



WE ARE



GEOG 596A
Individual Studies –
Peer Review

Master of Geographic
Information Systems

Penn State University
www.worldcampus.pennstate.edu

Mapping Smith Farm, USA – Spring Mills, Pennsylvania

A Full Cycle Remote Sensing Exercise – From Data Acquisition to End-Product Creation

Jamal Cadwell

Advisor Karen Schuckman

GEOG 596A: Individual Studies – Peer Review

Penn State University, MGIS (Spring 2018)

August 3, 2017

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Background

Remote Sensing & Earth Observation Certificate at Penn State

GEOG 892 – Geospatial Application of Unmanned Aerial Systems – Qassim Abdullah

GEOG 883 – Remote Sensing Analysis & Applications – Jarlath O’Neil-Dunne

GEOG 480 – Exploring Imagery & Elevation Data in GIS – Rakesh Malhotra

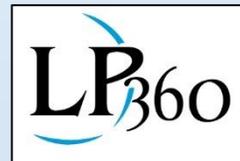
GEOG 481 – Topographic Mapping with LiDAR – Karen Schuckman



GEOG 892



GEOG 481



GEOG 883



GEOG 480



“Applying skills learned in the program to create a full cycle remote sensing workflow”

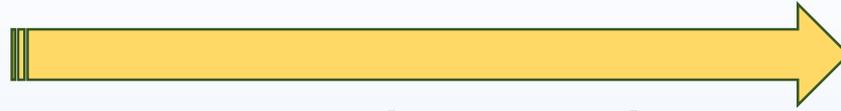
Background

Smith Farm, USA – Spring Mills, Pennsylvania

Deeded to Haines - 1767



200 acres



250 years and 18 owners later...



John and Catherine Smith - 2017



70 acres

Background

Smith Farm, USA – Spring Mills, Pennsylvania

Agricultural to post-agricultural (natural conditions)

Conservationist role / Preserving for generations

Promote ecological diversity in plants & animals



CENTRE COUNTY HISTORICAL SOCIETY

Centre Furnace Mansion

1001 East College Avenue ❖ State College, Pennsylvania 16801 ❖ 814.234.4779

December 22, 2011

John and Catherine Smith
Chicory Lane Farm
P.O. Box 132
246 Brush Mountain Road
Spring Mills, PA 16875

Dear Mr. and Mrs. Smith,

Our congratulations to you for being selected to receive a 2011 Award of Excellence in Historic Preservation from the Board of Governors of the Centre County Historical Society.

We wish to recognize your contributions through the preservation of Chicory Lane Farm in Spring Mills, including the early log farm house and the site of early agricultural uses relative to land productivity and water resources.

You and your guests are cordially invited to join us at our annual meeting and awards ceremony at the Centre Furnace Mansion on Sunday, January 8, 2012 at 3:00 p.m. to receive your award. Please R.S.V.P. with your name and number of guests no later than January 6th by calling (814) 234-4779 or by emailing info@centrecountyhistory.org.

We ask that if you have any photos that could be used during the award presentation to emphasize the historical importance of your recognition, please send them to the Society. Any materials loaned will be returned to you on January 8.

We offer our thanks on behalf of the residents of our area for all of your contributions relative to the maintenance and use of a Centre County farmstead.

Sincerely,

Robert Hazelton

John Ziegler

*Nominating Committee, Preservation Awards
Board of Governors*

CC: Ann Donovan

www.centrecountyhistory.org

Goals and Objectives

Smith Farm, USA – Spring Mills, Pennsylvania



0. House, Yard, & Barn

1. Grasslands

- 1.1 Pollinator Field (Planted)
- 1.2 Mesic Grassland (Planted)

2. Upper Wetland

- 2.1 Wet Meadow (Natural)
- 2.2 Cat-tail Marsh (Natural)
- 2.3 Farm Pond (Built & Planted)

3. Front Field

- 3.1 Red Maple - Mixed Shrub Palustrine Woodland (Planted)

4. Lower Wetland

- 4.1 Herbaceous Vernal Pools (Built & Planted)

5. Front Meadow

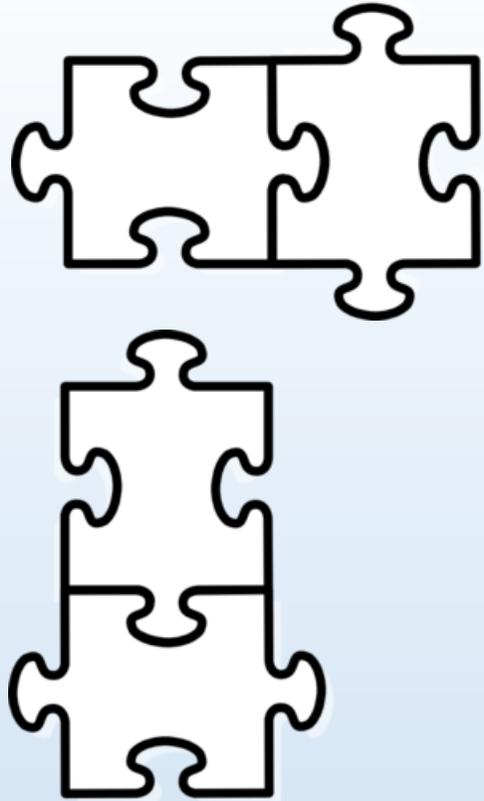
- 5.1 Black Willow Shrub Wetland (Natural)

6. Forests

- 6.1 Successional Forest (Managed)
- 6.2 Hemlock - Red Oak Mixed Hardwood Forest (Natural)
- 6.3 Red Oak Mixed Hardwood Forest (Planted)

Proposed Methodology

Smith Farm, USA – Spring Mills, Pennsylvania



1

Abstract – Map Smith Farm to help land owner maximize land-use potential. Conduct full cycle remote sensing exercise

2

Focus Area – Area of interest will be within range of the 70-acre property boundary. Depending on time, the area may be smaller

3

Determine Data Needs – Preliminary map of land parcel for planning, ground control points, aerial imagery

4

Determine Derivative Product Needs – Point cloud via imagery, DEMs, DSMs, land-cover classification, NDVI

5

Determine Equipment Needs – UAS, camera, GPS, all-terrain vehicle for transportation, field supplies (i.e., poles, flags, stakes)

6

Determine Hardware / Software Needs – Laptop, ArcGIS, Mission Planner (drone inputs / planning), and Pix4D

7

Acquire Data – Once planning is done, acquisition must be conducted (i.e., field work to capture GPS, drone for imagery) Be FAA Part 107 compliant before hand

8

Load / Preprocess Data – Load data with appropriate software / hardware, preprocess before usage

9

Workspace Setup / QC Data – After data load (i.e., imagery, culture) continue to ensure data is suitable for use

10

Process Data / Create Products – Follow steps, manipulate data, export derivative products for use

11

Analyze Data – Conduct analyses of the data products created

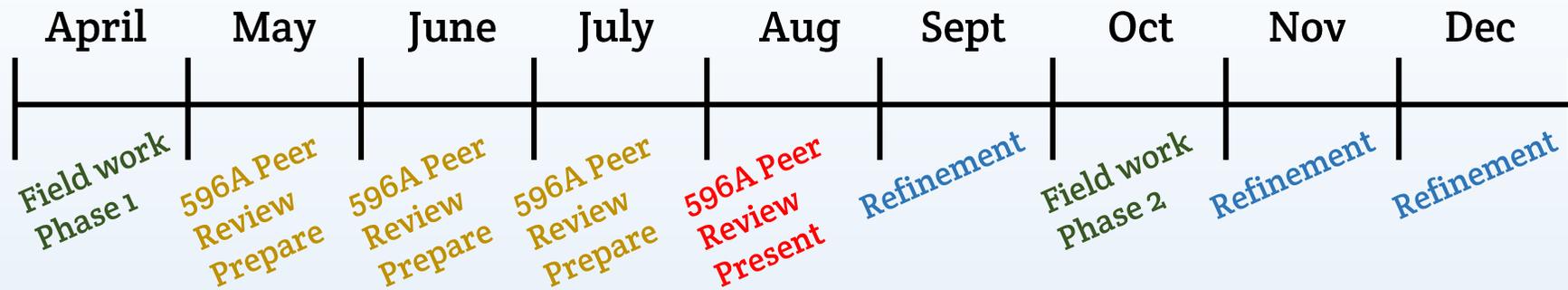
12

Document Findings / Reporting – Include commentary, imagery, and any other information that illustrates work, state findings

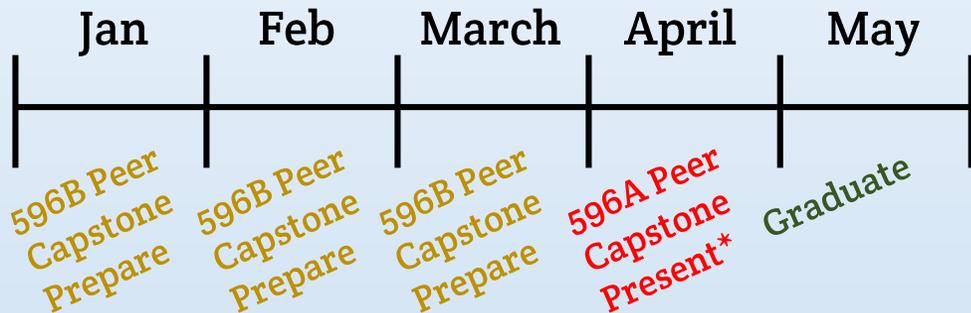
Project Timeline

Smith Farm, USA – Spring Mills, Pennsylvania

2017



2018

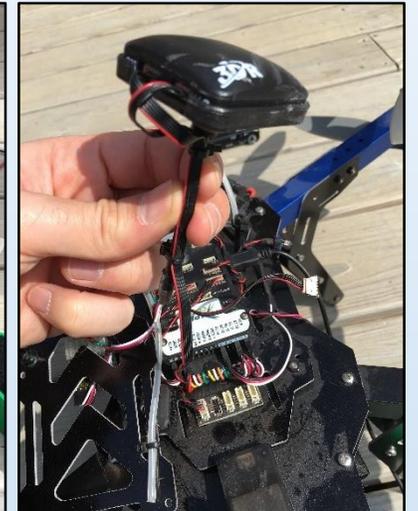
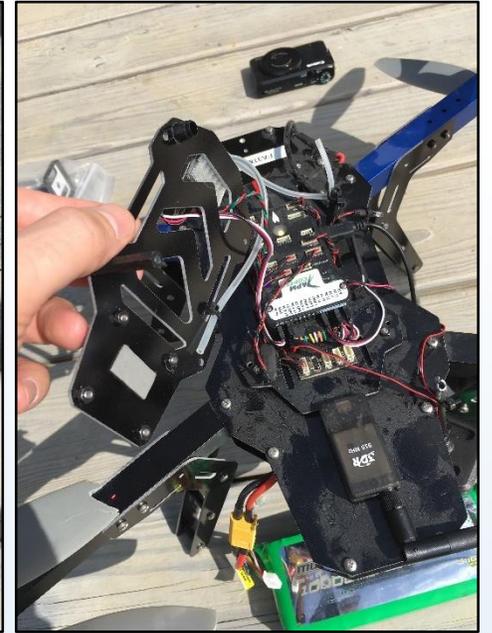


*Signifies presentation will be completed before month of May but more than likely will be conducted earlier in the semester

Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania

Before...



After...

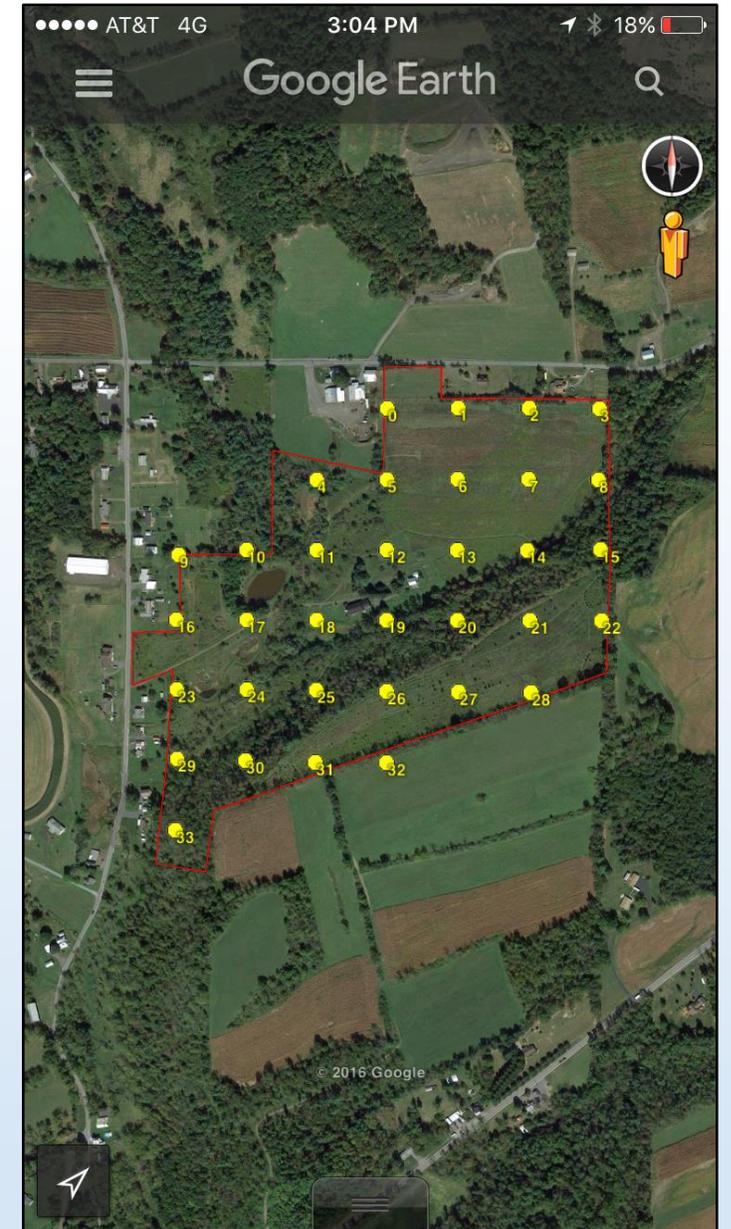
Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 1)



Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 1)



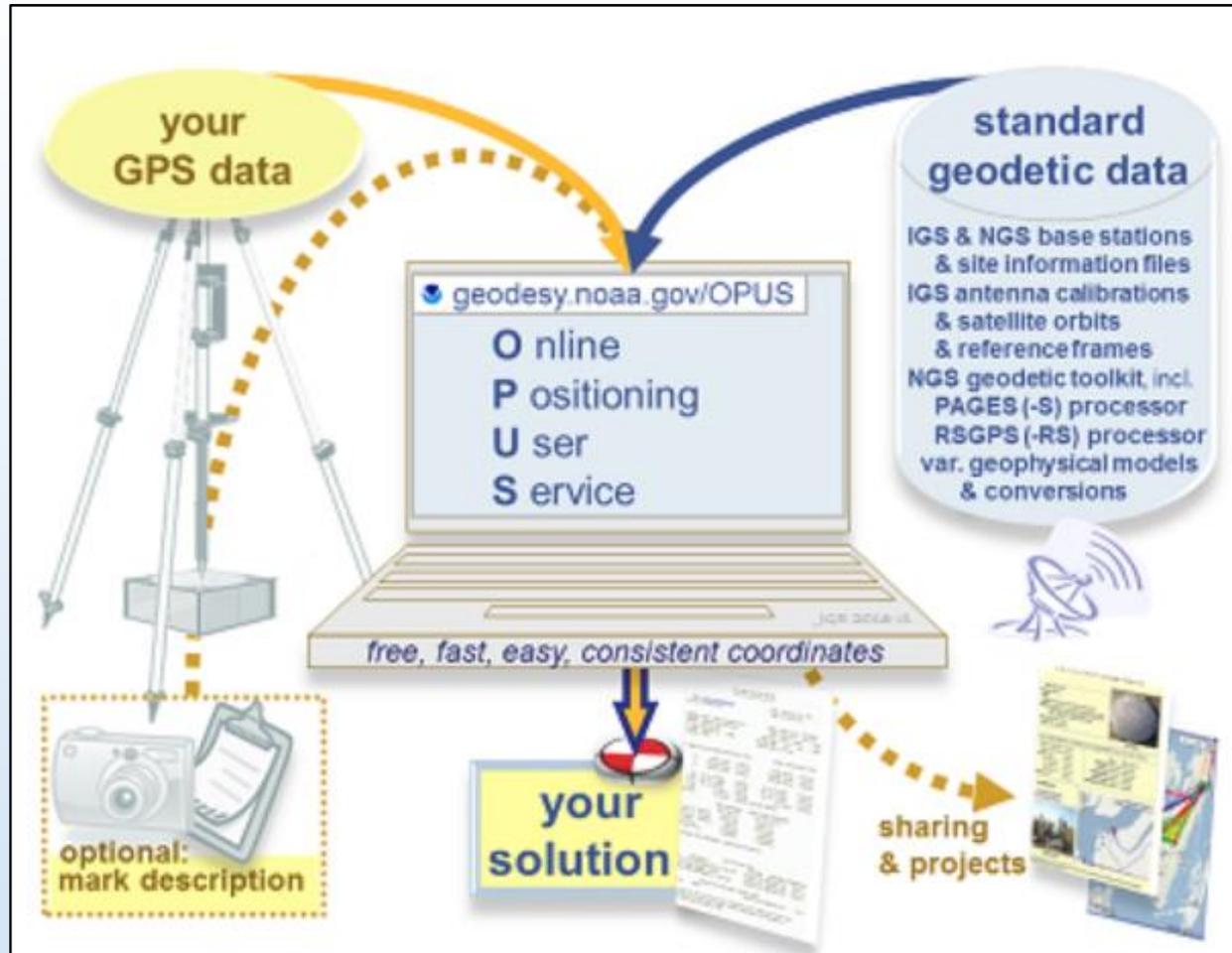
Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 1)



Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 1)



FILE: 035256104A0.HCN OP1498251360373

HCN File, Unique XML File Name

NGS OPUS-RS SOLUTION REPORT
=====

All computed coordinate accuracies are listed as 1-sigma RMS values.
For additional information: <https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy>

USER: jamal.cadwell@gmail.com DATE: June 23, 2017
RINEX FILE: 0352104t.17o TIME: 20:58:49 UTC

SOFTWARE: rsgps 1.38 RS81.pr1 1.99.3
EPHEMERIS: igs19445.eph [precise]
NAV FILE: brdc1040.17n

ANT NAME: CHCX90D-OPUS NONE
ARP HEIGHT: 1.6

OBS USED: 2349 / 2484 : 95%
QUALITY IND. 13.89/ 23.81
NORMALIZED RMS: 0.355

Observation Date, Start & Stop Time

START: 2017/04/14 19:20:20
STOP: 2017/04/14 19:43:30

Antenna Name, Antenna Reference Point Height in Meters

REF FRAME: NAD_83(2011) (EPOCH:2010.0000) IGS08 (EPOCH:2017.28442)

Horizontal Reference Frame

X:	1041417.855(m)	0.006(m)	1041416.980(m)	0.006(m)
Y:	-4716078.332(m)	0.020(m)	-4716076.910(m)	0.020(m)
Z:	4152440.934(m)	0.016(m)	4152440.886(m)	0.016(m)

Latitude, Longitude in Degrees Minutes Seconds

LAT:	40 52 42.20051	0.005(m)	40 52 42.23280	0.005(m)
E LON:	282 27 8.56814	0.005(m)	282 27 8.54474	0.005(m)
W LON:	77 32 51.43186	0.005(m)	77 32 51.45526	0.005(m)

Elevation, Orthometric Height in Meters

EL HGT:	335.631(m)	0.025(m)	334.407(m)	0.025(m)
ORTHO HGT:	368.929(m)	0.028(m)	[NAVD88 (Computed using GEOID12B)]	

Orthometric Height Uncertainty, Vertical Reference Frame

	UTM COORDINATES	STATE PLANE COORDINATES	UTM, State Plane Coordinates, Northing, Easting in Meters
UTM (Zone 18)	4528381.676	79059.569	
Northing (Y) [meters]	4528381.676	79059.569	
Easting (X) [meters]	285337.657	617058.538	
Convergence [degrees]	-1.66793996	0.13388244	
Point Scale	1.00016719	1.00000080	
Combined Factor	1.00011454	0.99994815	

US NATIONAL GRID DESIGNATOR: 18TTL8533728381(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DE7166	LYCO LYCOMING CNTY CTH CORS ARP	N411427.499	W0770008.348	61014.3
DJ8949	PASS SCHUYLKILL HAVEN CORS ARP	N403820.925	W0760929.779	120290.4
DM4139	PAFC CHAMBERSBURG CORS ARP	N395649.413	W0774011.167	103938.8
DK6722	PAPC COUDERSPORT 2 CORS ARP	N414551.866	W0780124.329	106164.5
DL7808	PABT TOWANDA CORS ARP	N414645.319	W0762649.672	136007.1
DE8103	YORK YORK CORS ARP	N395913.276	W0764424.537	120381.7
DM2670	PAFM MCCONNELLSBURG CORS ARP	N395744.912	W0775843.617	108091.4
DM4700	PAJP PUNXSUTAWNEY CORS ARP	N405644.654	W0785703.370	118465.0
AF9631	WIL1 WILKES BARRE CORS ARP	N411818.912	W0760055.100	137195.7

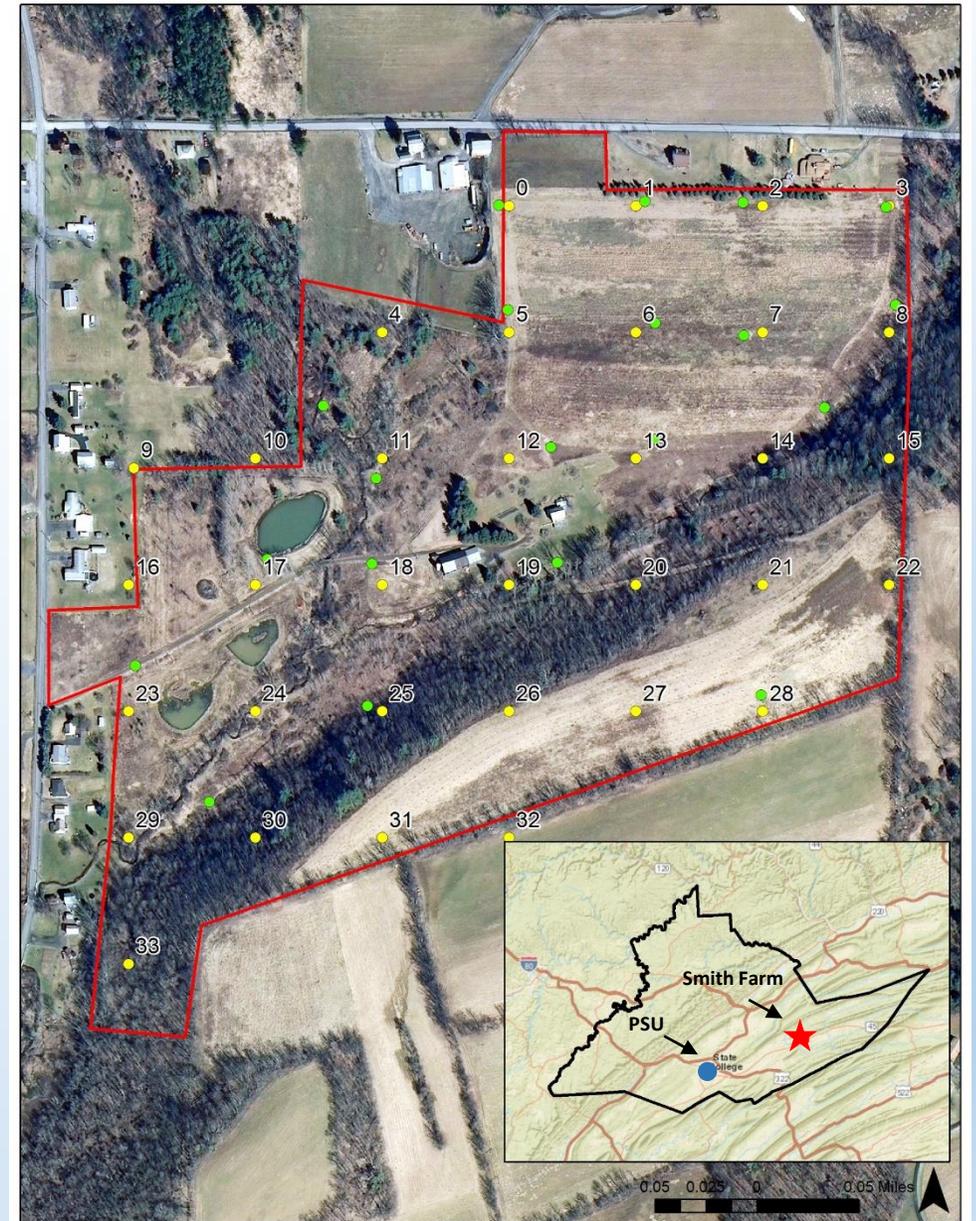
NEAREST NGS PUBLISHED CONTROL POINT

KW2901	SPRING	N405222.525	W0773201.847	1310.1
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This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

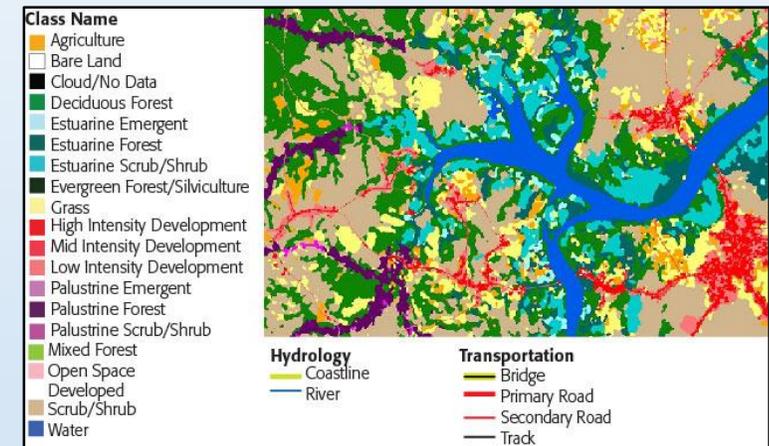
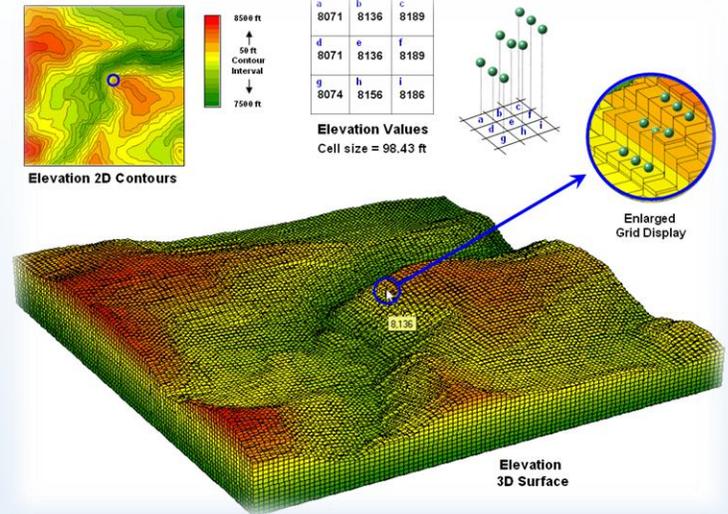
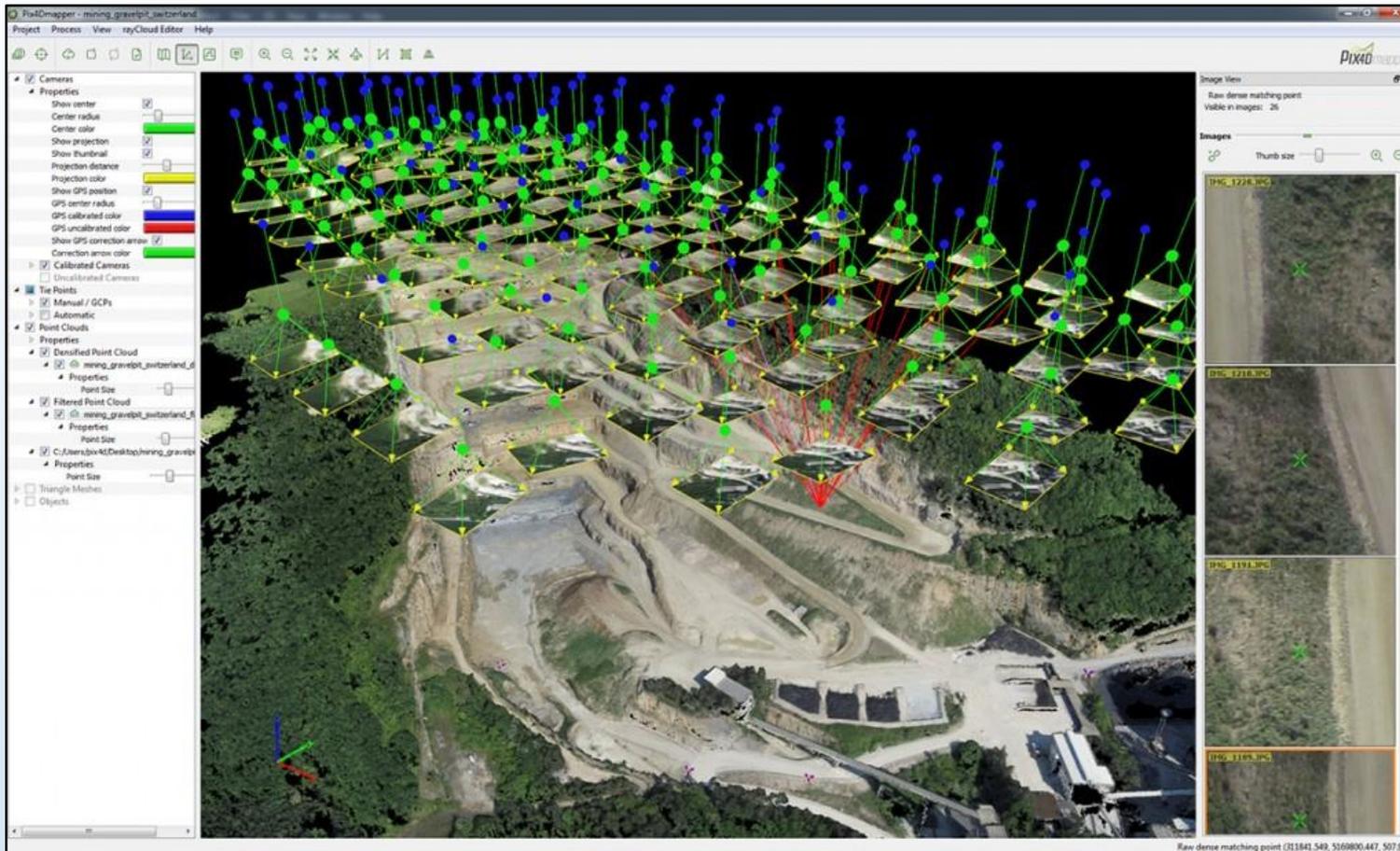
Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 2)



Work Conducted / Anticipated Results

Smith Farm, USA – Spring Mills, Pennsylvania (Phase 3)





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Thank You!

Questions and Answers

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