



DEPARTMENT OF THE ARMY  
FORT WINGATE DEPOT ACTIVITY  
P.O. BOX 268  
FORT WINGATE, NM 87316

January 20, 2012

Mr. John Kieling  
Chief, Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, New Mexico 87505-6303

**RE: Phase 2 Soil Background Work Plan**

Dear Mr. Kieling:

The purpose of this letter work plan is to describe the approach for obtaining additional soil background data for arsenic and antimony at Fort Wingate Depot Activity (FWDA). Recent RFIs at Parcels 21, 11, and 22 have shown arsenic values from hundreds of samples exceeding the background value established in the *Soil Background Study and Data Evaluation Report, Version 2, Final, October 2010* and the NMED Soil Screening Level. The Army believes the arsenic exceedances are due to natural concentrations of arsenic in the Administration and Workshop areas being higher than those found in the October 2010 background report. See Section 3.6.1 of the Parcel 11 RFI Report for additional discussion on arsenic. The Army believes there is a similar case for arsenic and antimony at Parcel 3.

The Army implemented the *Background Study and Data Evaluation Work Plan (Revised), dated December 2009* which was approved by NMED on March 2, 2010. This work plan focused sampling on ecological zones as mentioned in Section 3.0 of the 2009 work plan instead of the Natural Resources Conservation Service (NRCS) soil units. Attachment D-1 of the 2009 work plan and Figure 1, attached, show the NRCS soil units. Note the soil units where the background samples were taken are not the same ones at Parcels 11, 21, 22 and to some extent Parcel 3. It is possible the soil units at these and other parcels have naturally higher arsenic values than those in the 2010 background report. A description of the soil units is attached.

Technical Approach: This work plan proposes obtaining background samples based on the NRCS soil units and comparing this data to results at SWMUs and AOCs on the depot. Samples will be taken from the soil units covering significant portions of the northern depot and soil units upgradient of the HWMU. Samples will not be taken in SWMUs or AOCs. The rationale and sample locations are presented in Table 1 and shown in Figures 2 - 5. Sample locations are represented by areas to allow for minor variances in sample locations determined in the field. The technical approach will follow Sections 3 and 4 of the December 2009 work plan approved by NMED with a few modifications.

Modifications to the 2009 work plan:

- All samples will be taken at 6-12" below the surface which represents the surface soil at FWDA where most exposure occurs.
- The Army plans to consult the NRCS soil scientist who originally mapped the area around FWDA for the NRCS to assist in sampling and classifying the soil

according to the NRCS soil types. The soil scientist may make minor location adjustments in the field based on professional judgment.

- Digging devices may include shovels, post hole diggers, or similar. Sample devices will be decontaminated between uses.
- Statistical calculations similar to those in the 2010 report will be prepared for each soil unit if possible, the entire combined data set taken under this work plan, and a combined data set from this work plan and that from the 2010 report.

The Army plans to obtain the samples in mid-2012 pending NMED approval of this work plan. If you have questions or require further information, please call me at 330-358-7312.

Sincerely,

Mark Patterson  
BRAC Environmental Coordinator

CF:  
Shannon Duran, NMED HWB  
Dave Cobrain, NMED HWB  
Chuck Hendrickson, U.S. EPA Region 6

**Table 1**  
**Proposed Soil Sampling Locations and Rationale**  
**2012 Background Study**  
**Fort Wingate Depot Activity**  
**Sample Depth: (6-12")**

<b>NRCS Map Unit</b>	<b>No. of Samples Per Unit</b>	<b>Parcel No.</b>	<b>Location Description</b>	<b>Metal of Interest</b>	<b>Rationale</b>	<b>Notes</b>
225	40	6, 11, 21	Sample in three locations: 1) Parcel 11 north of SWMU 3 but south of a line from the sewer plant and guard house, 2) East of the admin area and SWMU 7 in parcel 11 & 21, and 3) southwest of Bldg 51 in Parcel 6.	Arsenic	Soil unit 225 covers all of the admin area and most of the workshop area and portions of Parcels 6 & 7. Results can be compared to numerous SWMUs/AOCs on north FWDA. Samples will be spread over the three areas to better represent north FWDA.	Take 10 samples north of SWMU 3, 20 samples east of the admin area and SWMU 7, and 10 samples southwest of Bldg 51.
350	10	1	Sample south of the kickout area in Parcel 1.	Arsenic & Antimony	The soil unit is up grade of and inside Parcel 3 and soil from the unit washes down the arroyo to the central part of Parcel 3.	
351	10	1	Sample south of the kickout area in Parcel 1.	Arsenic & Antimony	Soil unit 351 is the Hogback - a large area draining into Parcel 3.	
404	10	1	Sample south of the kickout area in Parcel 1.	Arsenic & Antimony	The soil unit is up grade of Parcel 3 and soil from the unit washes down the arroyo to the central part of Parcel 3.	
414	10	1	Sample south of the kickout area in Parcel 1.	Arsenic & Antimony	The soil unit lies in and near the bottom of the arroyo collecting eroded material from surrounding units and is upsteam of the HWMU.	
550	10	1	Sample in Parcel 1 but within the kickout area.	Arsenic & Antimony	The unit lies within the kickout area but likely contributes a significant amount of soil down at the HWMU.	An Army OESS will assist in site clearance and ensure no munitions debris (potential contamination) is in the sample area.
555	10	2	Sample north of the kickout area in Parcel 2 and west of H-Block.	Arsenic & Antimony	Soil unit covers the arroyo near SWMU 14, 15, the CAMU, and AOC 89.	Sample between the two arroyos.

Note: Map Unit descriptions are located at the end of the work plan.

## Map Unit Description (Brief, Generated)

McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties

[Minor map unit components are excluded from this report]

Map unit: 225 - Aquima-Hawaikuh silt loams, 1 to 5 percent slopes

Component: Aquima (40%)

*The Aquima component makes up 40 percent of the map unit. Slopes are 1 to 5 percent. This component is on alluvial fans, uplands. The parent material consists of fan alluvium over stream alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R035XA112NM Loamy ecological site. Nonirrigated land capability classification is 6c. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Component: Hawaikuh (40%)

*The Hawaikuh component makes up 40 percent of the map unit. Slopes are 1 to 5 percent. This component is on fan remnants, uplands. The parent material consists of fan alluvium over stream alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R035XA128NM Clayey ecological site. Nonirrigated land capability classification is 6c. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Map unit: 350 - Toldohn-Vessilla-Rock outcrop complex, 8 to 35 percent slopes

Component: Toldohn (35%)

*The Toldohn component makes up 35 percent of the map unit. Slopes are 8 to 35 percent. This component is on ridges, uplands. The parent material consists of slope alluvium over residuum weathered from shale. Depth to a root restrictive layer, bedrock, paralithic, is 5 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F035XG134NM Pinus Edulis-Juniperus Monosperma/querqus Gambelii/bouteloua Gracilis ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Component: Vessilla (30%)

*The Vessilla component makes up 30 percent of the map unit. Slopes are 8 to 15 percent. This component is on ridges, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone. Depth to a root restrictive layer, bedrock, lithic, is 5 to 20 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R035XF618AZ Sandy Upland 13-17" P.z. Moderately Deep ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.*

Component: Rock outcrop (20%)

*Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.*

Map unit: 351 - Rock outcrop-Vessilla complex, 35 to 70 percent slopes

Component: Rock outcrop (60%)

*Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.*

## Map Unit Description (Brief, Generated)

McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties

Map unit: 351 - Rock outcrop-Vessilla complex, 35 to 70 percent slopes

Component: Vessilla (30%)

*The Vessilla component makes up 30 percent of the map unit. Slopes are 35 to 70 percent. This component is on cuestras, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone. Depth to a root restrictive layer, bedrock, lithic, is 5 to 20 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R036XB014NM Shallow Loam ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.*

Map unit: 404 - Rock outcrop-Techado-Stozuni complex, 5 to 60 percent slopes

Component: Rock outcrop (35%)

*Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.*

Component: Techado (35%)

*The Techado component makes up 35 percent of the map unit. Slopes are 5 to 60 percent. This component is on cuestras, uplands. The parent material consists of slope alluvium and colluvium over residuum weathered from shale. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F039XA002NM Pinus Ponderosa-Pseudotsuga Menziesii/quercus Gambelii-Cercocarpus Montanus/poa Fendleriana ecological site. Nonirrigated land capability classification is 8. This soil does not meet hydric criteria. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Component: Stozuni (25%)

*The Stozuni component makes up 25 percent of the map unit. Slopes are 5 to 15 percent. This component is on cuestras, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone. Depth to a root restrictive layer, bedrock, lithic, is 5 to 20 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F039XA002NM Pinus Ponderosa-Pseudotsuga Menziesii/quercus Gambelii-Cercocarpus Montanus/poa Fendleriana ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.*

Map unit: 414 - Zunalei-Corzuni loamy fine sands, 2 to 10 percent slopes

Component: Zunalei (50%)

*The Zunalei component makes up 50 percent of the map unit. Slopes are 2 to 10 percent. This component is on fan remnants, uplands. The parent material consists of eolian deposits over fan alluvium derived from sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F039XA007NM Pinus Ponderosa-Pinus Edulis/muhlenbergia Montana-Bouteloua Curtipendula ecological site. Nonirrigated land capability classification is 6c.*

## Map Unit Description (Brief, Generated)

McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties

Map unit: 414 - Zunalei-Corzuni loamy fine sands, 2 to 10 percent slopes

Component: Corzuni (40%)

*The Corzuni component makes up 40 percent of the map unit. Slopes are 2 to 10 percent. This component is on fan remnants, uplands. The parent material consists of eolian deposits over fan alluvium derived from sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 65 percent. This component is in the F039XA007NM Pinus Ponderosa-Pinus Edulis/muhlenbergia Montana-Bouteloua Curtipendula ecological site. Nonirrigated land capability classification is 6c.*

Map unit: 550 - Bryway-Galzuni loams, 1 to 8 percent slopes

Component: Bryway (50%)

*The Bryway component makes up 50 percent of the map unit. Slopes are 2 to 8 percent. This component is on cuestras, uplands. The parent material consists of slope alluvium derived from sandstone over residuum weathered from shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R035XA112NM Loamy ecological site. Nonirrigated land capability classification is 6c. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.*

Component: Galzuni (35%)

*The Galzuni component makes up 35 percent of the map unit. Slopes are 1 to 8 percent. This component is on fan remnants, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R036XB002NM Clayey ecological site. Nonirrigated land capability classification is 6c. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Map unit: 555 - Parkelei-Evpark fine sandy loams, 2 to 8 percent slopes

Component: Parkelei (45%)

*The Parkelei component makes up 45 percent of the map unit. Slopes are 2 to 8 percent. This component is on cuestras, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the F035XG134NM Pinus Edulis-Juniperus Monosperma/quercus Gambelii/bouteloua Gracilis ecological site. Nonirrigated land capability classification is 6c. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

Component: Evpark (35%)

*The Evpark component makes up 35 percent of the map unit. Slopes are 2 to 8 percent. This component is on cuestras, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R035XA112NM Loamy ecological site. Nonirrigated land capability classification is 6c. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.*

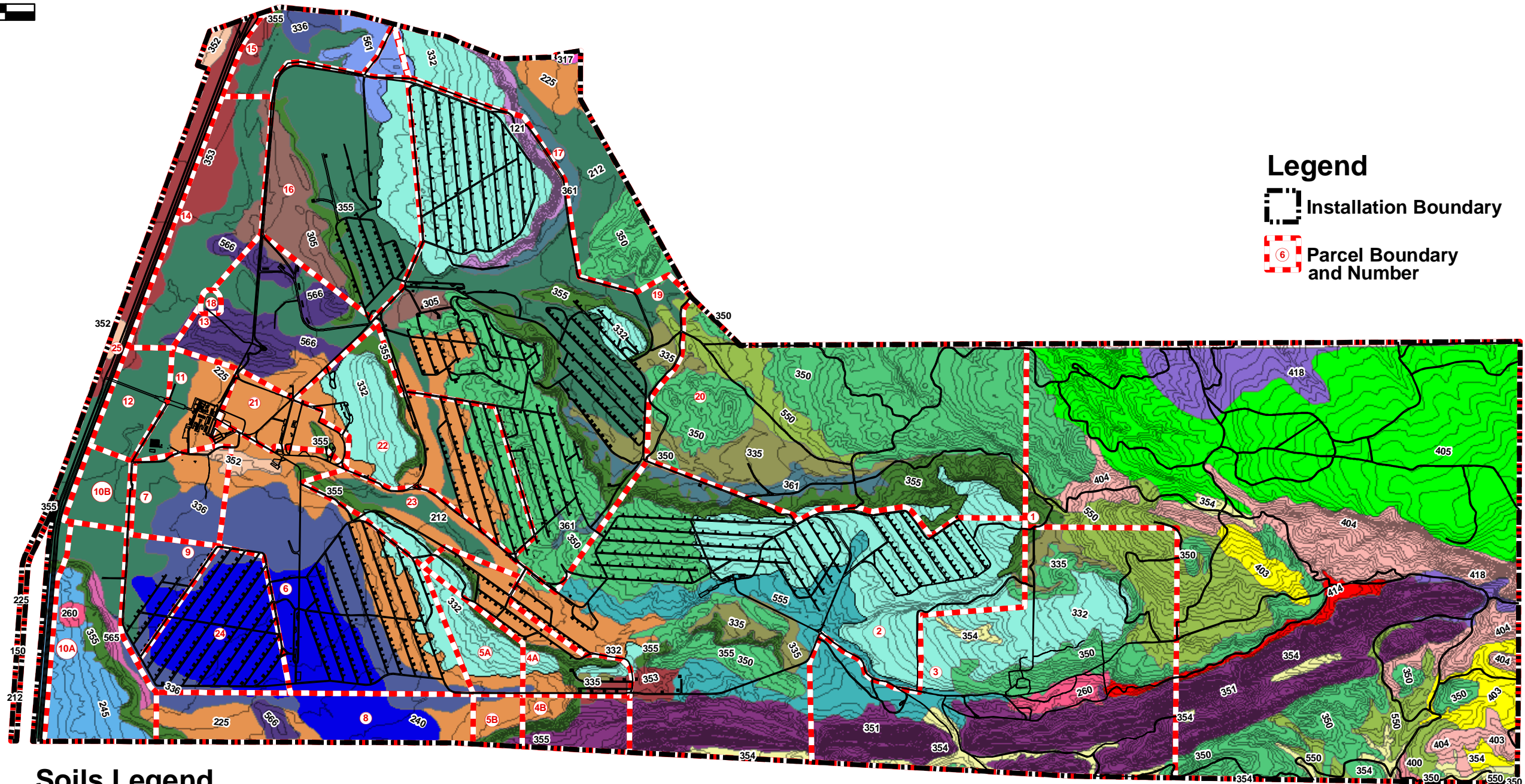
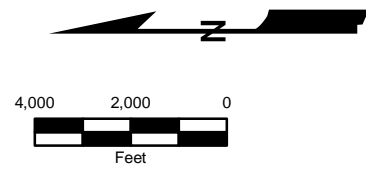
## Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.



A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.































Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.



### Legend

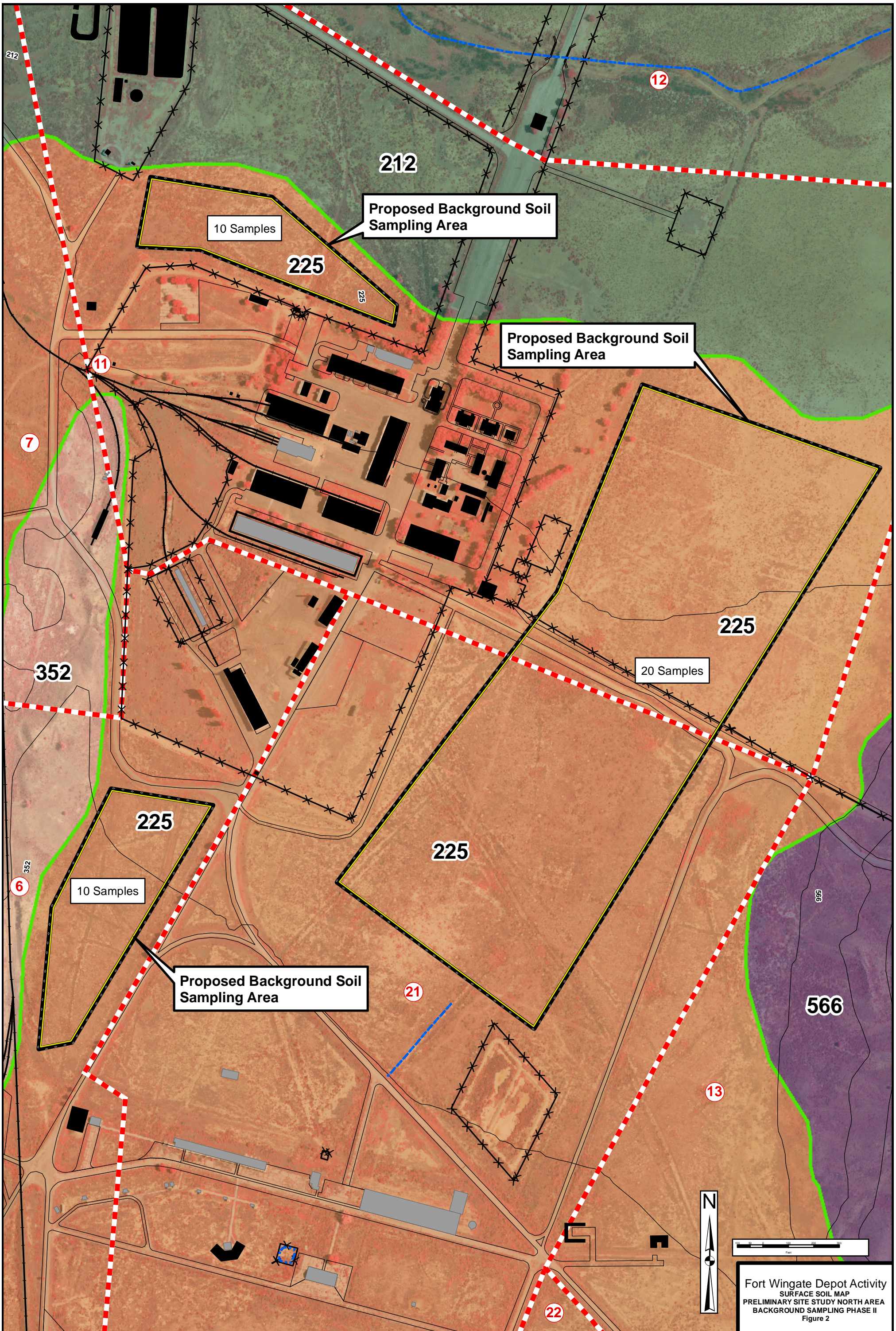
-  Installation Boundary
-  Parcel Boundary and Number

### Soils Legend

- |  |  |  |   |
|--|--|--|---|
|  121 Badland  |  317 Highdye-Evpark-Bryway complex, 2 to 20 percent slopes         |  354 Knifehill loam, 1 to 5 percent slopes                        |  418 Asaayi-Osordidge complex, 2 to 15 percent slopes            |
|  150 Riverwash-Escawetter association, 0 to 1 percent slopes  |  332 Evpark-Arabrab complex, 2 to 6 percent slopes                 |  355 Rizno-Tekapo-Rock outcrop complex, 2 to 45 percent slopes    |  550 Bryway-Galzuni loams, 1 to 8 percent slopes                 |
|  212 Rehobeth silty clay loam, 0 to 1 percent slopes          |  335 Venadito clay, 1 to 3 percent slopes                          |  361 Monpark silty clay, 2 to 8 percent slopes                    |  555 Parkelei-Evpark fine sandy loams, 2 to 8 percent slopes     |
|  225 Aquima-Hawai kuh silt loams, 1 to 5 percent slopes       |  336 Nuffel-Venadito complex, 1 to 3 percent slopes                |  400 Shoemaker-Stozuni complex, 2 to 8 percent slopes             |  561 Flugle-Plumasano association, 2 to 8 percent slopes         |
|  240 Breadsprings and Nahodish soils, 0 to 2 percent slopes   |  350 Toldohn-Vessilla-Rock outcrop complex, 8 to 35 percent slopes |  403 Valnor-Techado complex, 2 to 25 percent slopes               |  565 Plumasano-Rock outcrop complex, 15 to 40 percent slopes     |
|  245 Buckle-Gapmesa-Barboncito complex, 1 to 6 percent slopes |  351 Rock outcrop-Vessilla complex, 35 to 70 percent slopes        |  404 Rock outcrop-Techado-Stozuni complex, 5 to 60 percent slopes |  566 Bamac extremely gravelly sandy loam, 5 to 50 percent slopes |
|  260 Quarries and pits  |  352 Zia sandy loam, 1 to 5 percent slopes                         |  405 Fortwingate-Owlrock complex, 2 to 8 percent slopes           |   |
|  305 Celavar-Atarque complex, 1 to 8 percent slopes           |  353 Mido loamy fine sand, 1 to 6 percent slopes                   |  414 Zunalei-Corzuni loamy fine sands, 2 to 10 percent slopes     |   |

**Fort Wingate Depot Activity, New Mexico  
Soils Map  
Figure 1**



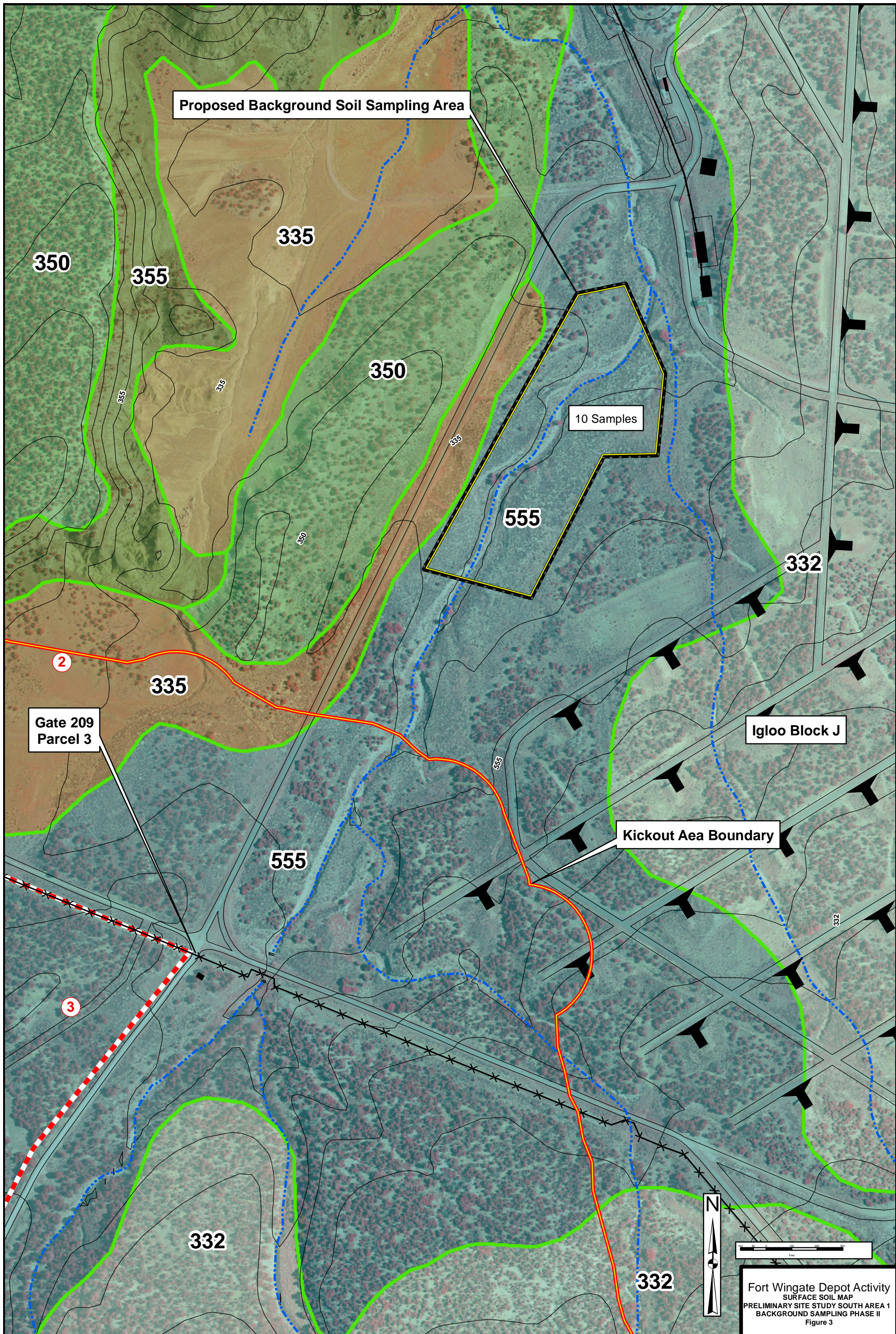


Proposed Background Soil Sampling Area

Proposed Background Soil Sampling Area

Proposed Background Soil Sampling Area

Fort Wingate Depot Activity  
SURFACE SOIL MAP  
PRELIMINARY SITE STUDY NORTH AREA  
BACKGROUND SAMPLING PHASE II  
Figure 2



Proposed Background Soil Sampling Area

350

355

335

350

10 Samples

555

332

2

335

Gate 209  
Parcel 3

Igloo Block J

Kickout Area Boundary

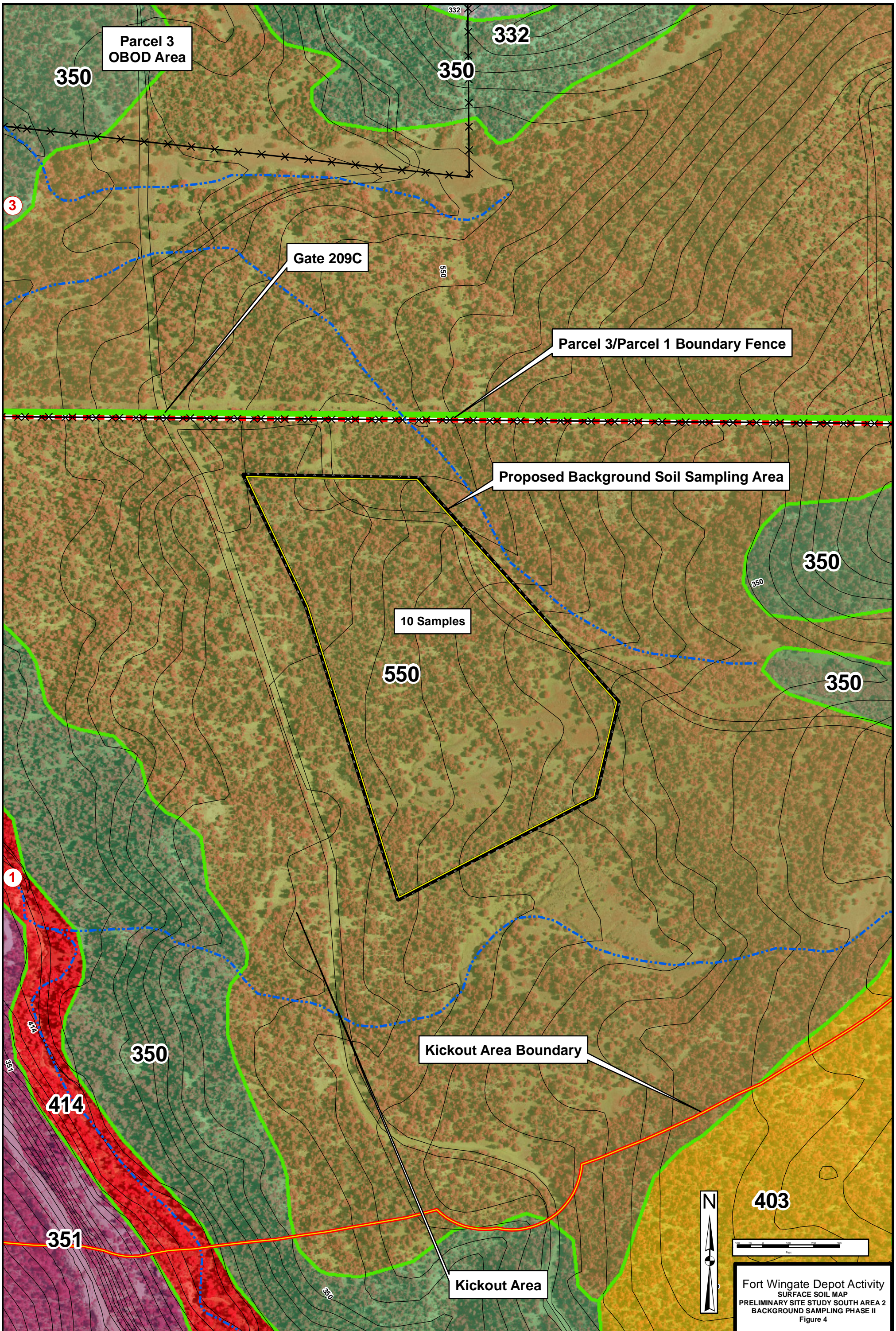
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3

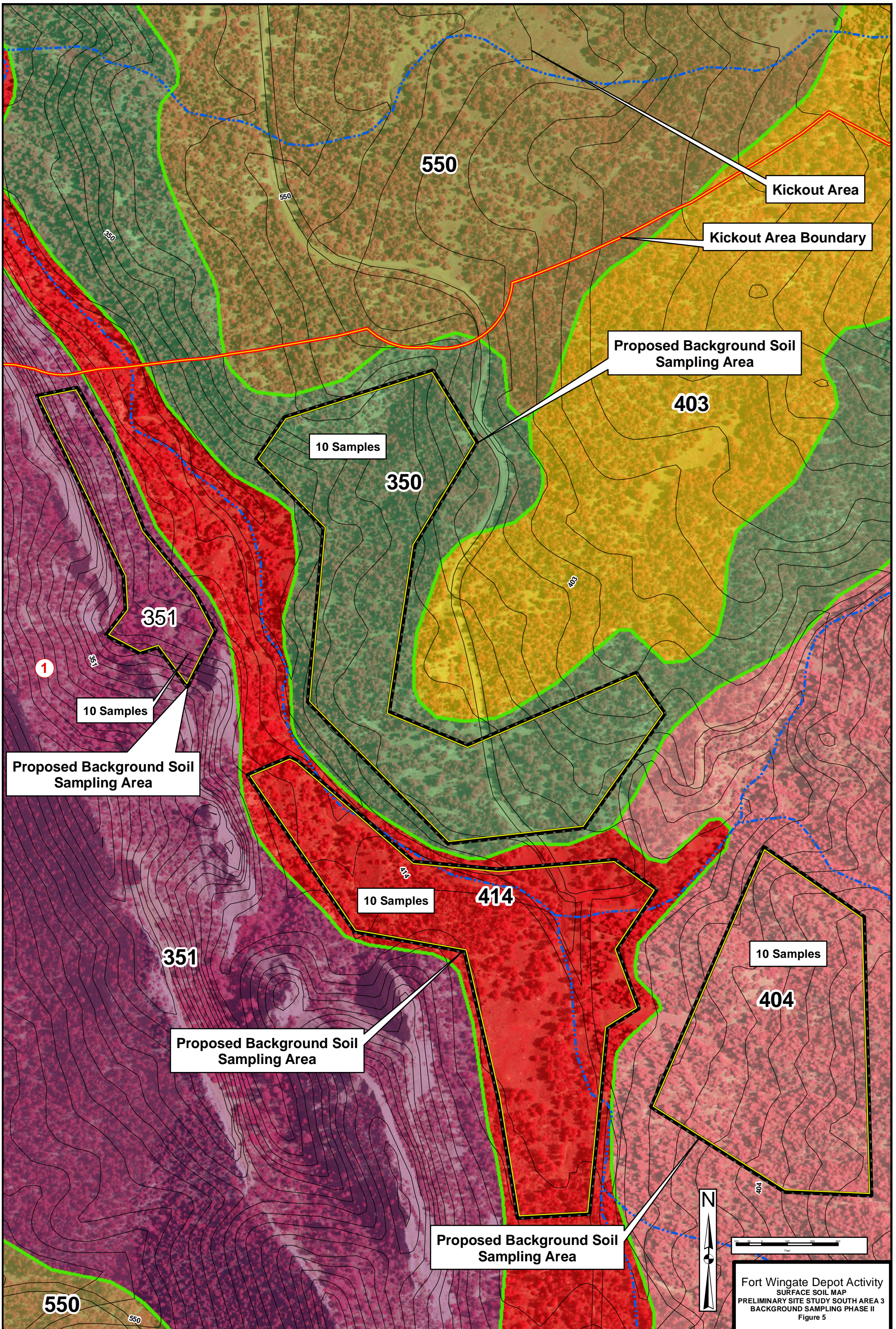
332

332

Fort Wingate Depot Activity  
SURFACE SOIL MAP  
PRELIMINARY SITE STUDY SOUTH AREA 1  
BACKGROUND SAMPLING PHASE II  
Figure 3



Fort Wingate Depot Activity  
SURFACE SOIL MAP  
PRELIMINARY SITE STUDY SOUTH AREA 2  
BACKGROUND SAMPLING PHASE II  
Figure 4



Fort Wingate Depot Activity  
SURFACE SOIL MAP  
PRELIMINARY SITE STUDY SOUTH AREA 3  
BACKGROUND SAMPLING PHASE II  
Figure 5