

**To:** Sonny Thornborrow, US Forest Service

**Cc:** Annica Brown, US Forest Service

**From:** Shane Matolyak, Tetra Tech

**Date:** July 27, 2021

**Subject:** 2021 New World Vegetation Monitoring  
(Contract GS-00F-168CA/12034318A0012, Order: 12034320F0065)

This memorandum presents results of the 2021 vegetation monitoring event conducted in accordance with the New World Long-Term Operations and Maintenance Plan (Tetra Tech, 2020). This is the second revegetation monitoring event conducted during the operations and maintenance phase of the New World project, the last event having been completed in 2016 (Tetra tech, 2017). **Attachment A** presents Figures 1 through 11 which consist of aerial photos of each monitored site, **Attachment B** presents field notes, and **Attachment C** consists of a photograph log.

Monitoring was conducted at 10 locations within the New World Mining District near Cooke City, Montana on July 20 and 21, 2021. Tetra Tech and USFS personnel observed each location to evaluate whether reclaimed sites were experiencing erosion or vegetation germination/survival failures in areas of 250 square feet or more, and whether weed infestations were occurring. **Table 1** summarizes the monitoring results.

Site Name	Bare Soil Present <sup>1</sup>	Revegetation Failure	Weeds Present	Action Recommended	Comments
Black Warrior	No	No	No	No	Erosion mats do not support grasses but are covered with moss in some areas. Area appears similar as during 2016 survey.
Borrow Area	No	No	No	No	No comments
Como Basin	Yes	Yes	No	No	Semi-permanent snow drift continues to hinder plant establishment within its footprint. One 10-inch tall fir tree was observed within reclaimed area.

**Table 1. Monitoring Summary**

Site Name	Bare Soil Present <sup>1</sup>	Revegetation Failure	Weeds Present	Action Recommended	Comments
Glengarry Waste Dump	No	No	Yes - Common dandelion	No	Reclamation appears to have been successful. Vegetation is colonizing areas of iron-rich seepage within reclaimed adit portal area.
Gold Dust	Yes	No	Yes - Common dandelion	No	Areas of bare soil do not appear to be associated with past revegetation activities. Sub-alpine fir seedlings observed. Unofficial two-track road is becoming established through reclaimed area.
Little Daisy	No	No	Yes - Common dandelion	No	Elk/meadow thistle present along road.
McLaren Upper	No	No	Yes - Common dandelion, thistle	Yes - Weed spraying	Weeds primarily found along roadside and also in locations identified in 2016.
McLaren Lower	Yes	Yes	Yes - Common dandelion, thistle	Yes - Weed spraying, erosion monitoring	Weeds primarily found along roadside but present below the road. Vegetation appears to be colonizing a 2,000 ft <sup>2</sup> area of bare soil observed in 2016.
McLaren Triangle	No	No	Yes - Common dandelion, thistle	No	Dandelions present but not prevalent. Elk/meadow thistle present along road. Fir tree seedlings are present.
Miller Creek	No	No	Yes - Canada thistle <sup>2</sup>	No	Canada thistle present in same location as 2016 survey but has not spread significantly. Creek banks well established and constructed rock berms intact.
Repository	No	No	Yes - Canada thistle <sup>2</sup> , Common dandelion, Goat's beard	Yes - Weed spraying, evaluate removal of tree seedlings	The northern aspect of repository has less vegetation cover compared to the southern aspect. Dandelions are particularly dense on southern aspect. Conifer seedlings are becoming established and may compromise synthetic liner.

<sup>1</sup> Indicates an area of 250 ft<sup>2</sup> or greater.

<sup>2</sup> Listed as Priority 2B on the Montana Noxious Weed List (DOA, 2019).

Tetra Tech makes the following conclusions based on the 2021 vegetation monitoring event:

- Vegetation appears to be well established at each of the sites, with some areas of failure occurring in the Como Basin and the Lower McLaren Pit.
- Bare soil in the Lower McLaren Pit is related to phytotoxic soil conditions as discussed in the previous Vegetation Monitoring Report (Tetra Tech, 2017). This area was largely bare in 2021 although vegetation was observed in rill and gully bottoms where runoff was occurring.
- As was the case in 2016, bare soil in the Como Basin is due to a persistent snowbank present along the western edge of the reclaimed area.
- Canada Thistle (*Cirsium arvense*), a Montana listed Priority 2B noxious weed, was present at the Miller Creek and Repository sites in the same locations observed in 2016 (**Attachment 1**).
- Non-native invasive weeds including Common Dandelion (*Taraxacum officinale*) and Goat's Beard (*Tragopogon dubius*) were observed at seven of the sites.
- Elk or Meadow Thistle (*Cirsium foliosum* or *C. scariosum*) were observed at some sites. These native thistles are not problematic however they could be confused with Canada Thistle during early phases of growth and were often located in areas where the 2016 survey identified the presence of Canada Thistle.
- Conifer seedlings were observed on top of the Selective Source Waste Repository. Because the Repository was constructed with a synthetic liner approximately 2 to 3 feet below the growth media surface, tree roots could potentially compromise the liner's integrity.
- Recreational use is causing the establishment of an unauthorized two-track trail within the reclaimed portion of the Gold Dust site.

Tetra Tech makes the following recommendations based on the 2021 vegetation monitoring event:

- Revegetation monitoring should continue as specified in the 2020 Long-Term Operations and Maintenance Plan (Tetra Tech, 2020) with the next event scheduled for summer 2026 and the final event scheduled for summer 2031.
- Conifer seedlings should be removed from Repository before their roots can damage the synthetic liner.
- Weeds are present in various reclaimed areas (**Table 1**) with Common Dandelions being the most prevalent, particularly on the south side of the Repository. Other weed species are likely present in the same areas identified in 2016 but have not spread considerably and (**Attachment 1**). Locations of weeds shown in **Attachment 1**, the south side of the Repository, and adjacent to the access road bisecting the McLaren Pit should be visited by weed control personnel and treated if warranted based on USFS weed control goals.
- A barrier should be placed at the Gold Dust site to prevent further vehicle incursion into the reclaimed area as this presents a route for weed invasion.

References:

Tetra Tech. 2017. 2016 New World Vegetation. May 4<sup>th</sup>.

Tetra Tech. 2020. 2020 2020 Long-Term Operations and Maintenance Plan. April 10<sup>th</sup>.

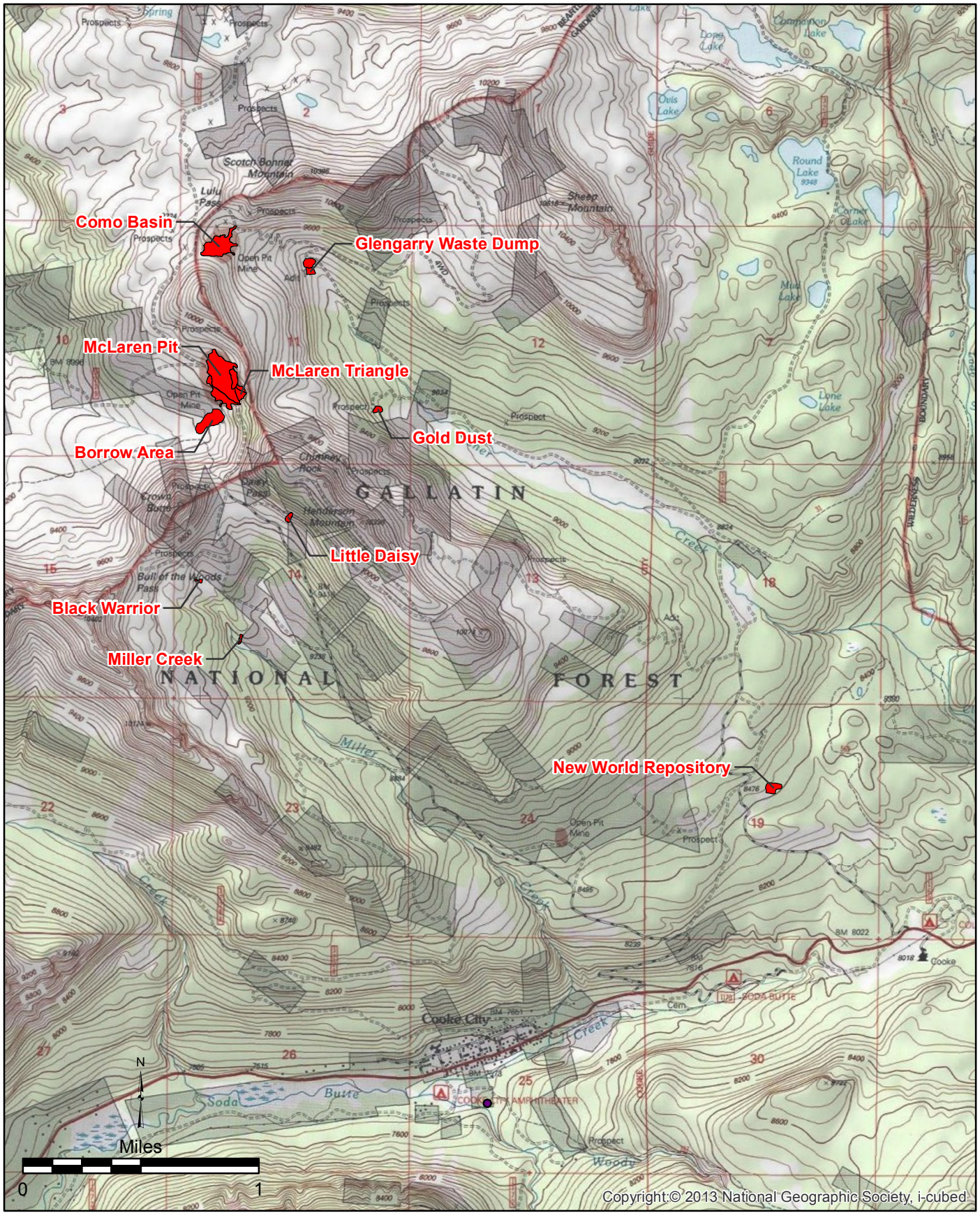
Montana Department of Agriculture (DOA). 2019. Montana Noxious Weed List. June.  
<https://agr.mt.gov/docs/weeds-docs/2019-Montana-Noxious-Weed-List.pdf>

Encl: Attachment A – Figures 1 - 11  
Attachment B – Field Notes  
Attachment C – Photograph Log

# **Attachment A**

**Figures 1 - 11**

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig1\_Overview.mxd



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October 2016

Figure 1

**Project Overview  
Vegetation Monitoring  
New World Mining District**



Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig2\_BlackWarrior.mxd





November 2016

**Figure 2**

**Black Warrior  
Vegetation Monitoring  
New World Mining District**



**Legend**

-  Approximate Revegetation Area Boundary
-  Contour

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November 2016

**Figure 3**

**Borrow Area**

**Vegetation Monitoring**

**New World Mining District**



**Legend**

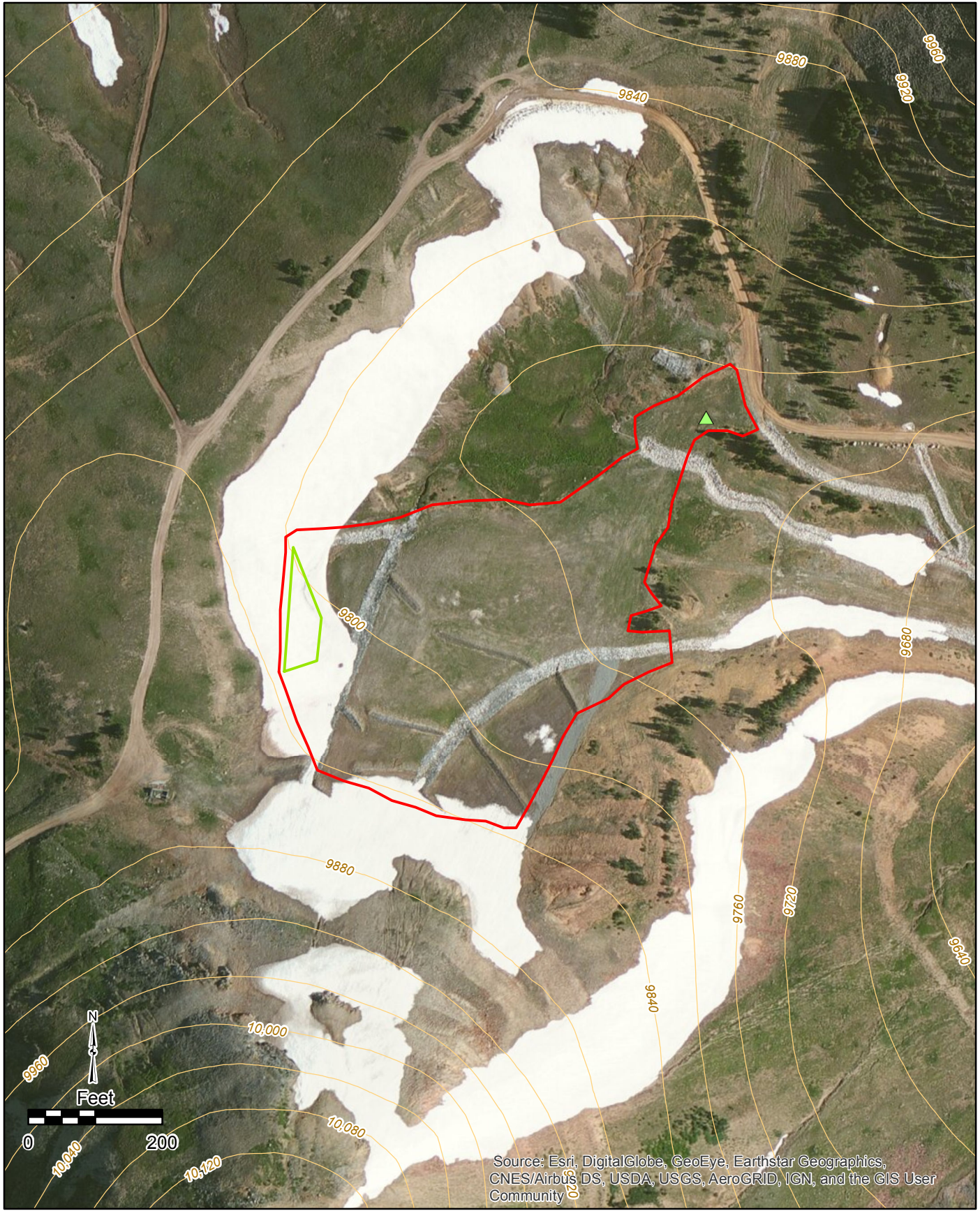


Approximate Revegetation Area Boundary



Contour

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig4\_ComoBasin.mxd



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

November 2016

**Figure 4**





**Como Basin**

**Vegetation Monitoring**

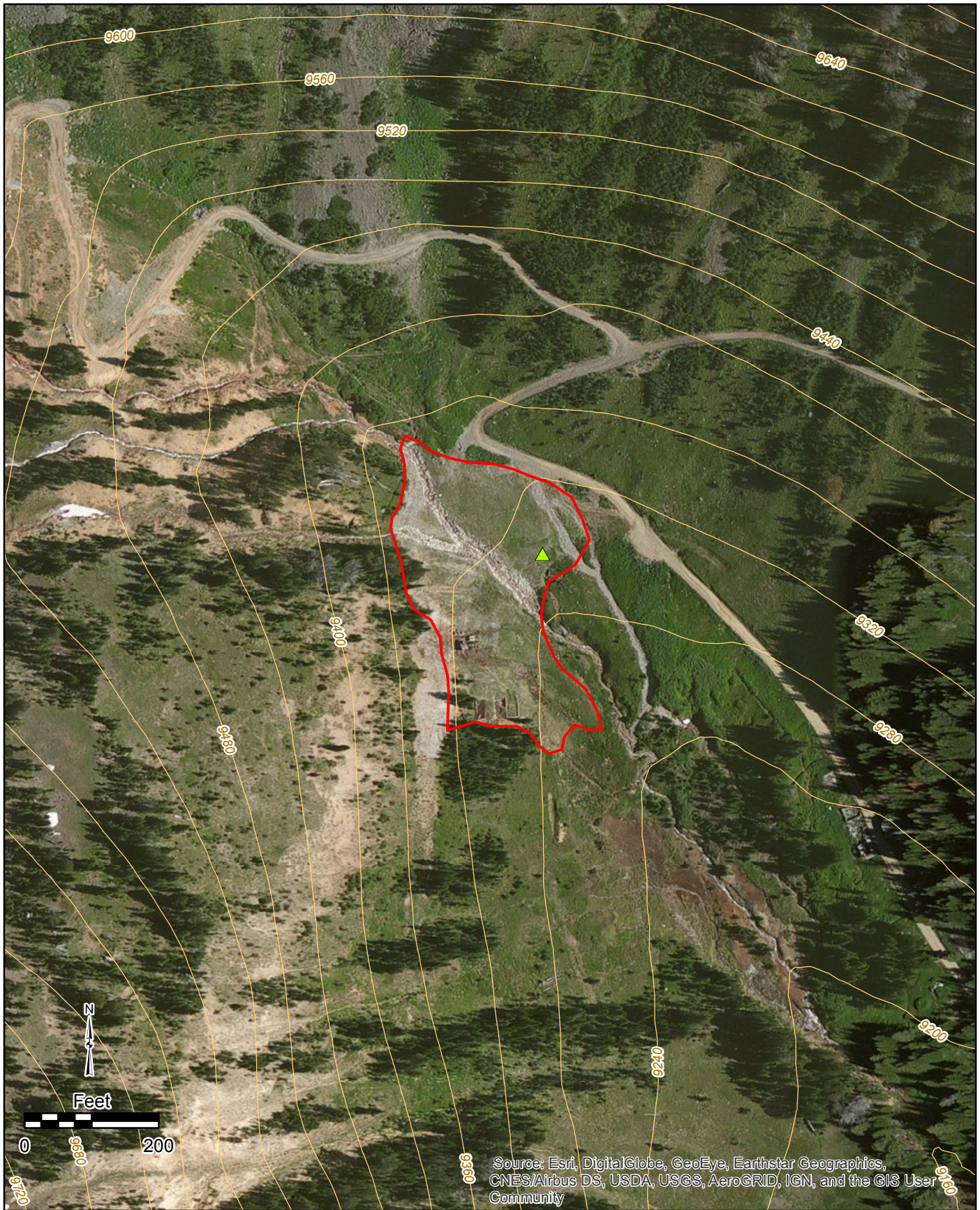
**New World Mining District**






**Legend**

-  Confirmed Weed Location
-  Bare Soil
-  Contour
-  Approximate Revegetation Area Boundary

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig5\_GlengarryWaste.mxd



**Legend**

-  Confirmed Weed Location
-  Approximate Revegetation Area Boundary
-  Contour

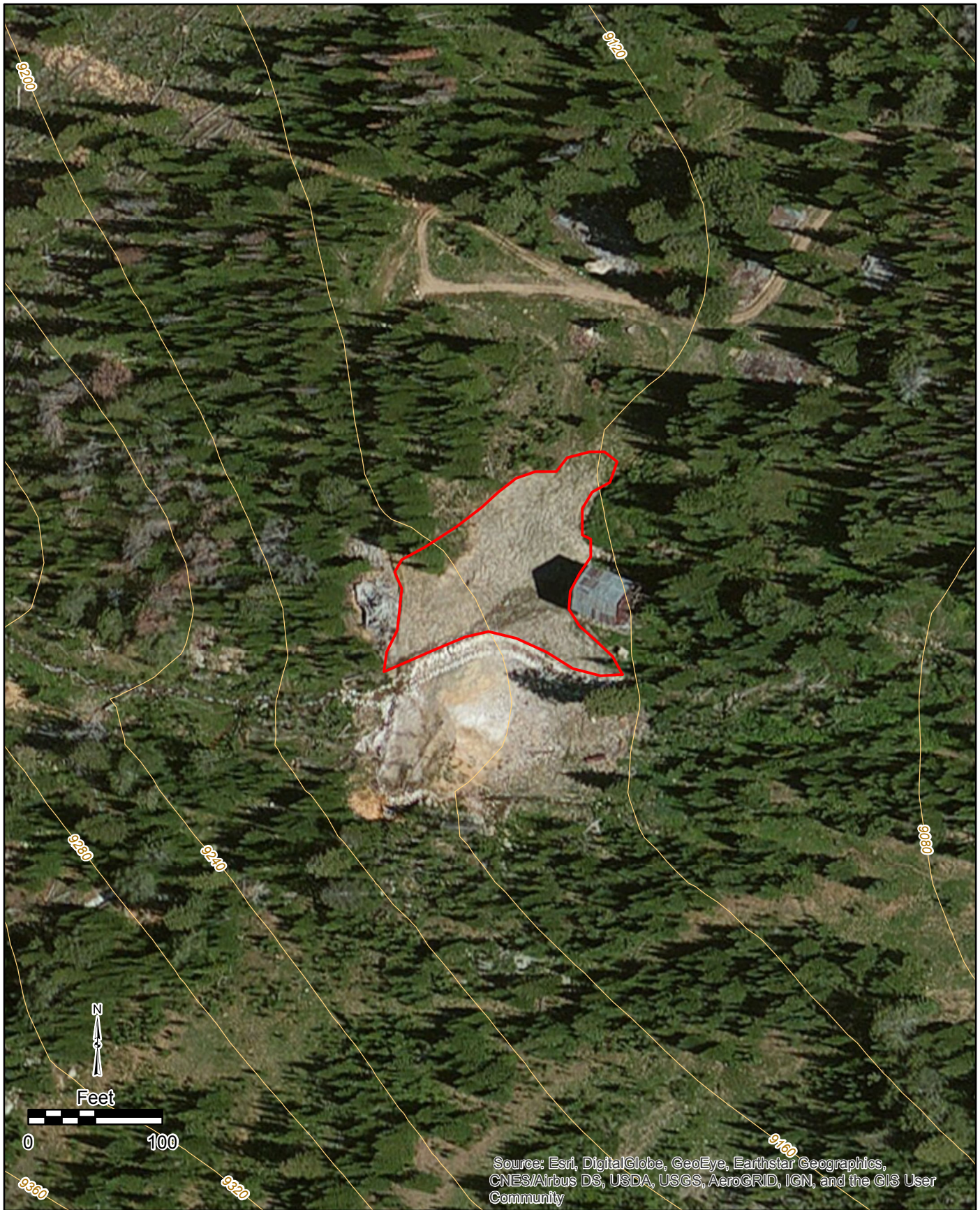
November 2016

**Figure 5**

**Glengarry Waste Dump  
Vegetation Monitoring  
New World Mining District**



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**Figure 6**



**Gold Dust**

**Vegetation Monitoring**

**New World Mining District**






**Legend**

-  Approximate Revegetation Area Boundary
-  Contour

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig7\_LittleDaisy.mxd



**Legend**

-  Confirmed Weed Location
-  Approximate Revegetation Area Boundary
-  Contour

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**Figure 7**

**Little Daisy**

**Vegetation Monitoring**

**New World Mining District**



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Figure 8

McLaren Pit

Vegetation Monitoring


New World Mining District



Legend

 Bare Soil

 Approximate Revegetation Area Boundary

 Confirmed Weed Location

 Contour

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig9\_McLarenTriangle.mxd



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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Figure 9

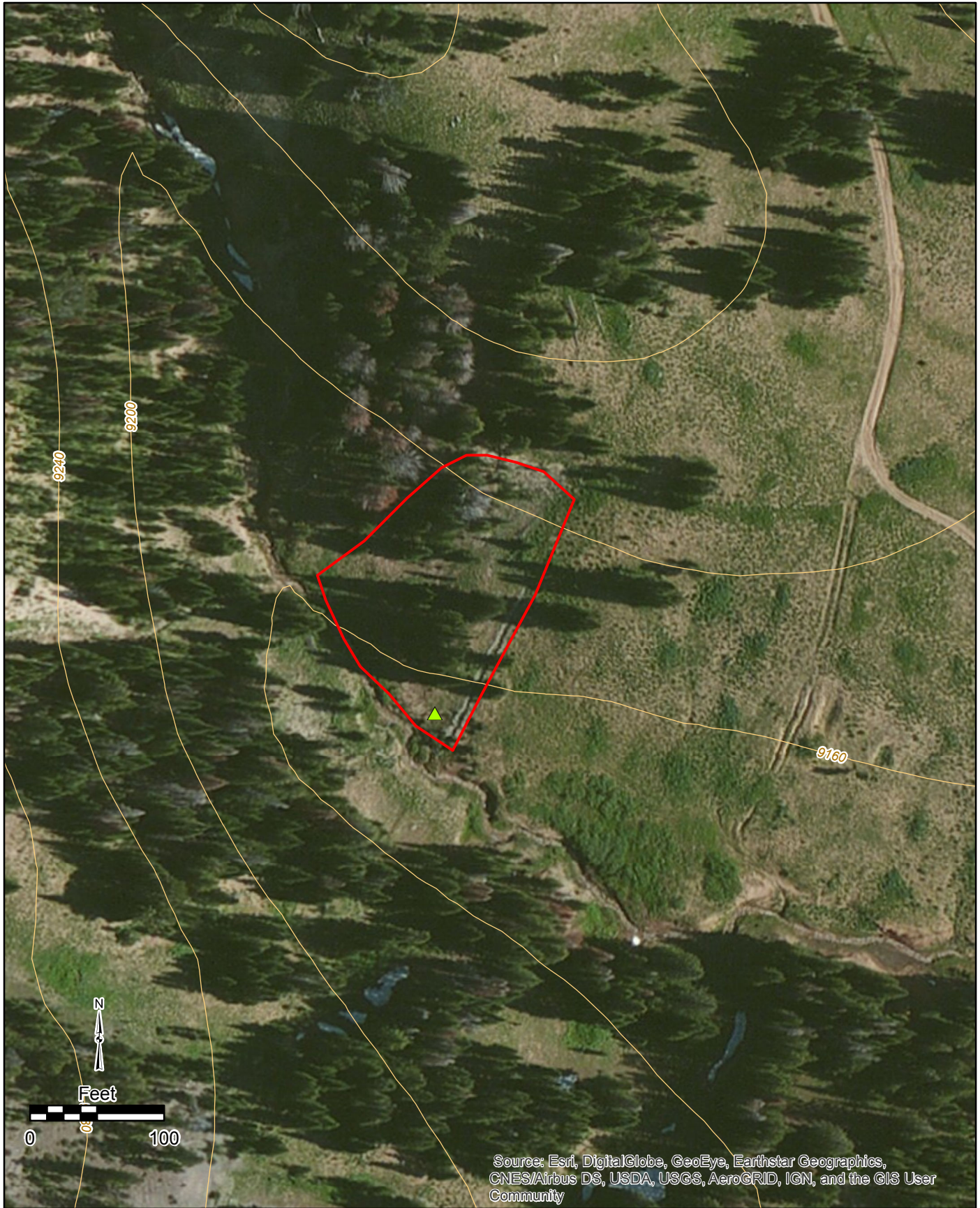
**McLaren Triangle  
Vegetation Monitoring  
New World Mining District**






**Legend**

-  Approximate Revegetation Area Boundary
-  Contour

Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig10\_MillerCreek.mxd



**Legend**

-  Confirmed Weed Location
-  Approximate Revegetation Area Boundary
-  Contour

November 2016

**Figure 10**

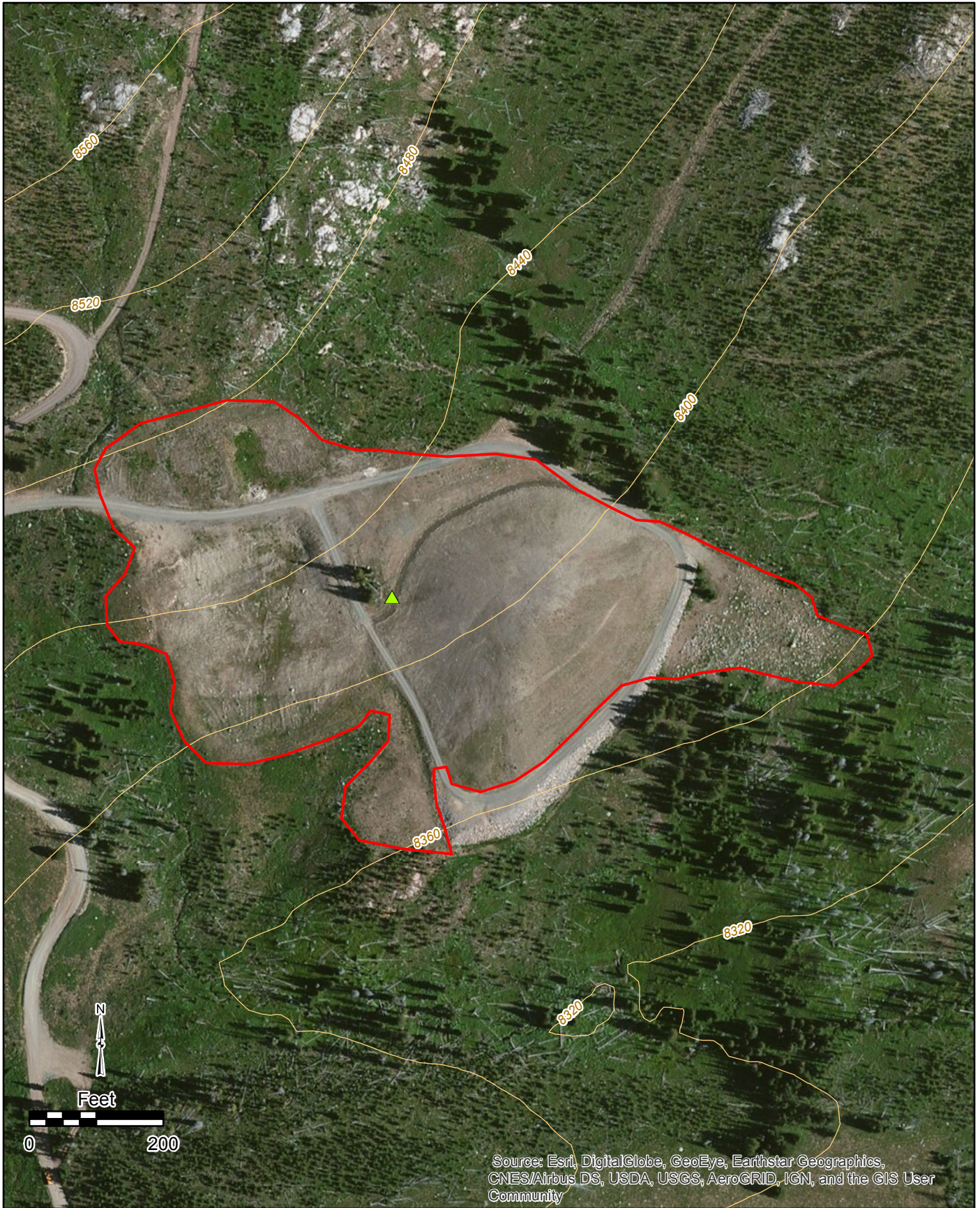
**Miller Creek**

**Vegetation Monitoring**




**New World Mining District**



Document Path: O:\T-Z\TTBozeman\114-710324B\_2016NewWorldVeg\GIS\ArcMap\Fig11\_NewWorldRepository.mxd



**Legend**

-  Confirmed Weed Location
-  Approximate Revegetation Area Boundary
-  Contour

November 2016

**Figure 11**

**New World Repository  
Vegetation Monitoring  
New World Mining District**



# **Attachment B**

## **Field Notes**

2 7-20-21

13:15 Miller Ck

Photos 1 & 2

Asters, Lupine, Carex sp, rushes

Canada thistle in same spot as  
last time

13:45 Black warrior

moss in channel on erosion map

Aster, monkey flower

no large bare areas, rushes

Alpine blue grass

photos 3 & 4, 5, 6, 7

14:15 Little Daisy

photo 5

no bare ground, columbine, <sup>pale</sup> Agoseris  
golden joy (wood), some juniper  
@ low & thistle, common woolly sunflower

3

15:15 rama Basin

no bare ground except @ snow drift  
T. monkey, fireweed, Pale Agoseris  
dandelions scattered throughout relaxation

photo 8 & 9

lots of moss in eastern portion  
of rec. area, 1 Fir tree ~ 10" tall

16:00 G-gully Photo 10

no bare spots, dense veg, even  
where old sewage appears @ partial  
pool, dandelions, fireweed, rushes  
geranium, willows, blue bell  
Sedges, Aster

16:30 Gold dust Photo 11

2-track becoming established in levee  
Aster, rush, T. monkey, dandelion  
monkey flower, blue grass  
Base of WR dump ~ 50' road  
on poor qual. soil

17:15 Repository

NO bare spots but north side  
has less dense veg.

Loss of dandelions esp on south  
side, blue grass, grass beard  
thistle. Drain field has  $\approx 10 \times 20$  f  
area of  $\approx 20$  (over this 12)

7-21-21 McLaren Triangle 8:30

NO bare spots

Timothy, Blue grass, Aster fescue, Fireweed  
Lupine, few dandelions, Fir trees  
Thistle along road-side edge

photo 13 &amp; 14

8:45 Upper MC P. 5

Fireweed, blue grass, Timothy, Thistle  
in areas previously mowed and others.

(drawn on map)

App says "Beistle thistle"

asters,

NO bare ground

9:00 Lower MC P. 1

Thistle along road, Fireweed  
Asters, timothy, ~~the~~ columbie,  
dandelion

9:15 Borrow Area

NO bare areas, sedges, white bark  
columbie, bluegrass

# **Attachment C**

## **Photograph Log**

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – BORROW AREA  
Tetra Tech Project # 114-710324E**



Photo 1. Borrow Area revegetation facing west.



Photo 2. Borrow Area revegetation facing east.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – BLACK WARRIOR  
Tetra Tech Project # 114-710324E**



Photo 1. Black Warrior revegetation facing north.



Photo 2. Black Warrior revegetation and drainage channel facing west.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – COMO BASIN  
Tetra Tech Project # 114-710324E**



Photo 1. Como Basin revegetation facing south.



Photo 2. Como Basin revegetation facing north.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – GLENGARRY WASTE DUMP  
Tetra Tech Project # 114-710324E**



Photo 1. Glengarry Waste Dump revegetation facing south.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – GOLD DUST  
Tetra Tech Project # 114-710324E**



Photo 1. Gold Dust revegetation facing southwest.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – LITTLE DAISY  
Tetra Tech Project # 114-710324E**



Photo 1. Little Daisy revegetation facing southwest.



Photo 2. Elk thistle at Little Daisy.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – LOWER MCLAREN  
Tetra Tech Project # 114-710324E**



Photo 1. Lower southern portion of Lower McLaren revegetation facing northeast.



Photo 2. Upper northern portion of Lower McLaren revegetation facing east.



Photo 3. Lower McLaren revegetation facing south.



Photo 4. Area of bare soil showing vegetation becoming established in rills / runoff channels.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – UPPER MCLAREN  
Tetra Tech Project # 114-710324E**



Photo 1. Upper McLaren revegetation facing south.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – MCLAREN TRIANGLE  
Tetra Tech Project # 114-710324E**



Photo 1. McLaren Triangle revegetation facing south.



Photo 2. McLaren Triangle revegetation facing east.

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – MILLER CREEK  
Tetra Tech Project # 114-710324E**



Photo 1. Miller Creek revegetation facing west.



Photo 2. Miller Creek revegetation facing north.



Photo 3. Miller Creek sparse area of revegetation facing southeast.

No Photo

**2021 VEGETATION MONITORING  
NEW WORLD MINING DISTRICT – REPOSITORY  
Tetra Tech Project # 114-710324E**



Photo 1. North face of Repository revegetation facing southeast.