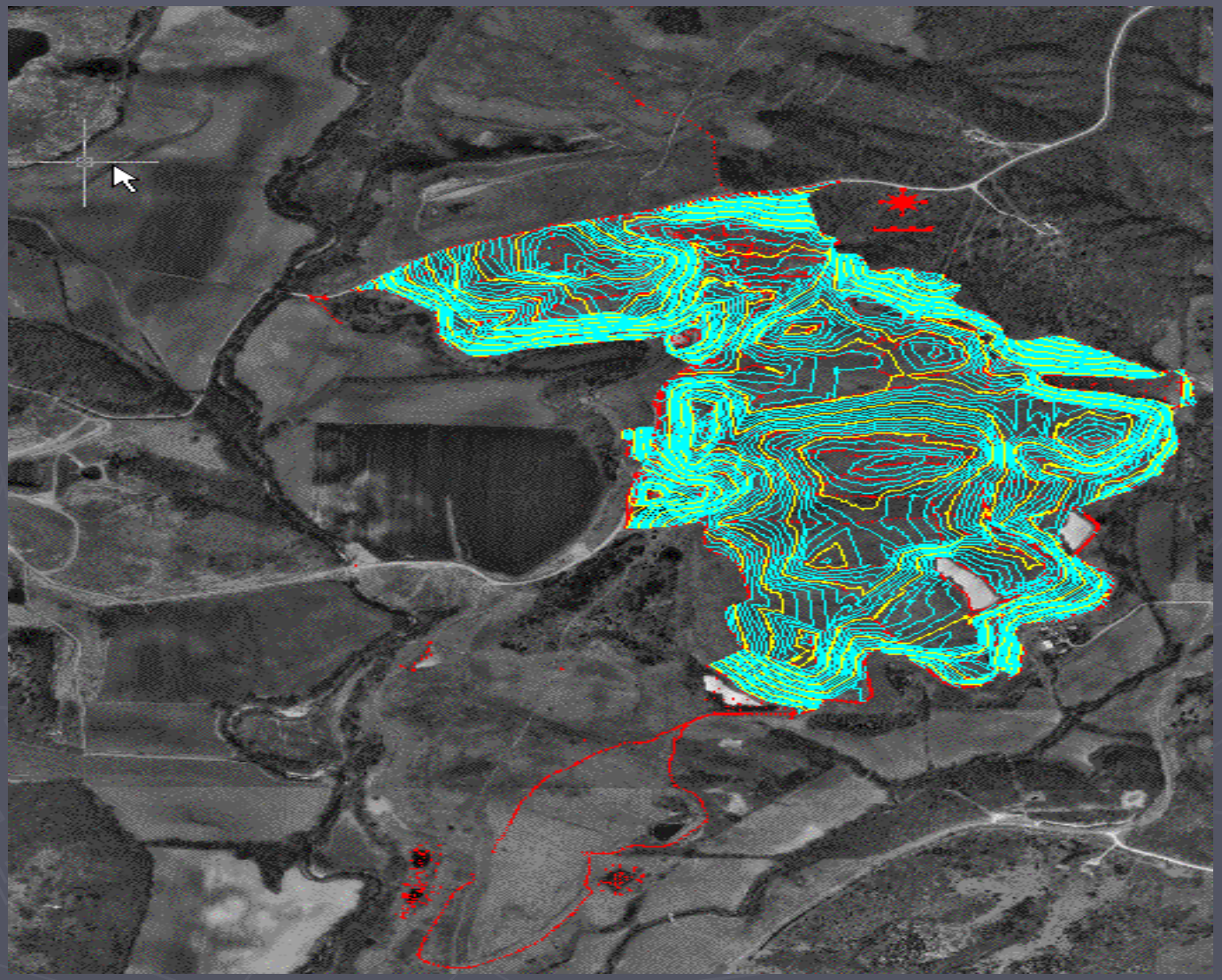
Survey Data Collection

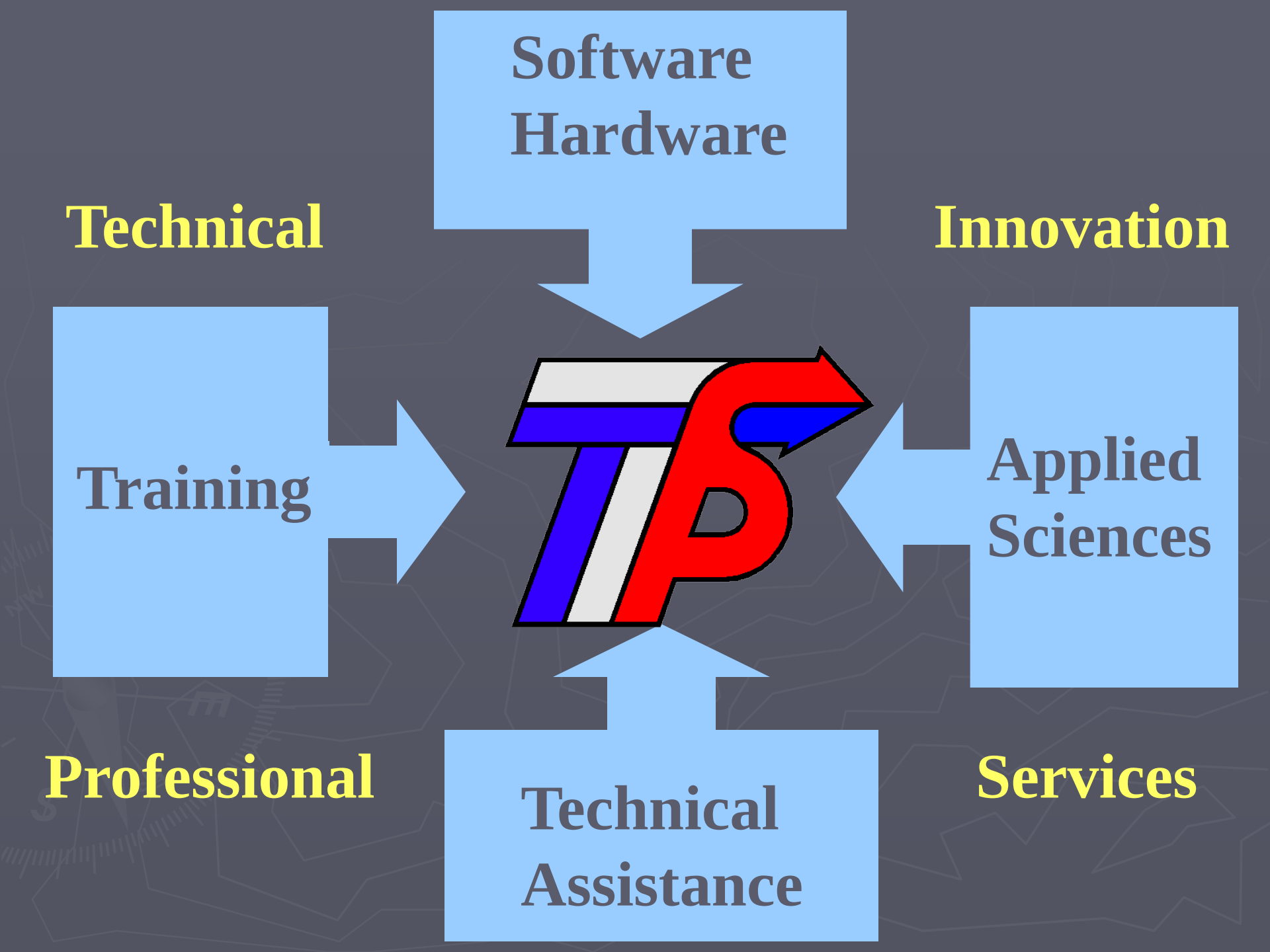
- 2 person crew
  - One person drove the gator while the other rode in the passenger seat to operate the computer and hold the pole steady.
  - Used the Auto-Points feature to collect points every 25 feet horizontally or 1 foot vertically.
  - Collected topo shots from the Gator. When other features were encountered, the crew got off of the gator and mapped the features

Field Results



Field Analysis




Software
Hardware
Technical
Innovation
Training
Applied
Sciences
Professional
Technical
Assistance
Services

One of those moments when mobile computing comes in handy

Questions???