
Riley Pass Uranium Mine Site –
Off to a Good Start
Mary Beth Marks
USDA Forest Service

acknowledgements:

Mark Donner, Tyrel Hulet - Trihydro

Dustin Wasley – GeoEngineers

Harold Hutson - BSR Engineering

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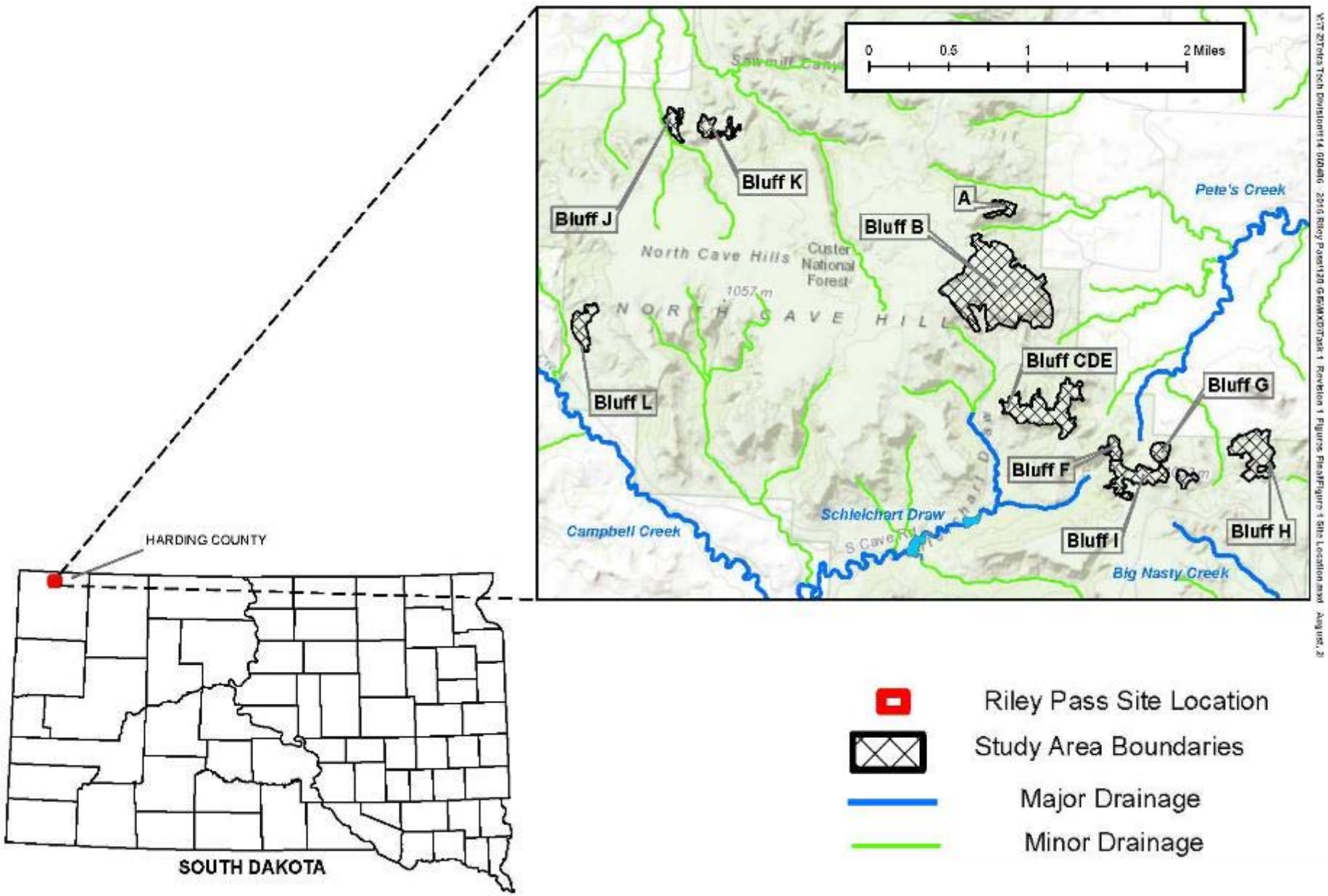
0
0.5
1
2 Miles
Bluff J
Bluff K
A
Bluff B
Pete's Creek
North Cave Hills
Custer National Forest
1057 m
Bluff L
Bluff CDE
Bluff G
Bluff F
Schleichart Draw
Campbell Creek
Bluff I
Bluff H
Big Nasty Creek
HARDING COUNTY
SOUTH DAKOTA
Riley Pass Site Location
Study Area Boundaries
Major Drainage
Minor Drainage

RILEY PASS URANIUM MINES

Prospecting Activities – as early as 1950

Uranium mining operations in 1962

Mining ceased in 1965

Overburden pushed off the outer edges of the pits, highwalls and spoils material with exposed radioactive material


• Exposed lignite ores and waste contain elevated contaminants
• Arsenic
• Molybdenum
• Selenium
• Uranium
• Radium
• Thorium

EROSION

- the physical characteristics of the soils,
- the relatively steep terrain they occupy, and
- regional climate conditions

Primary transport of contaminants is erosion – both wind and water

Soil piping throughout spoils material

Northeast Drainage Channel – Bluff B

Riley Pass Reclamation Approach selected in the Action Memo

- Isolate the contaminated waste
- Reclaim using natural landform mine reclamation techniques

Risk-based Cleanup Levels

Arsenic risk-based cleanup level

142 mg/kg

Radium-226 risk-based cleanup level

30 pCi/g

Riley Pass Reclamation Approach selected in the Action Memo

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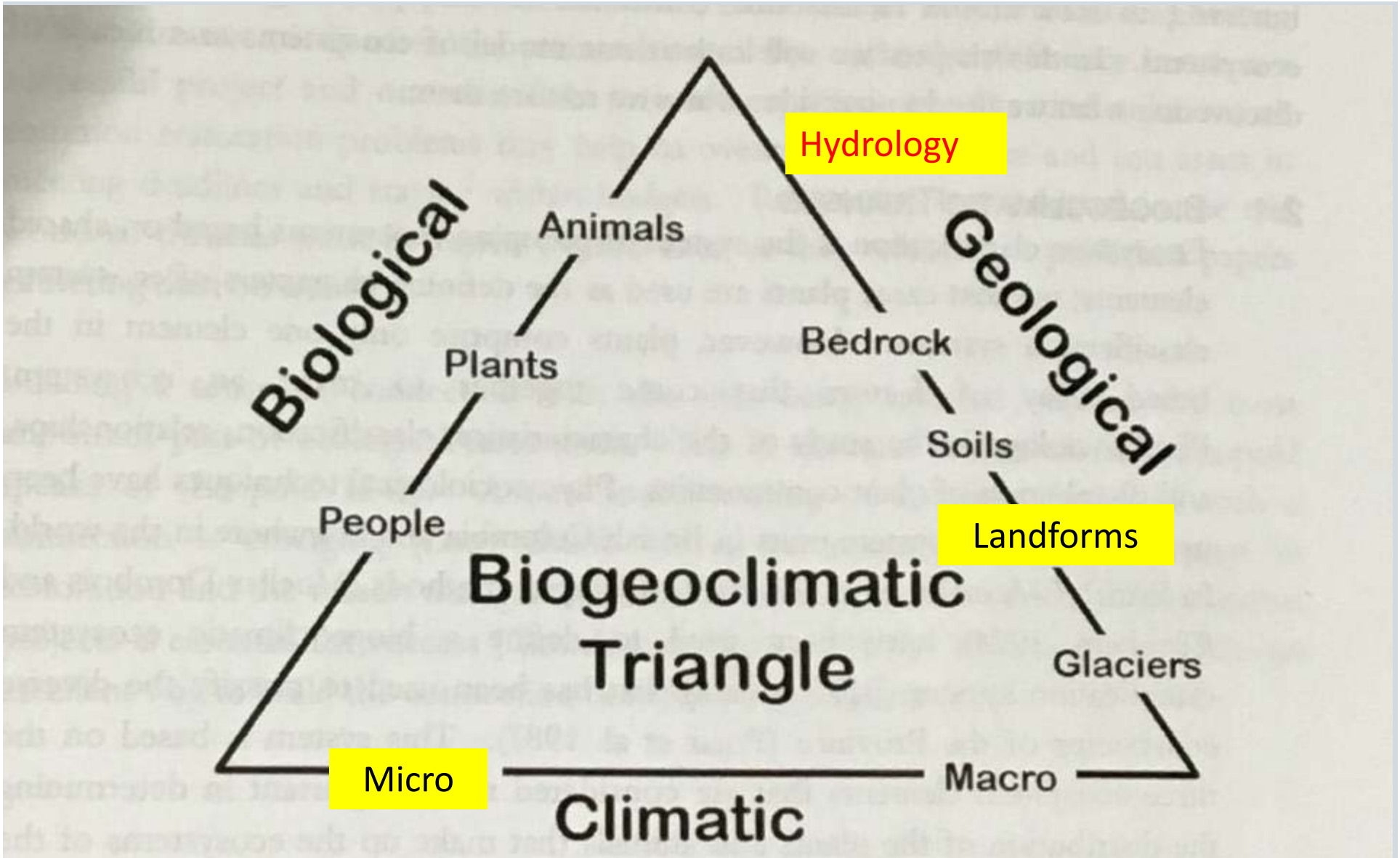


Figure 2-1. Biogeoclimatic triangle showing the elements that are needed for effective restoration planning.

What are the Natural Landforms at Riley Pass?

Reclamation Approach

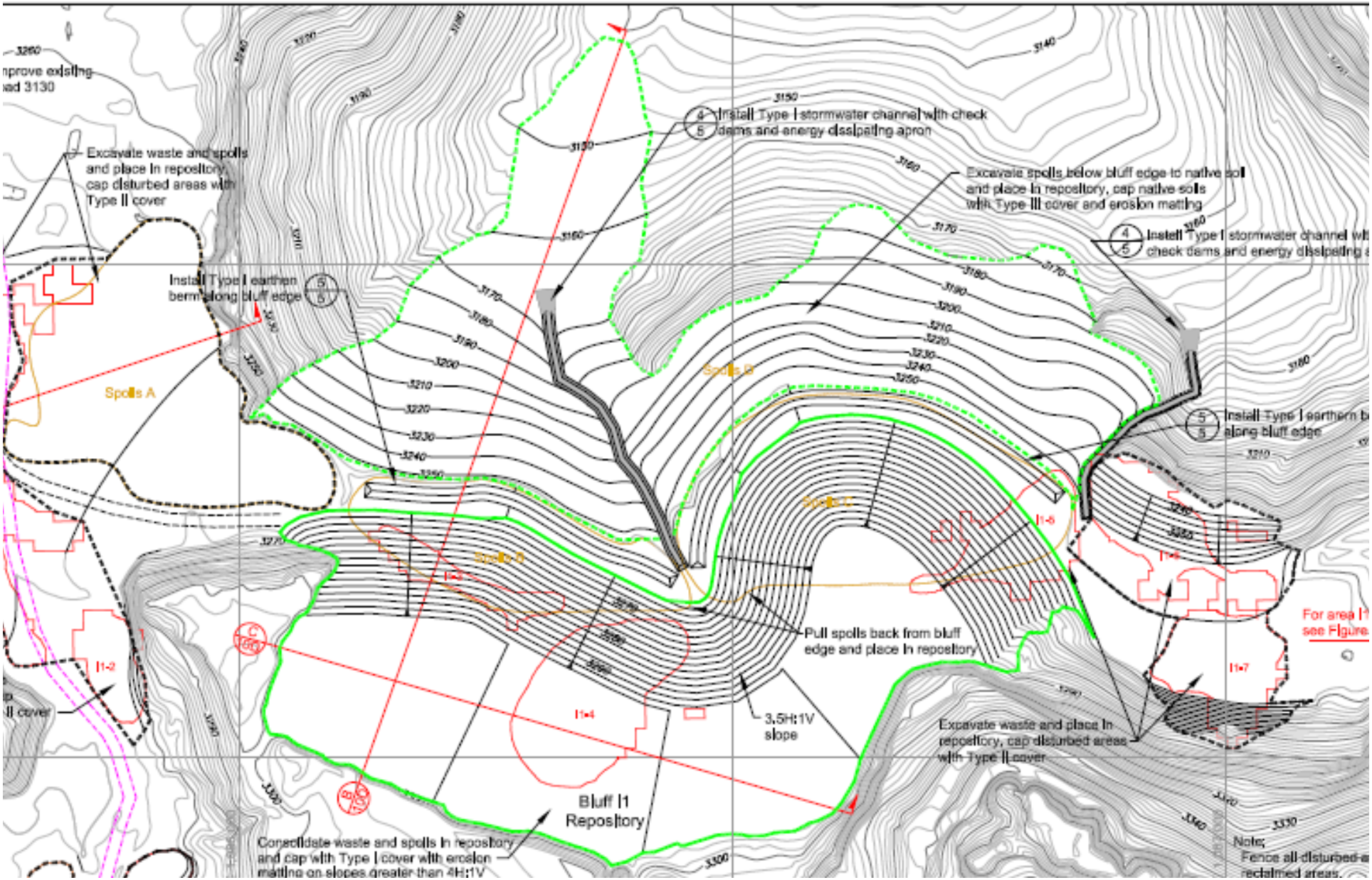
TRADITIONAL MINE RECLAMATION

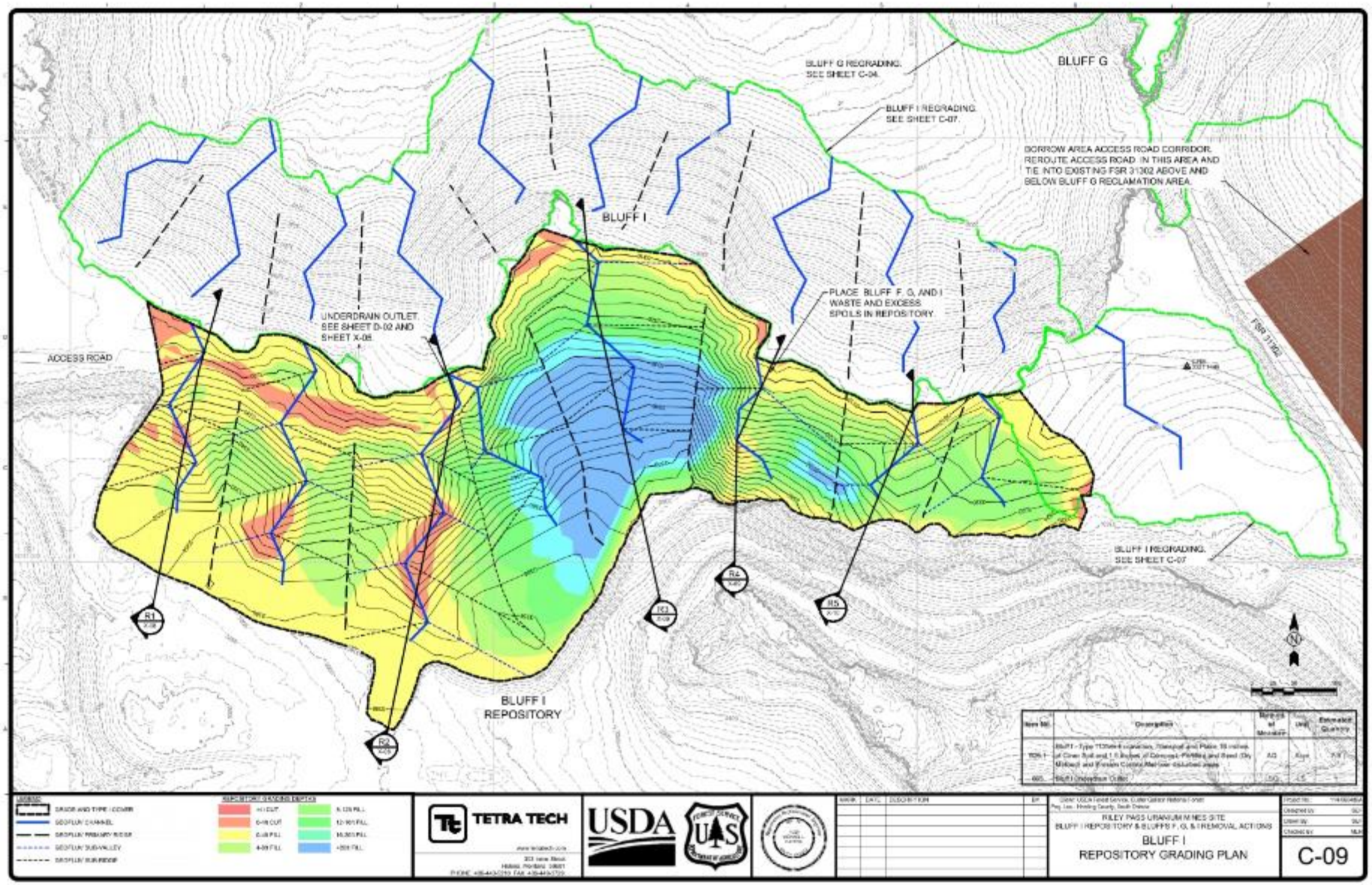
- Constant uniform slopes
- Rock lined ditches
- Terraces
- Erosion Control structures, such as rock basins and check dams

NATURAL LANDFORM RECLAMATION

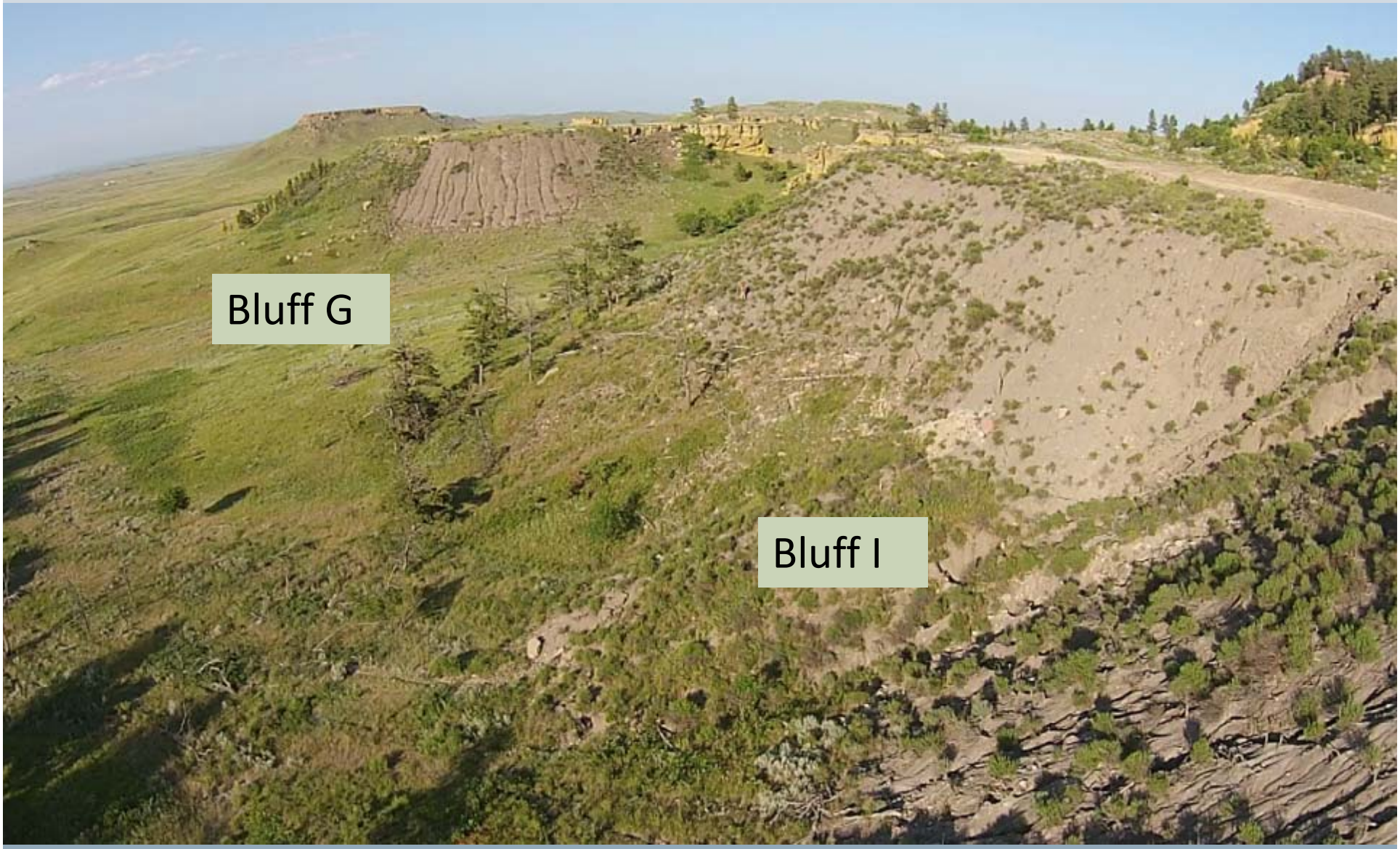
- Natural channel morphology
- Small drainage basins
- Increased diversity of slope aspects and habitat
- Stable configuration of slopes

Traditional Reclamation Design



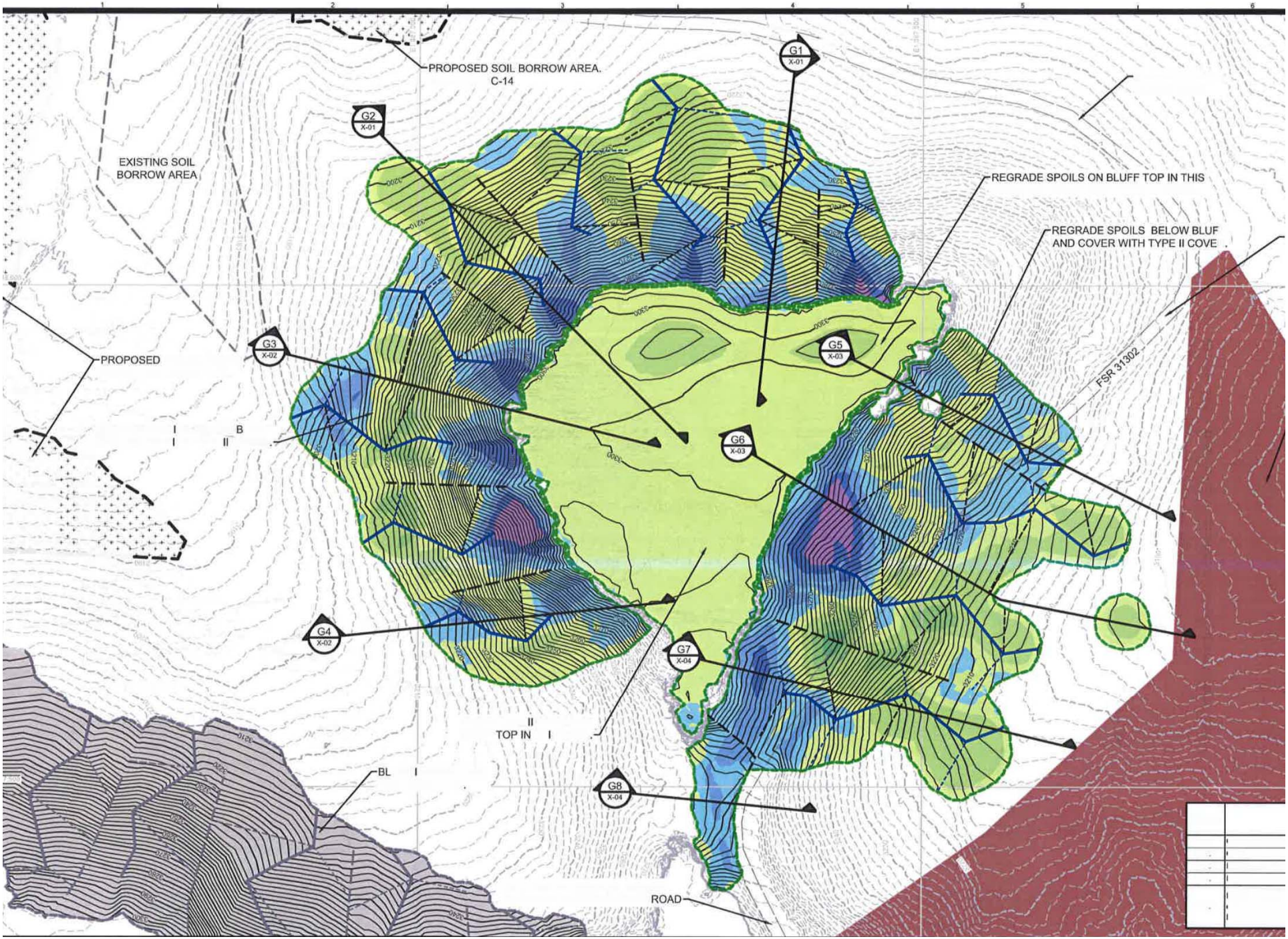

BLUFF G REGRADING. SEE SHEET C-04.
BLUFF G
BLUFF I REGRADING. SEE SHEET C-07.
BORROW AREA ACCESS ROAD CORRIDOR. REROUTE ACCESS ROAD IN THIS AREA AND TIE INTO EXISTING FSR 31302 ABOVE AND BELOW BLUFF G RECLAMATION AREA.
BLUFF I
UNDERDRAIN OUTLET. SEE SHEET D-02 AND SHEET X-08.
PLACE BLUFF F, G, AND I WASTE AND EXCESS SPOILS IN REPOSITORY.
ACCESS ROAD
FSR 31302
BLUFF I REGRADING. SEE SHEET C-07
BLUFF I REPOSITORY
TETRA TECH
USDA
FOREST SERVICE
RILEY PASS URANIUM MINES SITE
BLUFF I REPOSITORY & BLUFFS F, G, & I REMOVAL ACTIONS
BLUFF I
REPOSITORY GRADING PLAN
C-09

Reclamation of Bluffs F, G and I



Bluff G – During Mining - 1964

Bluff G – Post Mining - 2012


PROPOSED SOIL BORROW AREA.
C-14
EXISTING SOIL
BORROW AREA
REGRADE SPOILS ON BLUFF TOP IN THIS
REGRADE SPOILS BELOW BLUF
AND COVER WITH TYPE II COVE
FSR 31302
PROPOSED
G1
X-01
G2
X-01
G3
X-02
G4
X-02
G5
X-03
G6
X-03
G7
X-04
G8
X-04
TOP IN
BL
ROAD


Sediment control fence

Constructing Access Roads

Excavate Waste

Load out Spoils


DEERE


08.16.2016

Filling and Compacting the Repository

Bluff B Spoils

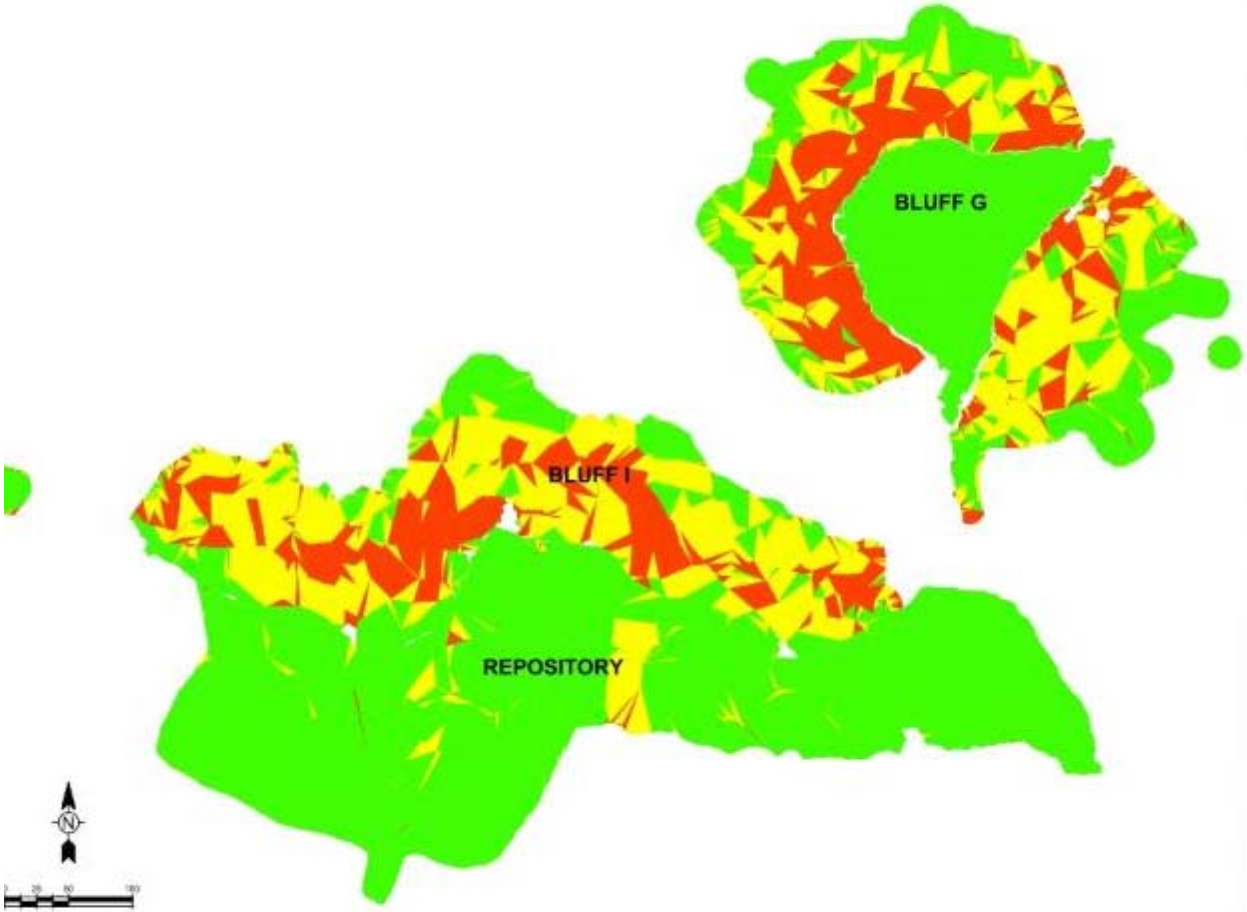
Starting to get to final surface

Cover Soil and Compost

Placing Cover Soil

Placing Compost and Rocks

Finished Slopes – Beginning to place Erosion Mat



Bluff G - Slopes Analysis Table				
Number	Minimum Slope	Maximum Slope	Area (acres)	Color
1	100:1	3:1	4.20	
2	3:1	2:1	2.25	
3	2:1	0:1	1.87	

Bluff I - Slopes Analysis Table				
Number	Minimum Slope	Maximum Slope	Area (acres)	Color
1	100:1	3:1	3.37	
2	3:1	2:1	3.00	
3	2:1	0:1	1.73	

Repository - Slopes Analysis Table				
Number	Minimum Slope	Maximum Slope	Area (acres)	Color
1	100:1	3:1	6.78	
2	3:1	2:1	0.41	
3	2:1	0:1	0.02	

TETRA TECH

USDA FOREST SERVICE

MARK	DATE	DESCRIPTION	BY
1	9/22/16	STEEP THRESHOLD CHANGED FROM 1.5:1 TO 2:1	BEP

Client: USDA Forest Service, Custer Gallatin National Forest
Proj. Loc.: Harding County, South Dakota

RILEY PASS URANIUM MINES SITE
BLUFF I REPOSITORY & BLUFFS F, G, & I REMOVAL ACTIONS

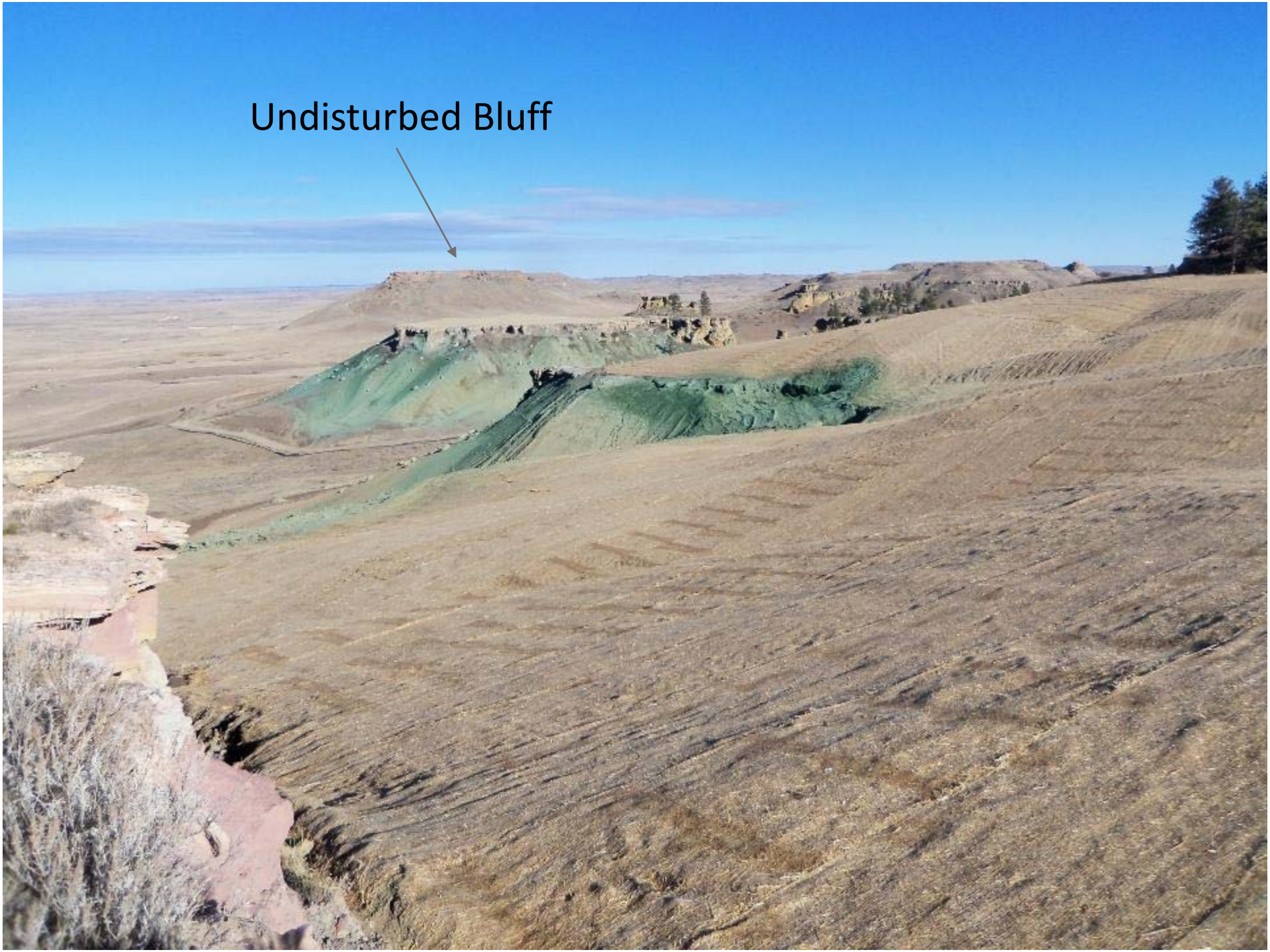
BLUFF I AND G
SLOPE ANALYSIS

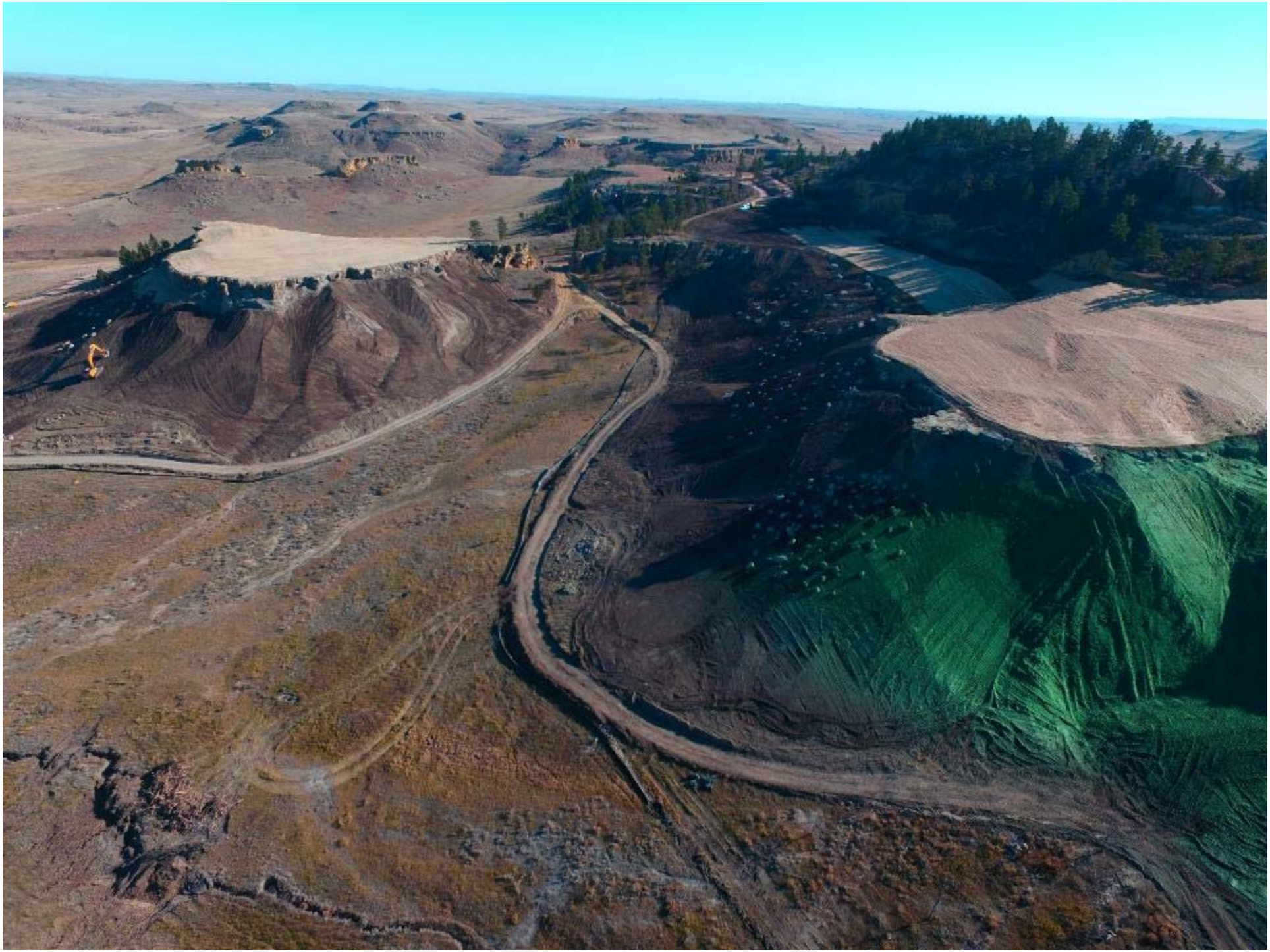
Project No.:
Designed By:
Drawn By:
Checked By:

F-0

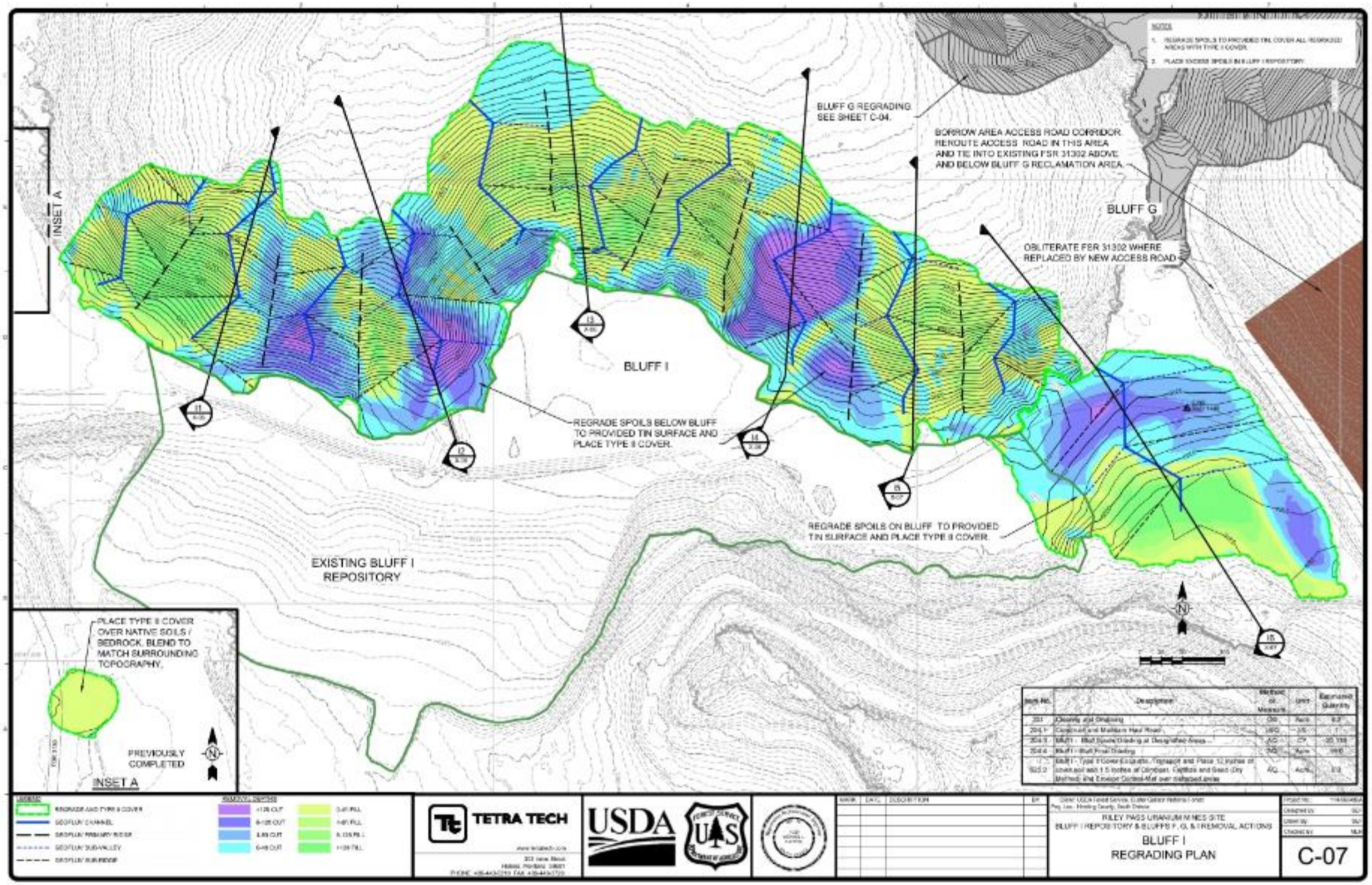
Applying Bonded Fiber Matrix


Channel Check Dams


Undisturbed Bluff




Spring 2017


BLUFF G REGRADING SEE SHEET C-04.
BORROW AREA ACCESS ROAD CORRIDOR. REROUTE ACCESS ROAD IN THIS AREA AND TIE INTO EXISTING FSR 31302 ABOVE AND BELOW BLUFF G RECLAMATION AREA.
BLUFF G
OBLITERATE FSR 31302 WHERE REPLACED BY NEW ACCESS ROAD
INSET A
BLUFF I
REGRADE SPOILS BELOW BLUFF TO PROVIDED TIN SURFACE AND PLACE TYPE II COVER.
REGRADE SPOILS ON BLUFF TO PROVIDED TIN SURFACE AND PLACE TYPE II COVER.
EXISTING BLUFF I REPOSITORY
PLACE TYPE II COVER OVER NATIVE SOILS / BEDROCK. BLEND TO MATCH SURROUNDING TOPOGRAPHY.
PREVIOUSLY COMPLETED
INSET A
TETRA TECH
USDA
RILEY PASS URANIUM MINES SITE
BLUFF I REPOSITORY & BLUFFS F, G, & I REMOVAL ACTIONS
BLUFF I
REGRADING PLAN
C-07

Reclamation of Bluff CDE - 2017

Reclamation of Bluff CDE

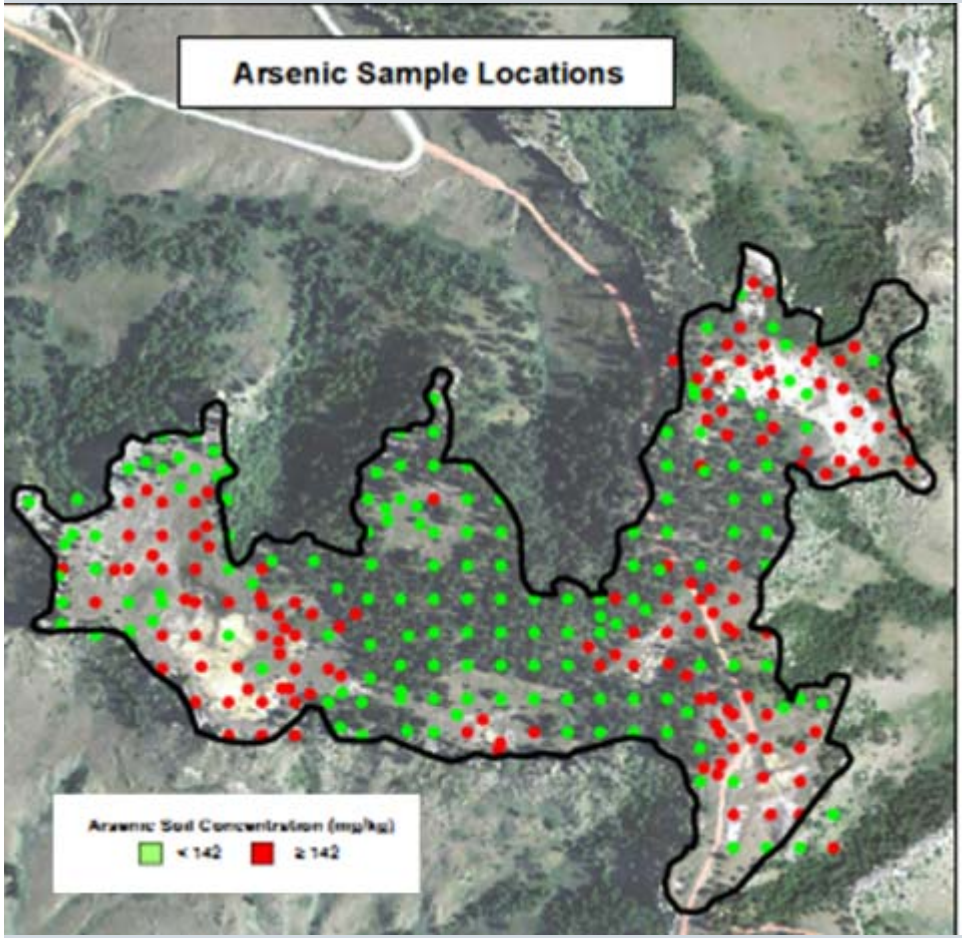
Isolate waste onsite

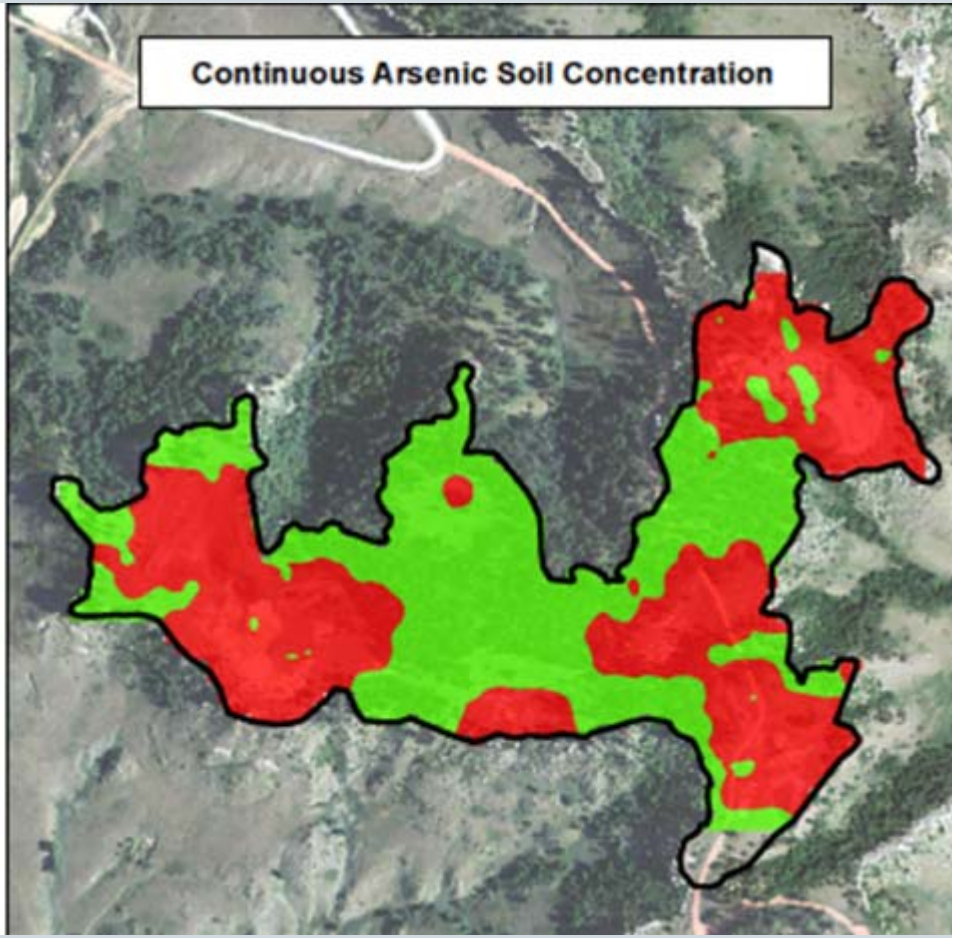
Construct Natural Landforms

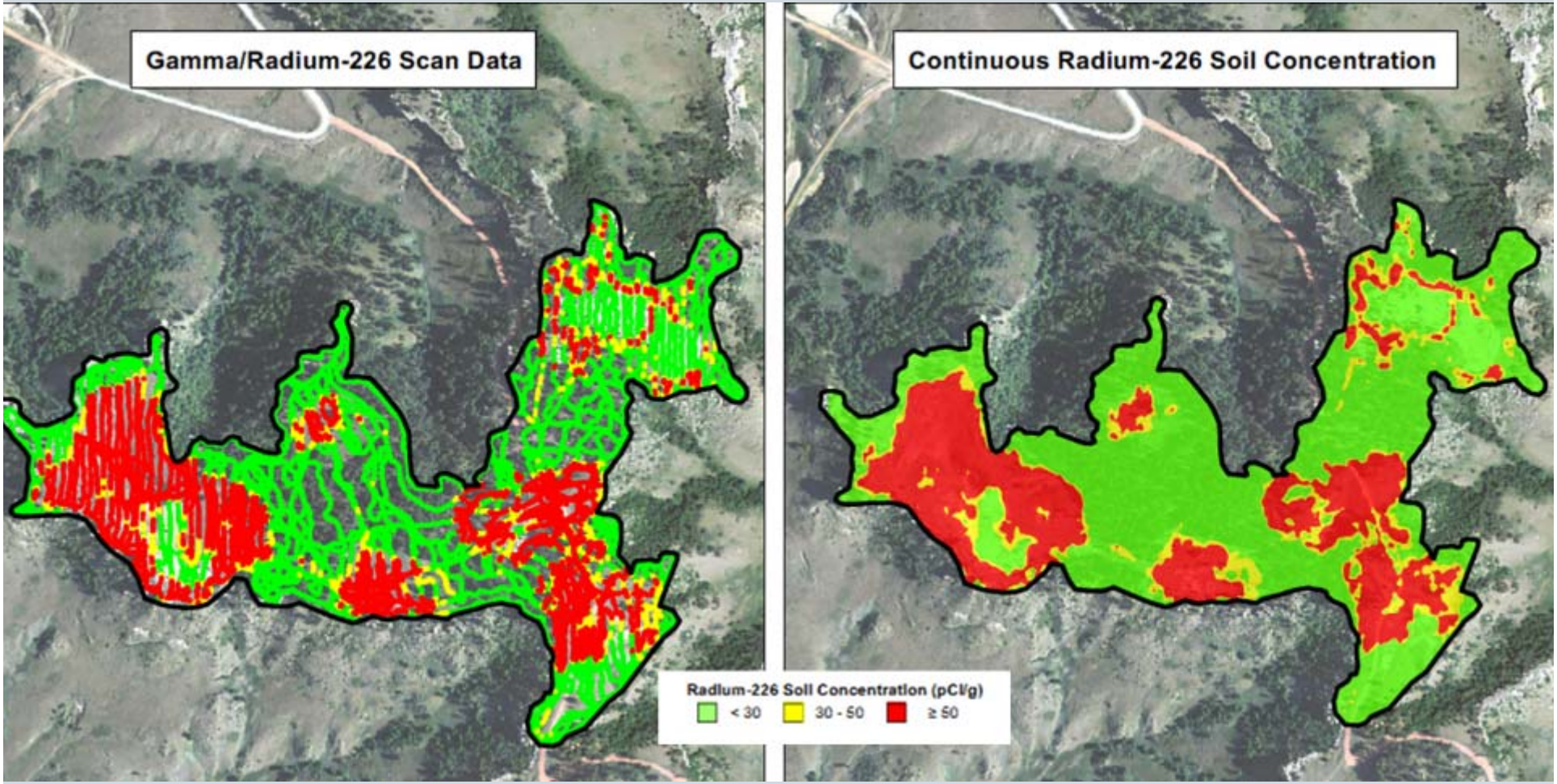
- Carlson Natural Regrade
- AutoCad

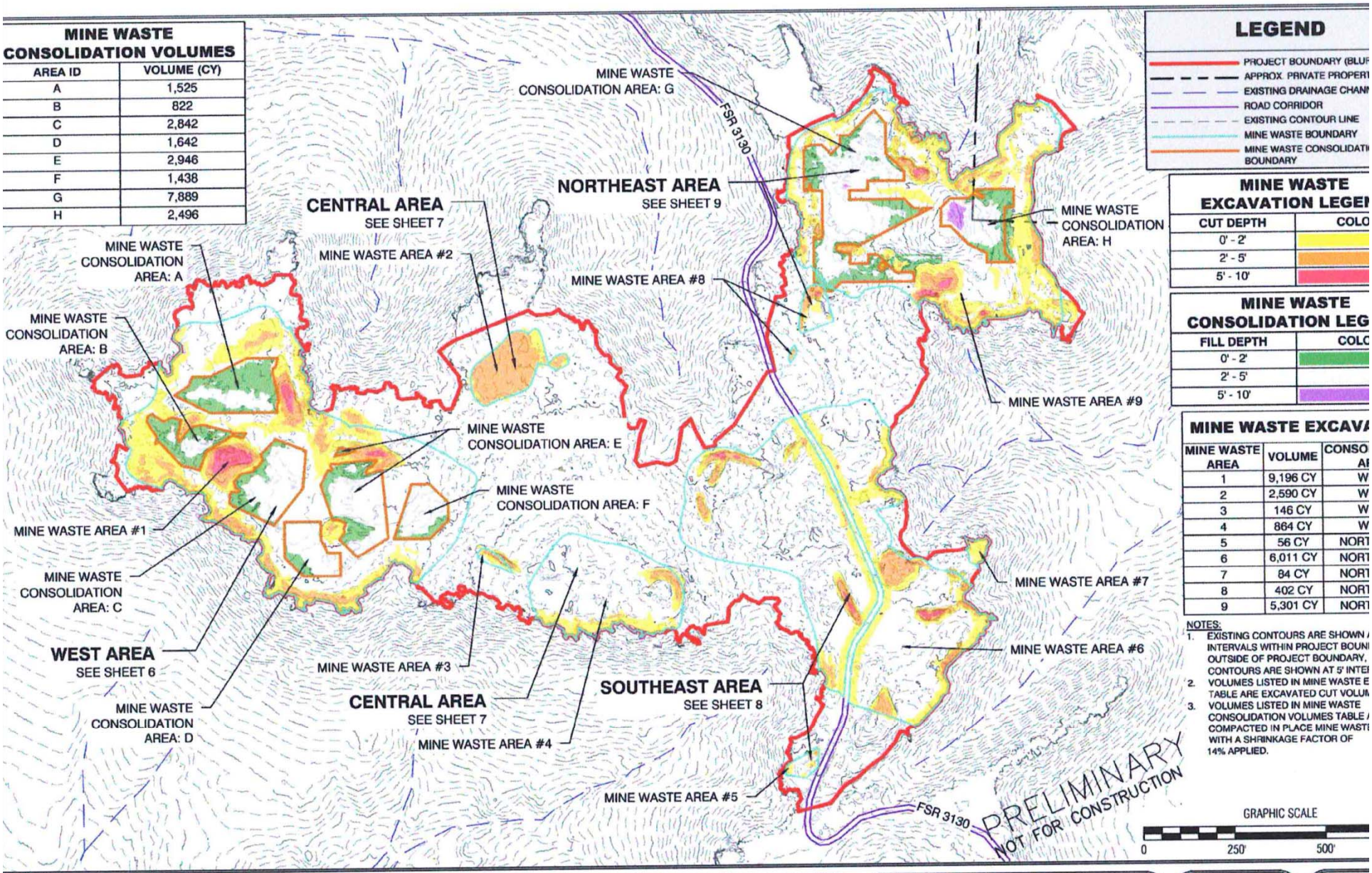
Utilize pond sediments as cover soil

- Amend with Gypsum


Arsenic Sample Locations
Arsenic Soil Concentration (mg/kg)
< 142
≥ 142


Continuous Arsenic Soil Concentration


Gamma/Radium-226 Scan Data
Continuous Radium-226 Soil Concentration
Radium-226 Soil Concentration (pCi/g)
< 30
30 - 50
≥ 50



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CUSTER GALLATIN NATIONAL FOREST

LT LEON ASSOCIATES INC
500 EAST LOCUST STREET SUITE 402
DES MOINES IOWA 50309
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REVISIONS:
No. 1 NAME XX/XX/XX DATE XXX INITLS
No. 2 NAME XX/XX/XX DATE XXX INITLS
No. 3 NAME XX/XX/XX DATE XXX INITLS

PROJECT NAME
RILEY PASS URANIUM MINE PROJECT
BLUFF CDE RECLAMATION

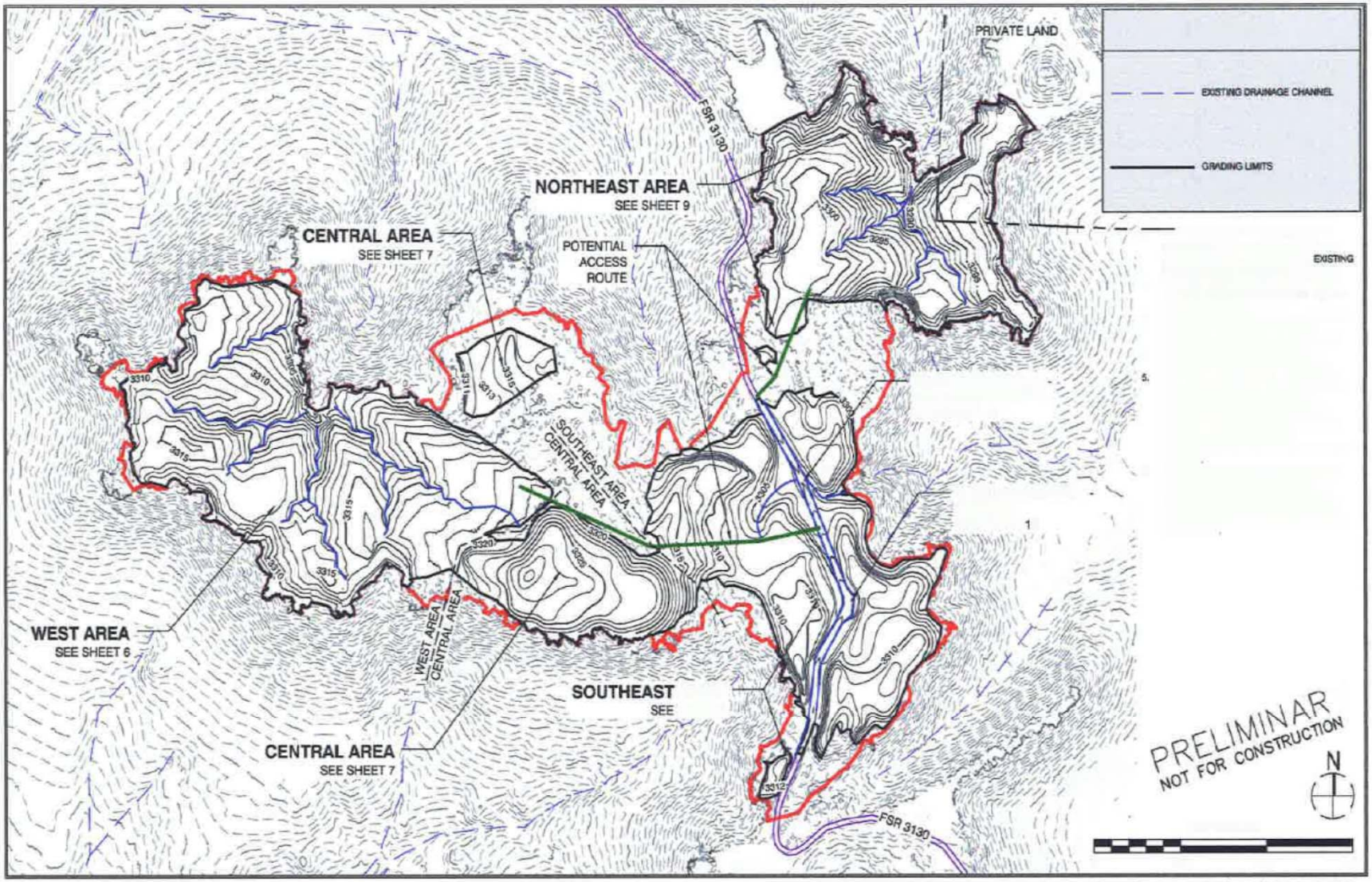
DRAWING NAME
MINE WASTE EXCAVATION & CONSOLIDATION PLAN

REVISION DATE
04/04/17

SCALE
1" = 250'

PROJEC
AG-0355-

SHEET
4


PRIVATE LAND
EXISTING DRAINAGE CHANNEL
GRADING LIMITS
EXISTING
NORTHEAST AREA
SEE SHEET 9
CENTRAL AREA
SEE SHEET 7
POTENTIAL
ACCESS
ROUTE
FSR 3130
SOUTHEAST AREA
CENTRAL AREA
WEST AREA
SEE SHEET 6
WEST AREA
CENTRAL AREA
SOUTHEAST
SEE
CENTRAL AREA
SEE SHEET 7
FSR 3130
PRELIMINAR
NOT FOR CONSTRUCTION
N
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CUSTER GALLATIN
NATIONAL FOREST
REVISIONS
XX/XXXX XXX
DATE INITIALS
PROJECT NAME
SHEET


Five Sediment Ponds at Bluff B

Sampling Sediment in Pond #5

Restore the Natural Landscape


Any Questions?