United States Department of Agriculture

# Geophysical study using Ground Penetrating Radar Van Cortlandt Park Old Putnam Trail Bronx, NY

Natural Resources Conservation Service

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United States Department of Agriculture

220 Davidson Avenue 4th Floor
Somerset, NJ 08873
Voice 732-537-6040
Web: http://www.nj.usda.gov

Thursday, June 20, 2019

FROM:
Edwin Muñiz
Soil Scientist
USDA NRCS
220 Davidson Ave. 4th Floor
Somerset, NJ 08873

TO:
Margot Perron
Administrator/President
Van Cortlandt Park/VCPConservancy
1 Bronx River Parkway
Bronx, NY 10462

SUBJECT: Ground penetrating radar study for anthropogenic disturbance
FIELD DATE: January 16, 2019 and April 23, 2019
REPORT DATE: June 20, 2019

PROJECT INFORMATION

Proposed project:
Using ground penetrating radar technology to establish the possible location of anthropogenic soil disturbance in Van Cortlandt Park Old Putnam Trail, Bronx, New York.

Location:
Old Putnam Trail, Bronx, New York

Procedure:
The data was collected with the radar unit TerraSIRch Subsurface Interface Radar (SIR) System-3000 and the 400 MHz antenna manufactured by Geophysical Survey Systems, Inc. The study area was established by delineating four areas of interest, the first area is a known cemetery, the second area is possible part of the existing fenced cemetery, the third area is the Old Putnam trail, and the last is a path used for pedestrians and maintenance crews west of the existing cemetery. A total of 65 transects were collected in a zigzag pattern to develop a 3D model with a starting point (0,0) in the southwest (lower left) corner. A manual gain was established during the data collection to avoid the auto calibration as a response of several obstructions and changes in the surface material.

The data was processed in RADAN 7 by editing the initial positioning time zero, removing background noise, and signal filter process to remove noise that could mask some of the deeper signals. Slices at 1.2 and 1.5 meters from the soil surface of the 3D model with a slice thickness of 2 nanosecond travel time were exported from RADAN 7 and used in ArcMap (Version 10.5 by ESRI).

Additional data was collected with multi-frequency electromagnetic conductivity meter EMP-400 Profiler® manufactured by Geophysical Survey Systems, Inc. and georeferenced with an external GPS antenna by Juniper Systems. The data was processed in Surfer® (Version 15) by Golden Software, Inc. In Surfer, a contour type map was created by kriging interpolation for Quadrature for a non-magnetic susceptibility in parts per million.

Annotations:

- Map location is included in this report as a reference for the data collection.
- These features were not field checked, and they can range from natural to anthropogenic features.
- The objective of the study was to detect possible anthropogenic features for future archeological studies.

Observations:

Data collected in 3 different sites in the proximity of the existing cemetery showed multiple locations of potential anthropogenic disturbance of linear shape, oriented east to west. Site 01, the existing cemetery, was used as a calibration site, where 2 well defined linear features highlighted in olive green and 3 other features, not as well defined, were located. In site 02, east of the existing cemetery, 4 potential linear features were identified. In site 03, the Old Putnam trail, was highly disturbed during the original construction. According to the information provided, the major concern for this site was the possibility of human remains incorporated into the cut and fill material during construction. Even though this technology provides the capability for locating potential burial sites, it does not provide enough information to differentiate the origin of disturbed material. However, no linear features were observed in the data collected except for an area with a higher amplitude signal characteristic of a dissimilar material or soil conditions such as moisture content or clay content. As compared to the 3 previously described site, site 04 provided the best-defined linear features of the entire study. This site is located west of the existing cemetery in an area designated as a path for pedestrian and maintenance crew use. In this site, as shown in figure 4, it is possible to observe 5 well defined linear features. As mentioned before in this report, this technology provides information to locate and define anthropogenic features however, the origin is uncertain without further archeological studies.

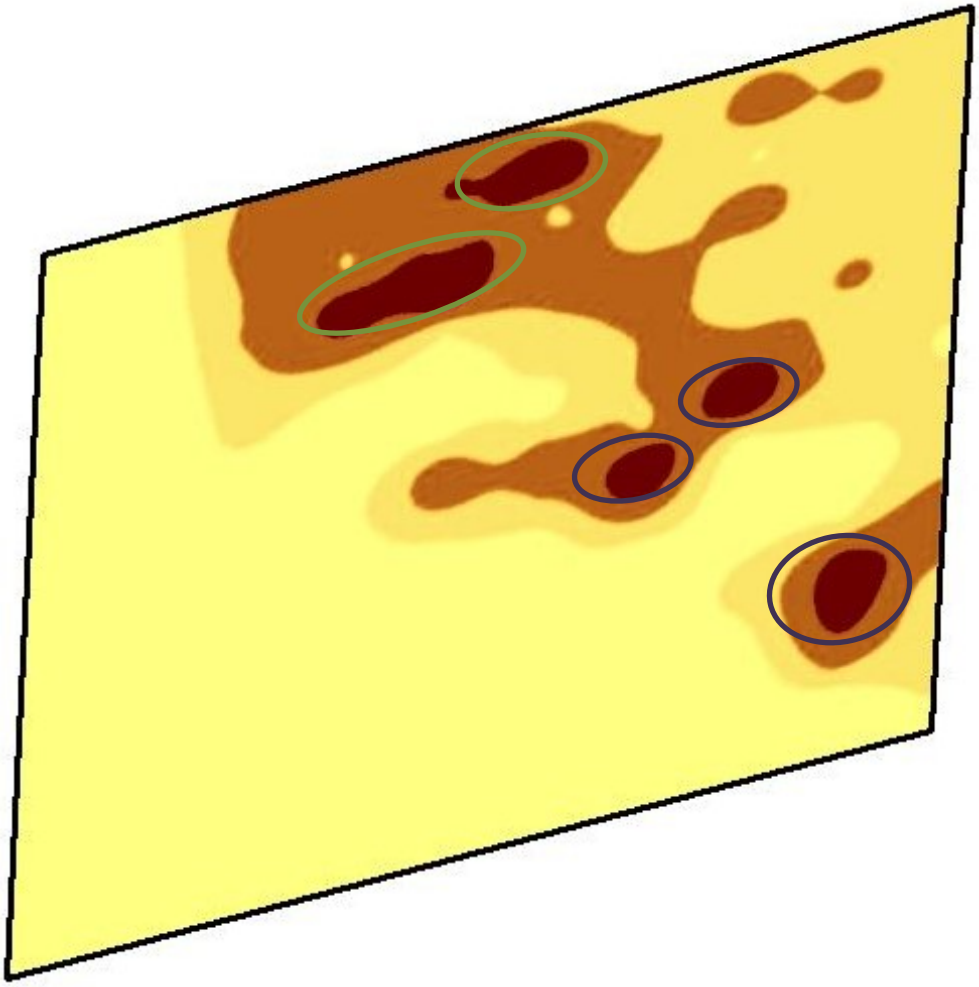


*Figure 1. Site 01 Cemetery*

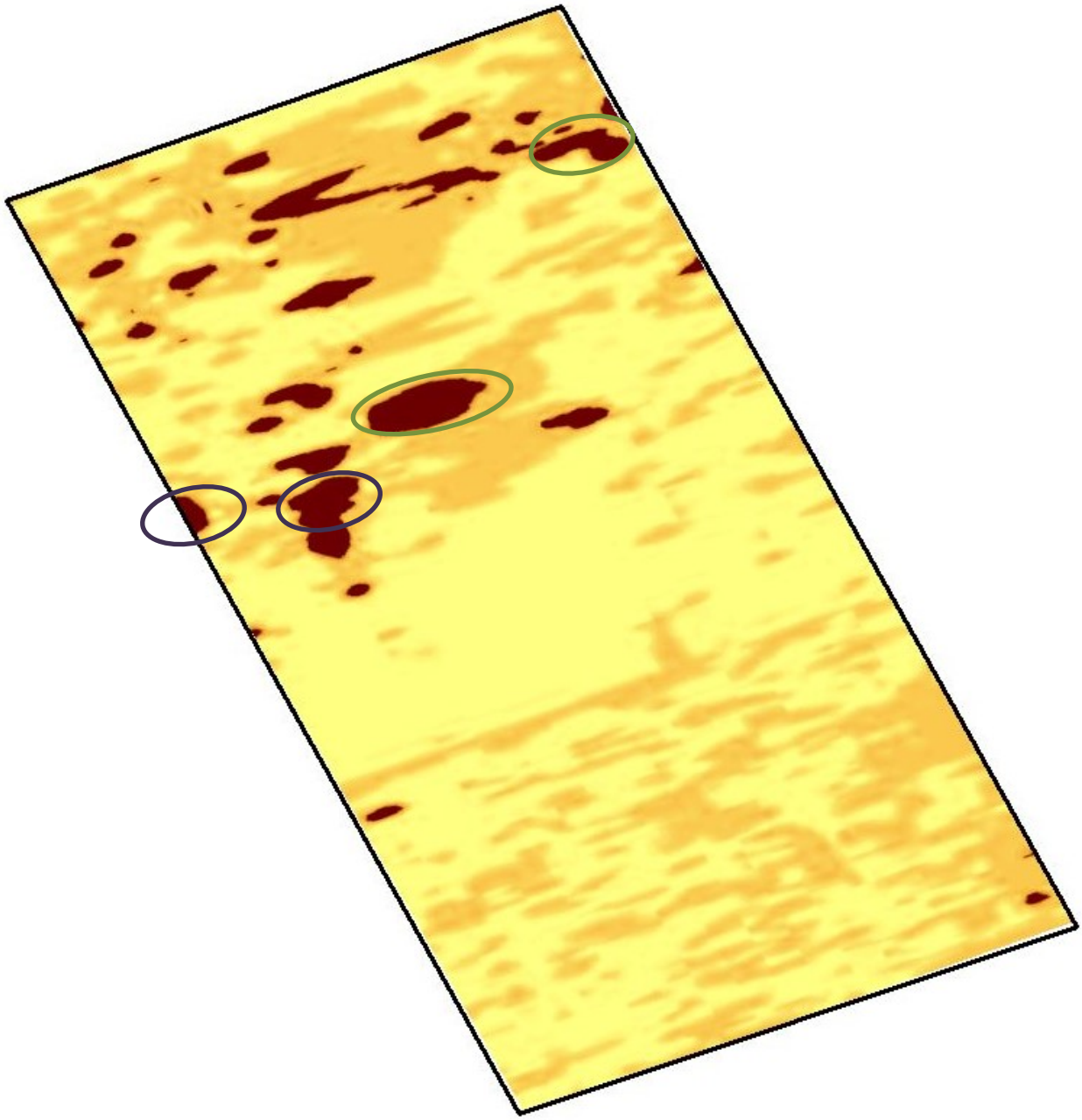


*Figure 2 Site 02 Area east of existing cemetery*

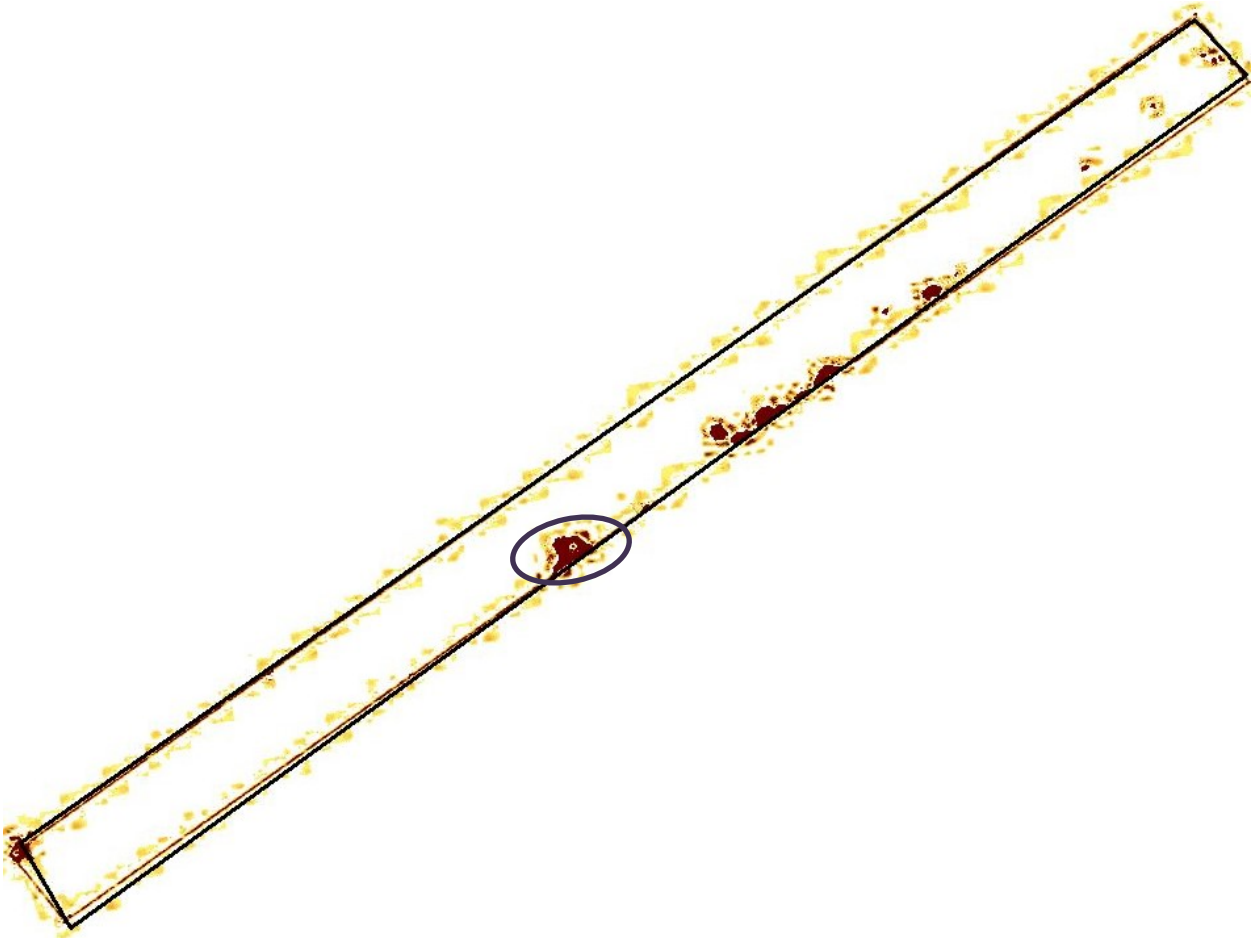


*Figure 3 Site 03 Old Putnam trail. Highlighted is an area with a higher amplitude signal characteristic of a dissimilar material or soil conditions such as moisture content or clay content.*

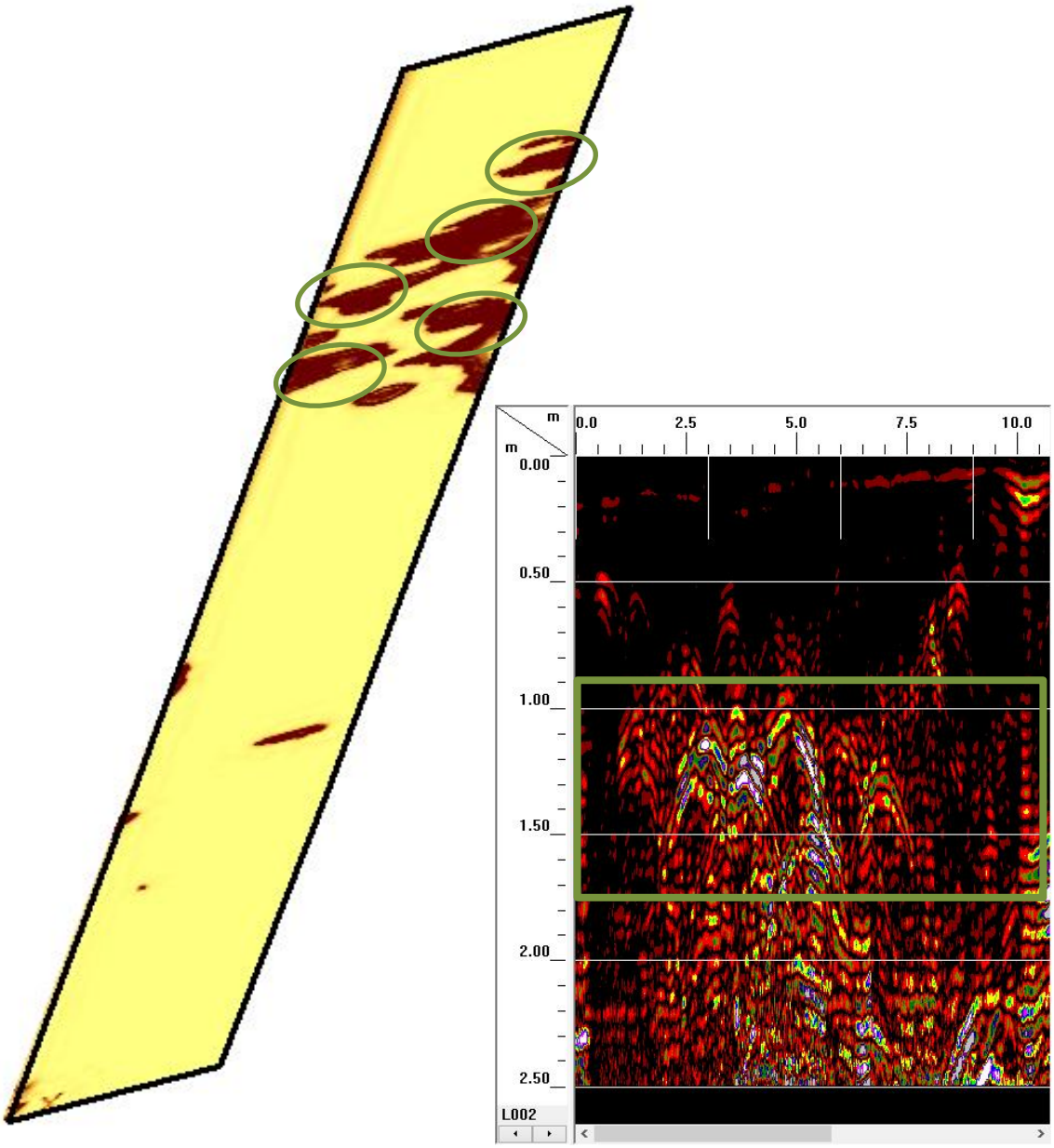
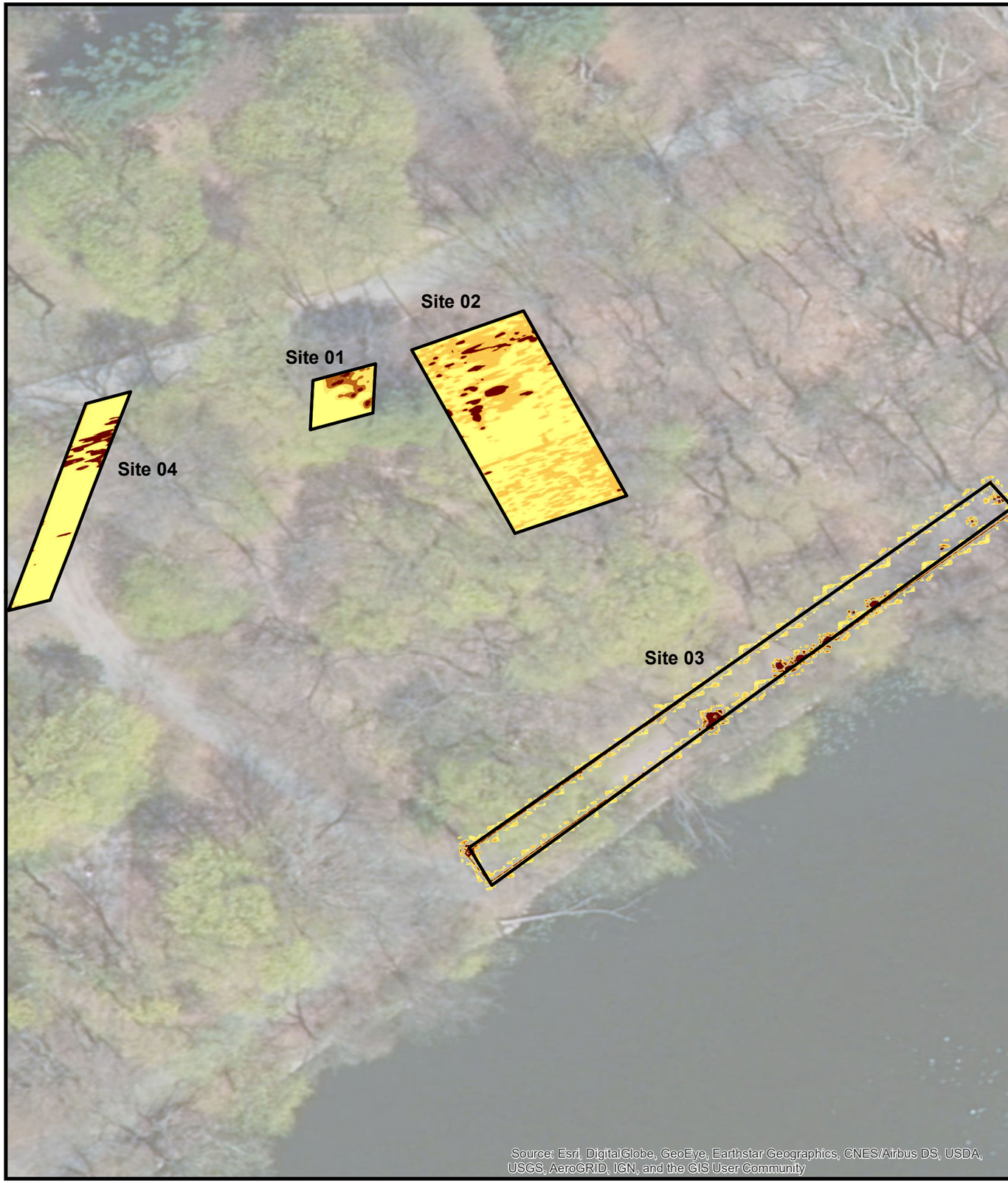
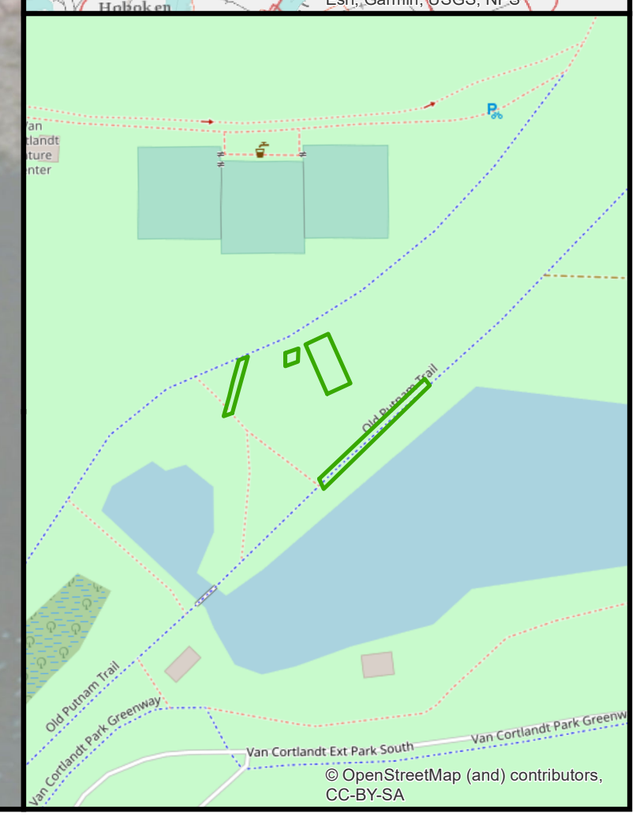



*Figure 4 Site 04 path used for pedestrian and maintenance crew west of the existing cemetery. Highlighted areas showed 5 linear features with in 1 to 1.5 meters deep.*

cc. Richard K. Shaw, PhD
State Soil Scientist








# Ground Penetrating Radar

Van Cortlandt Park
Bronx, New York

Study to Detect Potential Anthropogenic Features

**Signal Amplitude**

Low

High

**Area of Interest**

AOIs

**Government Units**

States

N W E S

Feet
40 20 0 40 80

1 inch = 40 feet

USDA United States Department of Agriculture
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