Kansas Surface Mining Section
GPS Utilization
September 20, 2010

The KDHE Surface Mining Section currently uses a Topcon GMS-2, a Trimble Geoexplorer 3 and a Trimble GeoXT handheld unit for field data collection. During the Joplin Regional Workshop for ArcPad 8.0, Kwang Kim (Min) of OSMRE requested information and examples of how the units were being used. The units are currently assigned as follows:

Topcon GMS-2	Program Services
Trimble Geoexplorer 3	Inventory and Vertical Opening Project
Trimble GeoXT	Engineering

Program Services

The Topcon GMS 2, running ArcPad, is used on a regular basis for various field activities (examples are attached). For field work on wetland delineations, the transect locations are recorded using the most current NAIP photo to create a visual that can be included in both the 404 Permit application and when required the T&E Action Permit application. Area calculations are easily obtained using the polygon feature.

For Title V, the Topcon, again using ArcPad, is used for recording soil probe locations and depth, vegetation sampling points and calculating areas as well as other tasks. In one instance the area of reclaimed cropland prime farmland was found to be deficient because of mapping the area with the Topcon. Another T&E Conservation Easement was found to be incorrectly fenced because of mapping with the Topcon. When information is needed to determine whether an area meets the slope requirements of cropland prime farmland, the Topcon can be used with a laser level to create an accurate slope determination.

Currently, the **only** way to utilize ArcPad on the Topcon is with the provided ArcPad 7.0.1 CE.NET Hot Fix. Topcon does not support any of the current versions of ArcPad. The limitations on software compatibility with the Topcon are and will continue to be serious problems. Although TIPS continues to provide updates and support for ArcGIS, the Topcon will remain stuck at ArcPad 7.0.

Inventory and Vertical Opening Project

History and Current Procedure

Currently the process of marking/mapping a shaft or sinkhole involves traveling to the site and using the Trimble Geoexplorer 3 to take a GPS reading. Once complete, the unit is then brought back to the office where the data is downloaded and placed on a map. There are drawbacks to having to do business this way. On numerous occasions once back at the office it has been discovered that the points are not truly recorded which means another trip has to be made to repeat the process. This is time consuming and wasteful.

Advantages of a new Trimble

With an updated Trimble unit, a trip to the field to collect the data would be streamlined. Once the unit has the map loaded a worker could plot multiple shafts or sinkholes and have the

security of knowing it is actually collected by seeing it on the map. With the ability to use data charts, the size, depth, and landowner could all be input while in the field along with any other information that is relevant to the site. Once back at the office the map file could be put back into ArcMap or AutoCAD and stored until used again.

The use of a new unit would be tremendous just to the Vertical Opening Project (coal) and the Vertical Opening Project (Lead and Zinc). A unit dedicated to these projects would be taken to the field on a daily basis to record information on shafts and sinkholes. It is not uncommon while working at a site to find new holes or be called by a landowner or city and county employees informing us of a new hole.

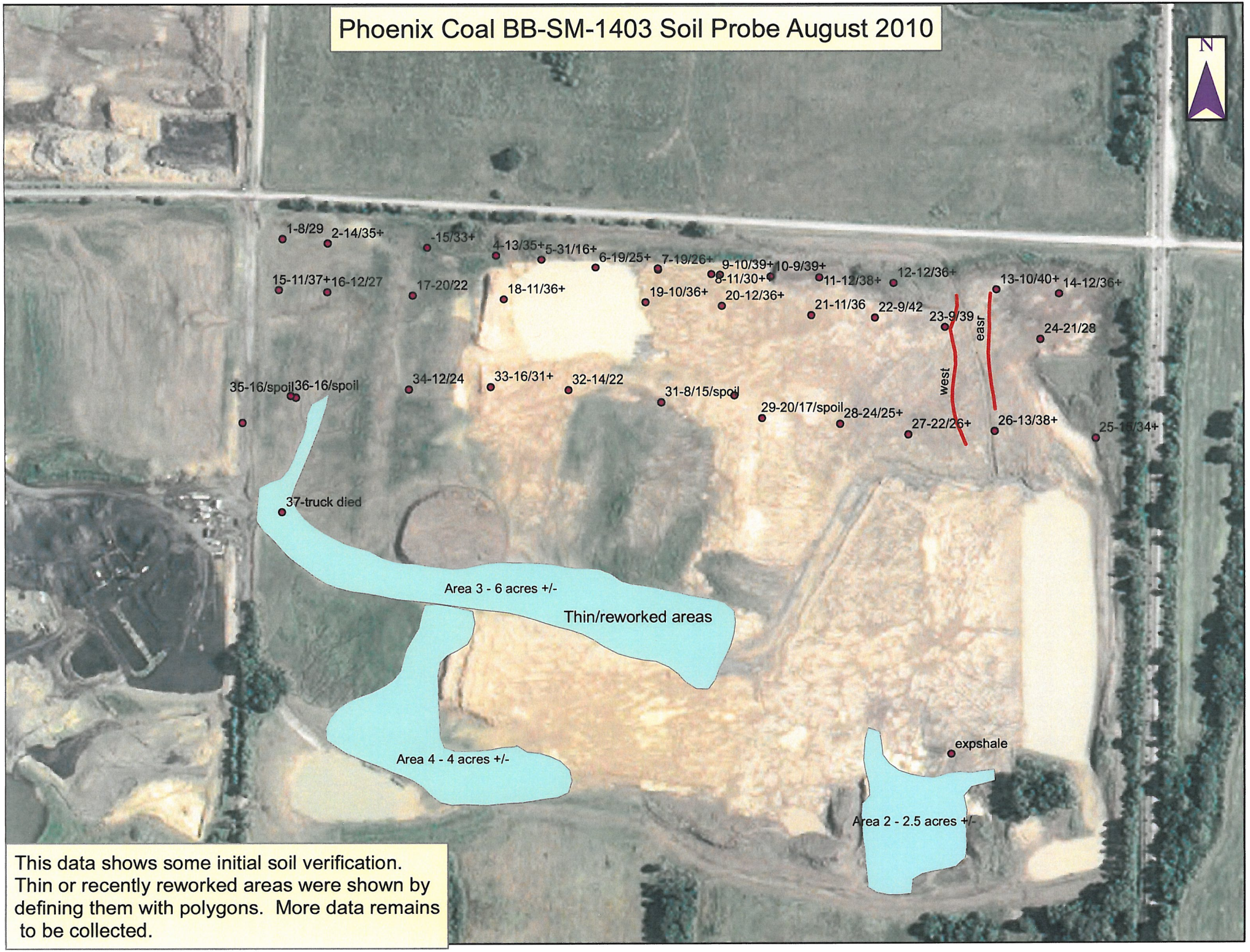
Engineering

The engineering staff has a Trimble GeoXT that has a serious software issues in the Windows Operating System. The unit, for reasons that can not be determined, will crash at any given time. The unit also has a problem acquiring satellite positions. It is not uncommon for the unit to take up to 20 minutes to obtain sufficient information to record data.

The engineering staff uses both the Trimble and the Topcon on a regular basis to take field information that is later input into drawings. The field data includes grading limits, culvert and drainage information, water lines, pond areas, stockpile boundaries. The units are also used in conjunction with the laser level to map topography. A project example from Clemens Coal is attached. The Engineering Staff strictly works in State Plane coordinates system, whereas other units may use latitude and longitude or some other coordinate system.

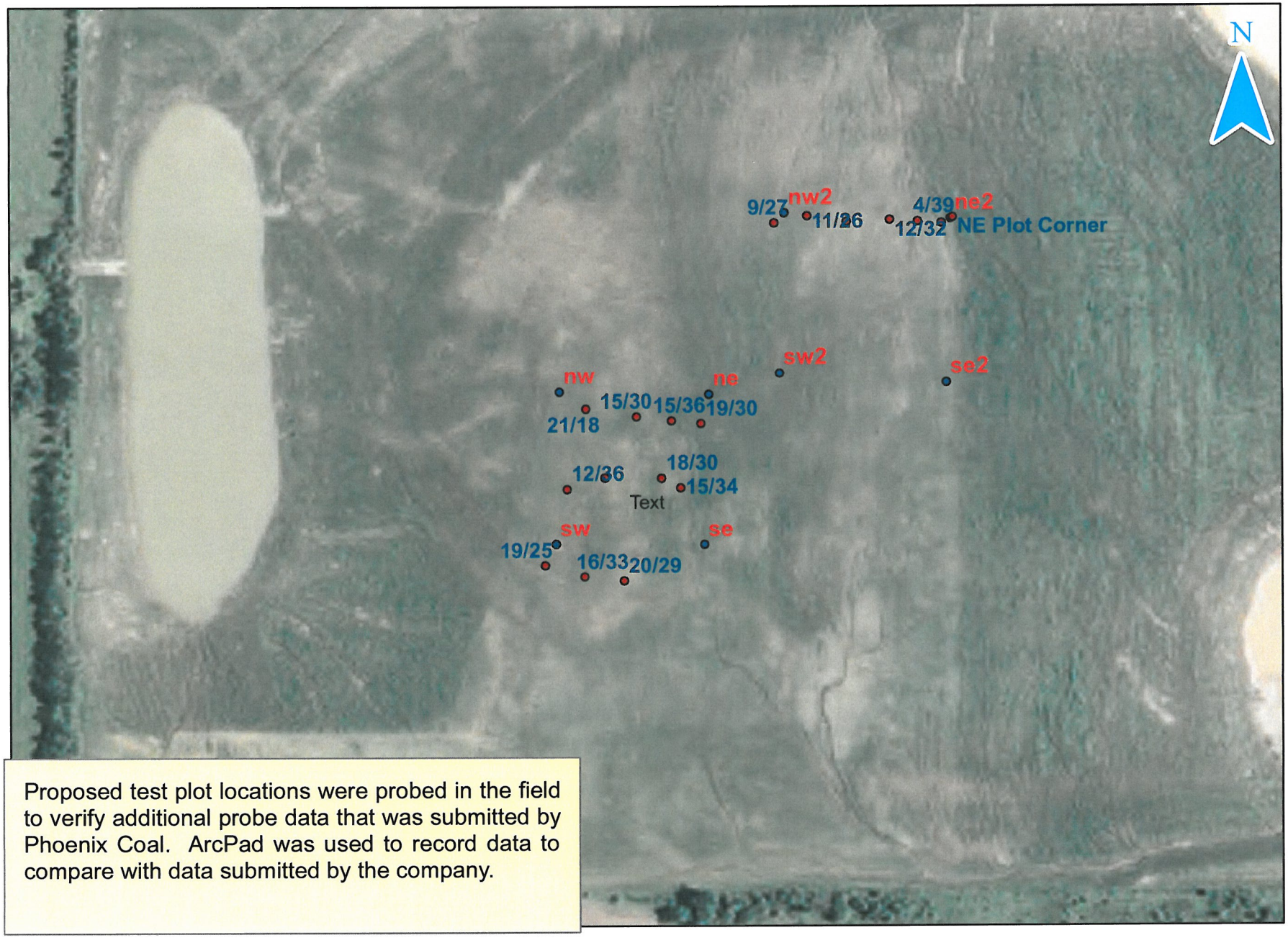
Summary

In closing it would be advantageous to have three units within the SMS; one each for Engineering, Program Services and the Vertical Opening Project. Trained personnel are in place and data collection units dedicated to each of the three areas would be used to the fullest potential.



This data shows some initial soil verification. Thin or recently reworked areas were shown by defining them with polygons. More data remains to be collected.

BB-SM-1402 Prime Farmland Test Plot Verification



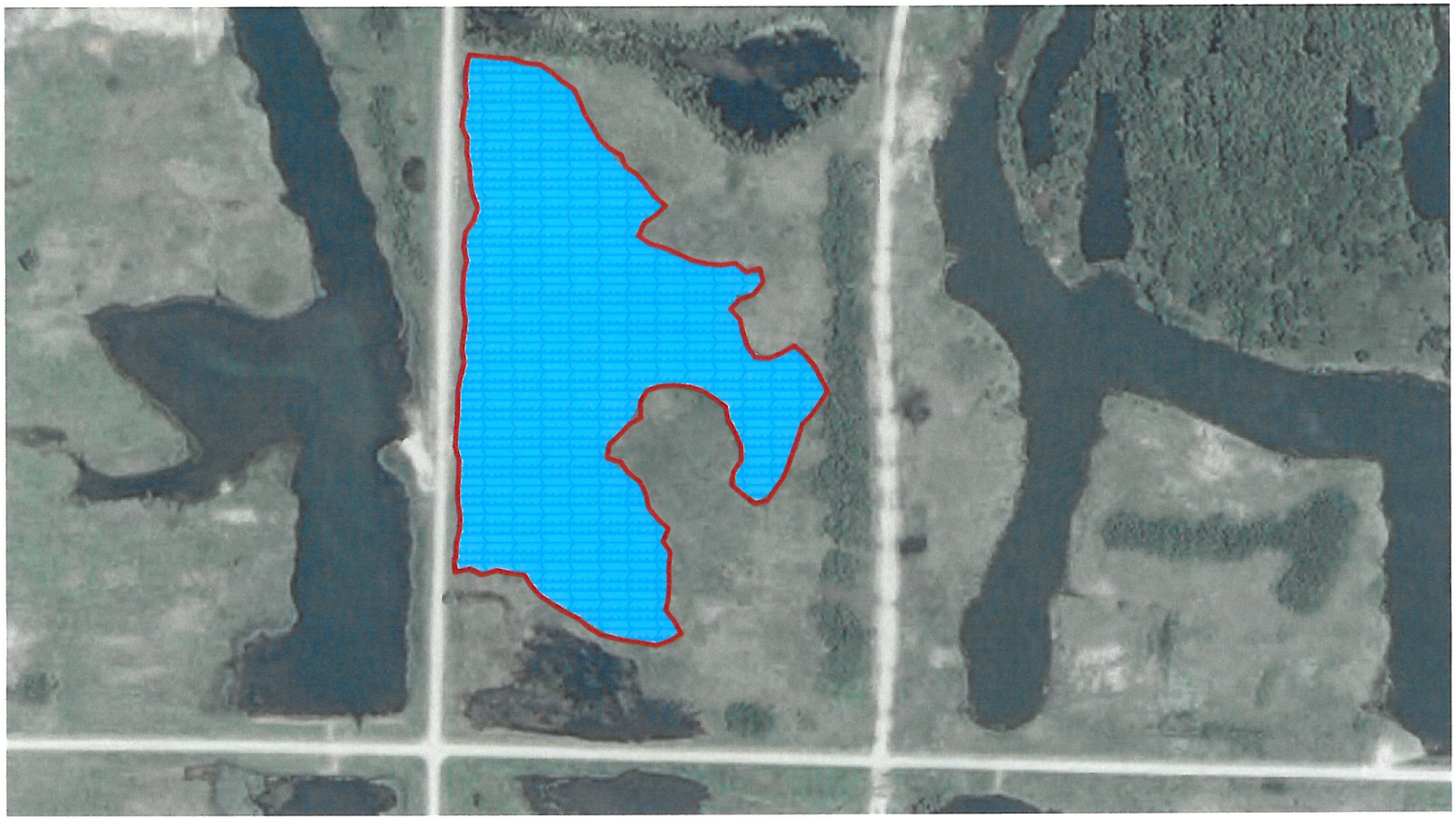
Proposed test plot locations were probed in the field to verify additional probe data that was submitted by Phoenix Coal. ArcPad was used to record data to compare with data submitted by the company.

Whitmore Pits Wetland Sampling

Whitmore Pits Spring Peeper and Wetland Sampling

Some of the information collected with the Topcon includes water depths and wetland sampling points. The polygon on this area was identified by KDWP as potential Spring Peeper (T&E) habitat and the area was defined using the Topcon.

Star Valley Road Wetland Mitigation Area



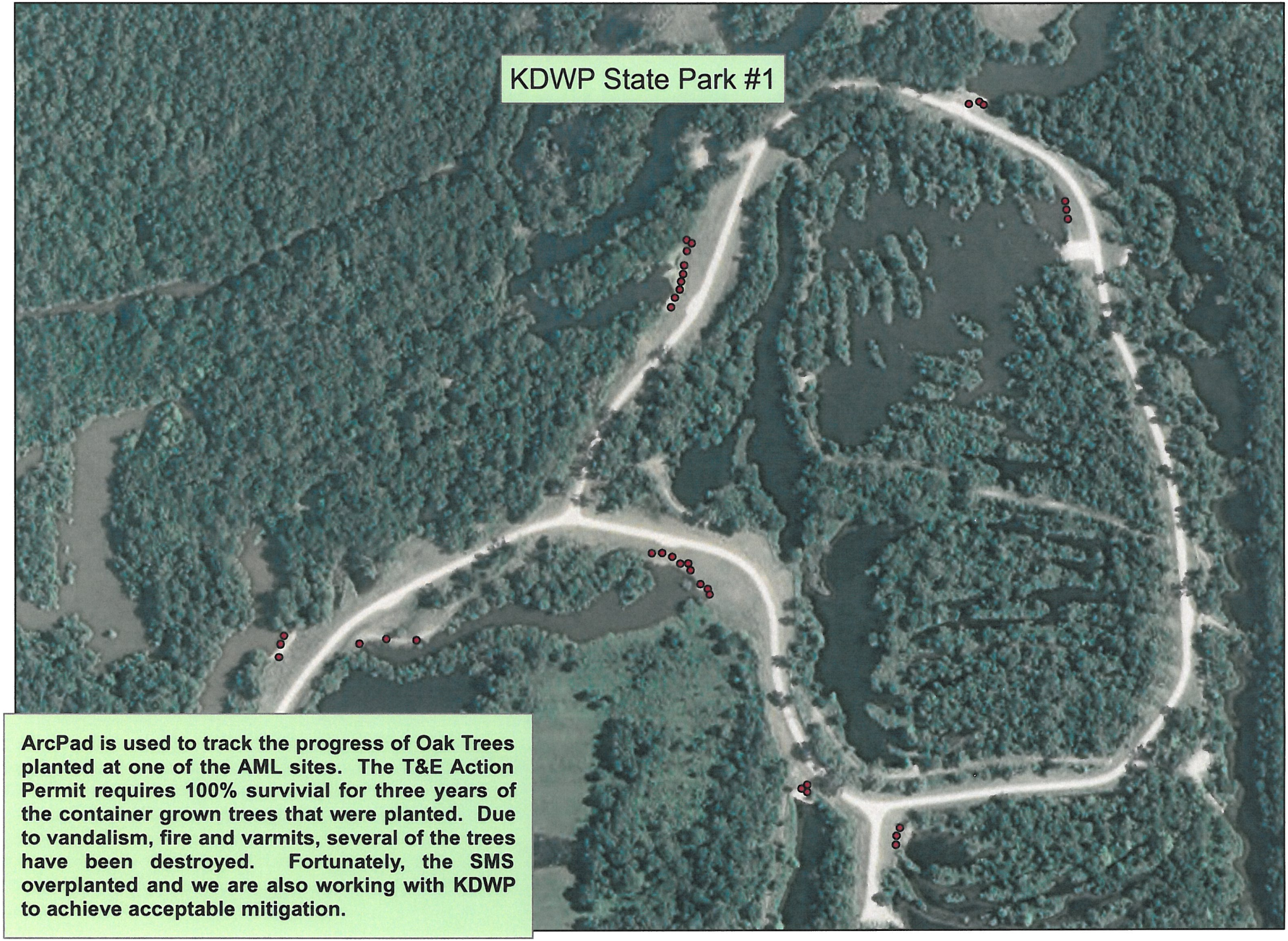
As part of the 404 permit, an existing wetland area will be modified so that water levels can be managed on an annual basis by Wildlife and Parks officials. Area calculations and wetland transcect points were collected with the Topcon using ArcPad.

McGraw Trucking Site

The SMS worked with Bureau of Waste to collect split samples from the McGraw trucking site. Sample locations were mapped with ArcPad. Acid and toxic forming coal waste has been identified on the site. Remediation is in progress.

Sportsman Pit Road

Sample Points for the wetland delineation were collected with the Topcon using ArcPad. The information will be used in the 404 permit application.



ArcPad is used to track the progress of Oak Trees planted at one of the AML sites. The T&E Action Permit requires 100% survivial for three years of the container grown trees that were planted. Due to vandalism, fire and varmits, several of the trees have been destroyed. Fortunately, the SMS overplanted and we are also working with KDWP to achieve acceptable mitigation.

A typical topographic survey using the Trimble GeoXT in conjunction with a Laser Level to calculate earthwork volumes with the Carlson Survcadd software.