

United States  
Department of  
Agriculture

Soil  
Conservation  
Service

Northeast NTC  
160 East 7th Street  
Chester, PA 19013

Subject: SOI - GPR Field Assistance

Date: September 14, 1987

To: Philip H. Christensen  
State Conservationist  
Soil Conservation Service  
Storrs, CT 06268

#### Purpose:

To chart the depth to the water table, characterize the underlying stratigraphy, and determine sites for piezometer wells.

#### Participants:

James A. Doolittle, Soil Specialist (GPR), SCS, Chester, PA  
Dr. Stephen Kaffka, Executive Director, Sunny Valley Foundation, New  
Milford, CT  
Kipen J. Kolesinskis, Soil Resource Specialist, Windsor, CT  
Edward H. Sautter, State Soil Scientist, SCS, Storrs, CT

#### Equipment:

The equipment used during this field trip was the SIR System-8. This unit consists of the Model 4800 control unit, the ADTEK Model SR-8004H graphic recorder, and the ADTEK Model DT-6000 tape recorder. The 120 MHz antenna was used with the Model 705DA transceiver.

The scanning time on the control unit was set at 100 nanoseconds. This provided a scanning depth of greater than 30 meters in some areas. The equipment operated well with no observed malfunctions.

#### Study Area

The study area was in hayland and located opposite the Sunny Valley Farm's office. The hayland consists of areas of Windsor loamy fine sand, 3 to 8 percent slopes and Hinckley gravelly loamy sand, 3 to 15 percent slopes. A 27.3 acres, rectangular plot was established across the study area with flags at 50 by 100 foot intervals.

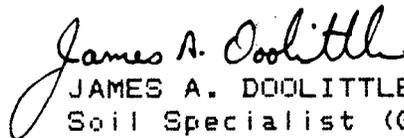
#### Results:

The GPR was used to measure the depth to the ground water and to characterize the strata underlying the study area. Eighteen transects, ranging from 150 to 1800 feet in length were completed with the radar.

The GPR provided high quality imagery of the entire study area. The amount and expression of subsurface stratification was most remarkable (see enclosed figure). The ground water table was apparent in about 40 percent of the area profiled. The image of the water table was difficult to resolve in some areas because of closely spaced, overlapping, and noisy echoes from subsurface strata. In some areas, the water table was beyond the actual depth probed or the probing depth of the GPR.

The radar profiles were analyzed in the field and sites suitable for piezometer wells were located. If surface elevations can be obtained, three-dimensional block diagrams and two-dimensional contour maps of the water table will be graphed using computer graphic techniques.

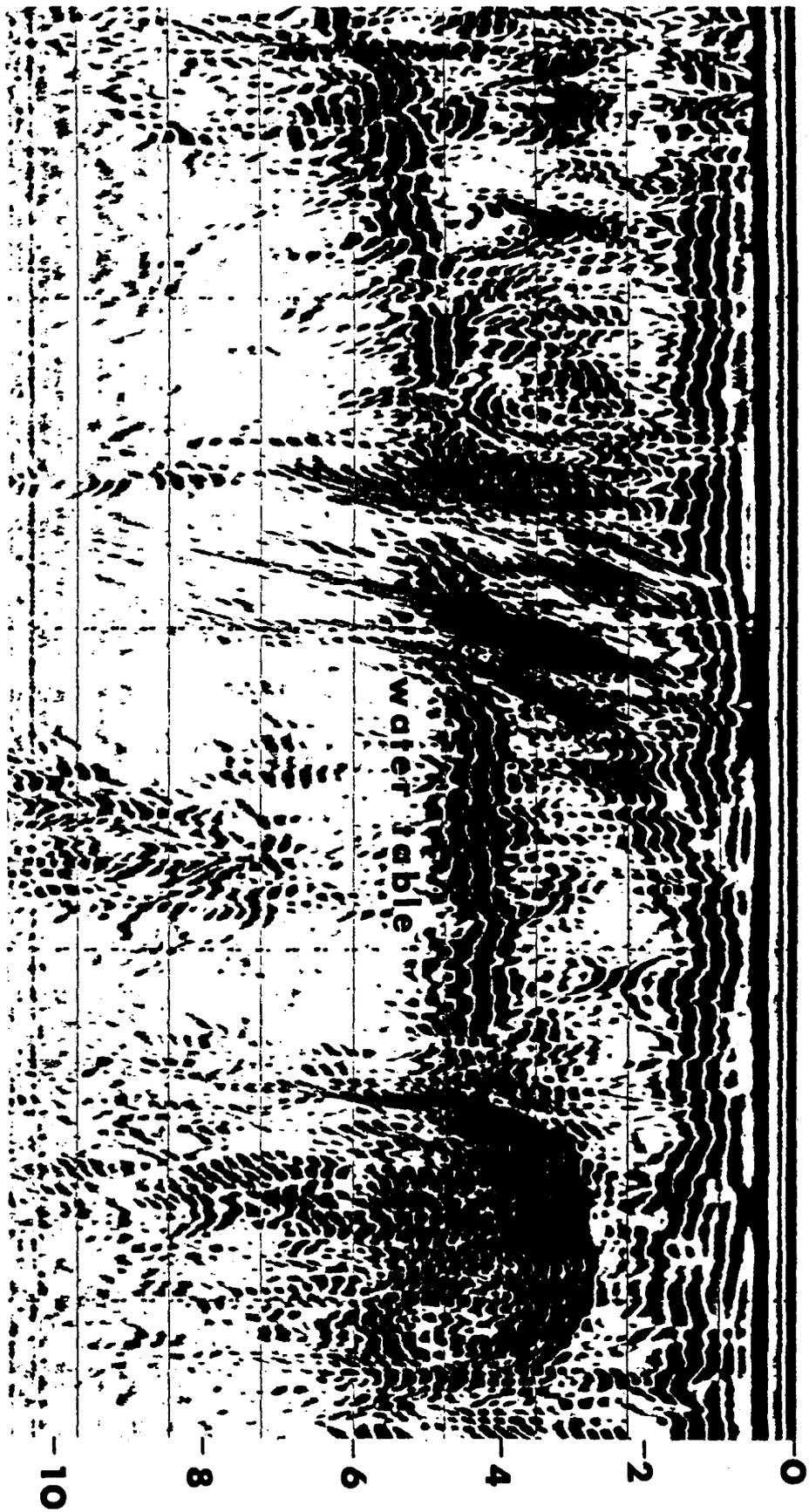
I would like to continue to monitor and chart the seasonal fluctuation of the water table across this landscape. I would like to return with the GPR to this study area in December and in March to continue this study. The grid coordinates will be in place, and field time would be minimum. Derived information would be useful in tracing the movement and fluctuation of ground water (and contaminants) across the study area. Utilizing the 80 MHz antenna, greater depths of penetration and possibly greater resolution of the water table may be attained.

  
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Soil Specialist (GPR)

cc:

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**GPR PROFILE OF THE WATER TABLE  
IN COARSE TEXTURED GLACIOFLUVIAL DEPOSITS**



**DEPTH IN METERS**