

Gamma Radiation Scanning Update

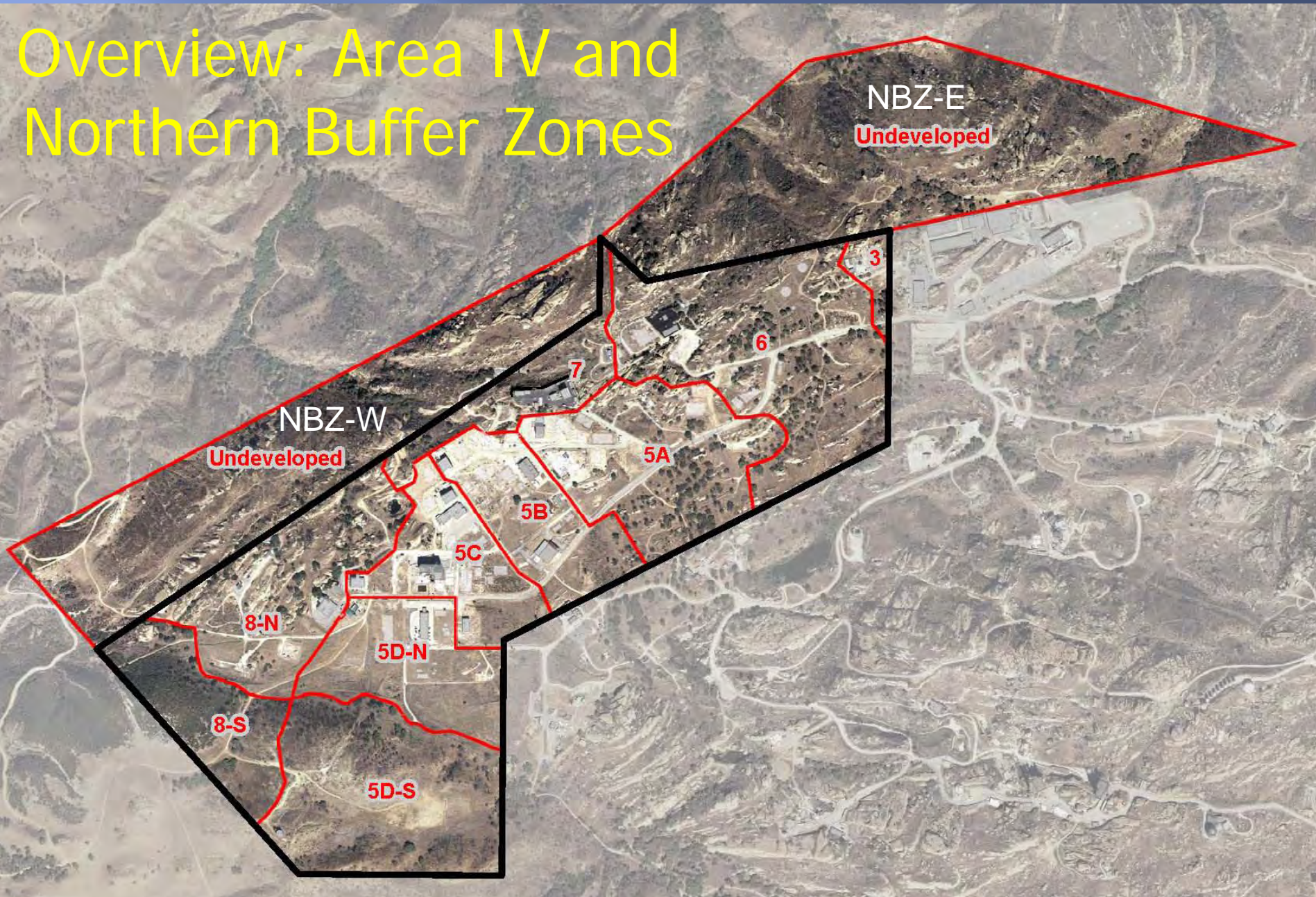
February 22, 2012



Agenda

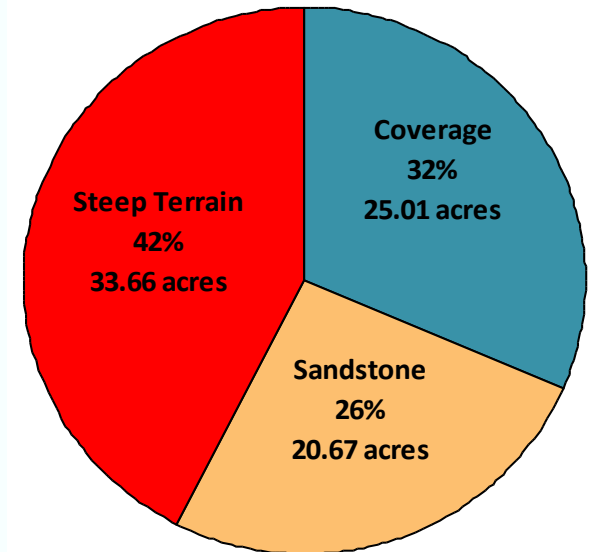
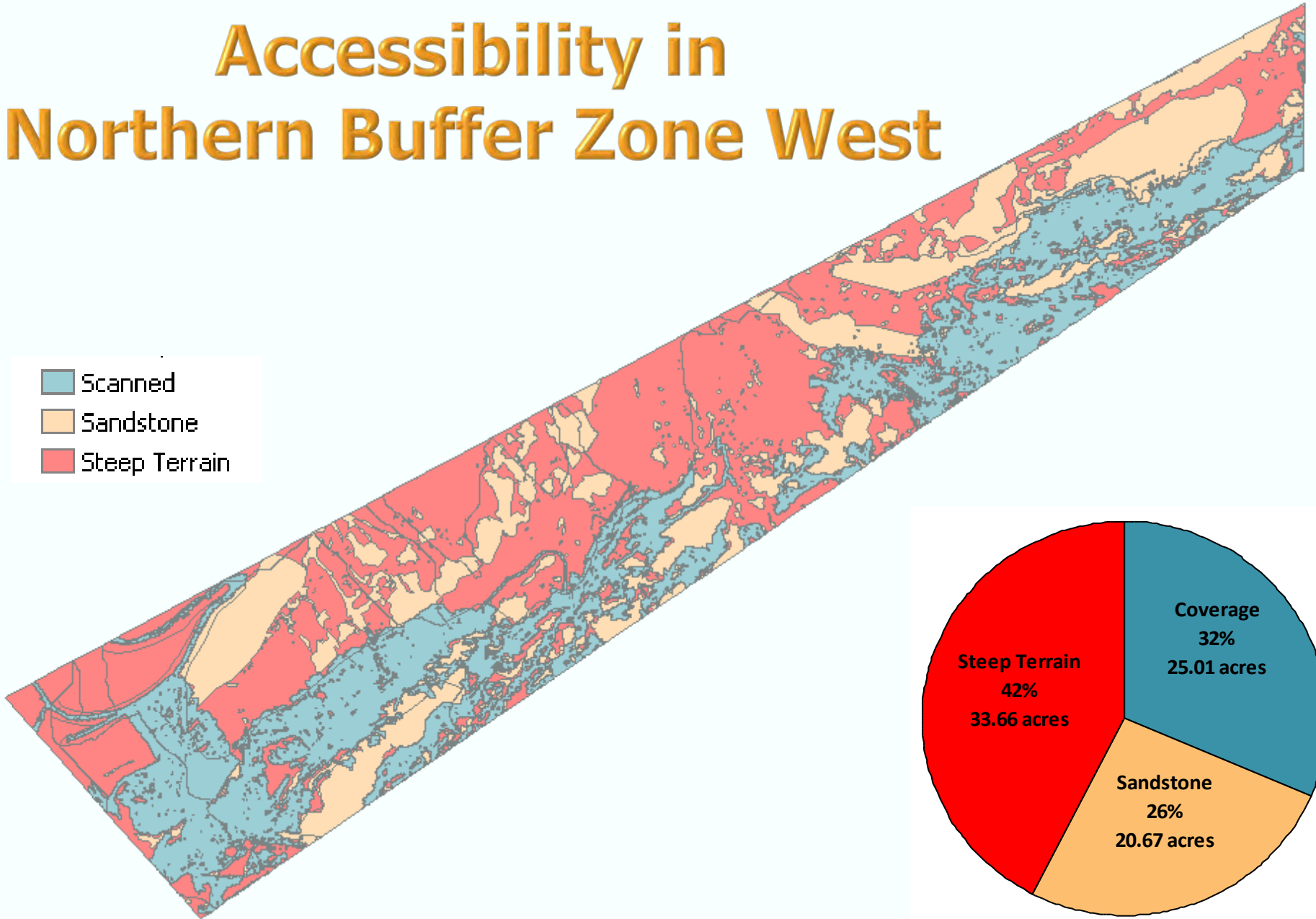
- Gamma Radiation Scanning Completed
- Scanning Coverage in Northern Buffer Zone (NBZ)
 - Scanned 100% of the accessible areas which:
 - Totaled 25% of the *entire NBZ*
 - 46 of 182 acres
 - Scanning was more limited than onsite areas due to very steep and rocky terrain and safety concerns.
- Identified, verified, and evaluated 27 of 27 PGRAYs
- Completed gamma scanning data evaluation

Overview: Area IV and Northern Buffer Zones



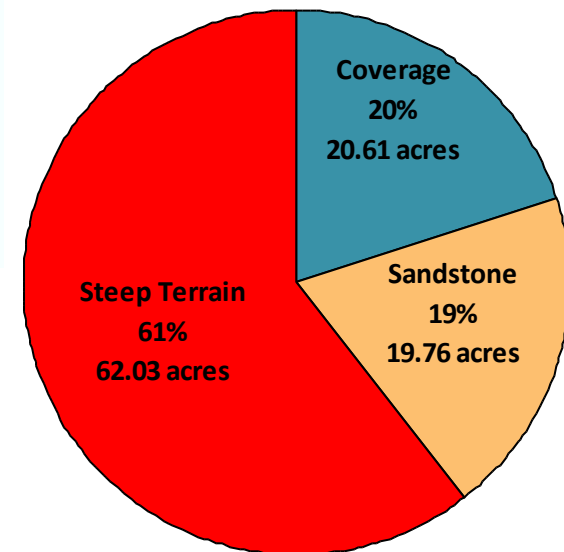
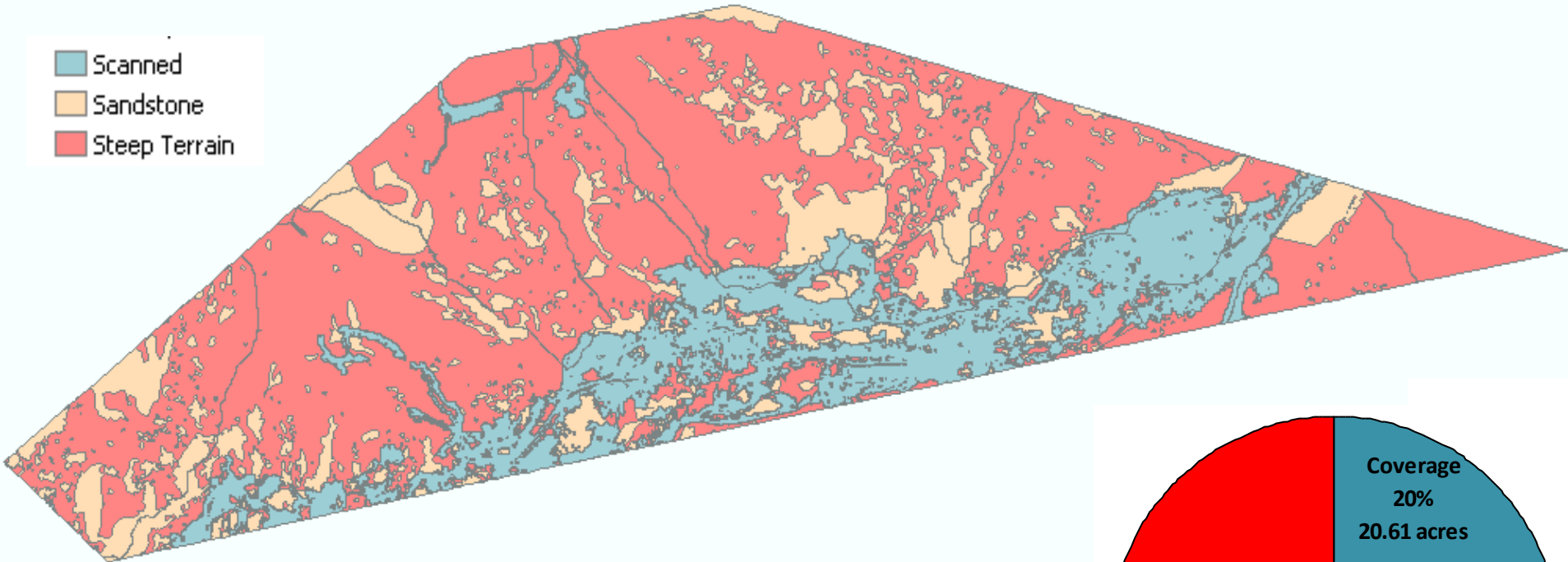
Accessibility in Northern Buffer Zone West

- Scanned
- Sandstone
- Steep Terrain



Accessibility in Northern Buffer Zone East

- Scanned
- Sandstone
- Steep Terrain



Photographic Examples of Terrain

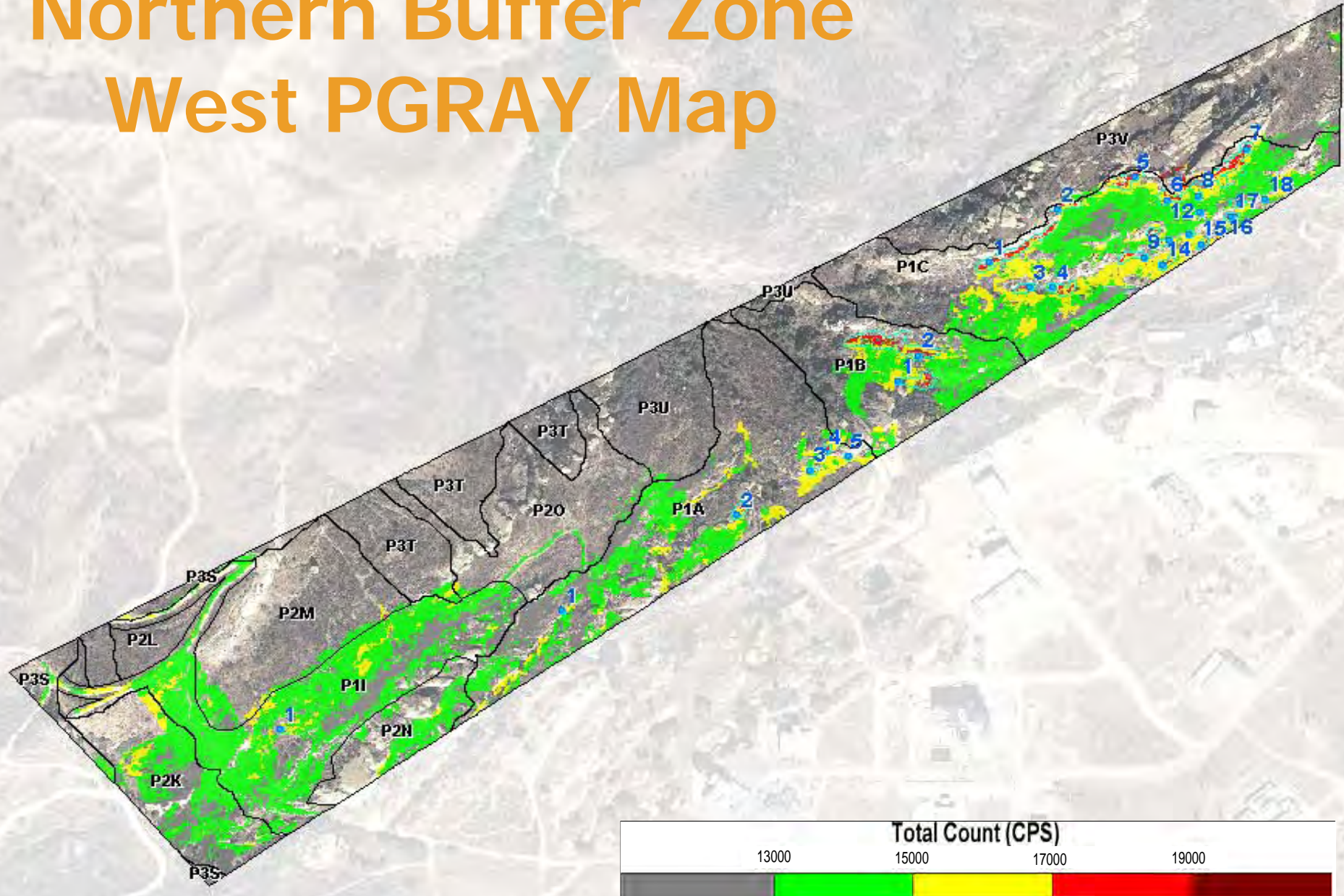
INACCESSIBLE



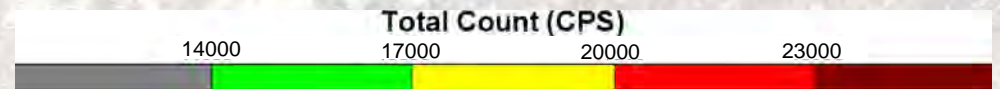
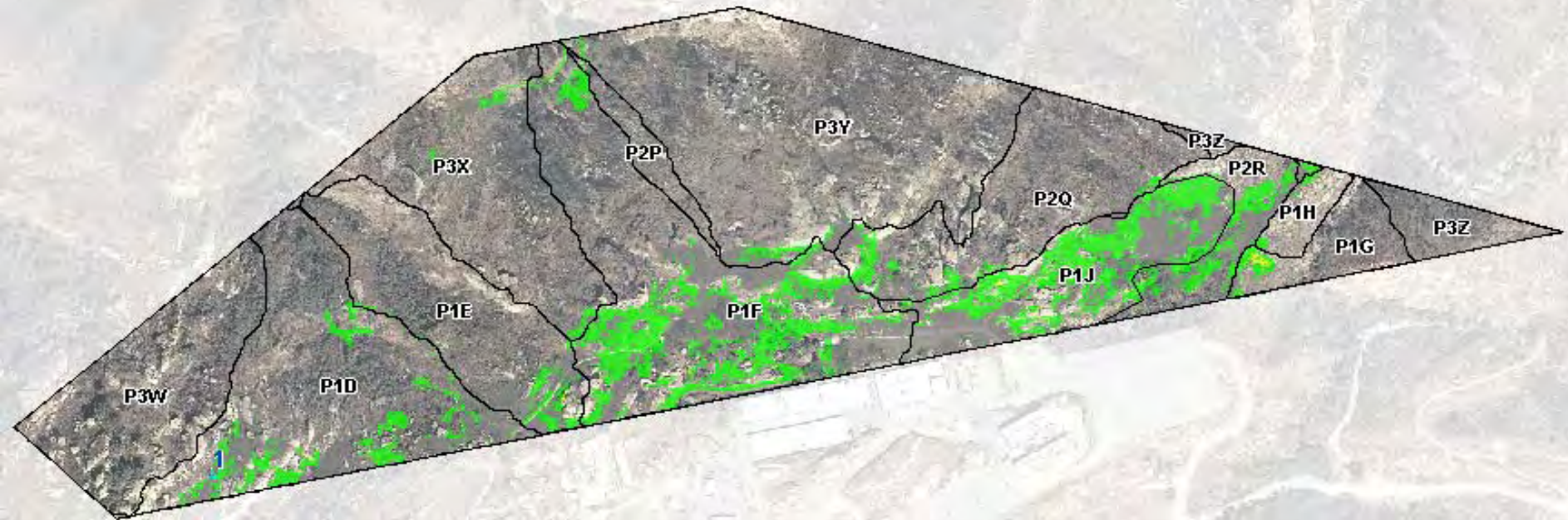
ACCESSIBLE



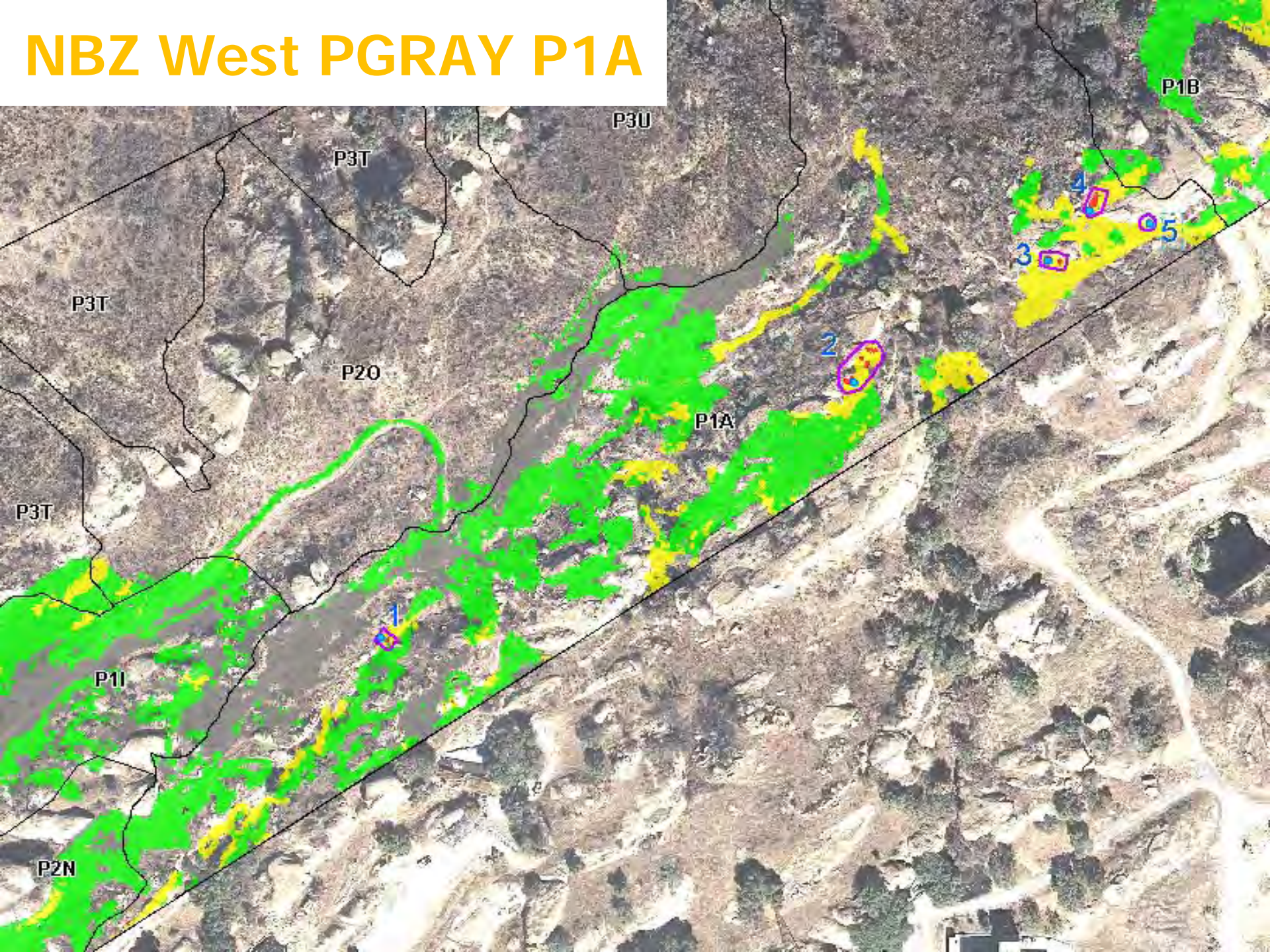
Northern Buffer Zone West PGRAY Map



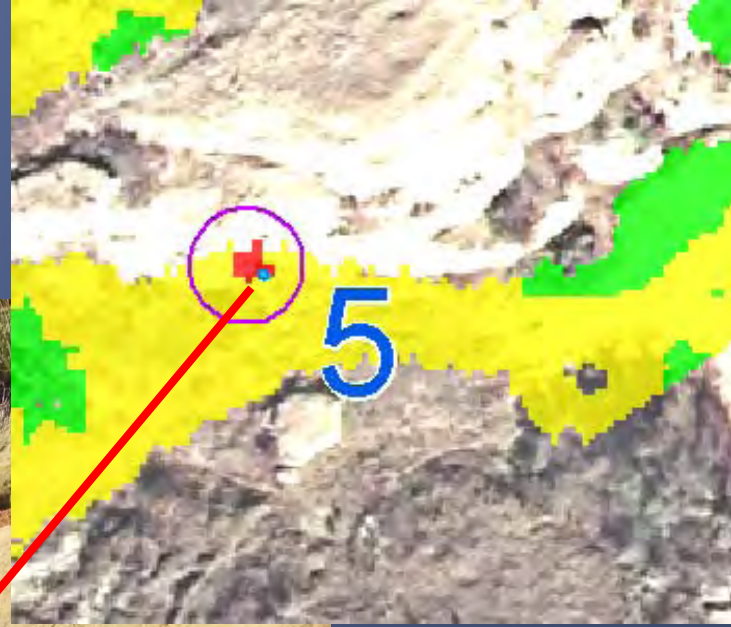
Northern Buffer Zone East PGRAY Map



NBZ West PGRAY P1A



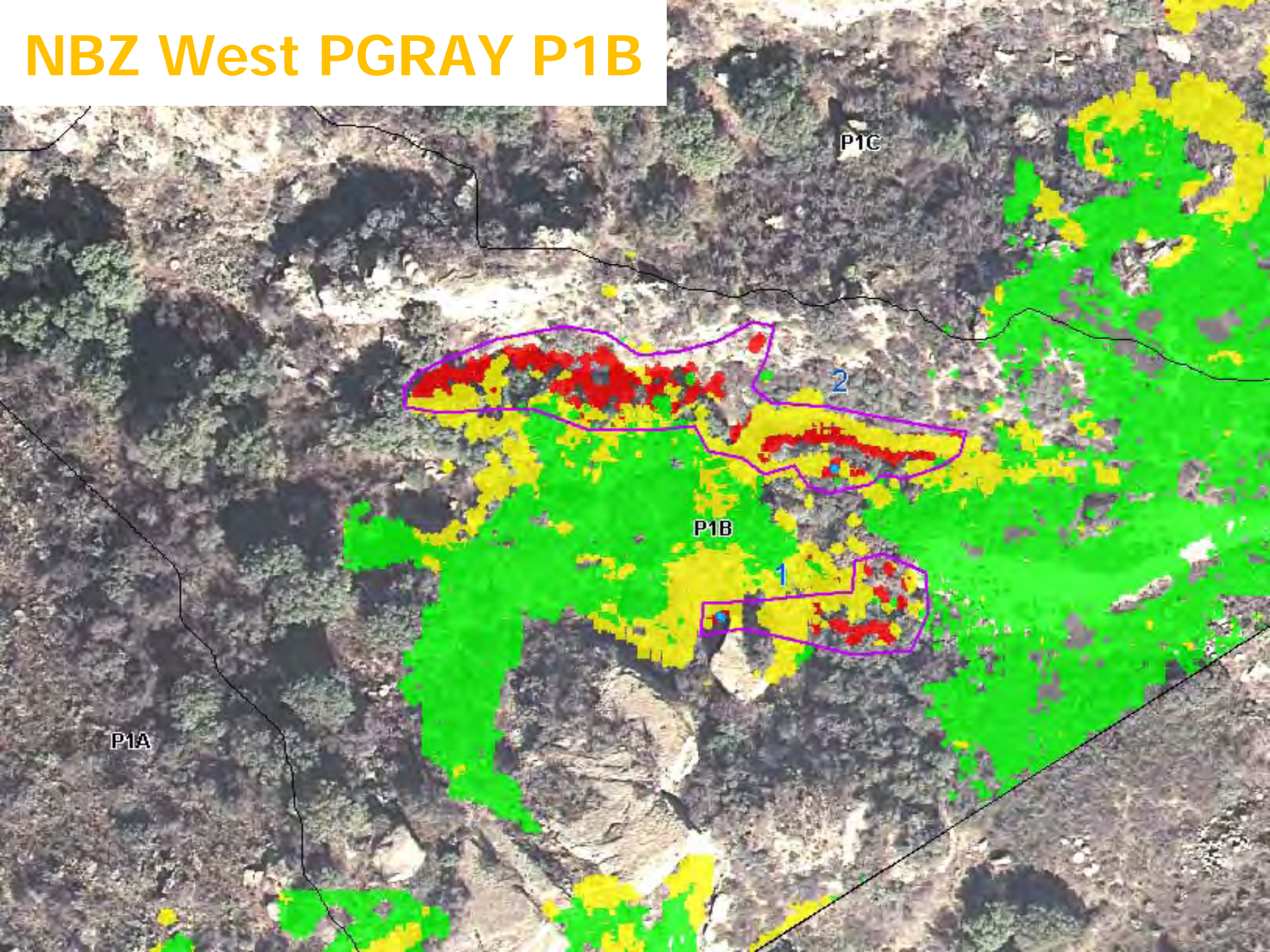
Terrain Example Photo of NBZ West PGRAY P1A-5



11/07/2011 15:19



NBZ West PGRAY P1B



P1C

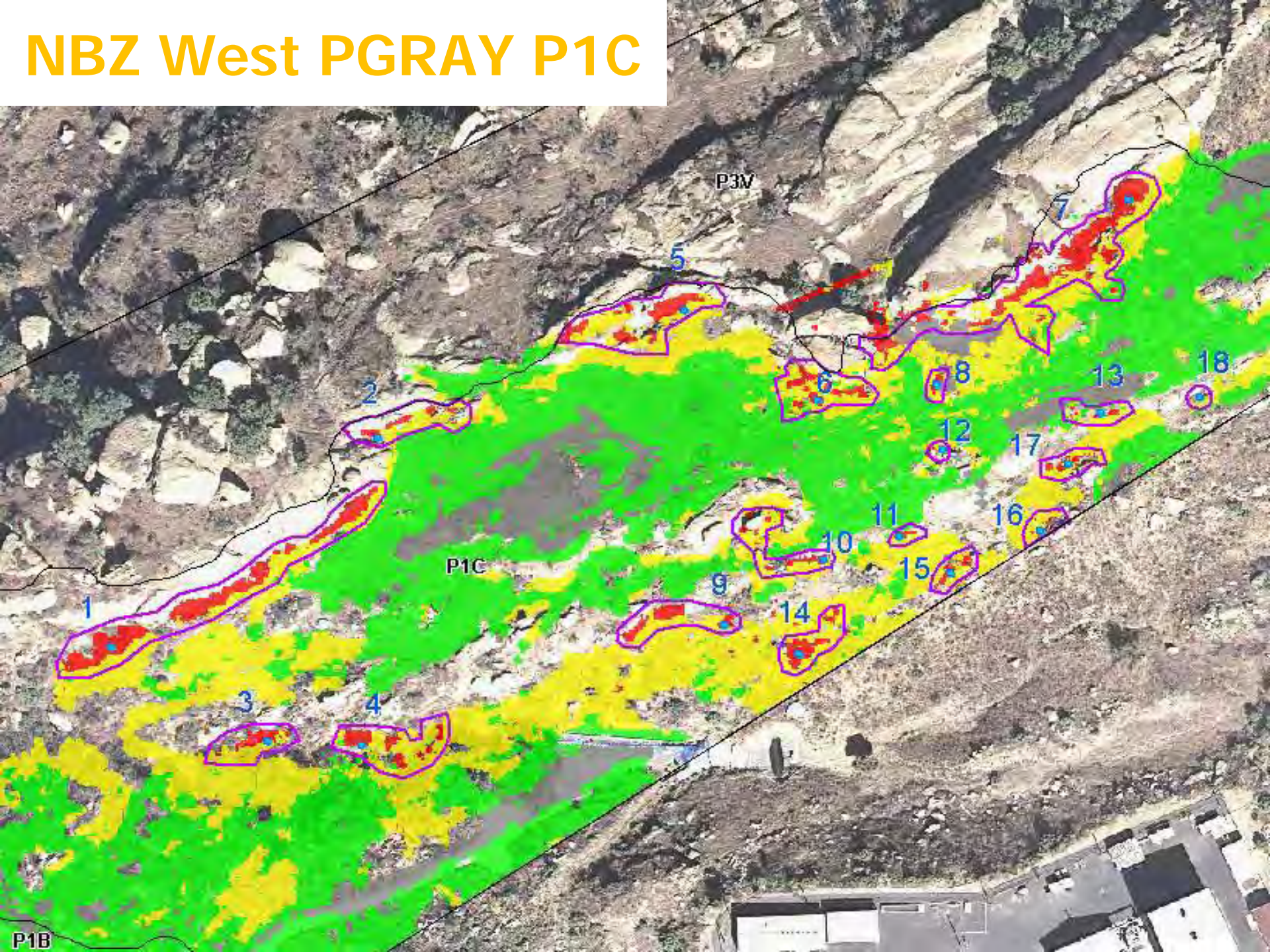
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P1B

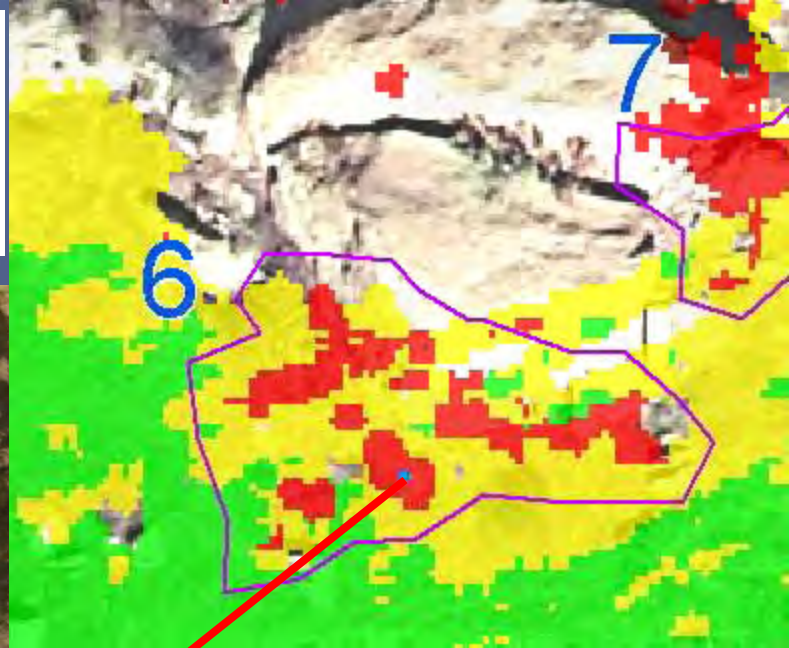
1

P1A

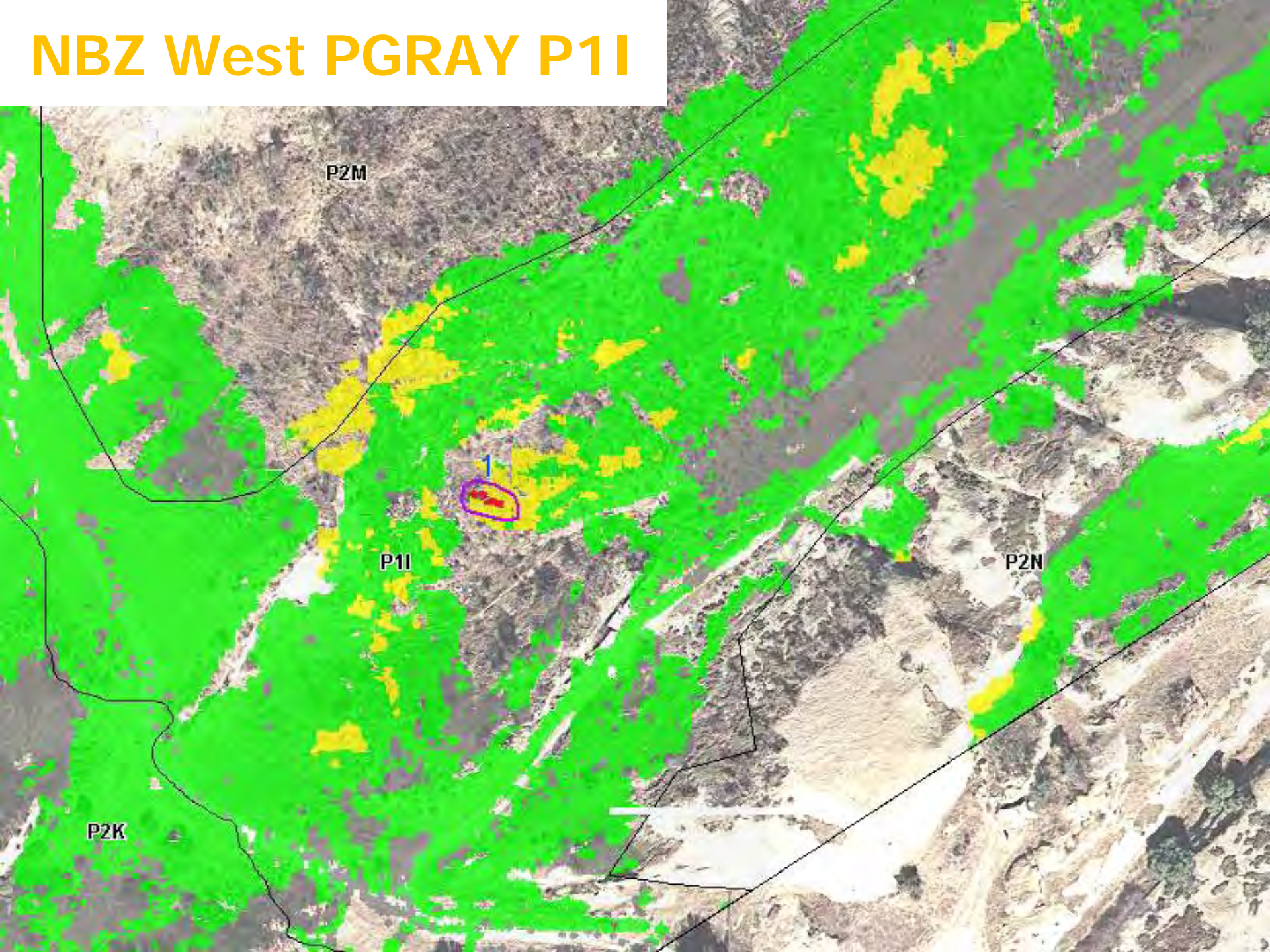
NBZ West PGRAY P1C



Terrain Example Photo of NBZ West PGRAY P1C-6



NBZ West PGRAY P1I



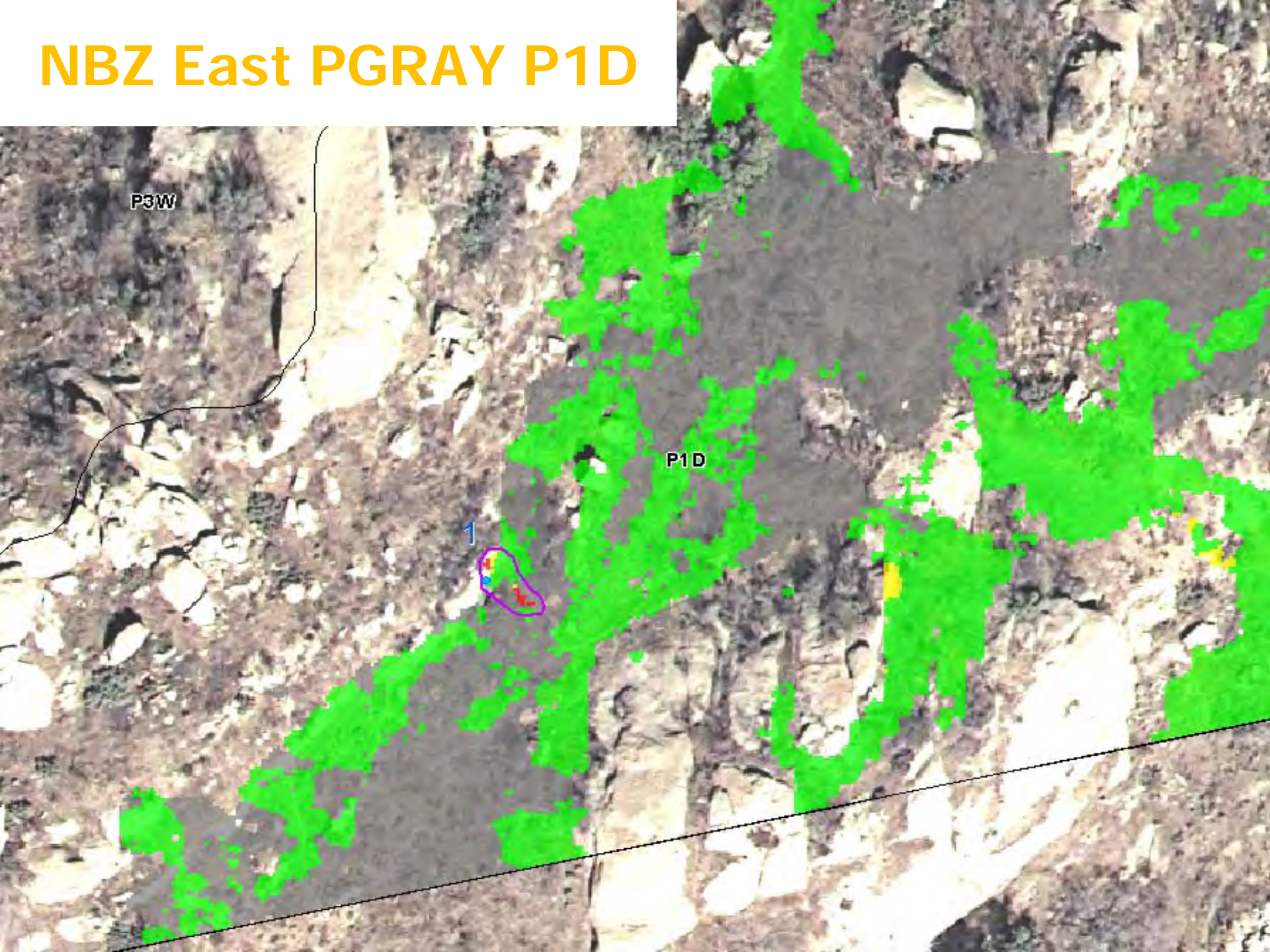
P2M

P1I

P2N

P2K

NBZ East PGRAY P1D



Evaluation of NBZ W and NBZ E Potential GRAYs

Locations	Evaluation
All locations	Not a GRAY; NORM
NORM is Naturally Occurring Radioactive Materials (Uranium, Thorium, and Potassium-40)	



Questions?

Thank you!



Figure 9.11
Gamma Anomalies
Northern Buffer Zone East
Former Santa Susana
Field Laboratory

U.S. EPA Region 9



Legend

- PGRAY Location
- PGRAY Boundary
- Priority Area Boundary

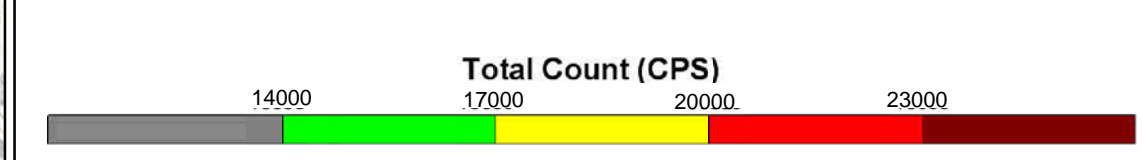
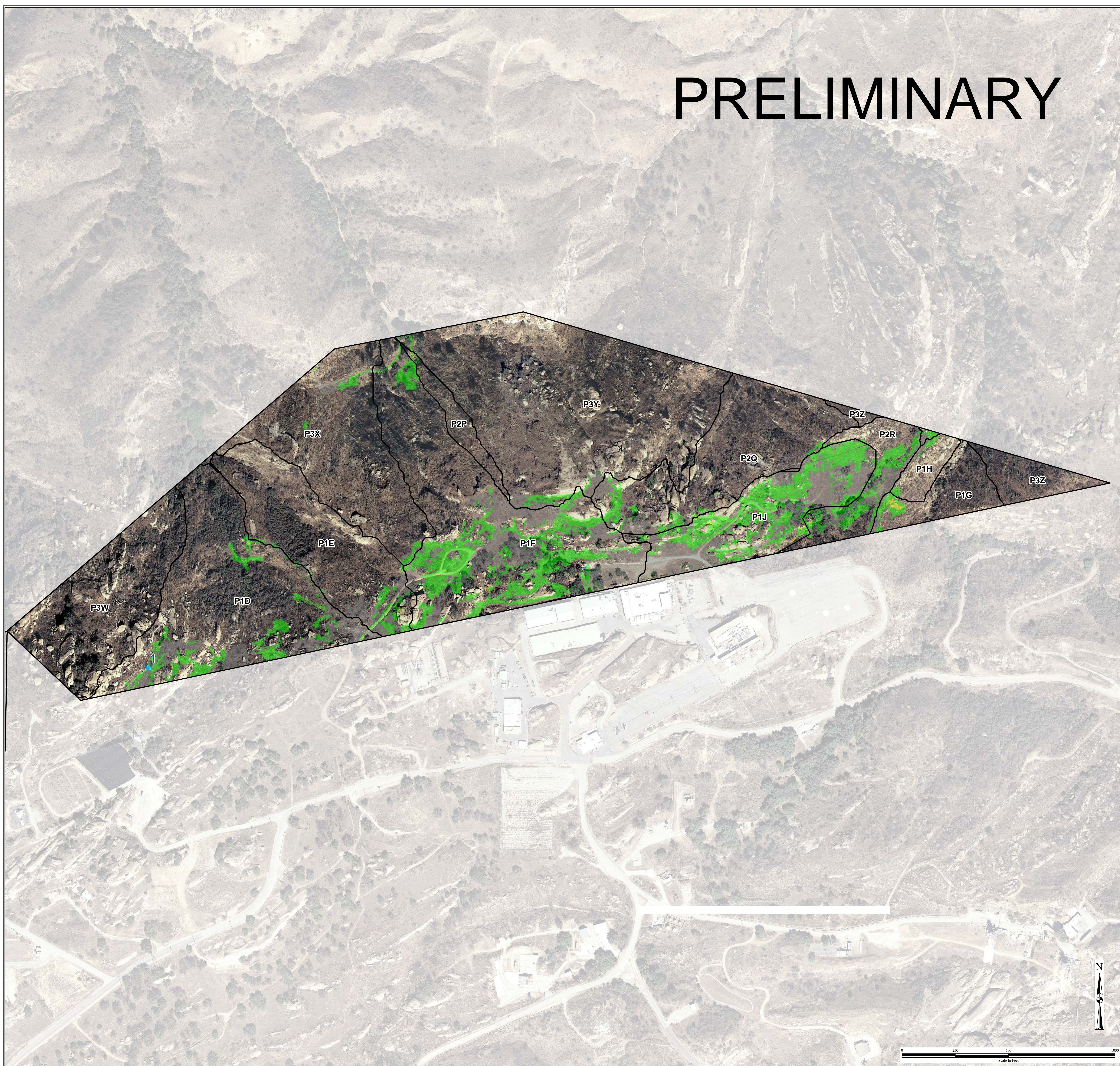


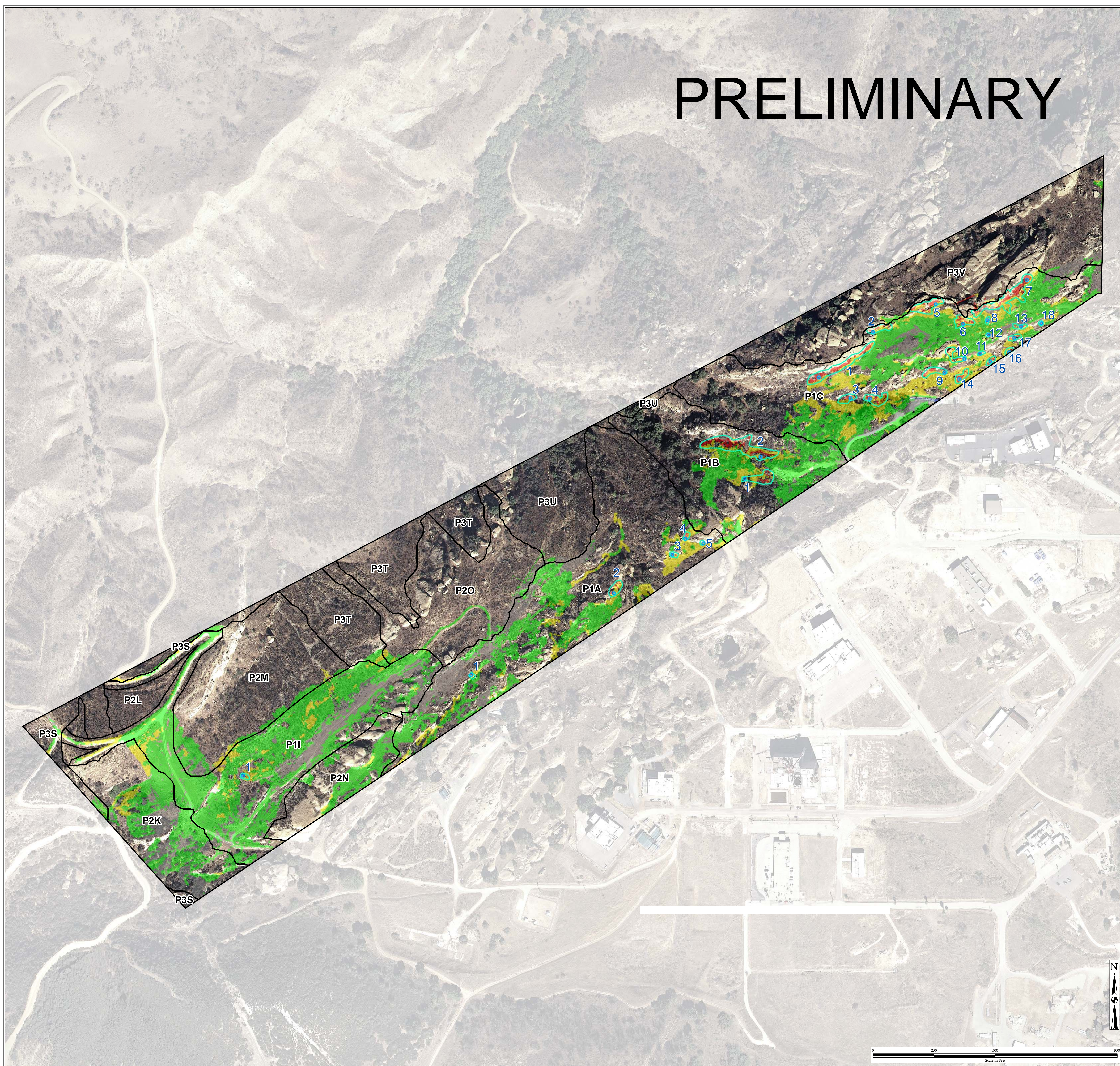
Figure 9.12
Gamma Anomalies
Northern Buffer Zone West
Former Santa Susana
Field Laboratory

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Legend

- PGRAY Location
- PGRAY Boundary
- Priority Area Boundary



Geophysical Investigation

- ▣ **RED EM31**: differences in soil conductivity, lateral changes in soil properties, density) sub-surface metal/utilities, containers & disturbed area (burial trenches)
- ▣ **BLUE Magnetometer**: ferrous (iron based) material Geologic features buried steel containers, unmapped utilities, UST's & demolition debris containing rebar & scrap metal
- ▣ **GREEN Ground Penetrating Radar (GPR)**: lateral & vertical (substrate) changes in electrical soil properties & subsurface materials, buried containers, UST's & utilities, burial trench & disturbed area/ higher resolution than other methodologies.



Geophysical Investigation

- ▣ **Point Source:** A single or small clustered discrete target
- ▣ **Linear:** Follow a line, unmapped utilities & other linear features, such as drainage, pathways & building footings
- ▣ **Broad:** Larger target or a cluster of many targets. Burial trench, disturbed area, UST.
- ▣ **Area:** Dashed lines boundary of a generally larger area of a common characteristic, such as landfills





Legend				HGL—Geophysical Investigation Report, SSFL—Ventura County, California	
Centerline Roads Primary Roads Secondary Roads Tertiary Roads Buildings Demolished Existing	Geophysical Anomalies Terrain Conductivity Magnetometer Ground Penetrating Radar Cut and Fill Boundaries Magnetometer Anomaly Linear Terrain Conductivity Anomaly Linear Ground Penetrating Radar Interpreted Drain Remnant Point Source Magnetometer Anomaly Point Source Terrain Conductivity Anomaly	Surface Water Intermittent Stream Permanent Stream Surface Water Lined Channel Surface Water Flow Surface Water Flow (From Boeing Database, 2008) Drains Wells	Surface Features Channel Drain Drainage Divide Gutter Tank Vault Well	Utilities Gas Storm Drain Sanitary Sewer Water Water (Removed) Water (Removed) Pipes (Unknown Type) Pipes (Unknown Type)	Northern Buffer Zone Anomalies Santa Susana Field Laboratory U.S. EPA Region 9 <small>F:\Santa_Susana\EP9038\Geophysical_Maps\StakeholderMeeting_NBZ\Geophysical_Anomalies.mxd 2/21/2012 jpbillock Source:HGL 2010, CIRGIS 2007 Coordinate System: NAD83 CA State Plane V</small>

NBZ NE Proposed Soil Samples Santa Susana Field Laboratory

PRELIMINARY

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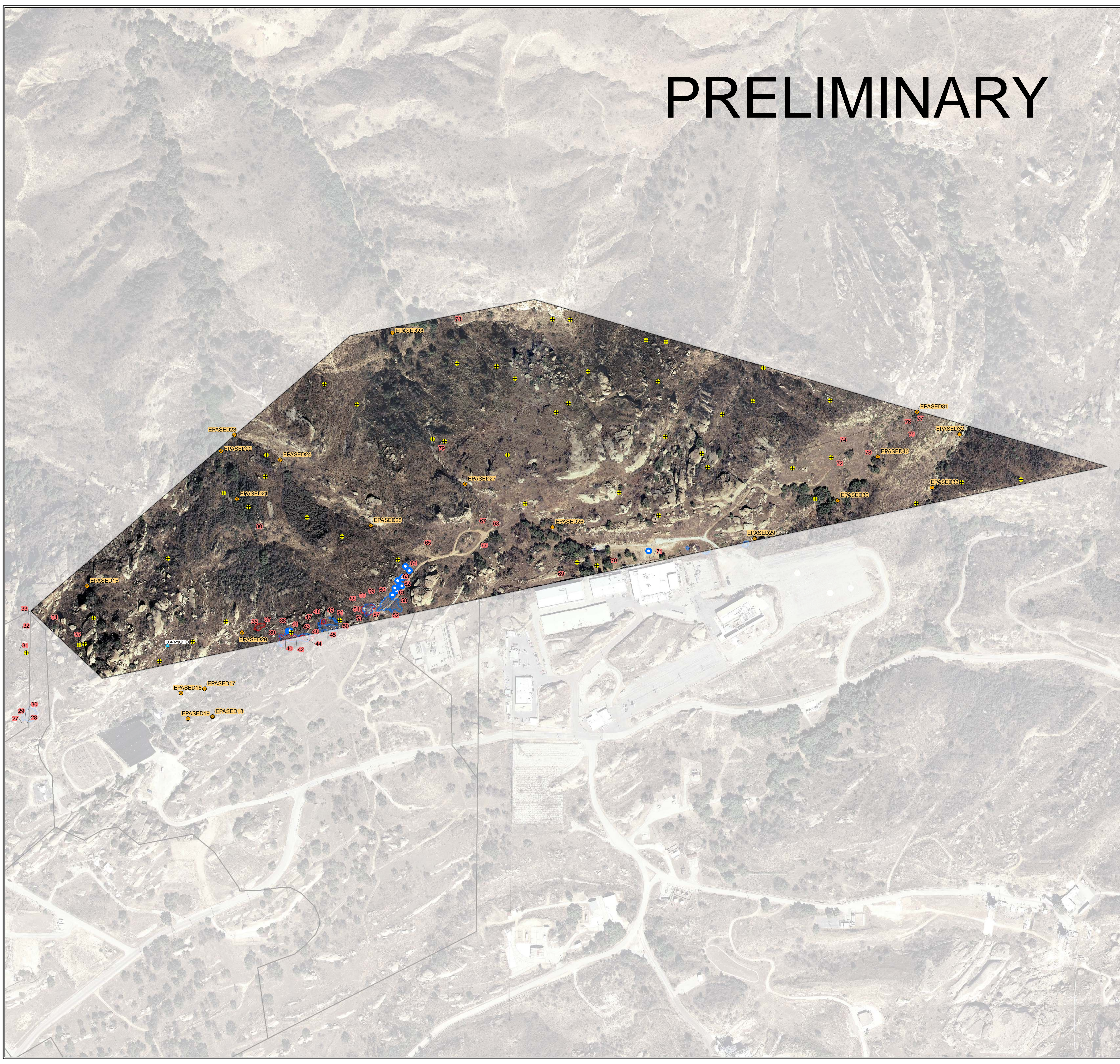


Legend

Proposed NBZ Sample Locations

Sample Type

- Surface (Random)
- Drainage
- Drainage Subsurface
- Subsurface
- Surface Subsurface
- Sediment Sample Locations
- PGRAY Locations
- Magnetometer Anomalies
- ScreenLayer
- Magnetometer
- Terrain Conductivity
- Subareas



NBZ NW Proposed Soil Samples Santa Susana Field Laboratory

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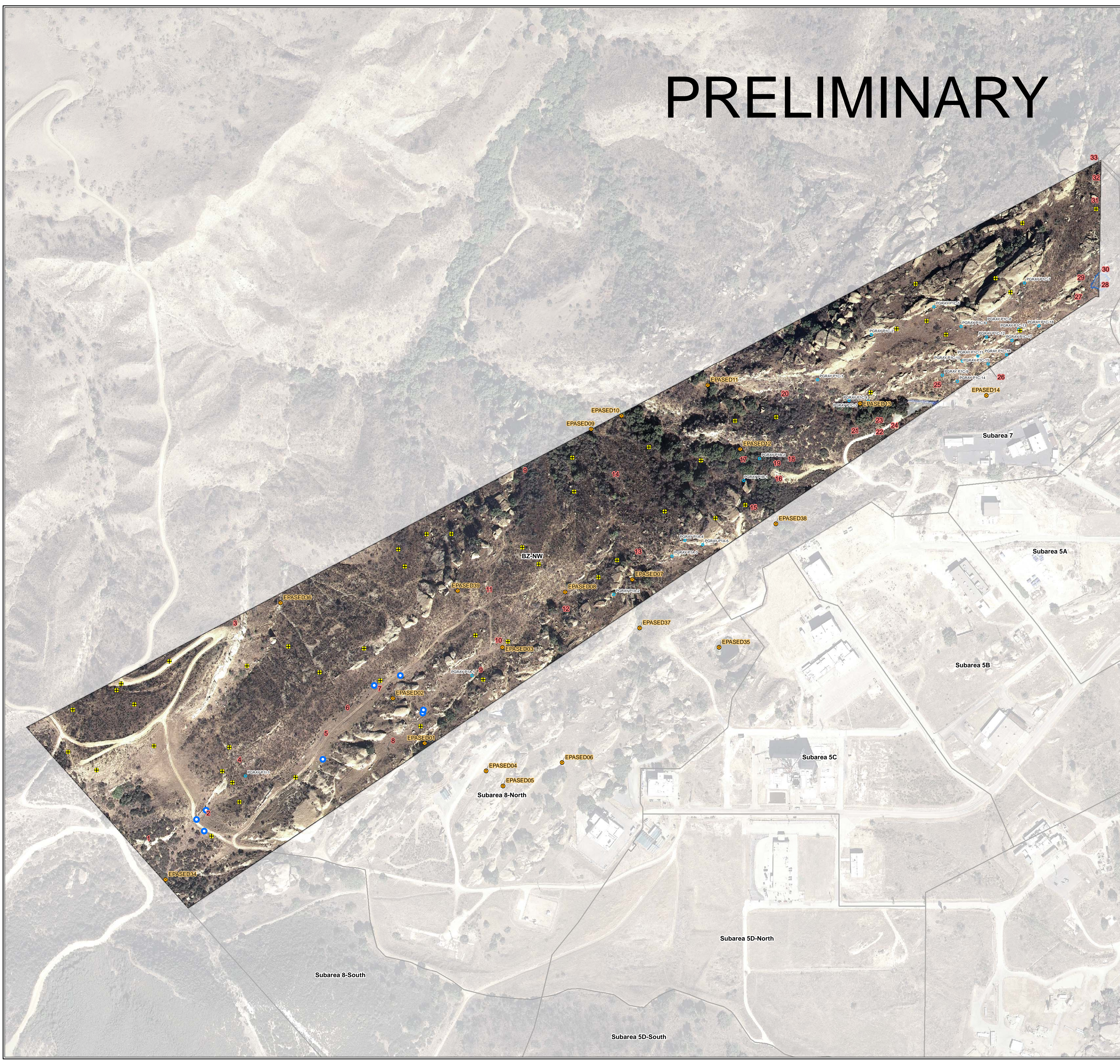


PRELIMINARY

Legend

Proposed NBZ Sample Locations

- Sample Type**
- Surface (Random)
 - Drainage
 - Drainage Subsurface
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 - ScreenLayer
 - Magnetometer
 - Terrain Conductivity
 - Subareas



Subarea 5B Summary of Results Exceeding RTLs

Sample Type	total	surface	subsurface	drainage
Samples Collected	466	188	249	29
Samples Exceeded	12	8	0	4
NORM Exceedances	0	0	0	0
Radionuclides Found	Cs-137 (10), Sr-90 (1), Eu-152 (1)			
Exceedance Ratios (= Activity / RTL)	10 – 1 = All 12 Exceedances			



Subarea 5B Round 2 Step-out Plan Overview Former Santa Susana Field Laboratory

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PRELIMINARY

Legend

Step-out Locations

SampleType

- + S
- + S/SS
- + SS
- Samples above R.T.L.s

Soil Sample Locations

SampleType

- Drainage
- ▲ Subsurface
- ▲ Surface Subsurface
- ScreenLayer
- Chemical Likely Remediation Zones
- D & D Likely Remediation Zones

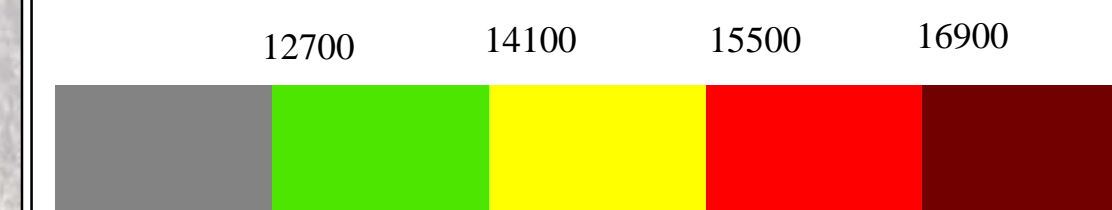
Location ID: 237
 Sample ID: 60267
 Sample Depth: 0.00 - 0.50
 Nuclide: Cs-137
 Activity: 0.265 pCi/g
 RTL: 0.207 pCi/g

1 - 10 x RTL value

Geophysical Anomalies

- Terrain Conductivity
- Magnetometer
- Cut and Fill Boundaries
- Magnetometer Anomaly Linear
- Terrain Conductivity Anomaly Linear
- Point Source Magnetometer Anomaly
- Point Source Terrain Conductivity Anomaly

Gamma Total Count (cps)



Subarea 6 Summary of Results Exceeding RTLs

Sample Type	total	surface	subsurface	drainage
Samples Collected	437	167	246	24
Samples Exceeded	75	50	24	1
NORM Exceedances	4	4	0	0
Radionuclides Found	Cs-137 (60), C-14 (9), Sr-90 (9), H-3 (8), Eu-152 (2), Cs-134 (1), Co-60 (1), Np-239 (1), Pu-239/240 (1)			
Exceedance Ratios (= Activity / RTL)	1000 – 100 = 7 exceedances			
	100 – 10 = 26 exceedances			
	10 – 1 = 60 exceedances			



Subarea 6 Samples above RTLs and Step-out Locations

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Legend

Step-out Locations

- SampleType**
- Drainage Subsurface
 - ⊕ Surface
 - ▲ Surface Subsurface
 - ▲ Subsurface
 - Samples above R.T.L.s

Soil Sample Locations

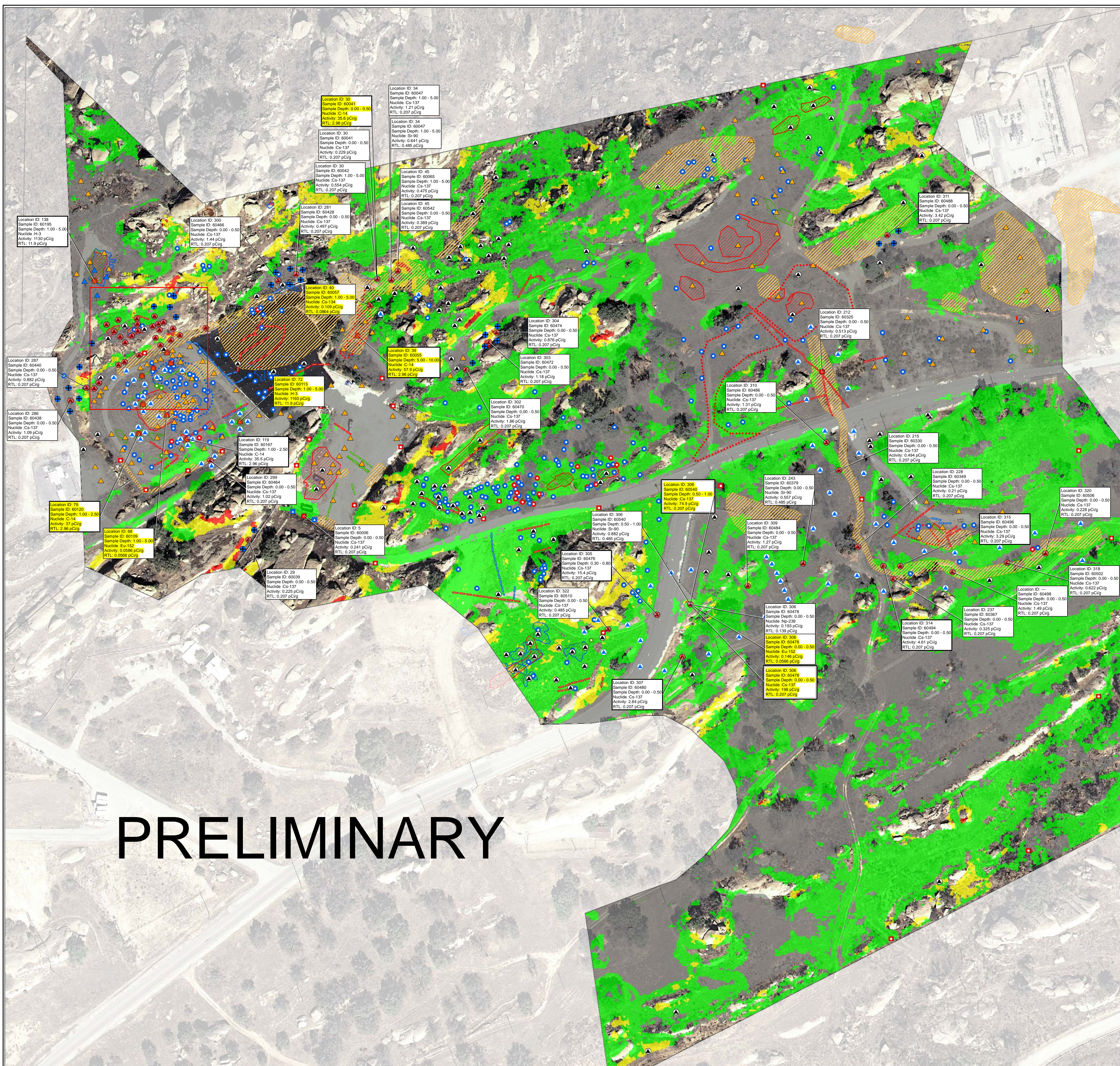
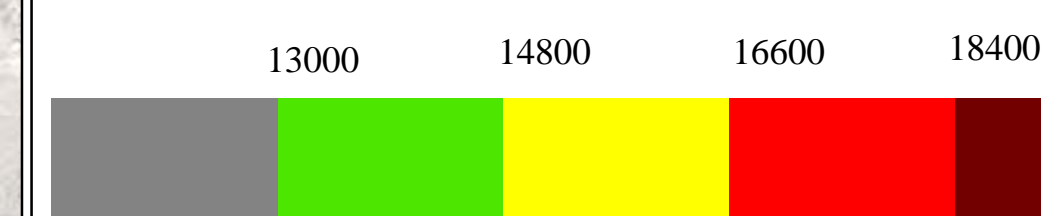
- SampleType**
- Drainage
 - ▲ Subsurface
 - ▲ Surface Subsurface
 - ScreenLayer
 - ▨ Chemical Likely Remediation Zones
 - ▨ D & D Likely Remediation Zones

- 1 - 10 x RTL value
- 10.001 - 100 x RTL value
- 100.001 - 1000 x RTL value

Geophysical Anomalies

- ▨ Terrain Conductivity
- ▨ Magnetometer
- ▨ Cut and Fill Boundaries
- ▨ Magnetometer Anomaly Linear
- ▨ Terrian Conductivity Anomaly Linear
- Point Source Magnetometer Anomaly
- Point Source Terrain Conductivity Anomaly

Gamma Total Count (cps)



PRELIMINARY



Subarea 6 Samples above RTL and Step-out Locations

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Legend

Step-out Locations

- Drainage Subsurface
- ⊕ Surface
- ▲ Surface Subsurface
- ▲ Subsurface
- Samples above R.T.L.s

Soil Sample Locations

- Drainage
- ▲ Subsurface
- ▲ Surface Subsurface
- ▨ Chemical Likely Remediation Zones
- ▨ ScreenLayer
- ▨ D & D Likely Remediation Zones

Location ID: 237
Sample ID: 60367
Sample Depth: 0.00 - 0.50
Nuclide: Cs-137
Activity: 0.325 pCi/g
RTL: 0.207 pCi/g

1 - 10 x RTL value

Location ID: 314
Sample ID: 60484
Sample Depth: 0.00 - 0.50
Nuclide: Cs-137
Activity: 4.61 pCi/g
RTL: 0.207 pCi/g

10.001 - 100 x RTL value

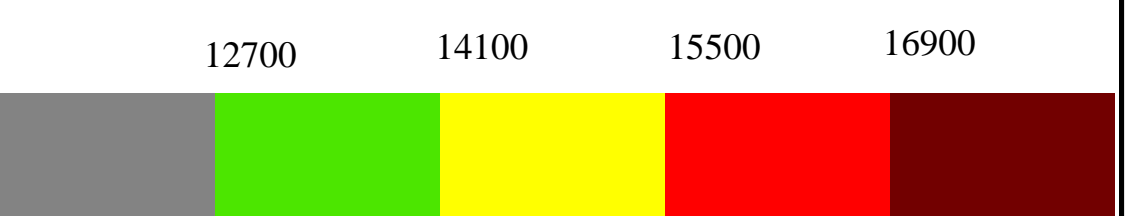
Location ID: 306
Sample ID: 60478
Sample Depth: 0.00 - 0.50
Nuclide: Cs-137
Activity: 198 pCi/g
RTL: 0.207 pCi/g

100.001 - 1000 x RTL value

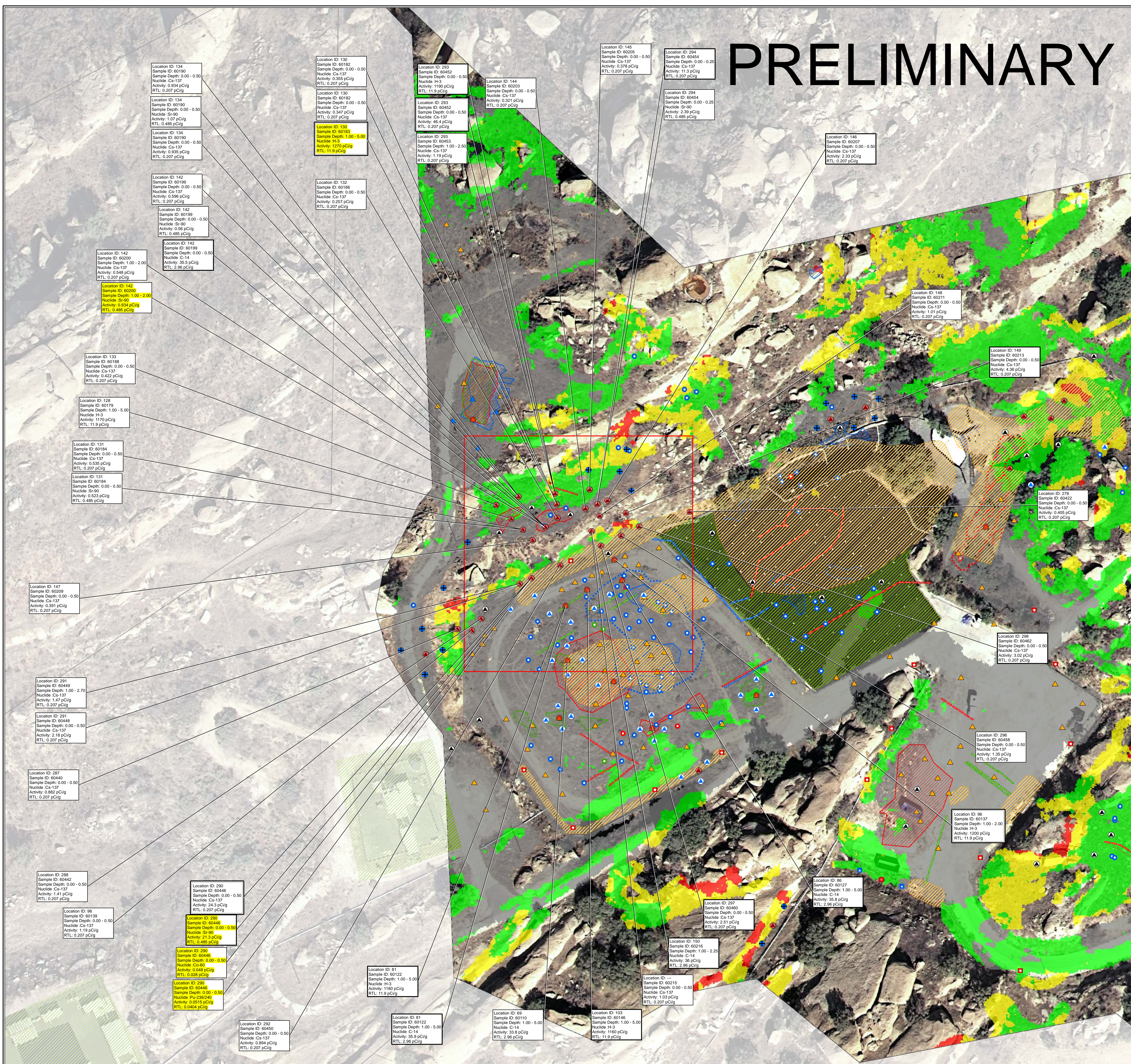
Geophysical Anomalies

- ▨ Terrain Conductivity
- ▨ Magnetometer
- ▨ Cut and Fill Boundaries
- Magnetometer Anomaly Linear
- Terrian Conductivity Anomaly Linear
- Point Source Magnetometer Anomaly
- Point Source Terrain Conductivity Anomaly

Gamma Total Count (cps)



PRELIMINARY



Major Milestones

- Historical Site Assessment Report May 2012
- Gamma Scanning Report May 2012
- Groundwater Report May 2012
- Completion of Soil Sampling July 2012
- Demobilization Sept 2012
- Final Soils Report Dec 2012



Round 1 Soil Sampling

Subarea	Planned	Collected	Duplicates	Total	Not Collected
3	15	12	1	13	2
5A	379	338	16	354	41
5B	493	466	22	488	27
5C	216	200	10	210	16
5D	486	466	25	491	19
6	518	437	23	460	81
7	302	254	13	267	48
8	304	284	17	301	20
TOTAL	2713	2457	127	2584	254

