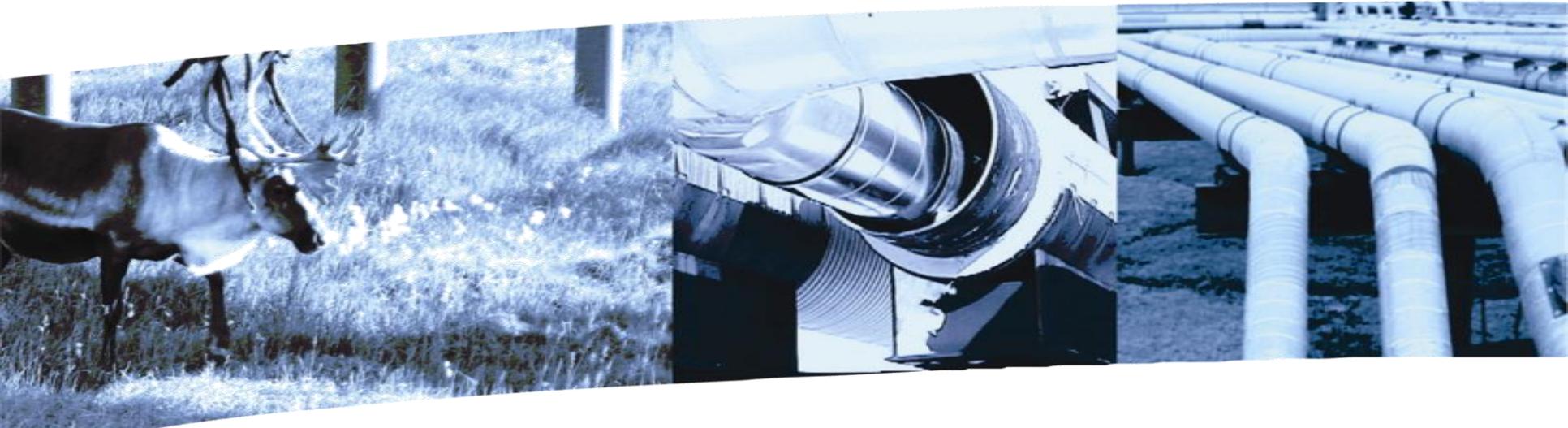




# OFC Geographic Information System (GIS) Prototype

**Ms. Christa Gunn**  
**Office of the Federal Coordinator**  
**Anchorage, AK**  
**ESRI Federal User Conference**



- **OFC Roles and Responsibilities**
- **Overview of Project**
- **Prototype**
  - **Requirement**
  - **Data Integration**
  - **Access**
  - **Applications**
- **Path Forward**

# OFC Roles and Responsibilities

- Coordination
- Compliance
- Information Source

## Mission Statement

*Advance our Nation's energy, environmental and economic security by expediting the delivery of clean natural gas from the North Slope of Alaska to North American markets*

# US Federal Agency Interaction

- **Office of Federal Coordinator**
- **Council on Environmental Quality**
- **Federal Energy Regulatory Commission**
- **Department of Interior**
  - BLM
  - BIA
  - FWS
  - MMS
  - NPS
  - USGS
- **Department of Energy**
- **Department of Transportation**
  - FHWA
  - PHMSA
  - FAA
- **Department of Treasury**
- **Department of State**
- **Department of Defense**
  - USACE
  - USAF
- **Department of Commerce**
  - NOAA
  - NMFS
- **Department of Homeland Security**
  - CBP
  - TSA
  - USCG
- **Department of Labor**
- **Environmental Protection Agency**
- **Department of Agriculture**
- **Advisory Council on Historic Preservation**
- **Department of Justice**
- **Federal Communications Commission**

# Coordination

- **Federal Agencies and the Administration**
  - Regular Interagency Meetings
  - Summer Visits and Briefings
- **State of Alaska**
  - Weekly Meetings with Permitting Staff
  - Surveillance and Monitoring Agreement
- **Canada**
  - Meet with Canadian Ministers, Senior Staff
  - Meet with U.S. and Canadian Ambassadors
- **Applicants**
  - Level playing field

# Pipeline Applicants

## ■ Denali

- Pre-filed with the Federal Energy Regulatory Commission (FERC)
- Filing Open Season package Apr 2010
- Offering route from North Slope to Alberta



## ■ Alaska Pipeline Project

- State License - AGIA
- Pre-filed with FERC
- Filed Open Season package Jan 2010
- Offering route from North Slope to Alberta or Valdez

**ALASKA**  
**PipelineProject**

 TransCanada  ExxonMobil



# What's Known

- **Competition to build this project**
- **Economic benefits huge for America**
  - Thousands of jobs on the table
  - Privately financed
- **Long term market for all domestic natural gas**
- **Multiple environmental benefits**
- **Infrastructure – minimize land use impact**
  - Current route utilizes existing Rights-of-Way
- **Achievable project**

# OFC Initiatives

- **Gap Analysis**
- **Consolidated Implementation Plans**
- **Senior Intergovernmental Management Team and Interagency Meetings**
- **Technical Team**
  - Share engineering information and expertise
- **Permit/Authorization Matrix**
- **Geographic Information System (GIS) Prototype**

# Prototype Need and Challenges

- Agencies use different sets of incompatible data and systems when studying the pipeline route
- Lack of a good, authoritative basemap to reference information relevant to permitting
- Much good data, but interrelation can be challenging
- Difficult for public to understand data picture from multiple sources



# Goals

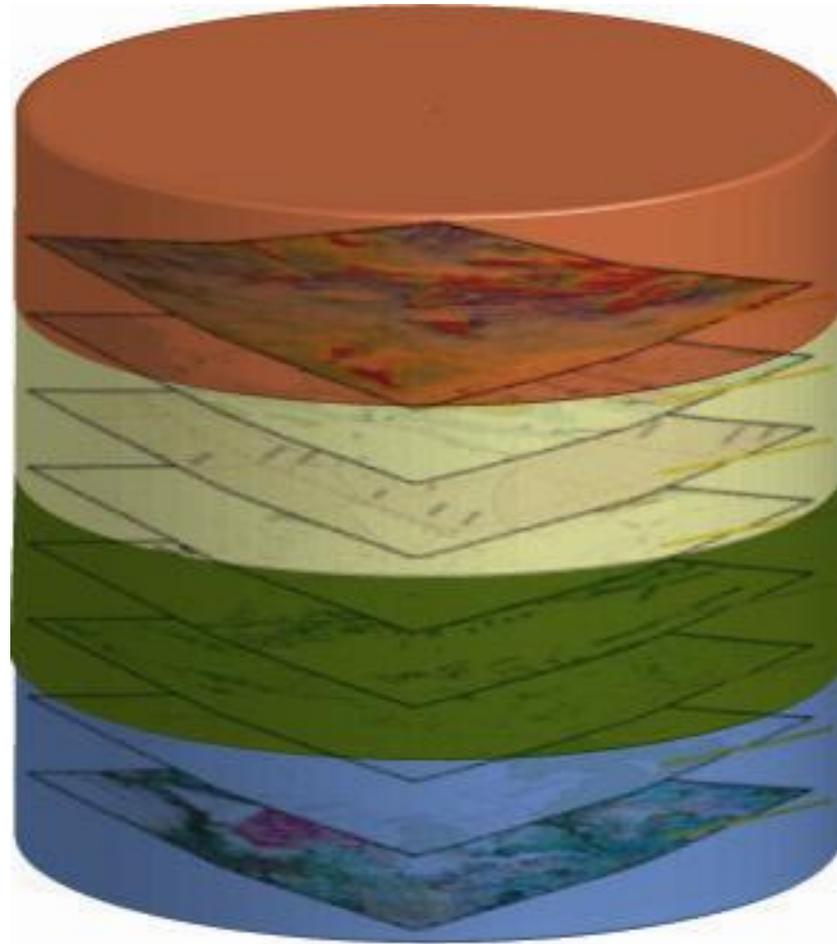
- **Establish an authoritative basemap and GIS for referencing data**
  - Provide a common standard and reference system
  - Single location to store/integrate historical data
- **Provide transparent access to the public, agencies, stakeholders, applicants and OFC**
  - Create web-based access to the data

***Demonstrate that the GIS prototype is an authoritative, consistent, and integrated source of information to construct, operate, and maintain the pipeline***

**OFC GIS PROTOTYPE**

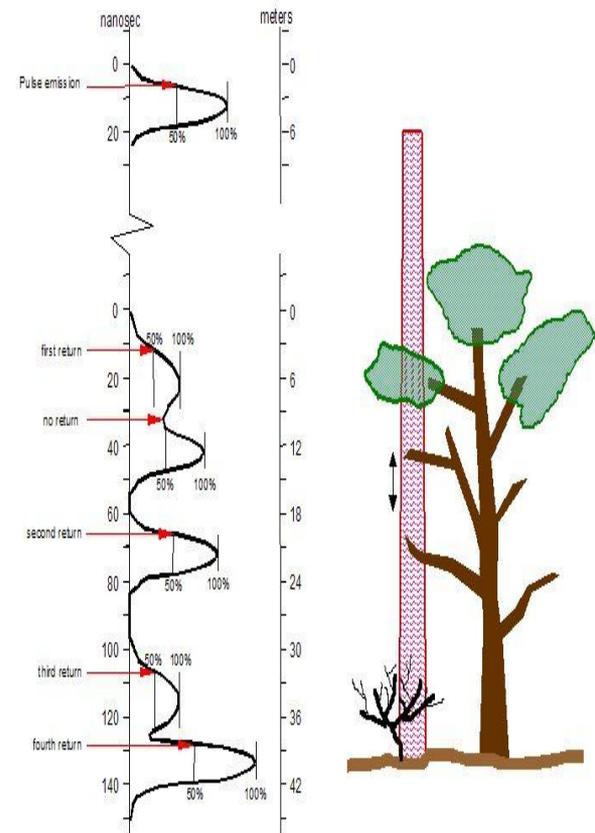
**DATA INTEGRATION**

# GIS is a Database

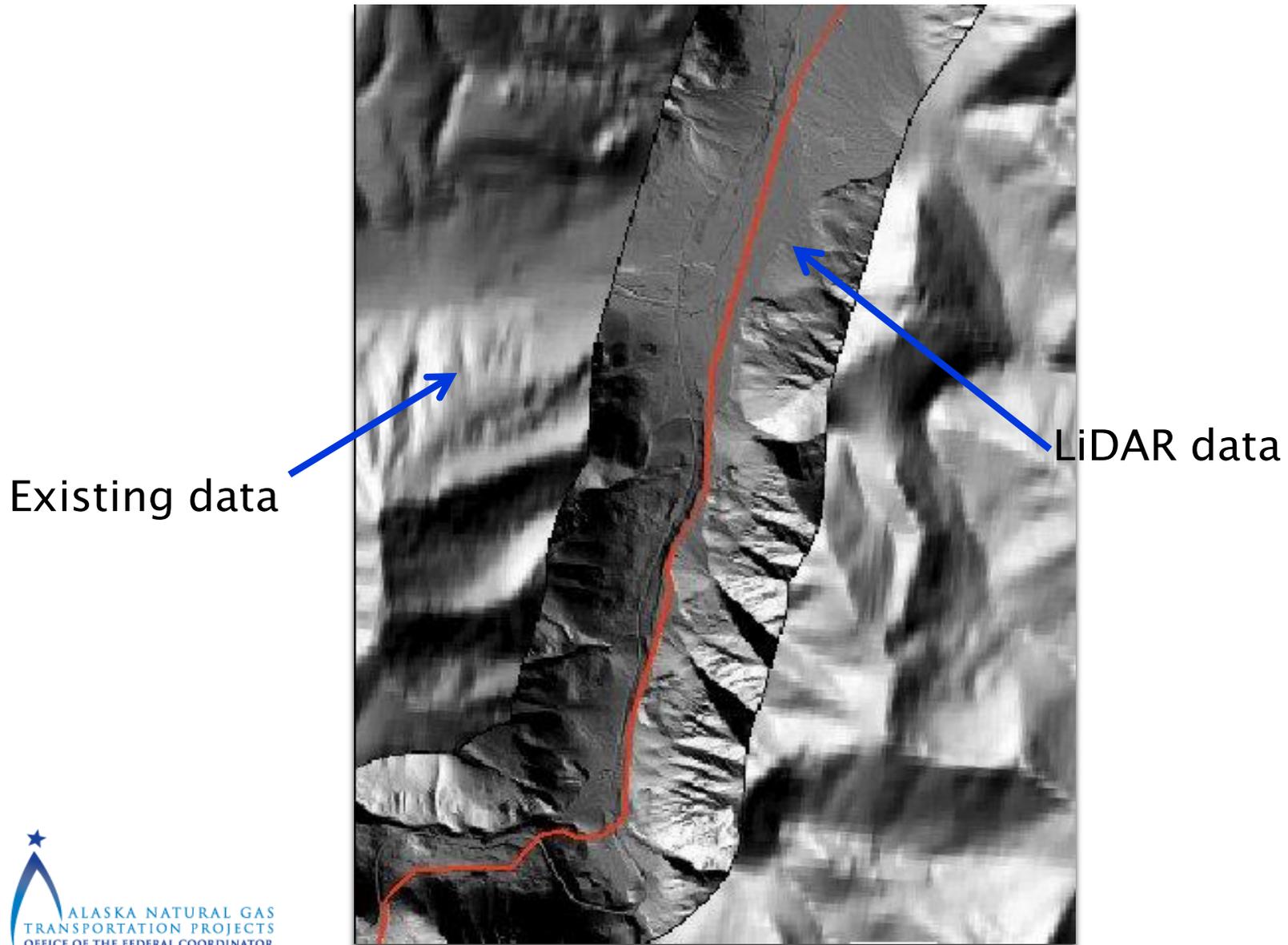


# Basemap for GIS Prototype

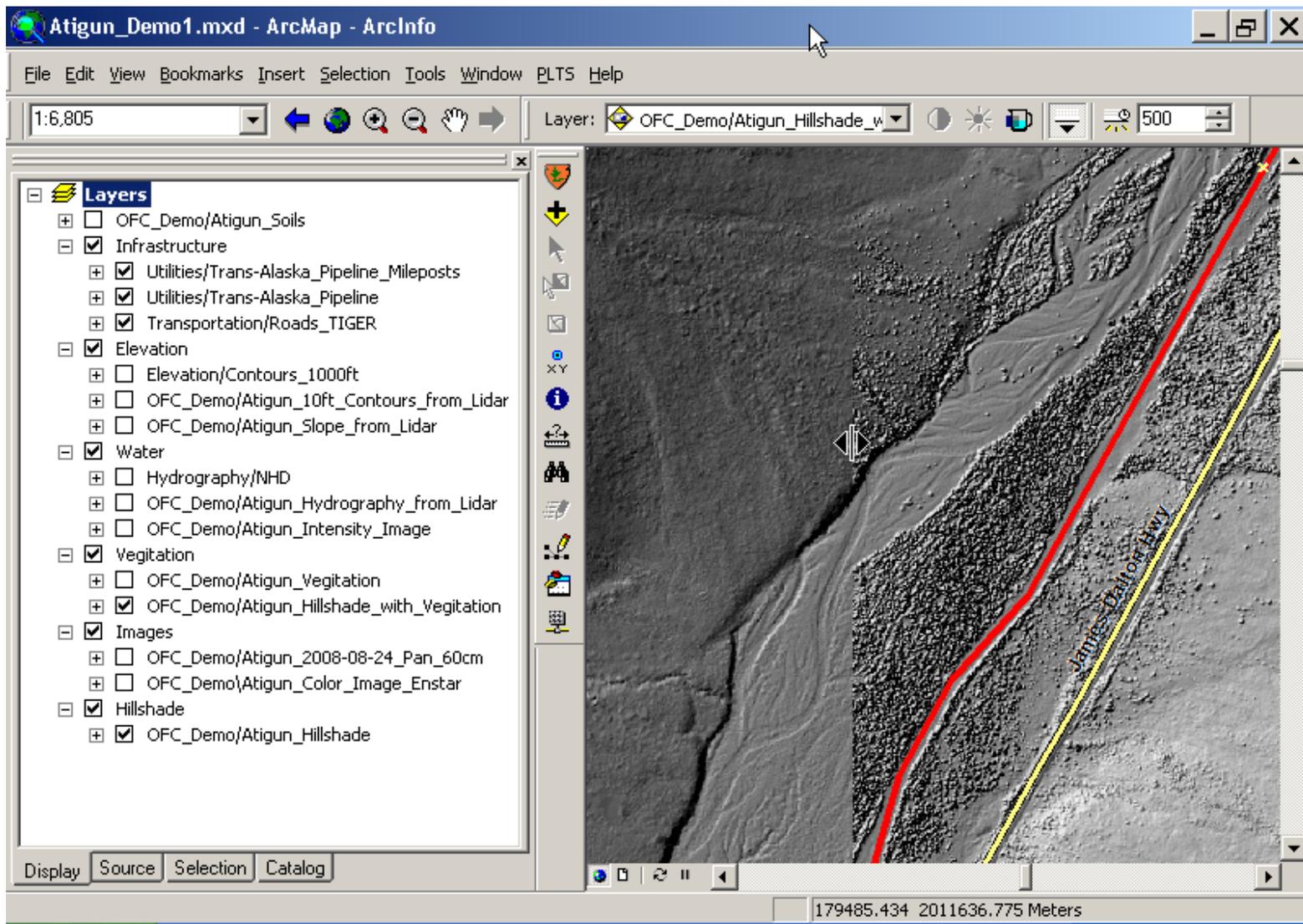
- **Light Detection and Ranging (LiDAR) Basemap:**  
Gives users an overview of broad, continuous features that would be other indistinguishable
- **LiDAR Specifications**
- **LiDAR Benefits**
  - Geohazard detection
  - Wetlands
  - Stream mapping
  - Geotechnical and
  - Engineering aspects



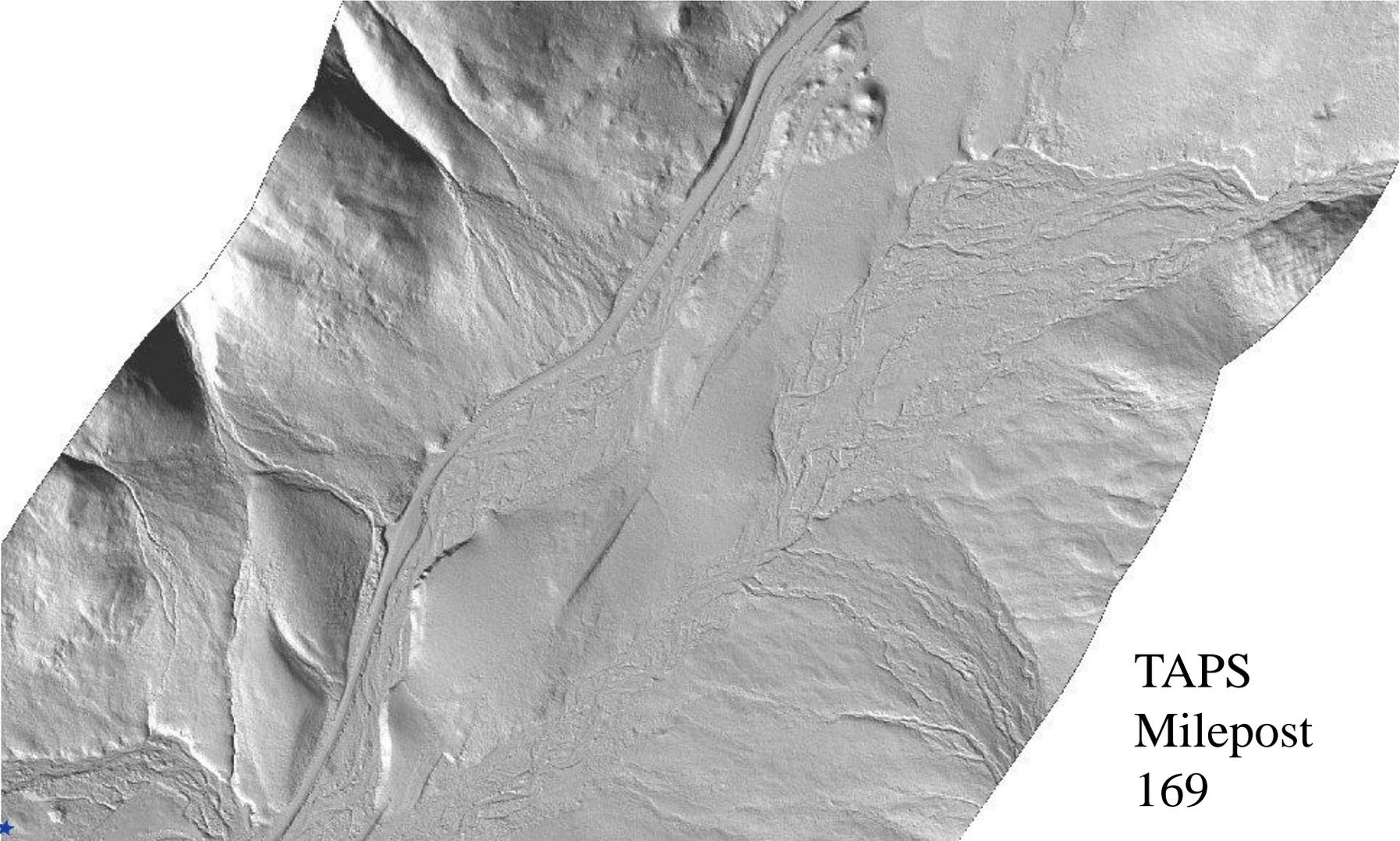
# Importance of Data Quality



# LiDAR Benefits

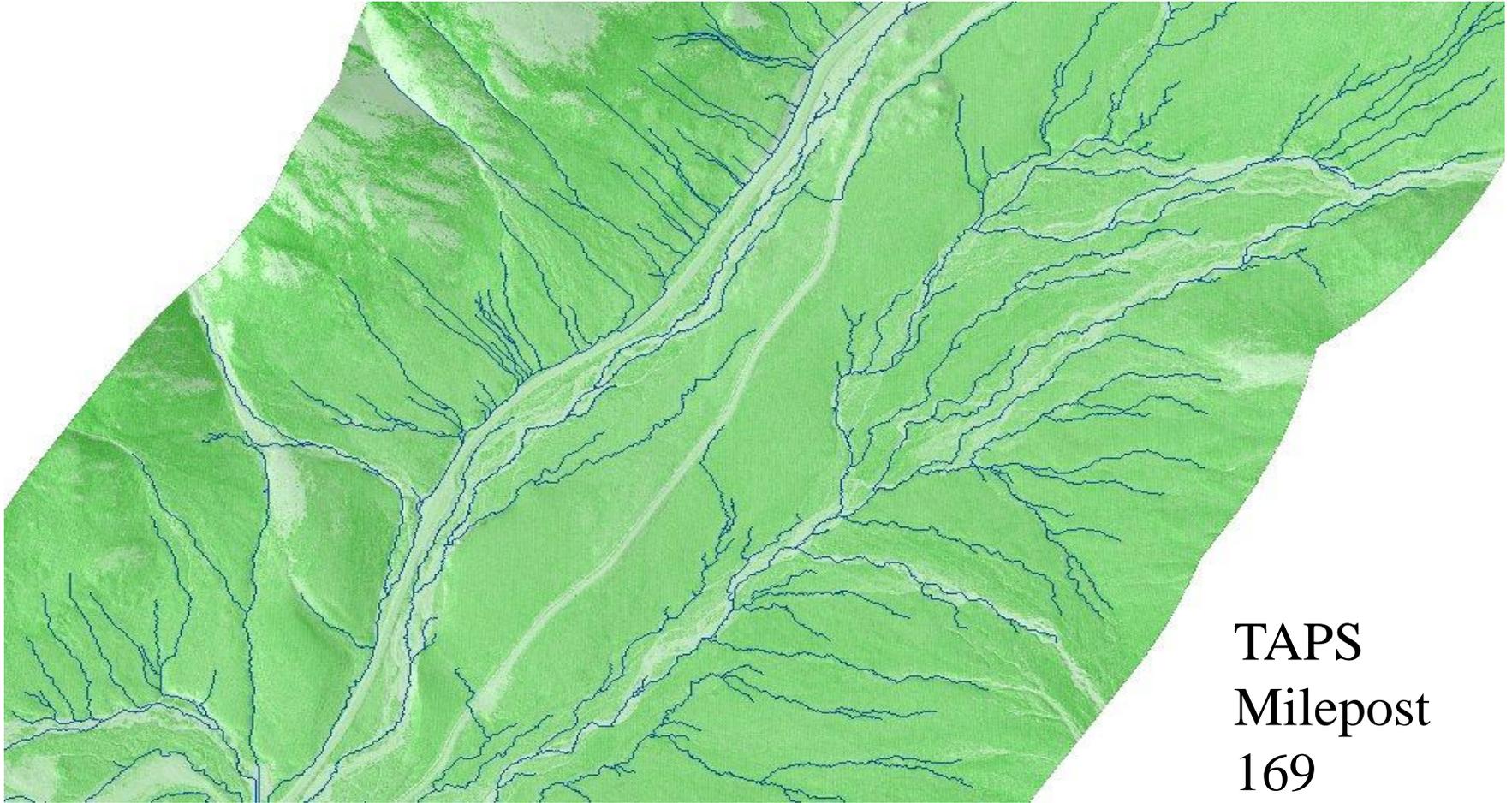


# Bare Earth Hillshade



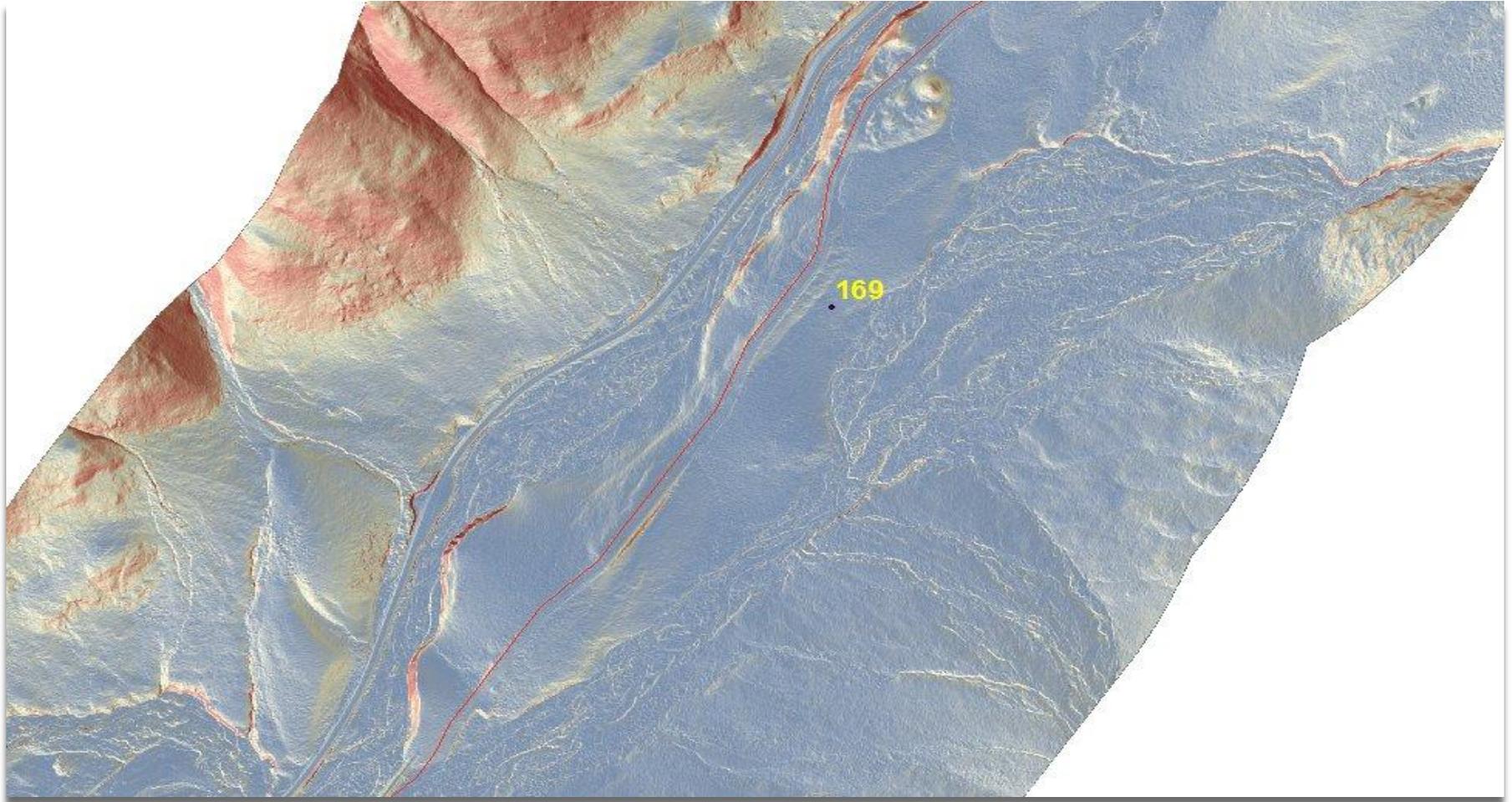
TAPS  
Milepost  
169

# LiDAR Derivative Analysis with GIS - Intensity Image and Streams

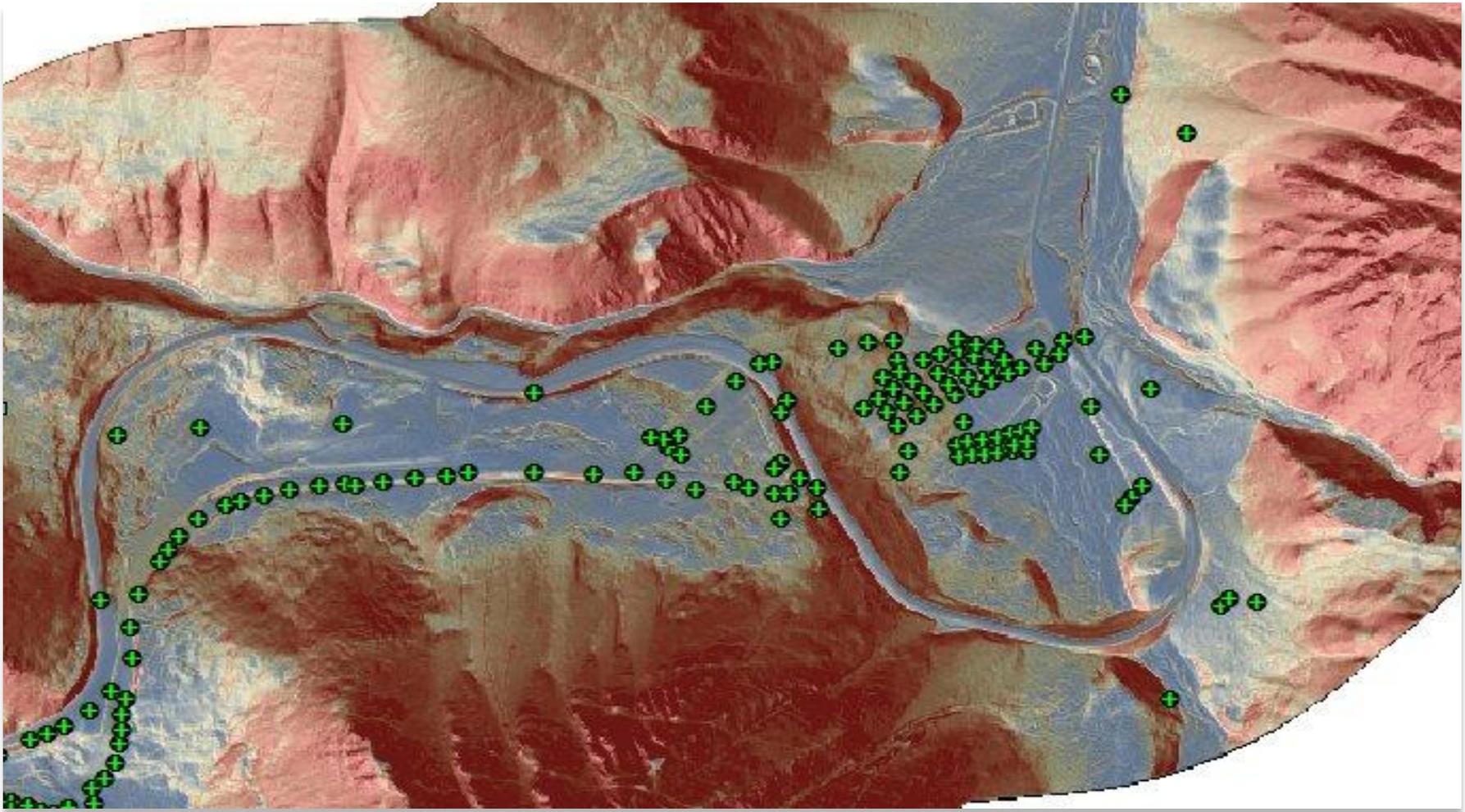


TAPS  
Milepost  
169

# LiDAR Derivative Analysis with GIS - Slope

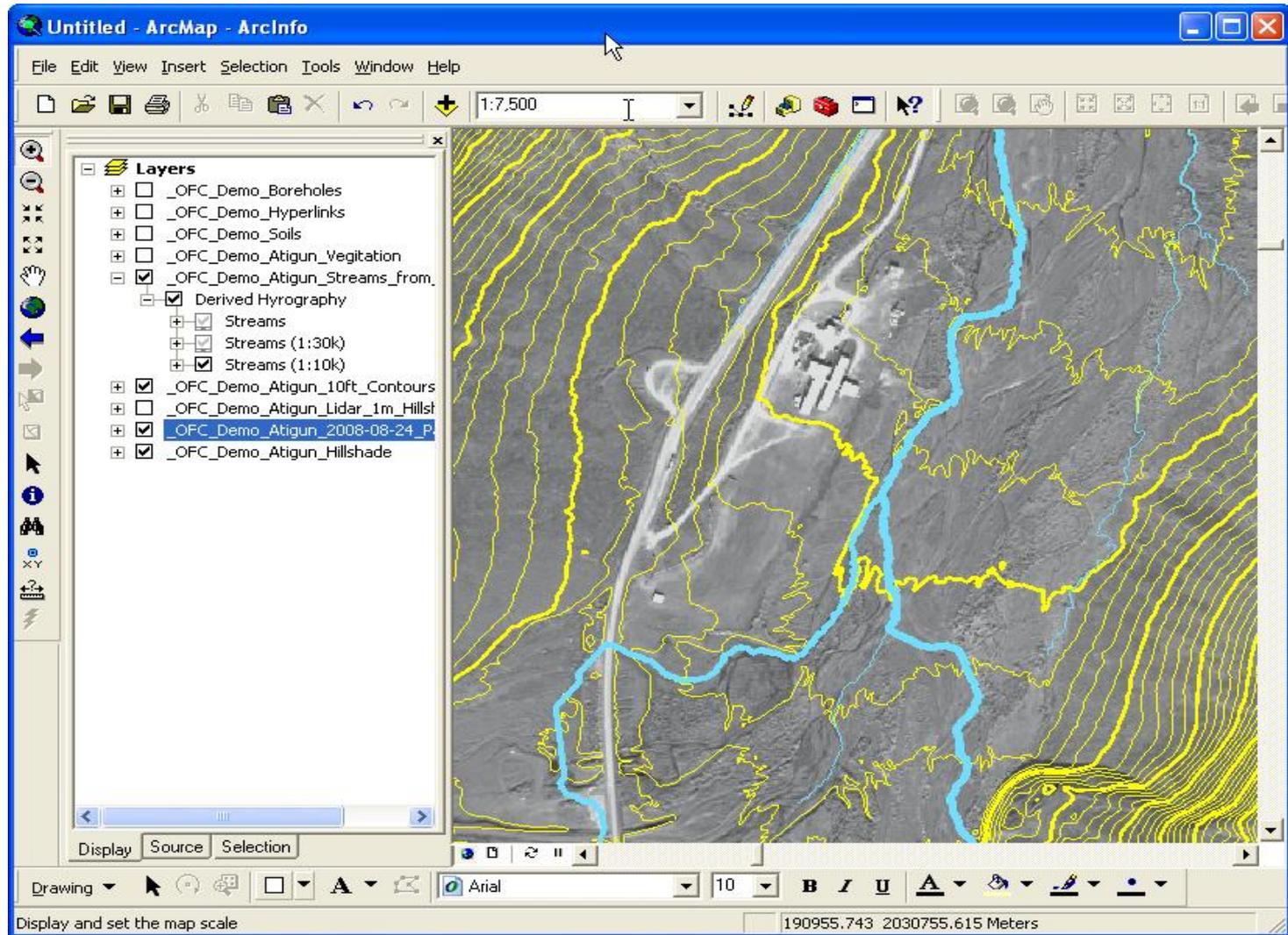


# LiDAR Derivative Analysis with GIS - Slope

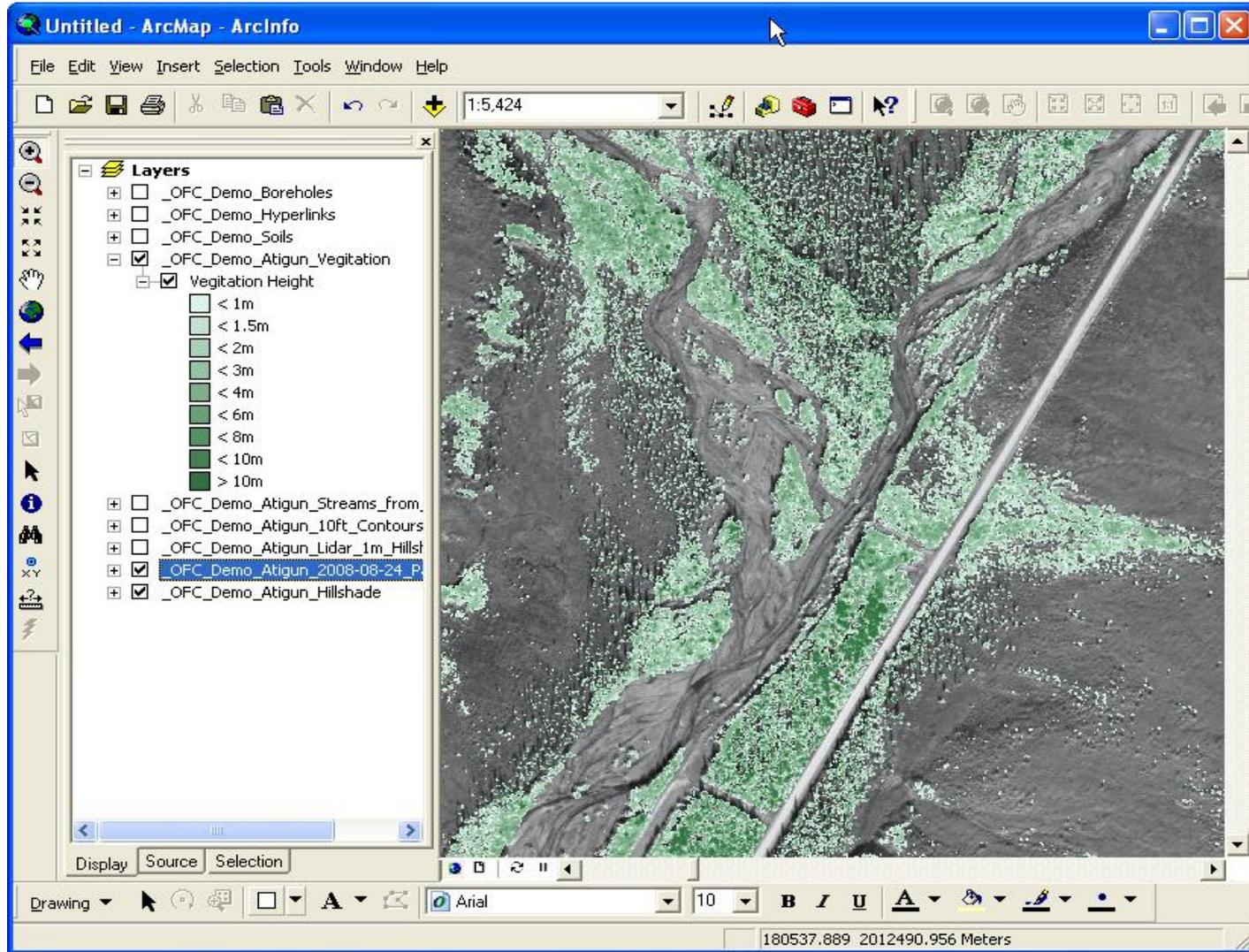


 = BOREHOLES

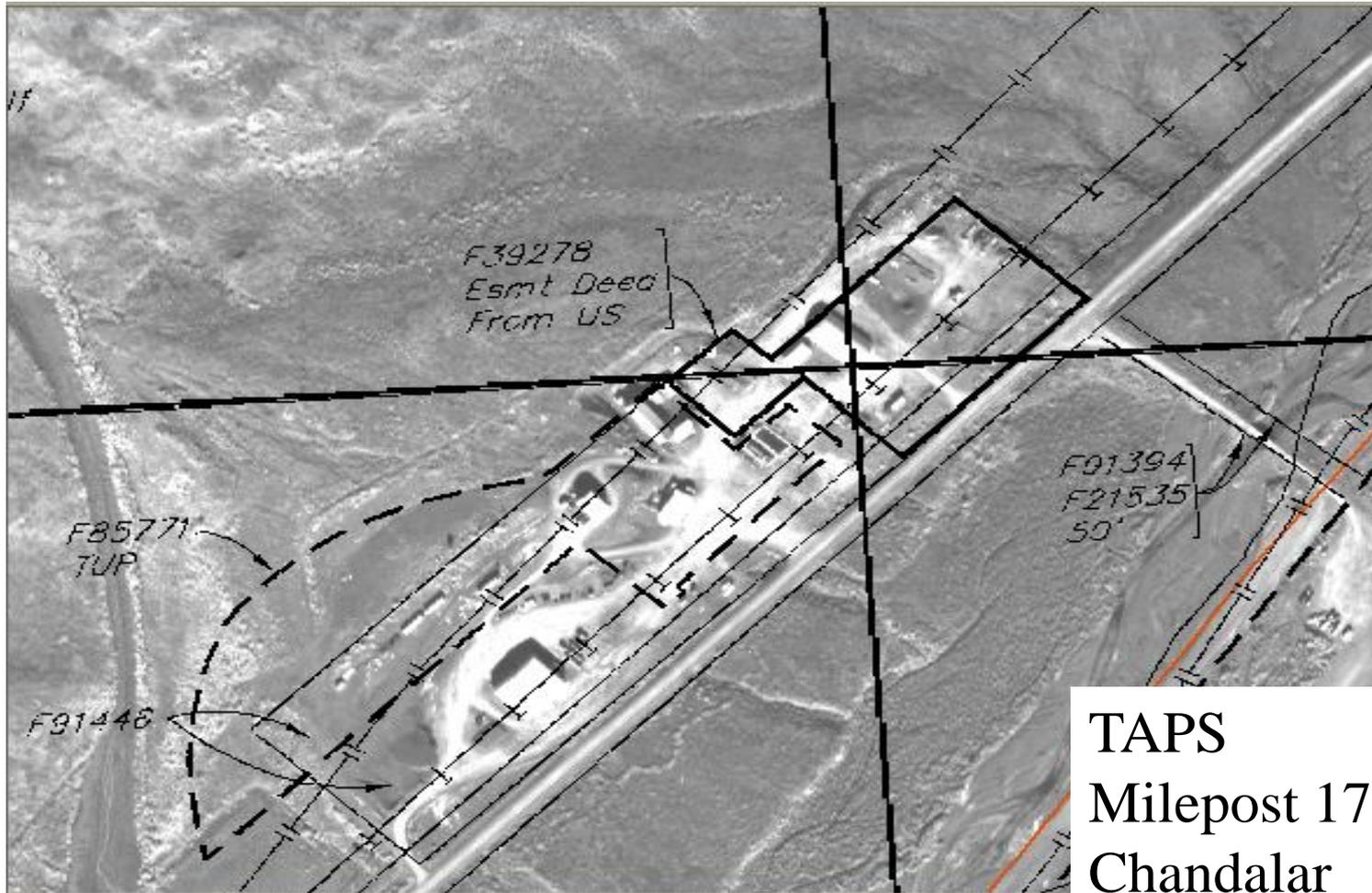
# LiDAR Derivatives - Streams and Topography



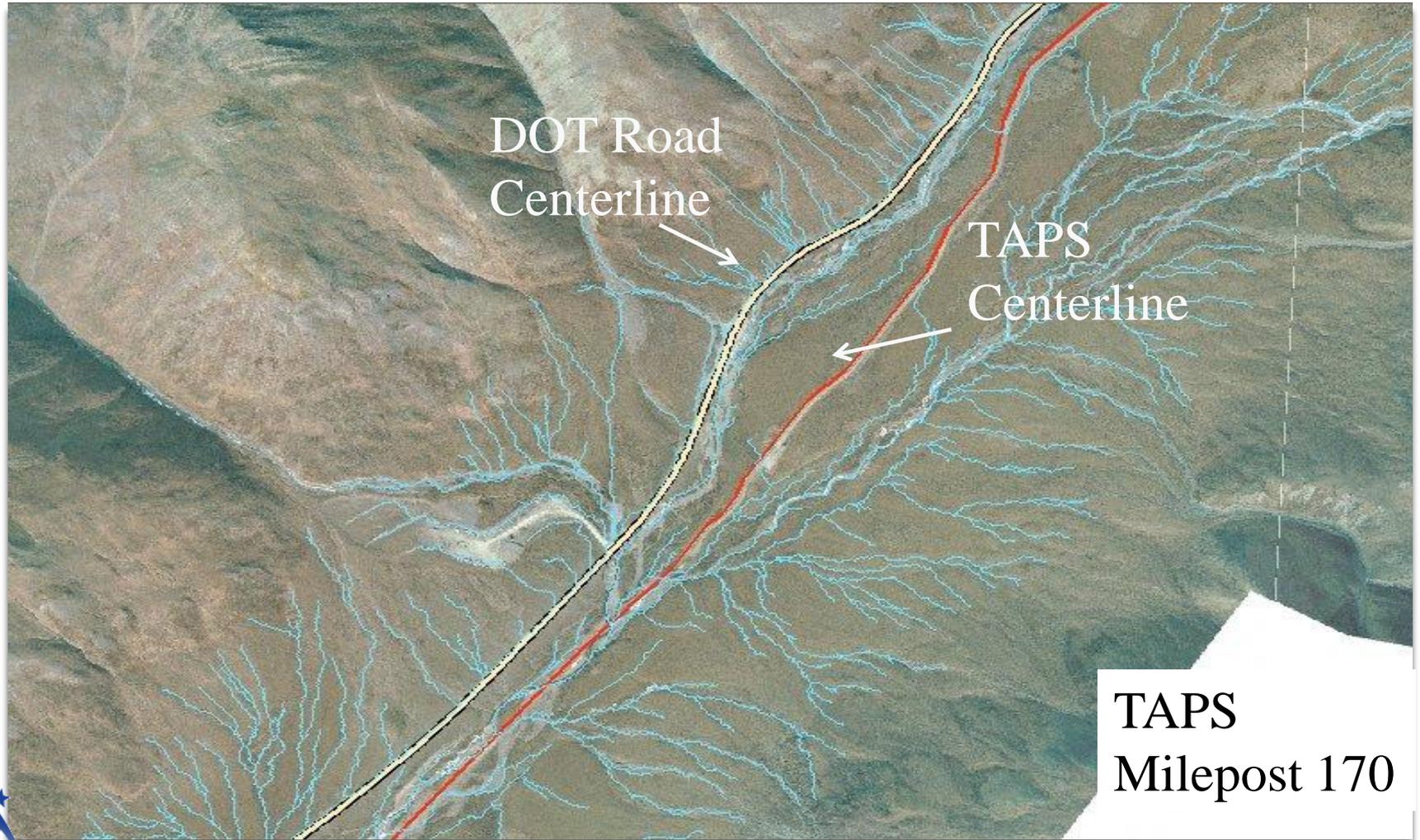
# LiDAR Derivative - Vegetation



# Data Integration - Land Status, Real Estate with Basemap



# Data Integration - Infrastructure (roads, centerline) on Basemap



# Data Integration - Incorporating Historical Geotechnical Data

**LOG OF TEST BORING**  
**FLUOR PROJECT NO. 478064**

Hole No. N70-26  
 Sheet 1 of 3  
 Total Depth 50.0'

Date Begun 8/25/80 D/N Date Completed 12/3/80 D/N Active Layer Thickness UNDETERMINED (B. Barry)  
 Station/M.P. 27-41 d Offset on pup L/R Alignment Sheet No. 27 Rev. No. 5  
 Rig No. 030 Mobile B-61 Carrier Terratek Drilling Methods 1 1/4" Hollow stem freeze core down auger  
 Contractor Beartooth Driller Snyder Helper Thompson Geologist Neil BAUER  
 Weather Partly Cloudy Wind 0-5 MPH Temperature 40 °F Precipitation Rain

Sampling Method	Sample No.	Blow Count	Locat. Sampled	Recovery	Depth in Feet	% Visible Ice	Frozen?	Soil Graph	Moisture	Consistency	Location Diagram
					0						on pup road
					1.00						
					9/25/80						
					W.D./A.B.						

GROUND WATER TABLE  
 Depth in Feet: 0  
 Time: 1:00  
 Date: 9/25/80  
 W.D./A.B.: WD

Vegetation: Moss grass tundra  
 Instrumentation: N/A

Location Diagram: on pup road

SP 1-10  
 BS 1-10  
 SA 4-10  
 SH 6-10

Sample 1 (0-0.4 NSS) UNFROZEN organic mat. Moss wet  
 Sample 2 (0.4-1.5) FROZEN silt w trace sand trace gravel some organic  
 15% ice on random clay lenses  
 NSS  
 Fair Recovery, Rock present in stone

Sample 3 (2.0-4) FROZEN silt w trace sand trace organic  
 15% ice on random clay lenses  
 1PWC  
 Dark brown color

0-0.4 UNFROZEN organic mat. Moss wet

Sample 4 (5-10) Silt w trace sand some gravel, mottled by sluff FROZEN  
 No penetration, No trace gravel  
 Numerous cobbles angular, dark brown color  
 Ice 15% to 20% large

@ 7.5' Boulder, unable to sample  
 indicates boulder in hole silt some gravel trace sand  
 angular

0.4-4 FROZEN silt w trace sand trace organic  
 15% ice on random clay lenses  
 @ 10' Boulder, unable to sample  
 indicates an abase

4-11.5 FROZEN silt w trace sand some gravel  
 indicates some positive divergence

Sample 5 (12.5-13) FROZEN sand trace silt  
 5% ice, No penetration, 3% ice on stone  
 Mostly med sand trace coarse sand angular

Sample 6 (15-17) FROZEN Sand some silt in matrix  
 No penetration, No trace organic  
 numerous organic

11.5-13.5 FROZEN sand w trace silt 70% ice particles  
 med-coarse sand angular, few cobbles  
 13.5-28

1980 NW data

**Baker** **LOG OF BORING: N70-93**

PROJECT: OFC Atigun Pass SHEET: 1 OF 2  
 LATITUDE: 68.19296 LONGITUDE: -149.401 GEO. DATUM: N/A START: 11/28/1980 END: 11/28/1980  
 GROUND ELEV.: 3301.4 ft ELEV. DATUM: N/A LOGGER: Steven Clark  
 WATER LEVEL: \_\_\_\_\_ TIME: \_\_\_\_\_ DATE: \_\_\_\_\_ DRILLER: Feldman; Nichols  
 EQUIPMENT: 030 Mobile B-61 w/ Flextrack DRILL CO.: Beartooth  
 METHOD DETAILS: 10 in. OD HSA, 3.0 in. OD spoon; 2.0 in. OD spoon, Hammer size unknown.

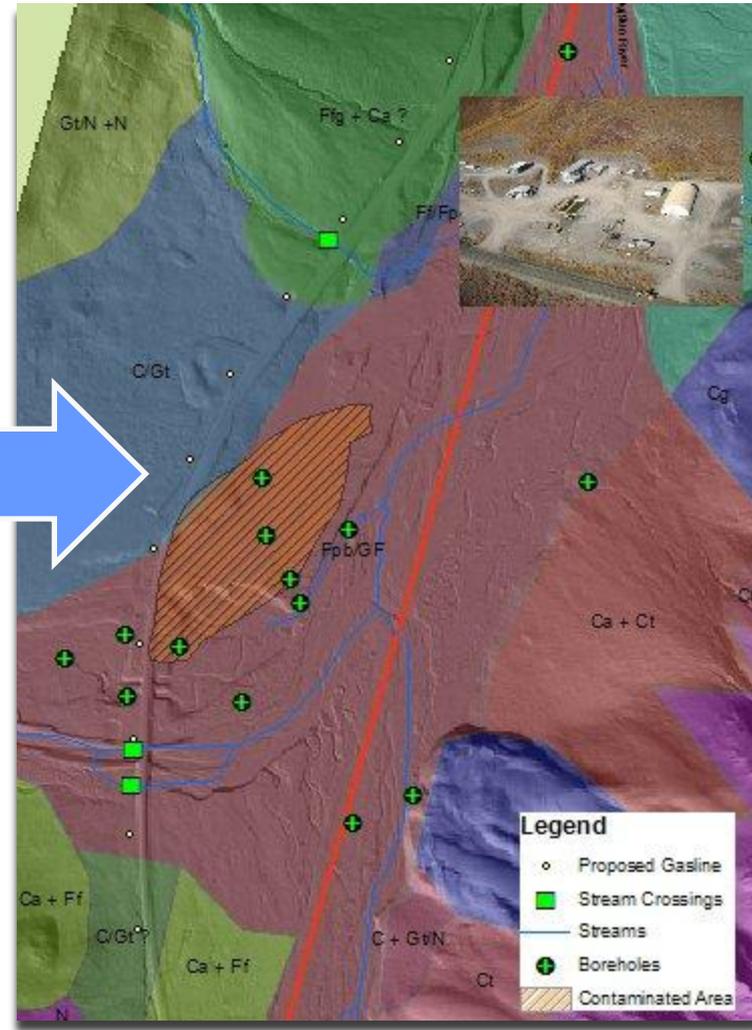
SAMPLE DEPTH (FT)	SAMPLE TYPE - NUMBER	RECOVERY %	SPT BLOW(S) 5 FT or (FQ/D)	TEST RESULTS	STRATA	DEPTH (FT)	DESCRIPTION	REMARKS
0.0	33-1	100%	6			0	PEAT, FROZEN, individual ice inclusions (Vx); 30% visible excess ice.	
0.5	33-2	100%	11			0.5'	0.5' - EL 3300.9	
1.0	33-3	100%	14			1	SILT, with sand and gravel; gray and brown. Frozen; well bonded; random ice formations along with ice crystals in pore spaces (Vr,x); 15% visible excess ice; trace organic inclusions.	
1.5	A					2		
2.5	33-4	100%	6			2		
4.0	A					4		
5.0	33-5	100%	14			5	SILT, with sand and gravel; gray and brown. Frozen; well bonded; random ice formations along with ice crystals in pore spaces (Vr,x); 10% visible excess ice; trace organic inclusions.	
6.5	A					6.5		
7.5	33-6	100%	36			7	SILT, with sand and gravel; gray and brown. Frozen; well bonded; random ice formations along with ice crystals in pore spaces (Vr,x); 30% visible excess ice; trace organic inclusions.	
9.0	A					9		
10.0	33-7	100%	14/0.5			10	4.5' - EL 3296.9	
10.5	33-8	100%	100/0.1			10.5	SILT, with sand and gravel; gray, subrounded to angular. Local iron staining. Frozen; well bonded; massive ice (ICE); 60% visible excess ice; hard, clear, white; trace silt inclusions.	
11.5	A					11.5	10.5' - EL 3290.9	
12.5	33-9	100%	36			12	GRAVEL, SANDY, with silt/clay; gray, subrounded to angular. Local iron staining. Frozen; well bonded; individual ice inclusions (Vx); 10% visible excess ice.	
14.0	A					14		
15.5	33-10	100%	30/0.1			15.5		
20.0	A					20		
21.5	33-11	100%	61			21	20.0' - EL 3281.4	
25.0	A					25	GRAVEL, SANDY, Frozen; well bonded; individual ice inclusions (Vx); 20% visible excess ice.	
26.5	33-12	100%	35			26.5	25.0' - EL 3276.4	
						27	SHALE, and siltstone; gray; moderately weathered. Frozen; random ice formations along with ice crystals in pore spaces (Vr,x); 40% visible excess ice.	
						27	27.0' - EL 3274.4	
						28	SHALE, and siltstone; gray; moderately weathered. Frozen; no visible ice segregation (Nbn); 0% visible excess ice.	

Boring backfill data not available.

# Data Integration - Geotechnical



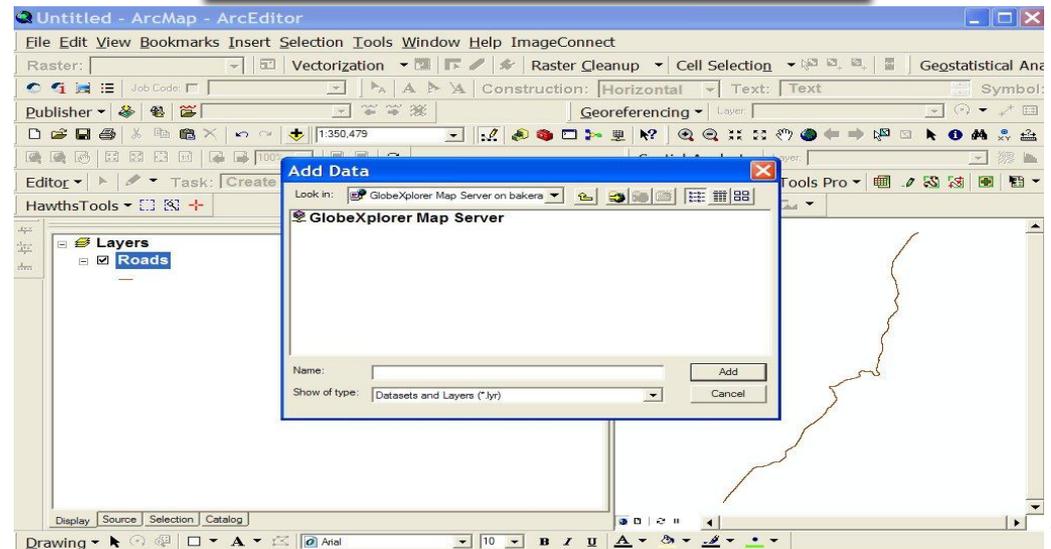
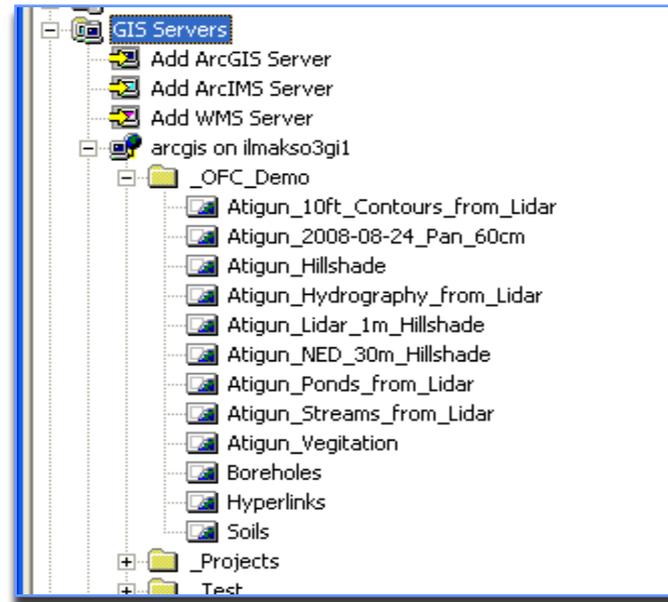
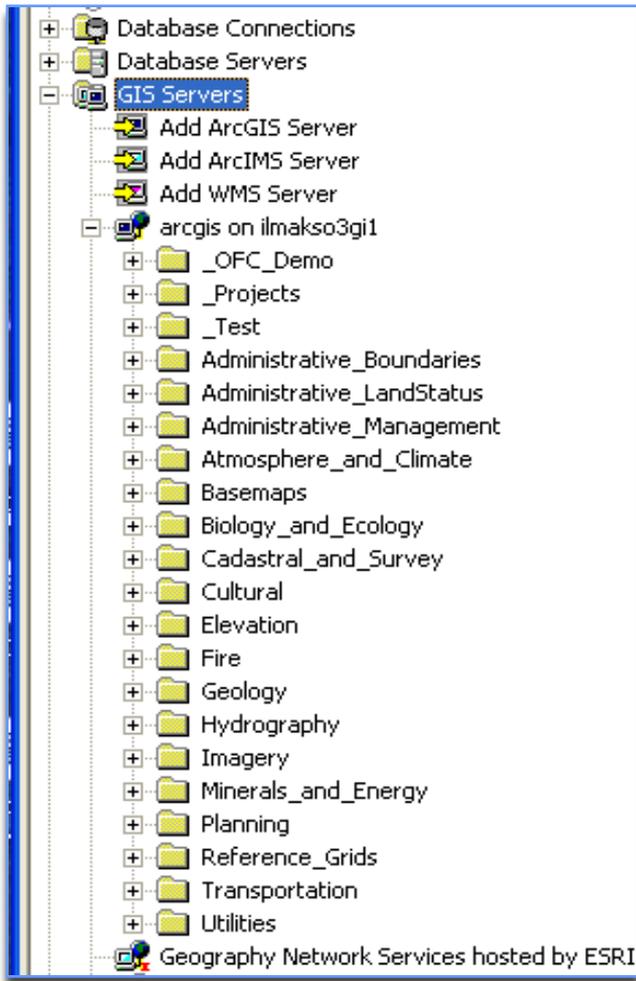
Basemap with geo-referenced alignment sheets



Data in GIS, geo-referenced to Basemap



# GIS Repository and Web Services



**OFC GIS PROTOTYPE**

**ACCESS TO DATA**

# Data Access – User Needs and Data Drive System Requirements

## Data Requirements

- GIS
- Related Data

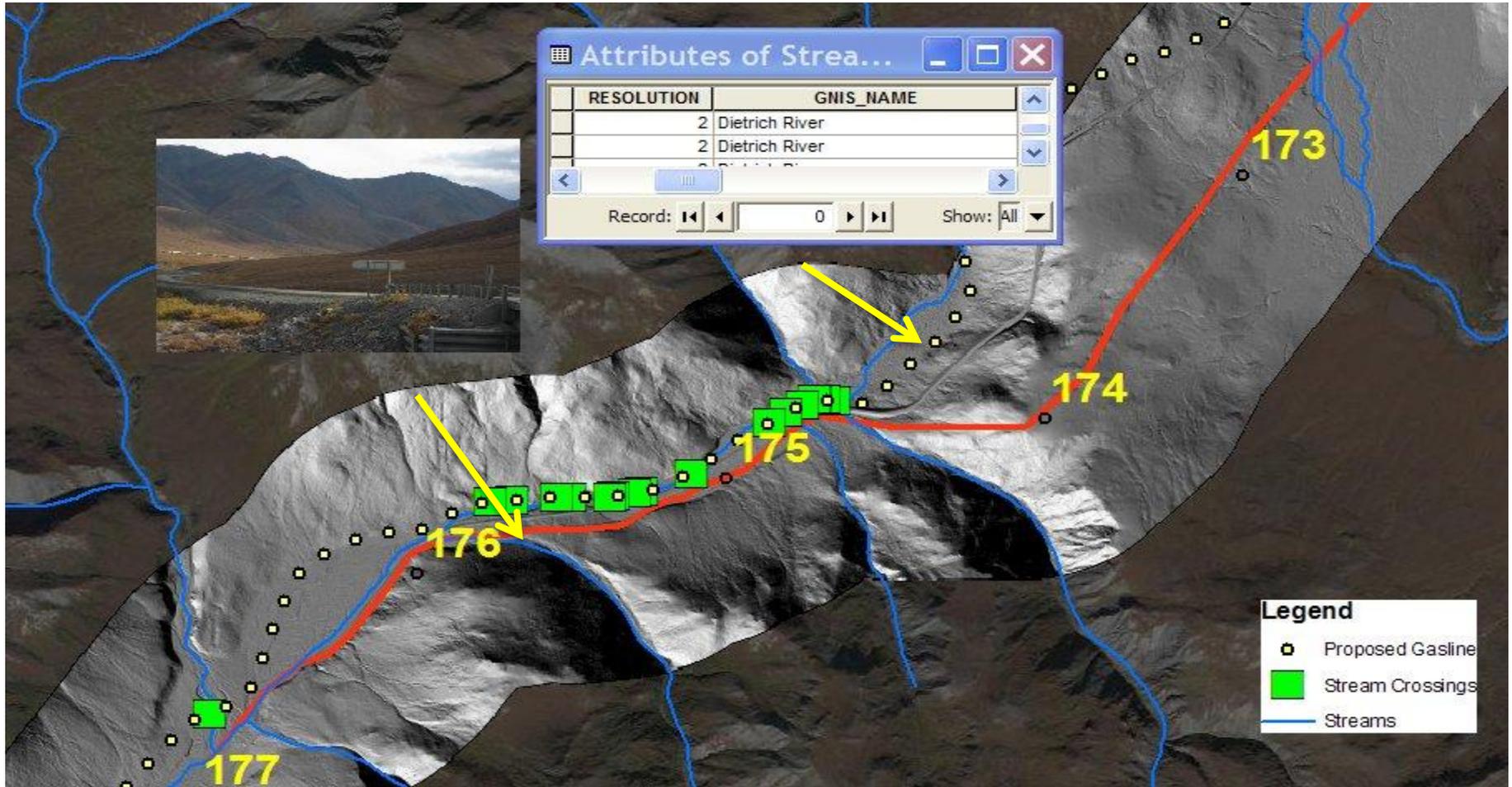
## Access Levels

- Open Public
- Agency
- Applicant

## System Requirements

- Hardware
- Software

# Data Access and Integration - Accessing Multiple Data Sets



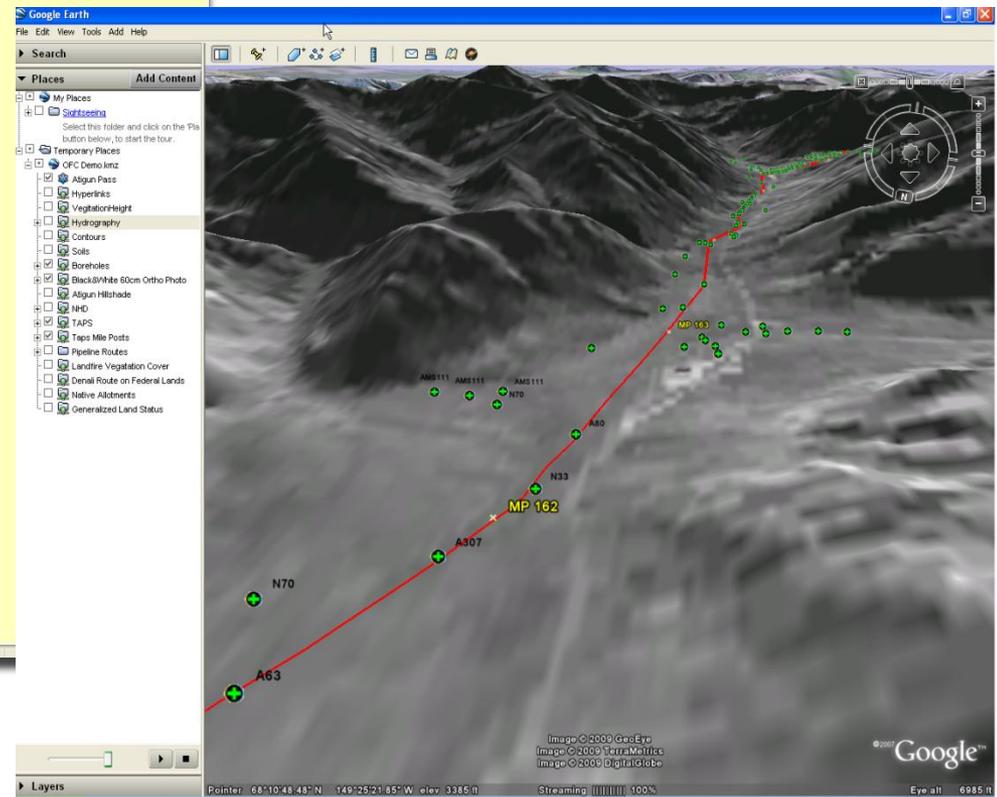
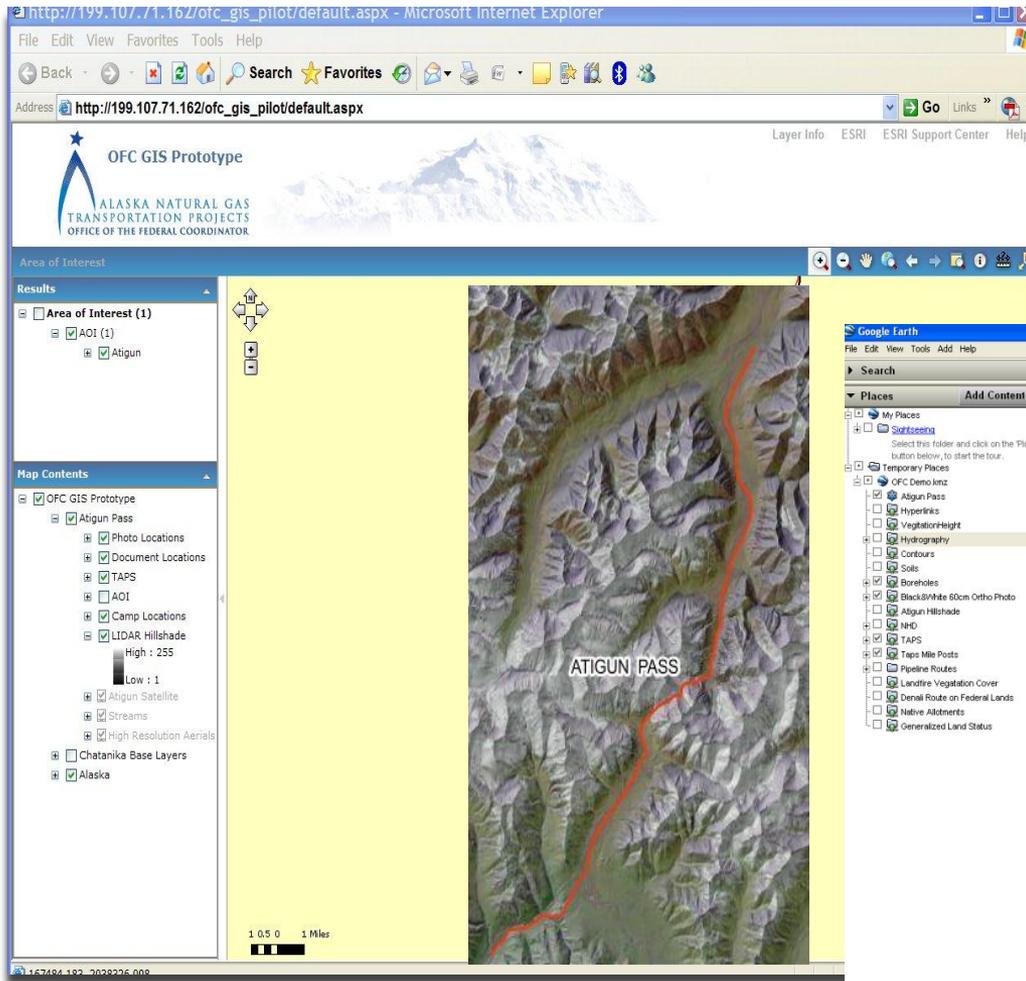
**OFC GIS PROTOTYPE**

**APPLICATIONS**

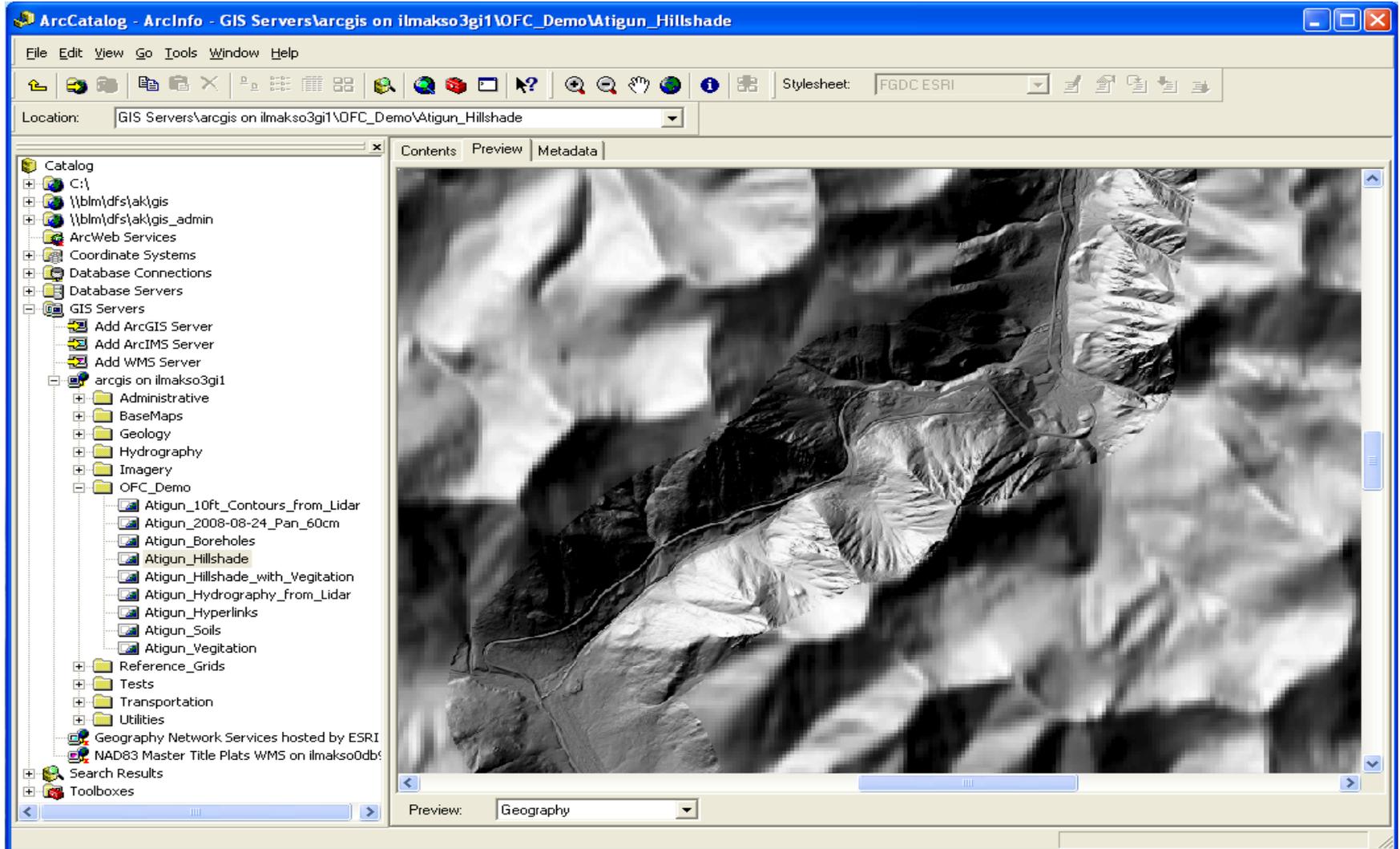
# Application Types

- **Web Access Application**
  - Internet browser
  - Public transparency
  - ArcGIS map document
  
- **Agency Web Service Application**
  - GIS layer repository
  - ArcGIS server
  - ArcMap

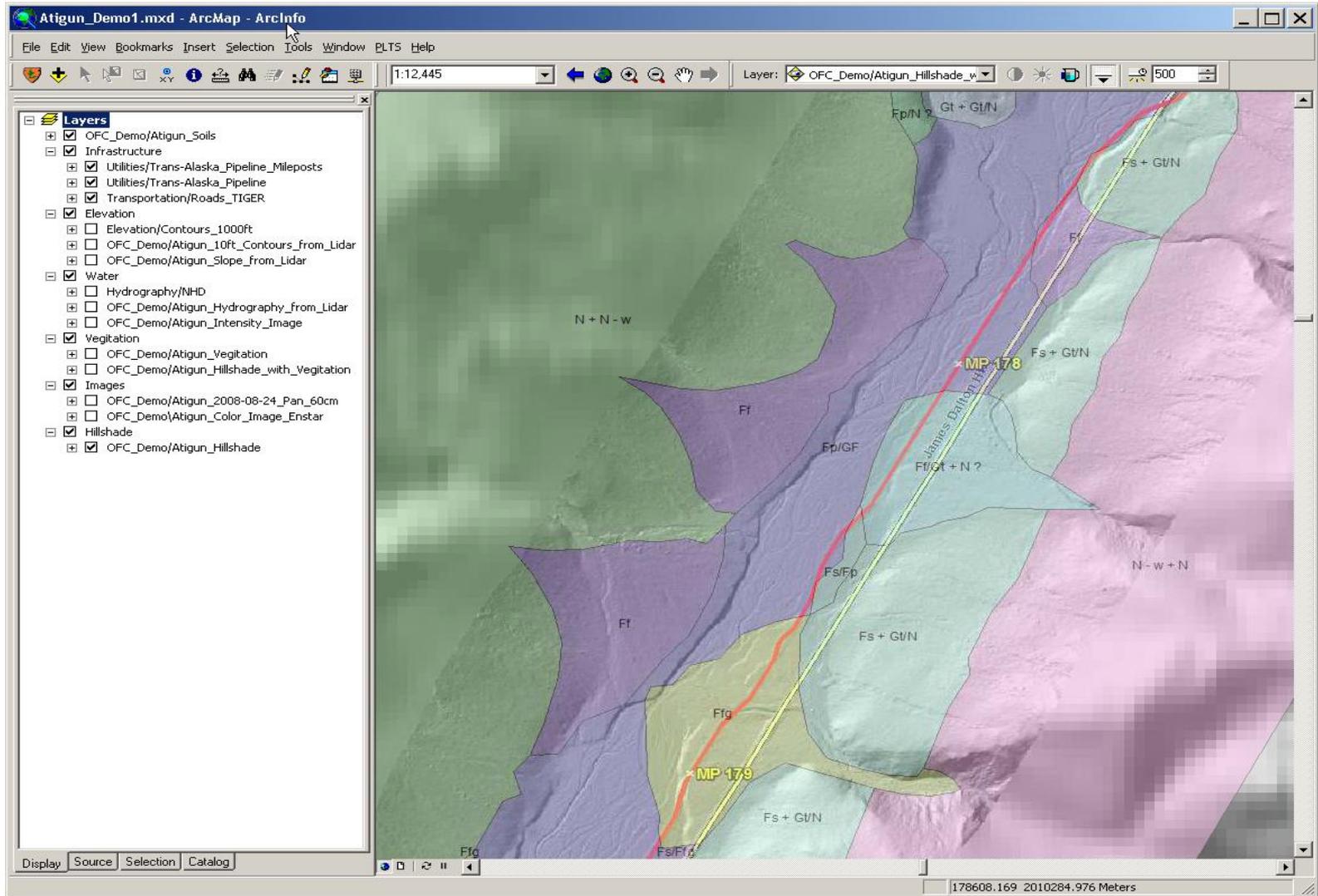
# Web Access to Data—Browser Level



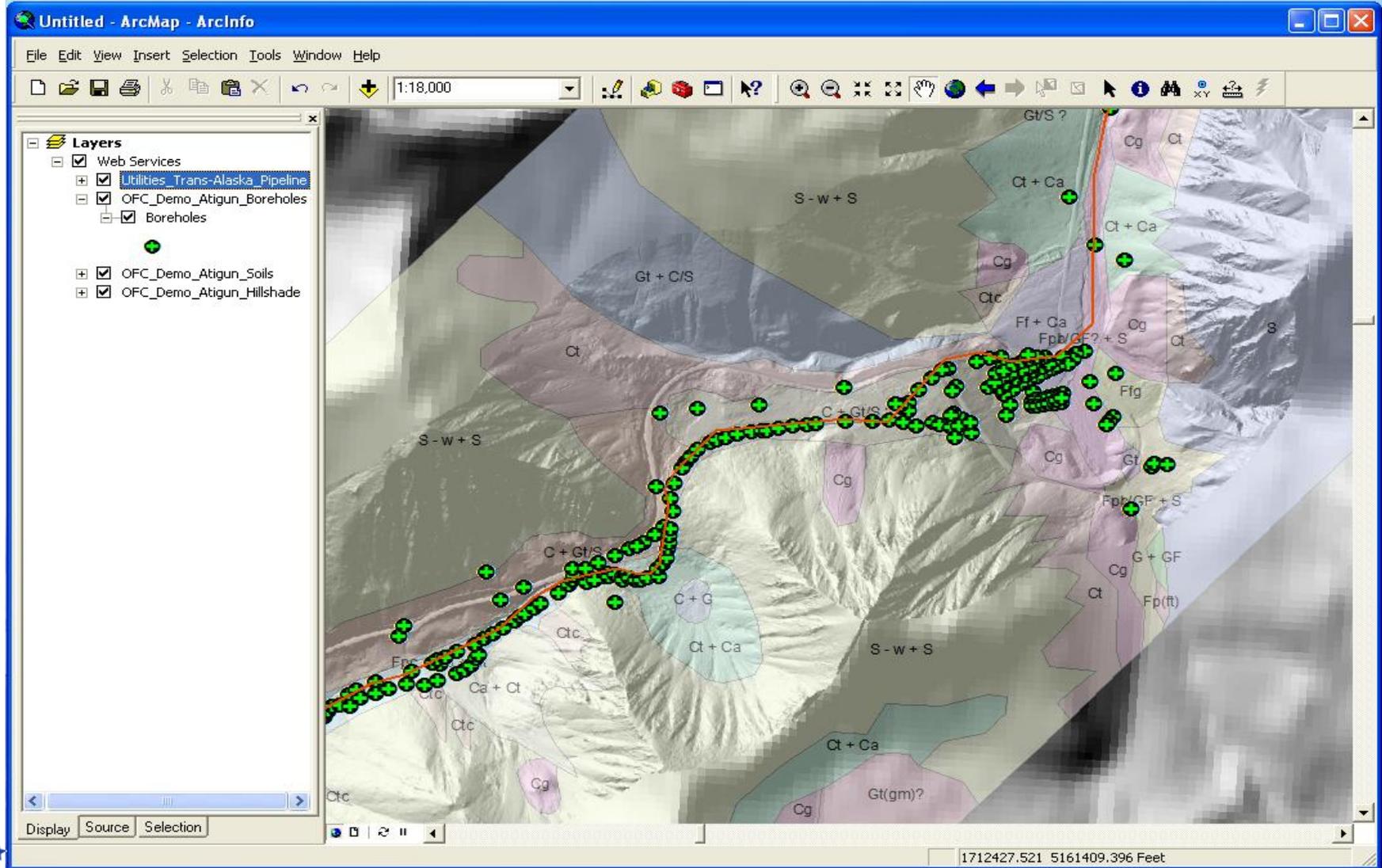
# Web Service – Public Access



# Data in GIS Web Service

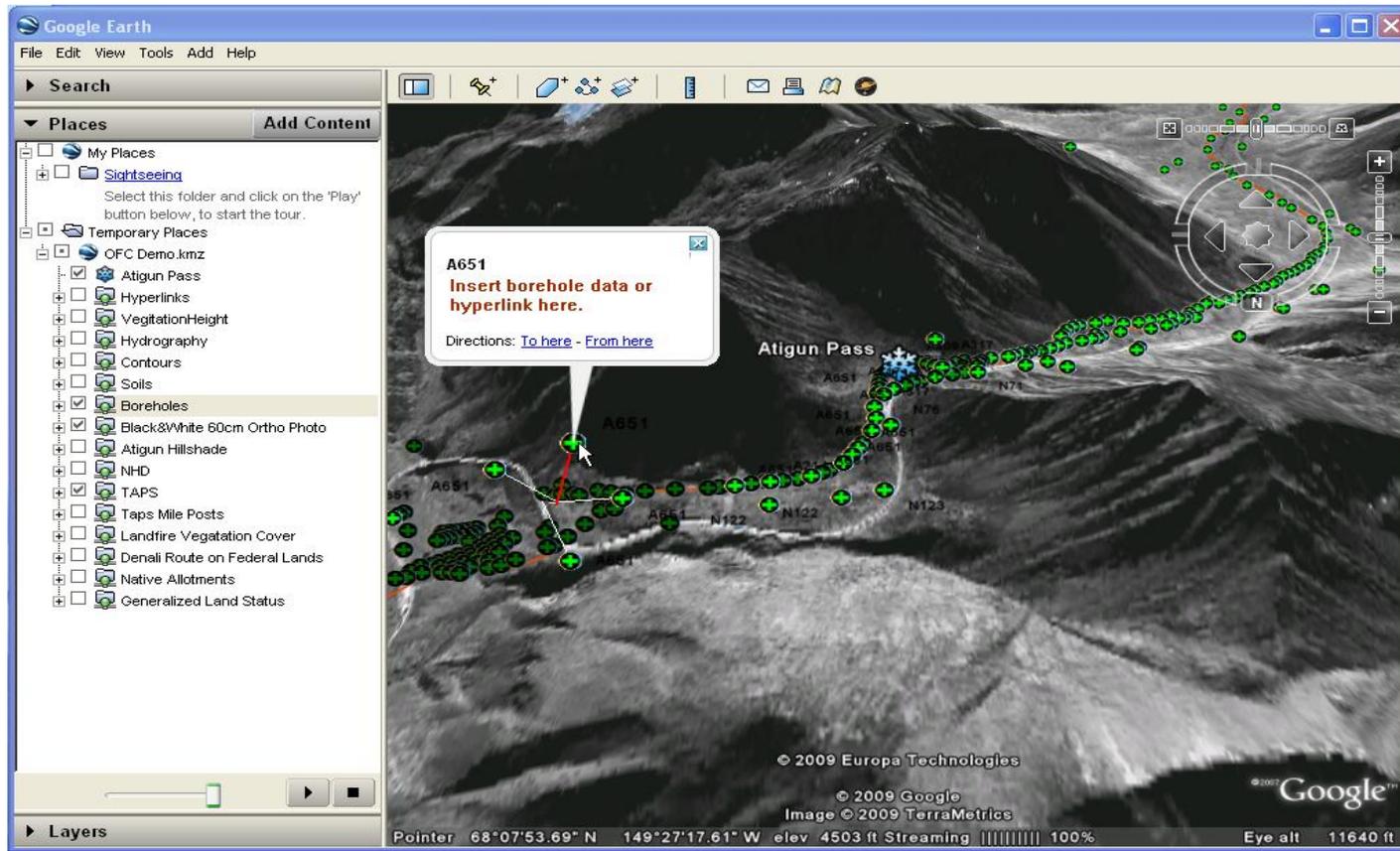


# Web Service in ArcMap



# Web Service Access

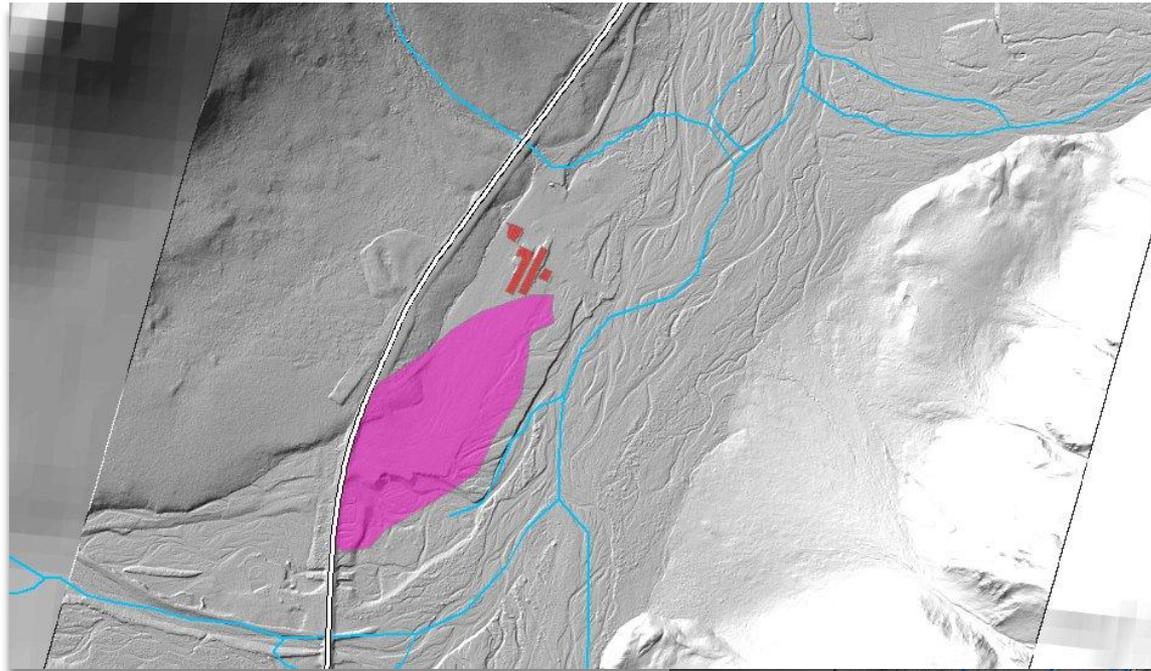
- Available at all access levels: example here Web Service publishing to Google Earth



**OFC GIS PROTOTYPE**

**HOW GIS CAN BE USED**

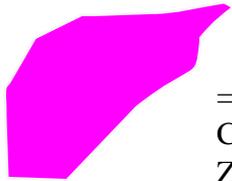
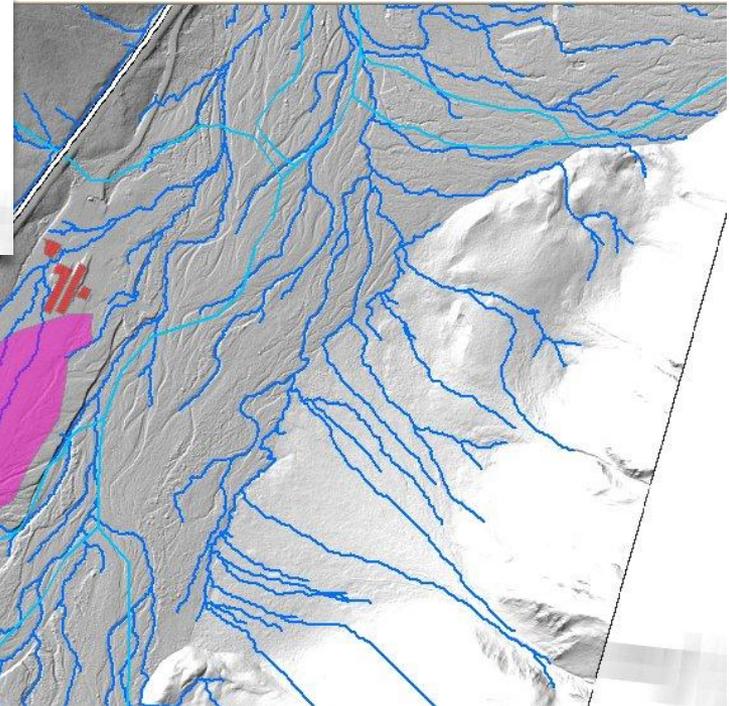
# Using the Data - Permitting



## Streams

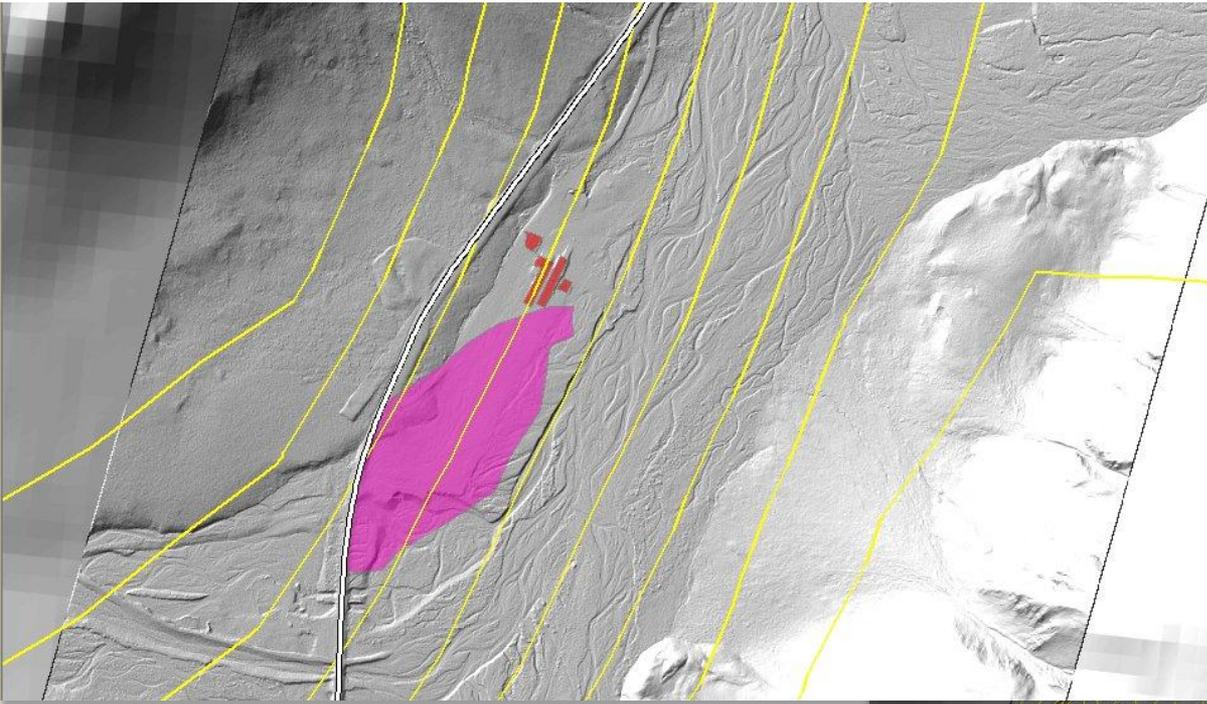
Left: Existing USGS

Right: LiDAR-derived



= EXAMPE  
CONTAMINATED  
ZONE

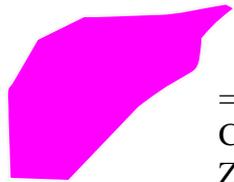
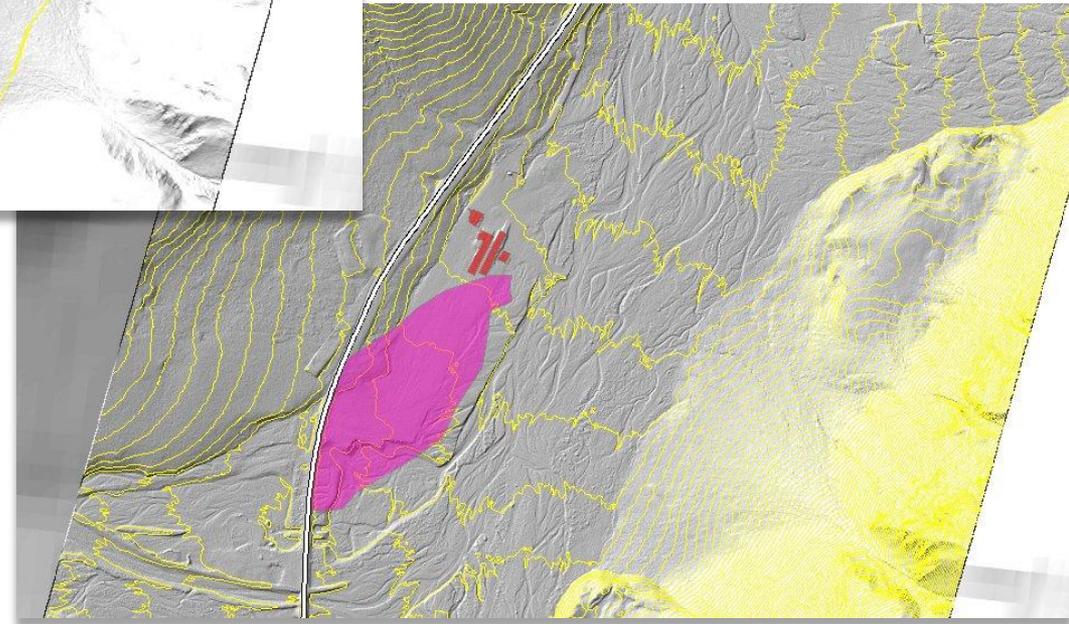
# Improvement in Data Quality - Resolution



## Topographic contours

Left: Existing USGS

Right: LiDAR-derived



= EXAMPLE  
CONTAMINATED  
ZONE

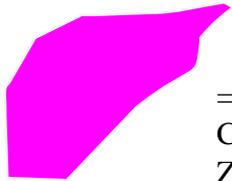
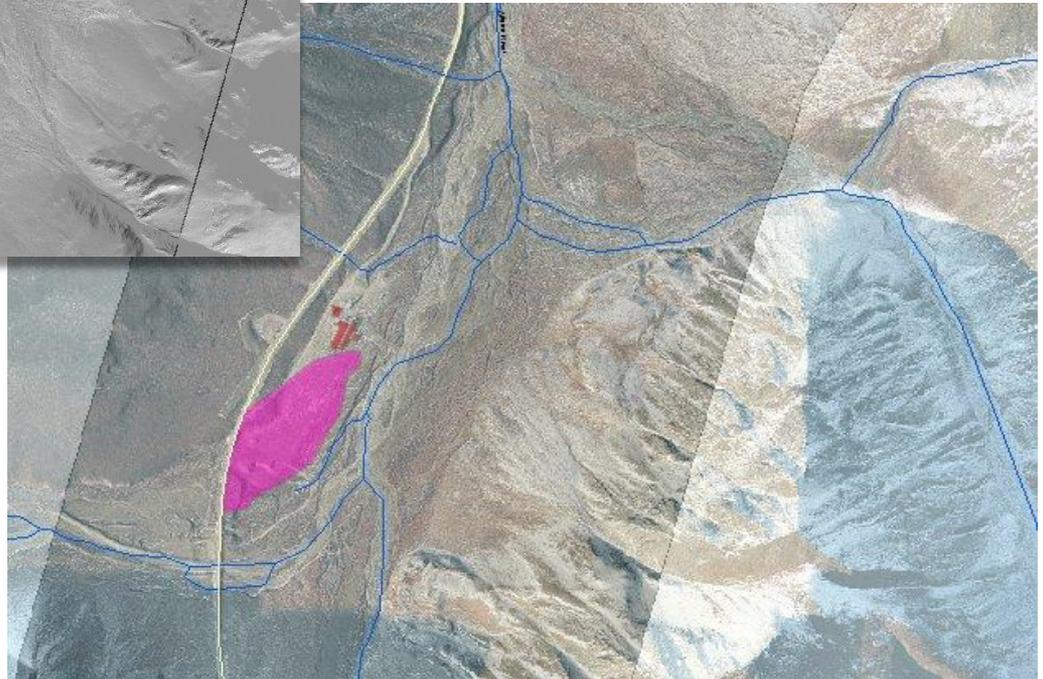
# Improvement in Data Quality – Real World View of the Landscape



## Orthoimagery

Left: Satellite B&W, 2008

Right: Satellite color, 2006



= EXAMPLE  
CONTAMINATED  
ZONE

**OFC GIS PROTOTYPE**

**PATH FORWARD**

# Key Findings

- **Identified Need - Authoritative basemap allows data to be integrated for multiple stakeholders**
  - Restoration mitigation, infrastructure planning, environmental permitting, etc
- **Closes Gaps**
  - Mapping - LiDAR coupled with good imagery provides a value-added database
  - Visualization
  - Historical Data Integration and Storage
  - Transparency - Web application provides transparent access to data
- **Target - Takes advantage of, and provides tool to enhance agency collaboration and efficiency**

# Summary

- **Next Step - Acquiring Agency Inputs**
  - Coordinate with agencies on data
  - Develop a data integration plan
  - Complete capture of historical data
  
- **Accomplishments**
  - Established LiDAR standard
  - Established access levels
  - Integrated historical geotechnical data
  - Proof of concept



## Contact Information:

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