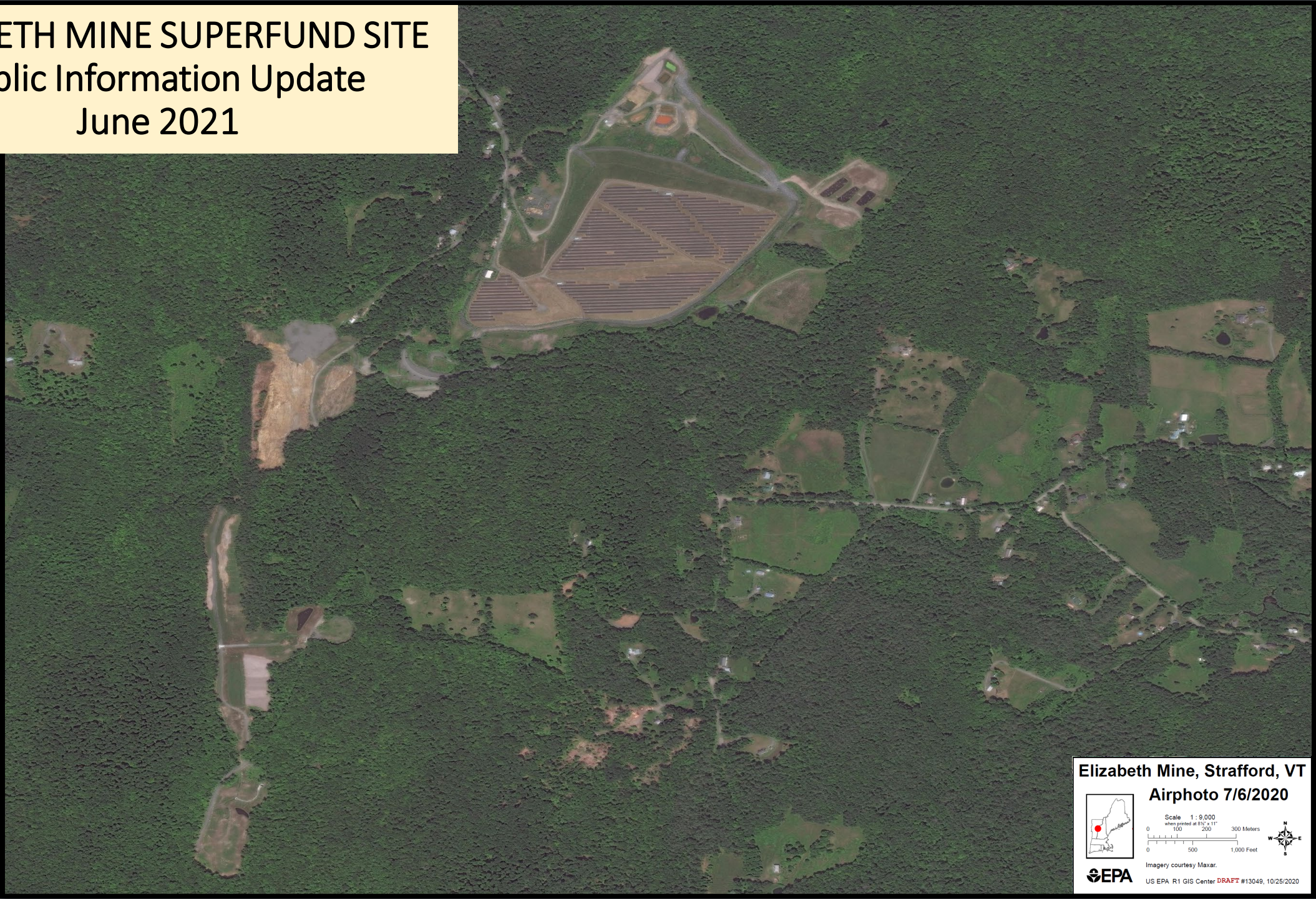


**ELIZABETH MINE SUPERFUND SITE**  
**Public Information Update**  
**June 2021**



**Elizabeth Mine, Strafford, VT**

**Airphoto 7/6/2020**



Scale 1:9,000

when printed at 8 1/2" x 11"

0 100 200 300 Meters

0 500 1,000 Feet



Imagery courtesy Maxar.



US EPA R1 GIS Center **DRAFT** #13049, 10/25/2020

# Outline

- Background Information and Summary of Completed Cleanup Actions at Elizabeth Mine
- Overview of Ongoing Cleanup Activities – (2020 and 2021)
- Summary and Contact Information

# Elizabeth Mine Update June 2021 Background Information

## Mining Sites in New England

### 4 National Priorities List Sites

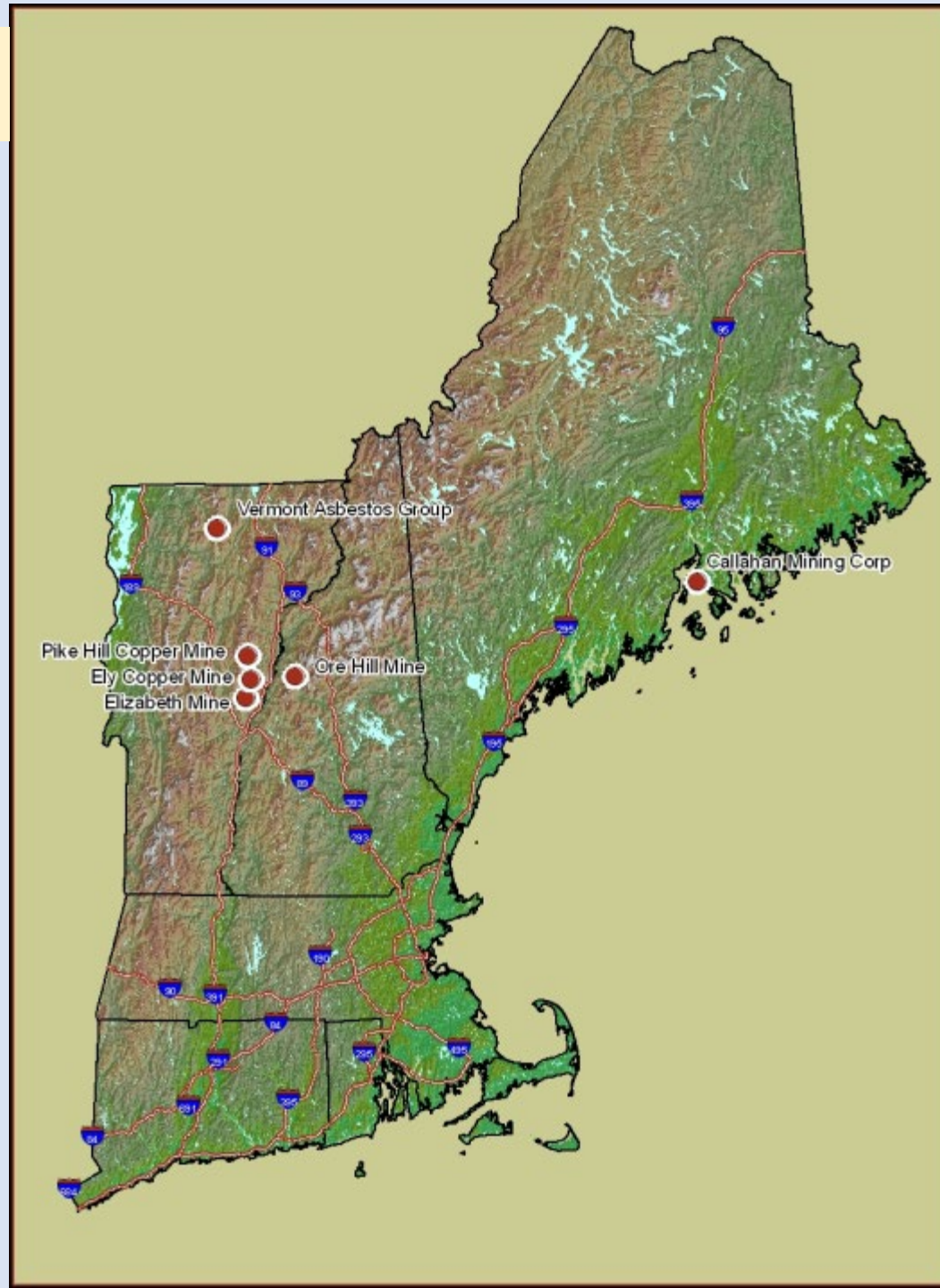
- Elizabeth Mine (2001)
- Ely Copper Mine (2001)
- Pike Hill Copper Mine (2004)
- Callahan Mining Corp (2002)

### 1 EPA Removal Action

- Vermont Asbestos Group (2007 – 2008)

### 1 Forest Service Removal (NTCRA)

- Ore Hill Mine

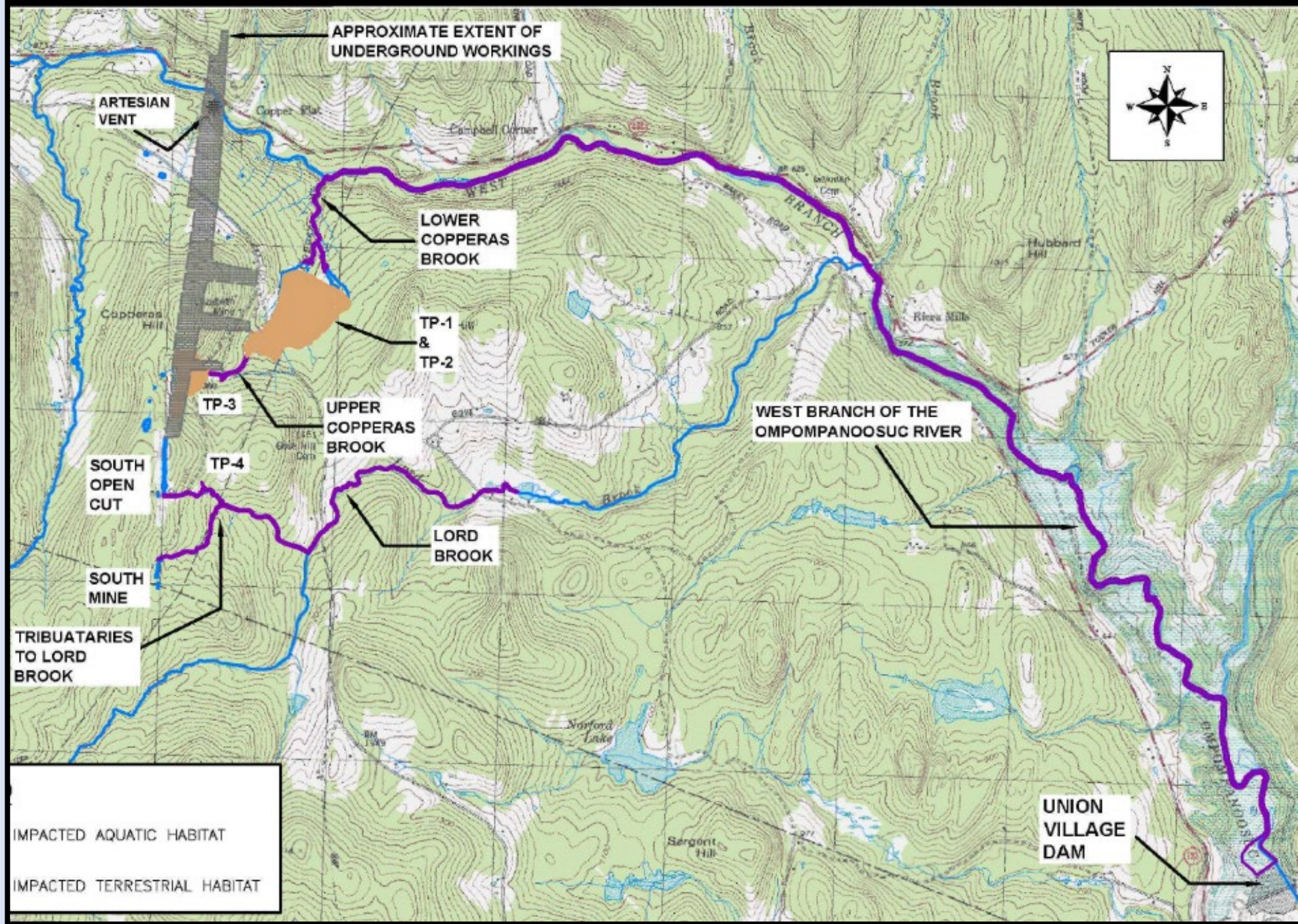


# Elizabeth Mine Update June 2021 Background Information

## Issues of Concern at Elizabeth Mine before cleanup

- Tailing dam for Tailing Pile 1 was unstable.
- Five miles of aquatic impacts in West Branch of Ompompanoosuc River, Copperas Brook, Lord Brook, and two tributaries of Lord Brook.
- Sediment in Copperas Brook and tributaries to Lord Brook were toxic to benthic organisms.
- High levels of lead in soil at Copperas Factories.
- Groundwater within underground workings (tunnels and shafts) and beneath waste areas was found to be unsuitable for human consumption.



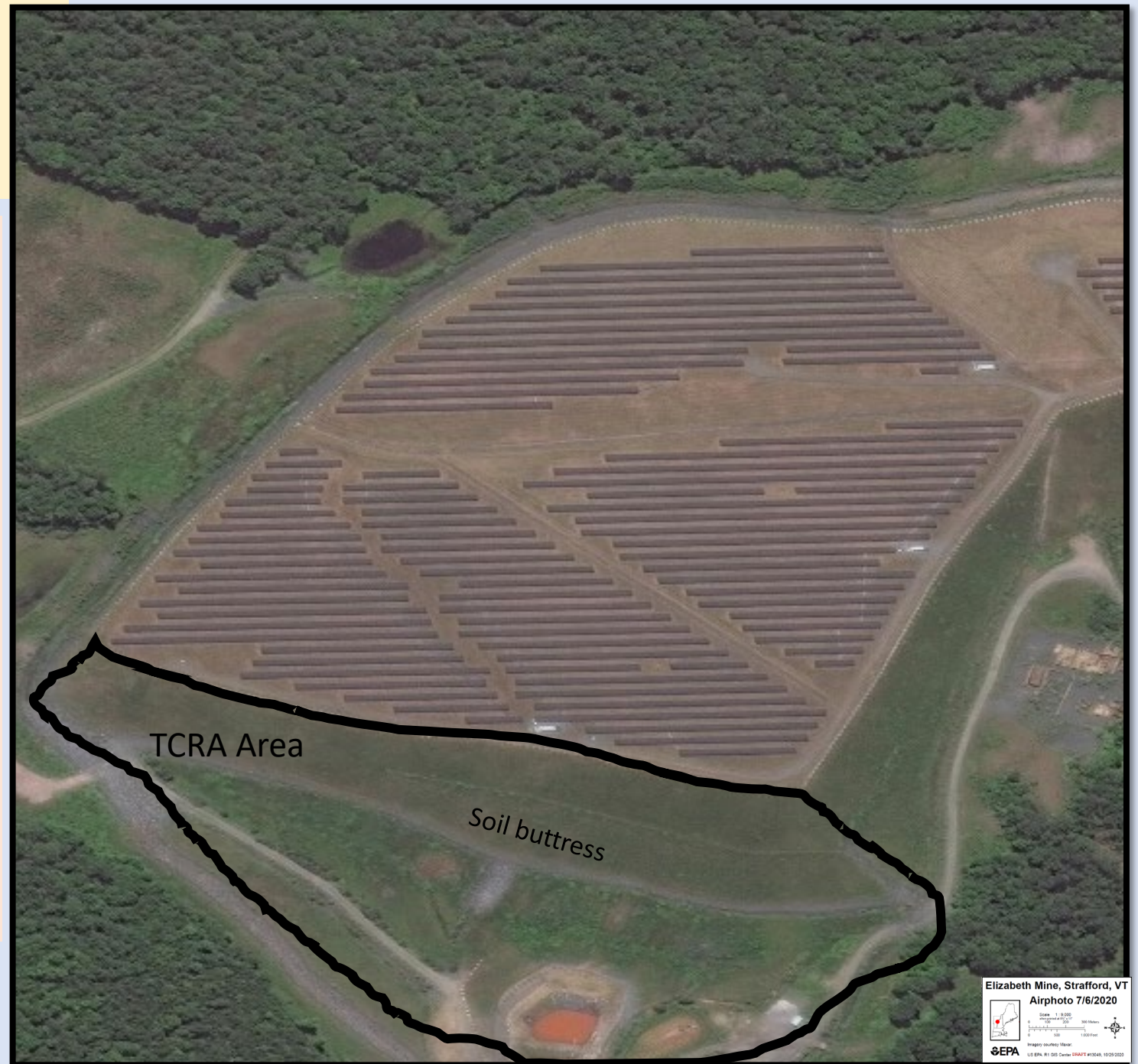


# Elizabeth Mine Update June 2021

## Background Information

### Cleanup Actions at Elizabeth Mine Superfund Site

- Time-Critical Removal Action (TCRA)
  - Tailing Dam stabilization
    - Installation of 60,000 cubic yard soil buttress to reinforce Tailing Dam and Toe Drain system.
    - Grading of slope above buttress
    - Completed in 2005

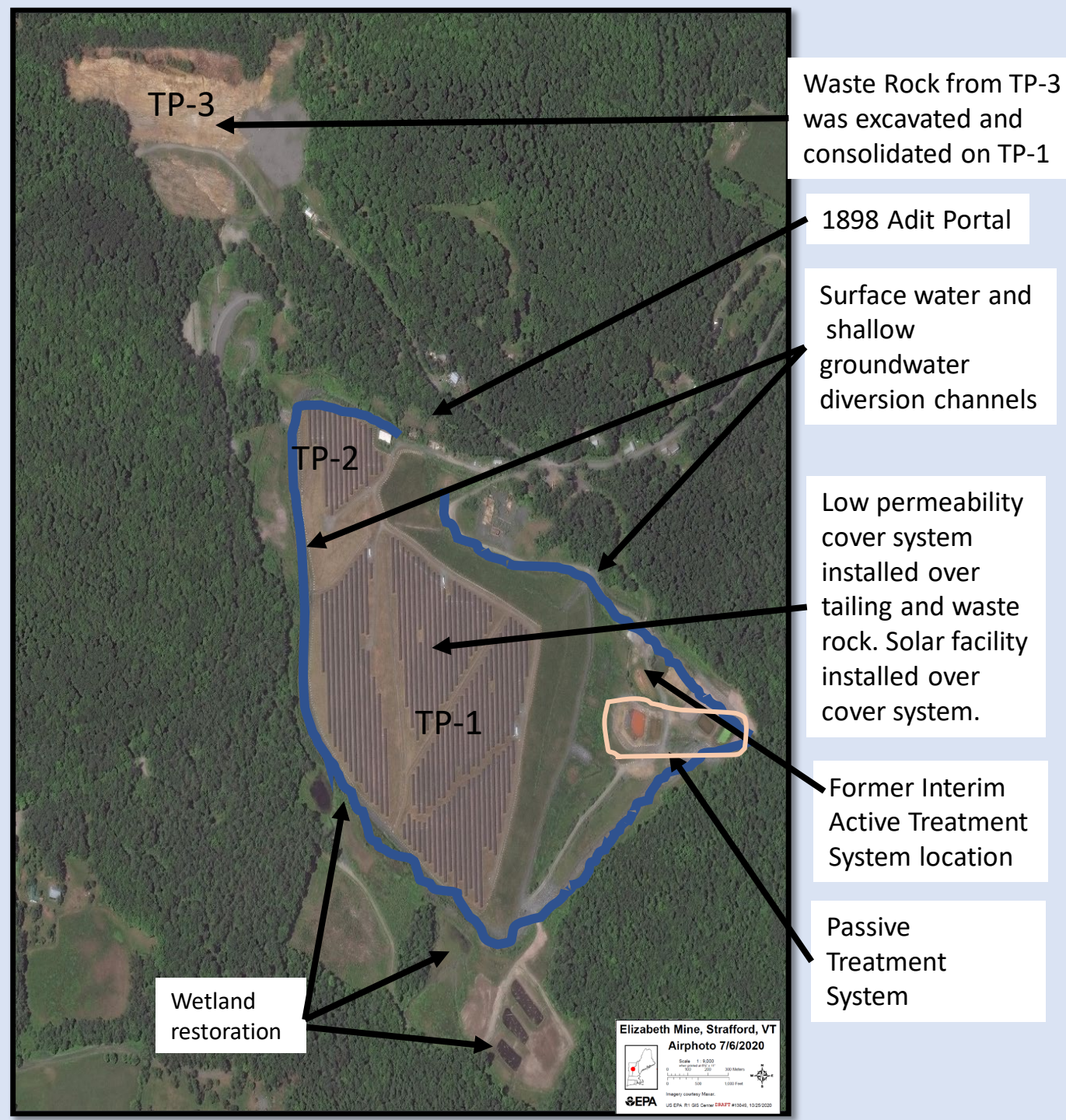


# Elizabeth Mine Update June 2021

## Background Information

### Cleanup Actions at Elizabeth Mine Superfund Site

- Non-Time-Critical Removal Action (NTCRA)
  - Phase 1: Surface water and shallow groundwater diversion channels, TP-3 waste relocation and consolidation, and interim water treatment system. Completed in 2010.
- Phase 2: TP-1/TP-2 cover system, additional surface water diversion channels, continued operation of interim water treatment system, and site restoration.
  - Active water treatment system operated until 2018, decommissioned in 2019.
  - Final actions will be the closure/stabilization of the 1898 Adit Portal and site restoration. To be completed in 2021.
- Phase 3: Passive treatment system for leachate from TP-1. Completed in 2020.

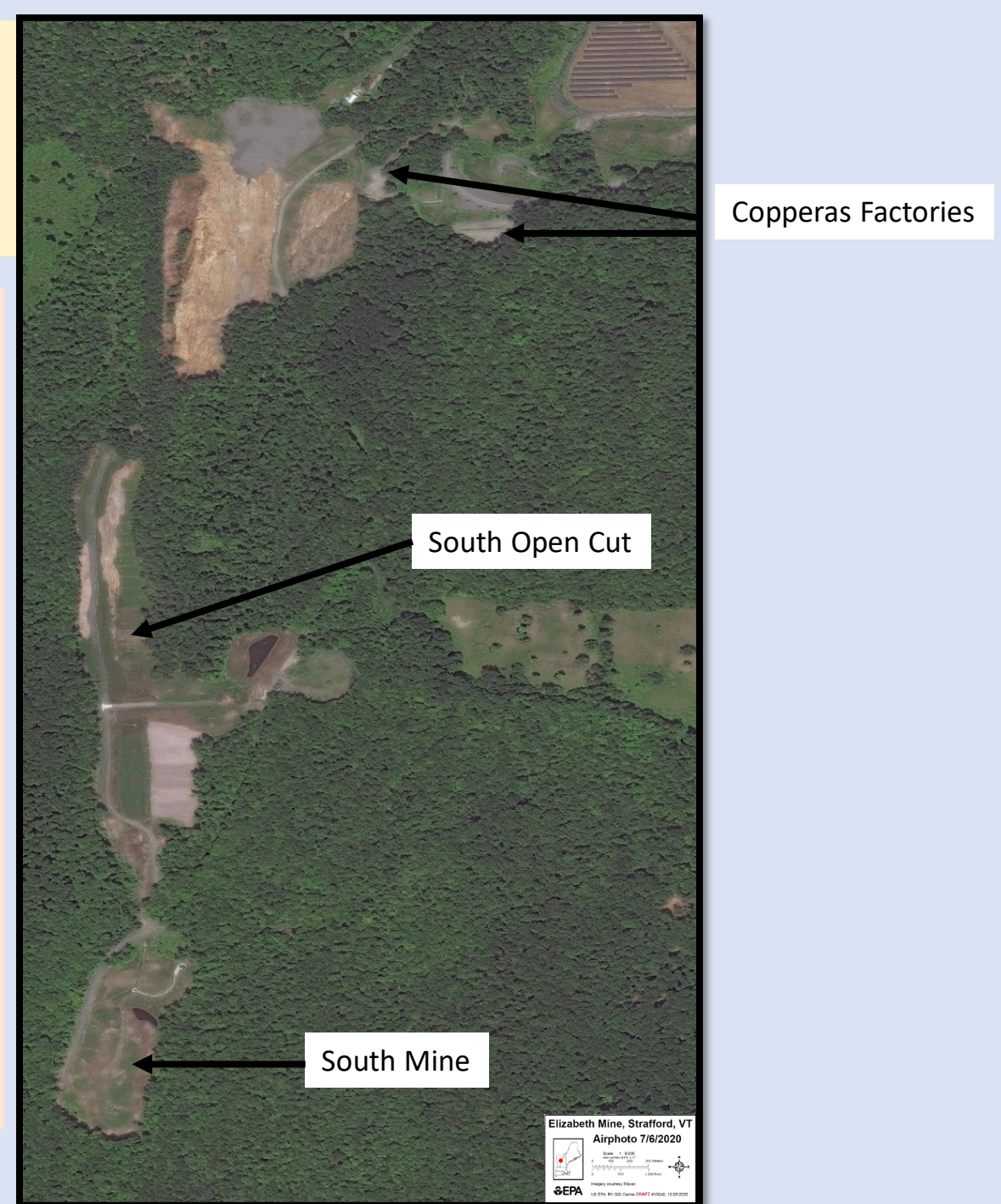


# Elizabeth Mine Update June 2021

## Background Information

### Cleanup Actions at Elizabeth Mine Superfund Site

- Remedial Action (RA)
  - Phase 1: Copperas Factories. Lead contaminated soil cleanup. Completed in 2010.
  - Phase 2: Lord Brook Source Areas (South Open Cut and South Mine): Completed in 2020.
  - Phase 3: Site-wide groundwater use restrictions; long-term monitoring of surface water, sediments, and groundwater; land-use restrictions; and final site restoration.
    - To be completed in 2021.
    - The Phase 3 activities are discussed later in this presentation.



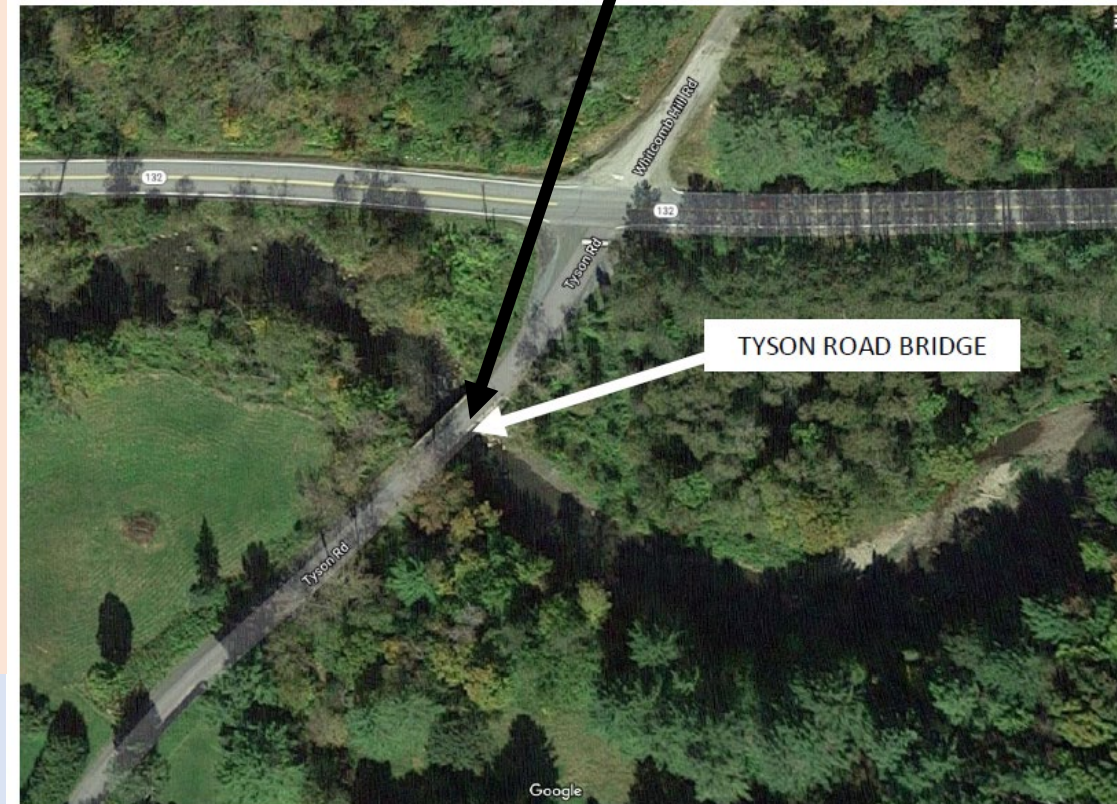


# Elizabeth Mine Update June 2021

## Current Site Activities

### Tyson Road Bridge Deck Repair

- Initial attempt to repair the deck on Tyson Bridge was initiated during 2020.
- Once the bituminous asphalt layer over the concrete bridge deck was partially removed, the bridge deck was found to have deteriorated to a degree that a simple repair was not appropriate.
- The US Army Corps of Engineers (USACE), working for EPA, collaborated with the Town of Strafford, Vtrans, VTDEC, and the site contractor, Nobis, to develop a bridge deck replacement design.
- The bridge beams were inspected by Vtrans and found to be in acceptable condition.



Elizabeth Mine Update June 2021  
Current Site Activities

Tyson Road Bridge Deck Repair

- Contractor mobilized on May 12, 2021.
- Existing deck removal was completed on May 20, 2021.
- Poured new concrete deck on June 2, 2021.
- Remaining work:
  - Install asphalt top layer
  - Install new asphalt approaches
  - Install new guardrail
- All work except new guardrail should be completed in June.
- Guardrail may not be available until August 2021.



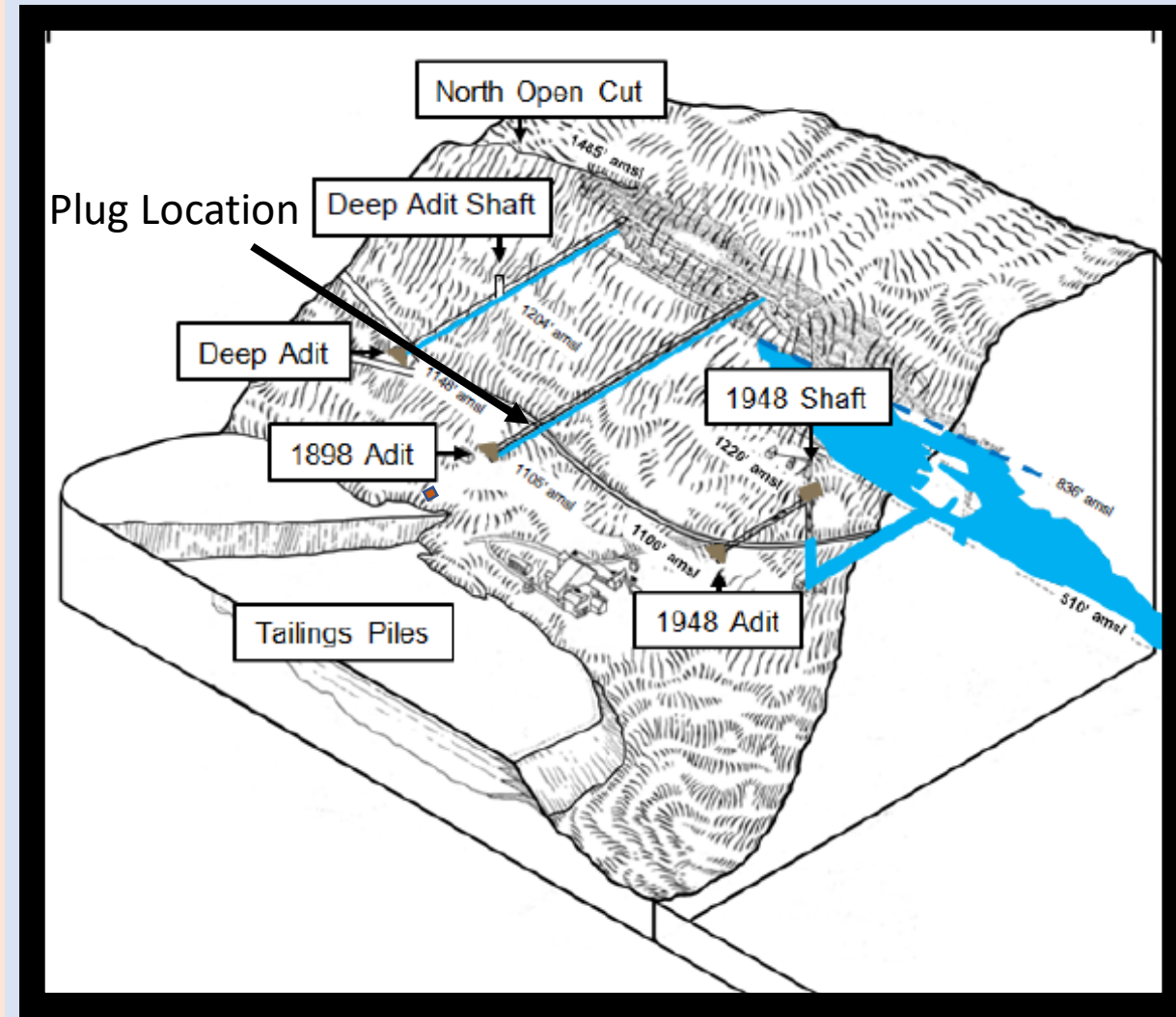
New concrete on bridge deck



New concrete on bridge deck

- NTCRA - 1898 Adit Closure

- The 1898 Adit has two internal blockages impounding an estimated 719,000 gallons of acidic water.
- The 1898 Adit also is believed to be the cause of the sink hole that formed adjacent to Mine Road in 2018.
- A concrete plug will be installed inside the 1898 Adit beneath Mine Road to prevent a future release of the impounded water.
- The concrete plug will also reduce the potential for a future sink hole at Mine Road.



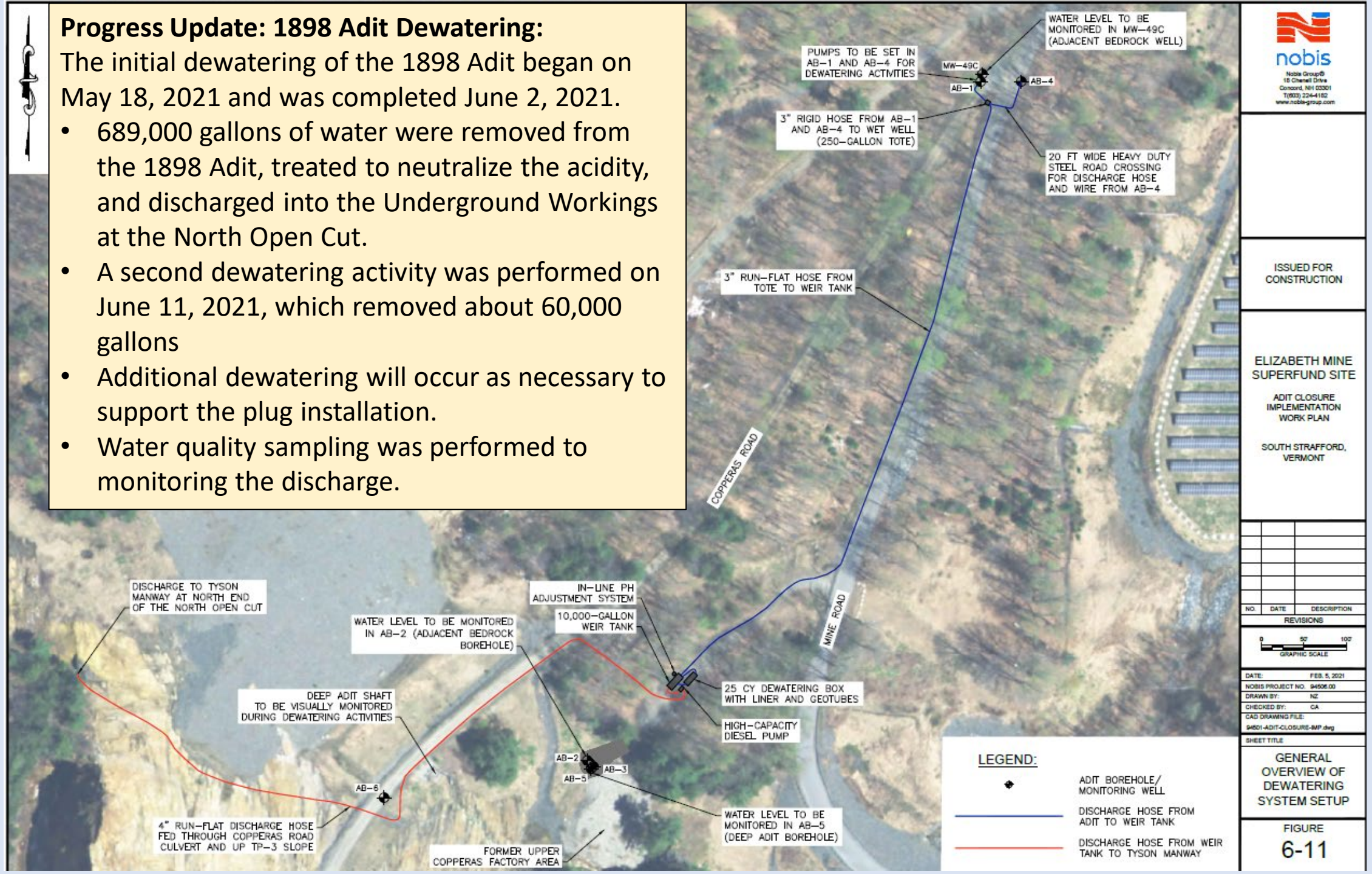
- **1898 Adit Plug - Overview of Activities: May – August 2021**

- Copperas Road will be closed.
- The majority of the water within the 1898 Adit will be removed.
- Holes will be drilled to allow for the injection of grout/concrete.
- Short-term closures of Mine Road may be necessary.
- Equipment will be demobilized from the Site and the disturbed areas restored.
- The section of Mine Road where the work is performed will be repaved.

## Progress Update: 1898 Adit Dewatering:

The initial dewatering of the 1898 Adit began on May 18, 2021 and was completed June 2, 2021.

- 689,000 gallons of water were removed from the 1898 Adit, treated to neutralize the acidity, and discharged into the Underground Workings at the North Open Cut.
- A second dewatering activity was performed on June 11, 2021, which removed about 60,000 gallons
- Additional dewatering will occur as necessary to support the plug installation.
- Water quality sampling was performed to monitoring the discharge.



ISSUED FOR CONSTRUCTION

ELIZABETH MINE SUPERFUND SITE  
ADIT CLOSURE IMPLEMENTATION WORK PLAN  
SOUTH STRAFFORD, VERMONT

- **1898 Adit Plug Activities: June– August 2021 – 1898 Plug Installation**

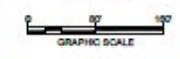
- Equipment was mobilized to the Site the week of June 7, 2021.
- The drilling contractor will bore 22 holes to access the 1898 Adit from Mine Road and Copperas Road.
- The 1898 Closure will include 5 components with an overall length of 61 ft:
  - A 12 ft long concrete bulkhead (bulkhead #1) will be installed on the Copperas Road side of the plug to prevent water from entering the work zone and act as a seal.
  - An acid resistant coating will be placed on the upgradient side bulkhead #1.
  - A second 6 ft long concrete bulkhead (bulkhead #2) will be installed on the downgradient side to create a form for the plug.
  - Grout/concrete will be pumped at high pressure between the bulkheads to create the 11 ft long plug.
  - Flowable fill will be injected into the 1898 Adit downgradient of bulkhead #2 to fill the 32 ft of void space between the bulkhead and the blockage at the Sink Hole.
- Short-term closures of Mine Road may be necessary.
- Equipment will be demobilized and the disturbed areas restored.
- The section of Mine Road where the work is performed will be repaved.



NOT ISSUED FOR CONSTRUCTION

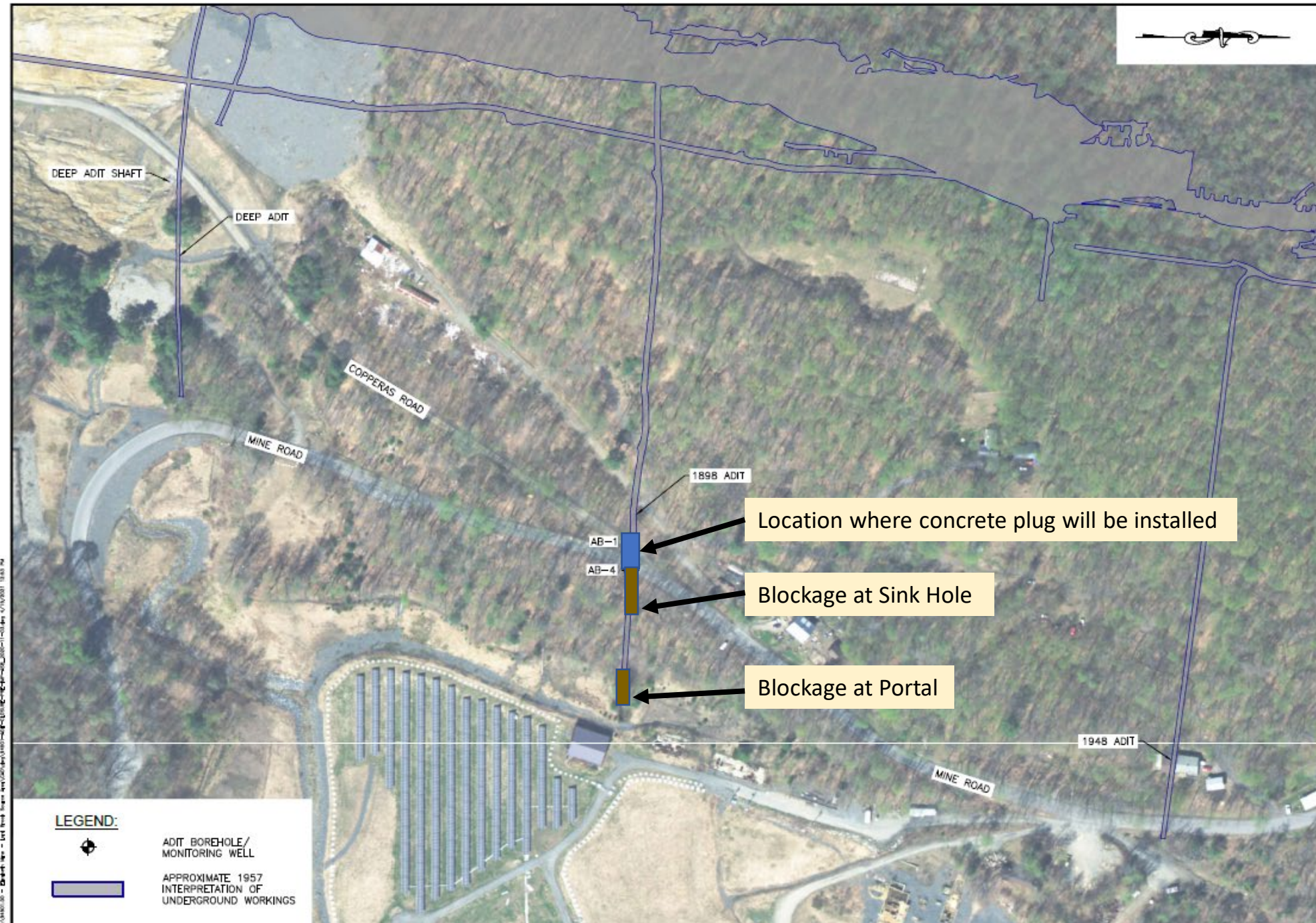
ELIZABETH MINE SUPERFUND SITE  
 LORD BROOK SOURCE AREA  
 PHASE 2 REMEDIAL ACTION  
 MINE ROAD  
 SOUTH STRAFFORD,  
 VERMONT

NO.	DATE	DESCRIPTION
REVISIONS		



DATE: DECEMBER 10, 2020  
 NOBIS PROJECT NO. 54507.00  
 DRAWN BY: NJZ  
 CHECKED BY: SJK  
 CAD DRAWING FILE: 54507-ADIT-CLOSURE-PRS-IMP-AB-B\_200  
 SHEET TITLE:

1898 Adit Plug and Blockage Locations



DEEP ADIT SHAFT

DEEP ADIT

COPPERAS ROAD

MINE ROAD

1898 ADIT

AB-1  
 AB-4

Location where concrete plug will be installed

Blockage at Sink Hole

Blockage at Portal

1948 ADIT

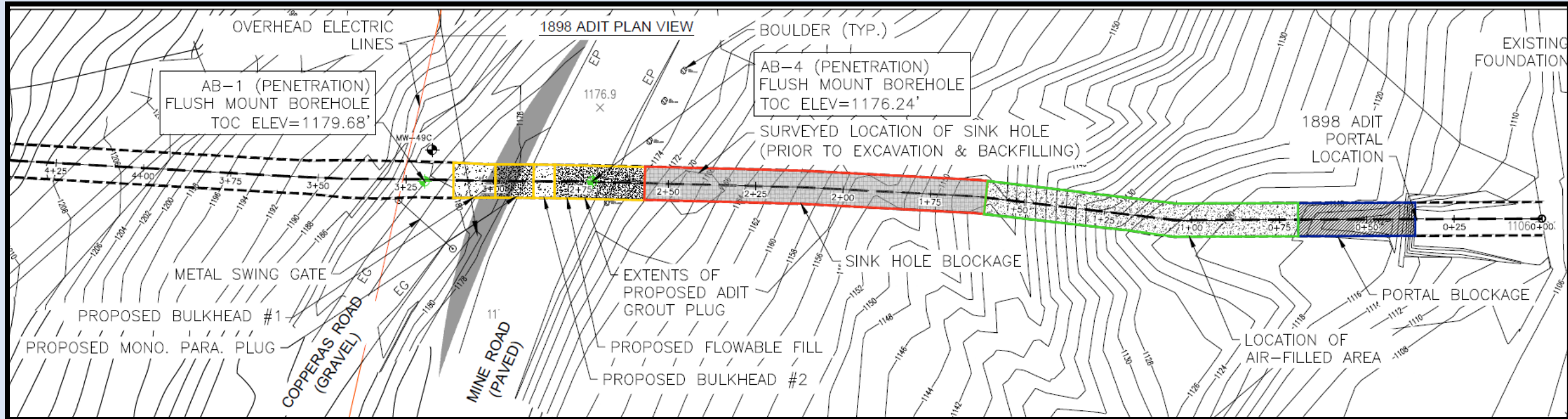
MINE ROAD

**LEGEND:**

- ADIT BOREHOLE/  
MONITORING WELL
- APPROXIMATE 1957  
INTERPRETATION OF  
UNDERGROUND WORKINGS

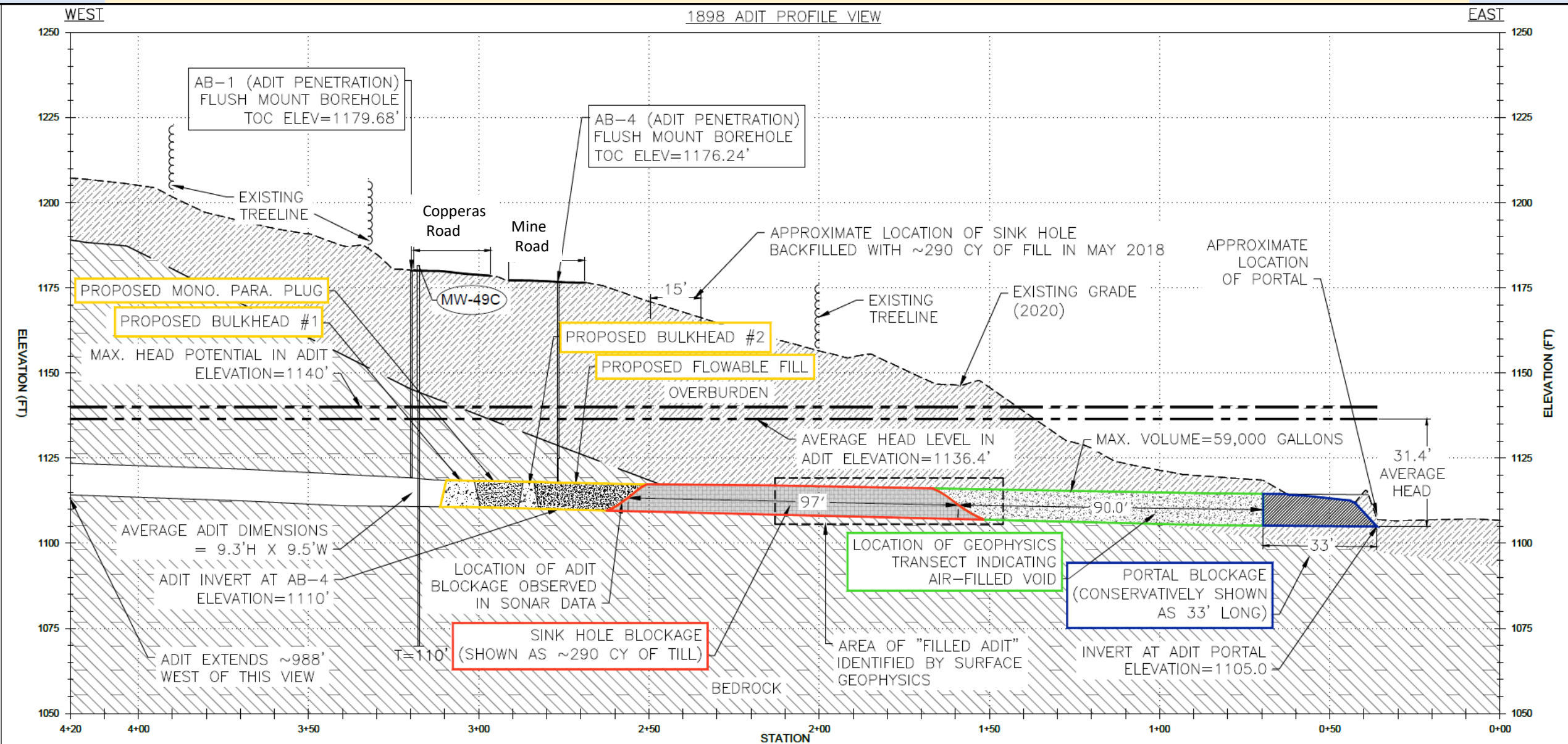
J:\Projects\54507-ADIT-CLOSURE-PRS-IMP-AB-B\_200\11-10-2020\11-10-2020.dwg 11/10/2021 10:43 AM

# Plan view of 1898 Adit Closure showing location of the two collapse zones (blockages)





# Cross-sectional view of the 1898 Adit Closure and collapse zones (blockages)



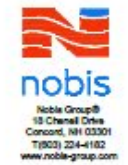
Elizabeth Mine Update June 2021  
Current Site Activities

- Phase 3 Remedial Action - Monitoring and Assessment
  - The ongoing groundwater, surface water, and residential well quality monitoring program will continue through 2021.
  - Sampling of the Passive Treatment System will also continue through 2021.
  - A sediment toxicity testing program will be performed for the tributaries to Lord Brook that receive drainage from the South Mine and South Open Cut.
  - Data collected through 2020 indicates:
    - Residential wells currently in use are not impacted by the mine related contamination.
    - Groundwater contamination appears to be confined to the former waste areas (South Mine, South Open Cut, TP-3, TP-1, and TP-2) and also within the limits of the Underground Workings.
    - Surface water data shows continued improvement for Copperas Brook, Lord Brook, the tributaries of Lord Brook, and the West Branch of the Ompompanoosuc River.

# Surface Water Sampling Locations



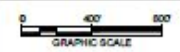
**LEGEND**  
▲ SW- SURFACE WATER SAMPLE LOCATION



NOT ISSUED FOR CONSTRUCTION

**ELIZABETH MINE SUPERFUND SITE**  
NON-TIME CRITICAL REMOVAL ACTION  
MINE ROAD SOUTH STRAFFORD, VERMONT

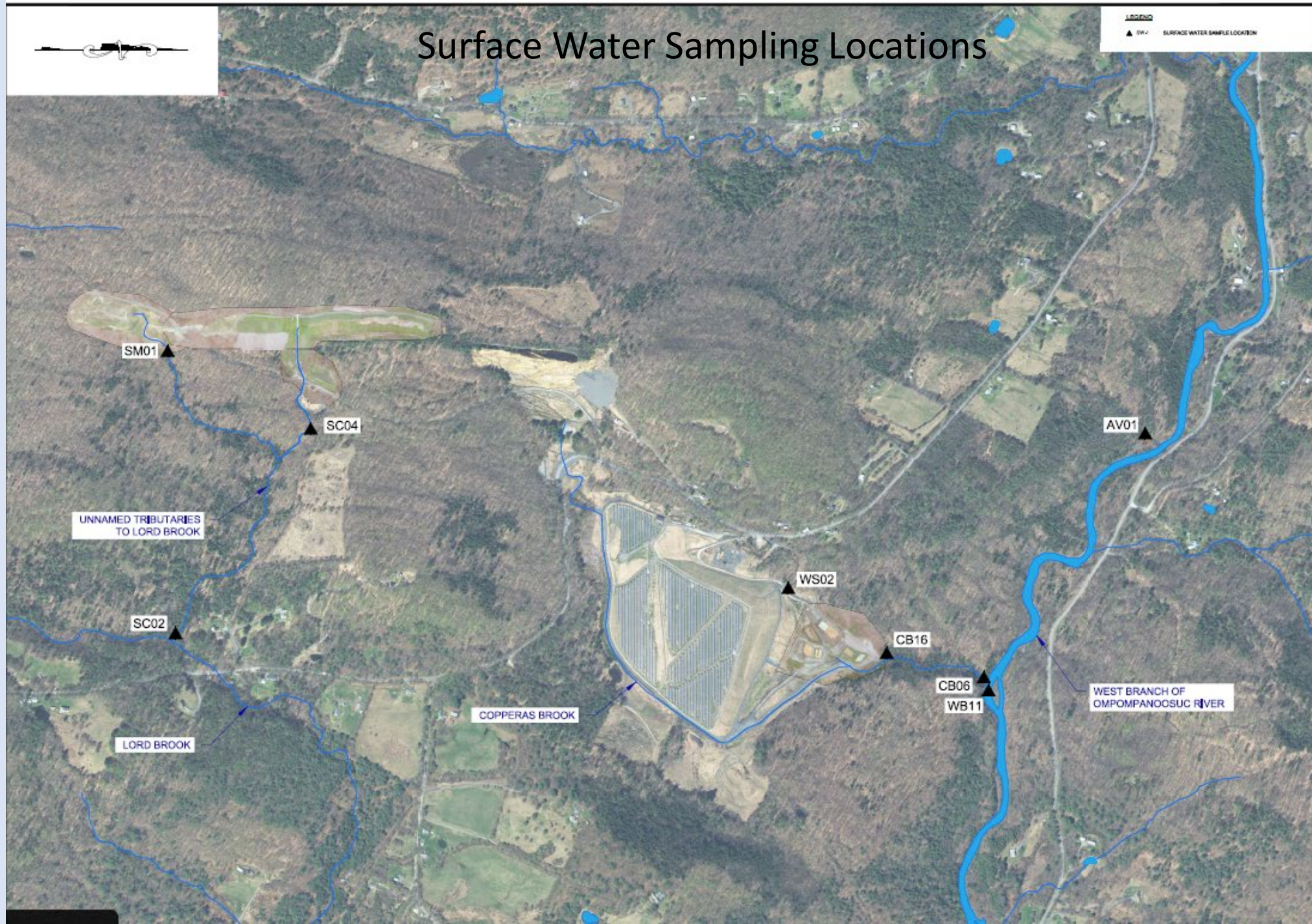
NO.	DATE	DESCRIPTION



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NOBIS PROJECT NO. 04507.00  
DRAWN BY: NZ  
CHECKED BY: BK  
CAD DRAWING FILE:  
Figures for ITH Public Presentation.dwg  
SHEET TITLE

**SURFACE WATER MONITORING LOCATIONS**

FIGURE 4-3



UNNAMED TRIBUTARIES TO LORD BROOK

LORD BROOK

COPPERAS BROOK

WEST BRANCH OF OMPOMPANOSUC RIVER

# Elizabeth Mine Update June 2021

## Current Site Activities

### • Passive Treatment System

- Performance monitoring will continue during 2021.
- Sample locations are shown with blue stars on adjacent figure. Samples are also collected from Copperas Brook.
- System consistently reduced iron concentration by >99%.
- Iron concentration in discharge from passive treatment system below 1 mg/l for all samples collected in 2020 and through May 2021.

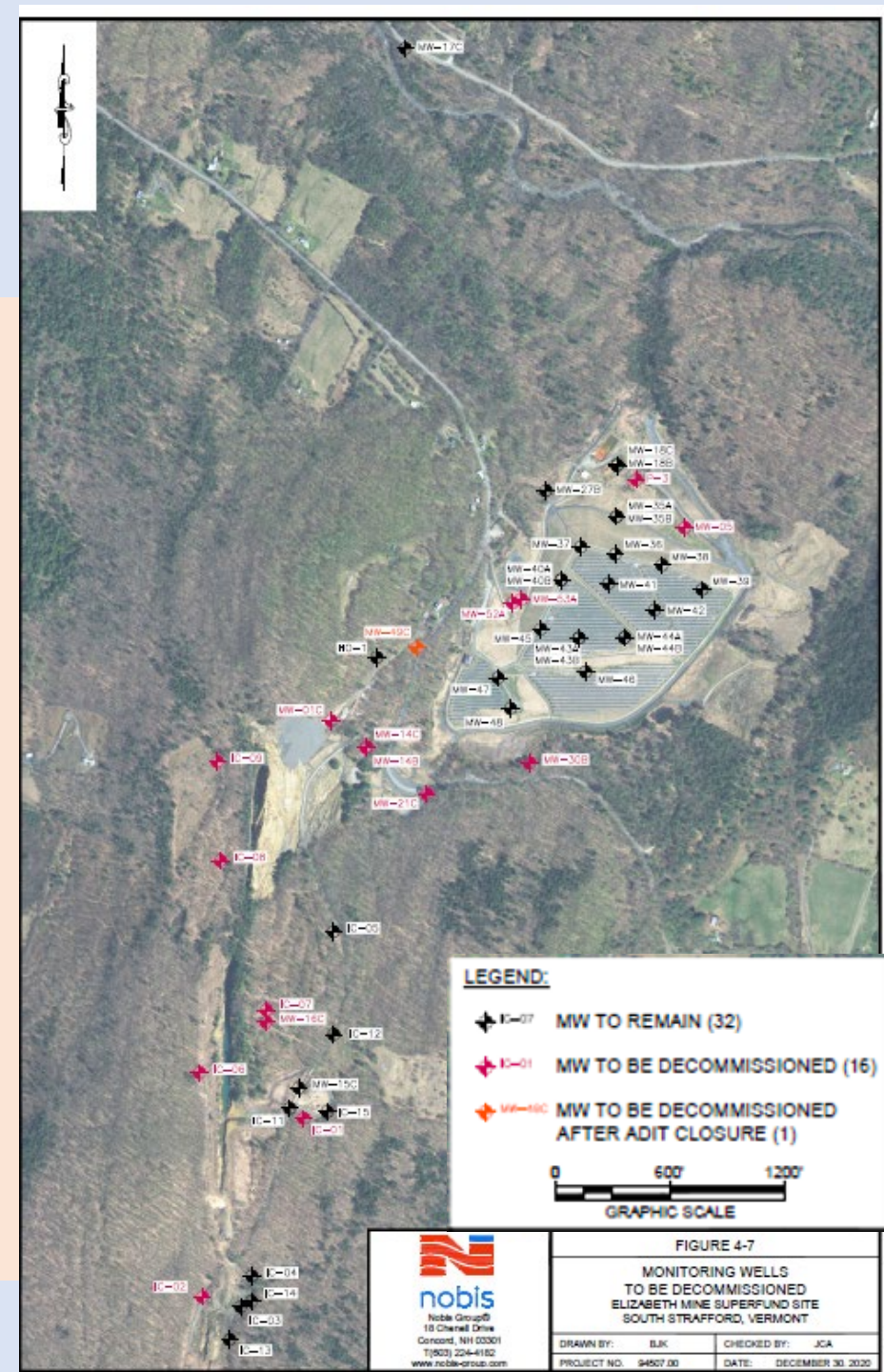


# Elizabeth Mine Update June 2021

## Current Site Activities

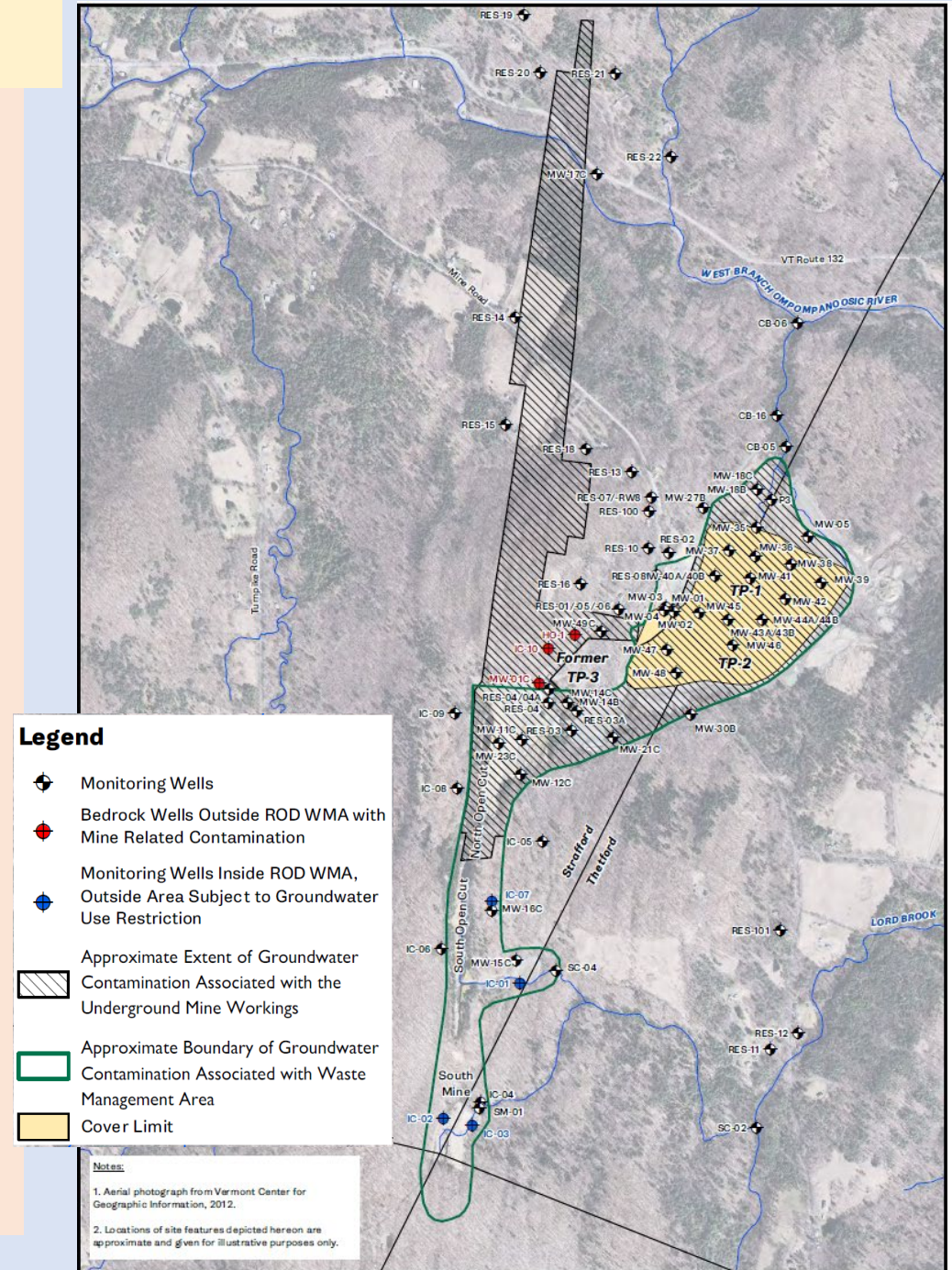
### Monitoring well decommissioning

- With the transition of the Site maintenance and monitoring to VTDEC by the end of 2021, EPA is removing (decommissioning) monitoring wells that are no longer needed.
- The removal of 19 monitoring wells is complete (shown in red).
- The remaining 28 monitoring wells will be used to evaluate groundwater quality and water levels across the Site area.



- **Groundwater Contamination Delineation**

- Five monitoring wells were installed in 2020 to refine the extent of contamination associated with the South Open Cut and South Mine areas.
- Two additional monitoring were installed in 2021 to further refine the groundwater contamination associated with the South Mine area.
- The major contaminants detected in groundwater are cobalt and manganese.
- The approximate extent of where groundwater contamination could be present is shown with the cross-hatching and also the area within the green line, known as the Waste Management area is within the green line.
- The private water supply wells in use near the site have been tested and do not contain mine related contaminants.



# Location of New Monitoring Wells

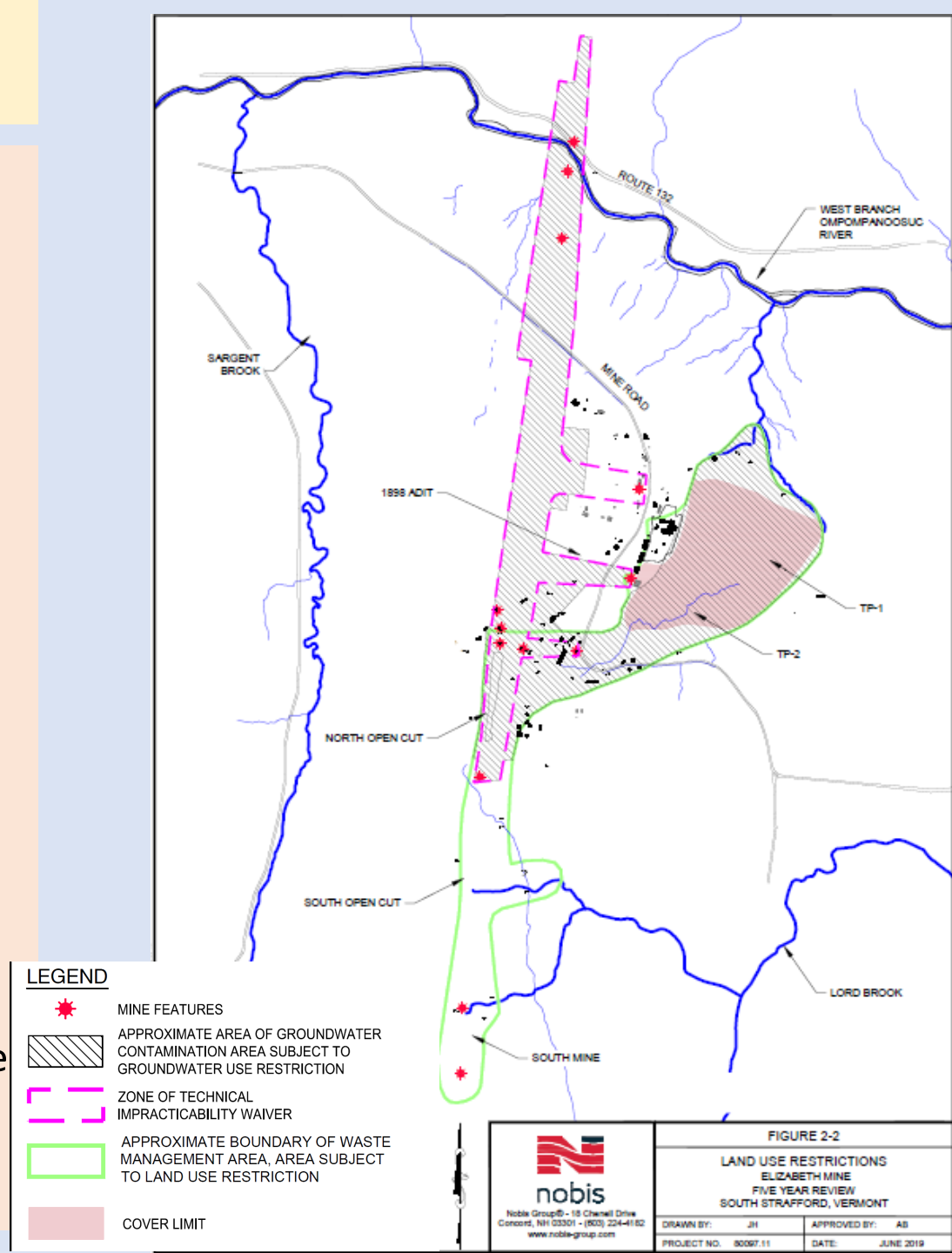


- Monitoring wells at locations IC11, IC12, IC13, IC14 and IC15 were installed in 2020.
- Two additional monitoring wells (IC 16 and IC17) were installed in 2021.

# Elizabeth Mine Update June 2021

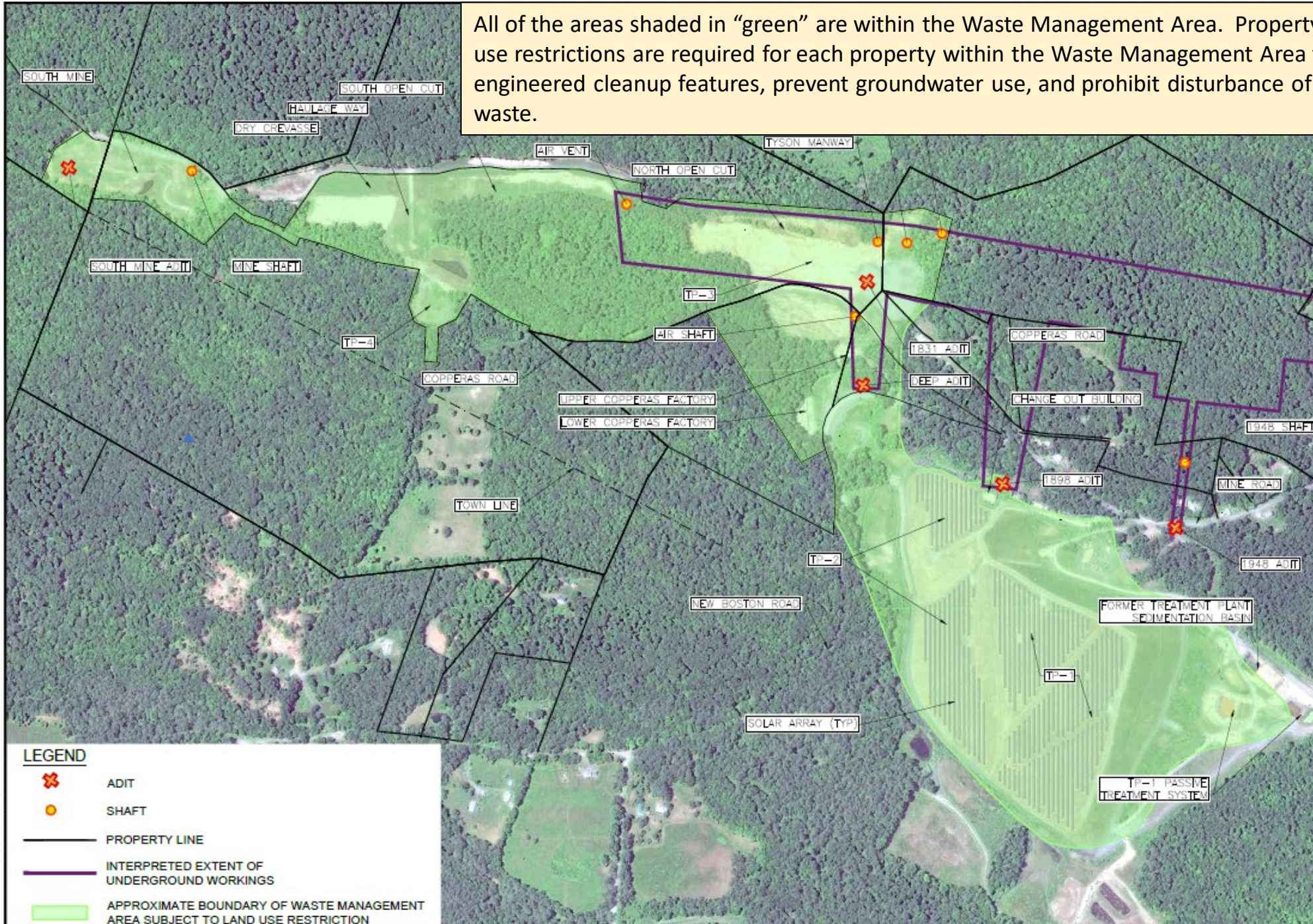
## Land and Groundwater Use Restrictions

- Institutional Controls are used to protect the completed cleanup actions, prevent future exposure to contaminated materials or contaminated groundwater, and prohibit activities that could release contamination into surface water.
- Two types of Institutional Controls are being implemented at the Elizabeth Mine.
  - For those properties within the Waste Management Area (where mine waste and/or engineered features are present) a *Grant of Environmental Restrictions, Right of Access and Easement* will be completed between the State of Vermont Department of Environmental Conservation (VTDEC) and the property owner to impose restrictions on the use of the property.
  - For properties outside the Waste Management Area, where groundwater contamination may be present, Groundwater Reclassification is being considered as a mechanism to require careful consideration regarding the location and depth of a future water supply well prior to installation.





All of the areas shaded in "green" are within the Waste Management Area. Property specific land use restrictions are required for each property within the Waste Management Area to protect the engineered cleanup features, prevent groundwater use, and prohibit disturbance of any buried mine waste.



**LEGEND**

- ADIT
- SHAFT
- PROPERTY LINE
- INTERPRETED EXTENT OF UNDERGROUND WORKINGS
- APPROXIMATE BOUNDARY OF WASTE MANAGEMENT AREA SUBJECT TO LAND USE RESTRICTION

NOT ISSUED FOR CONSTRUCTION

**ELIZABETH MINE SUPERFUND SITE**  
 INSTITUTIONAL CONTROL ZONES  
 MINE ROAD SOUTH STRAFFORD, VERMONT

NO.	DATE	DESCRIPTION

REVISIONS

0 250' 500'  
 GRAPHIC SCALE

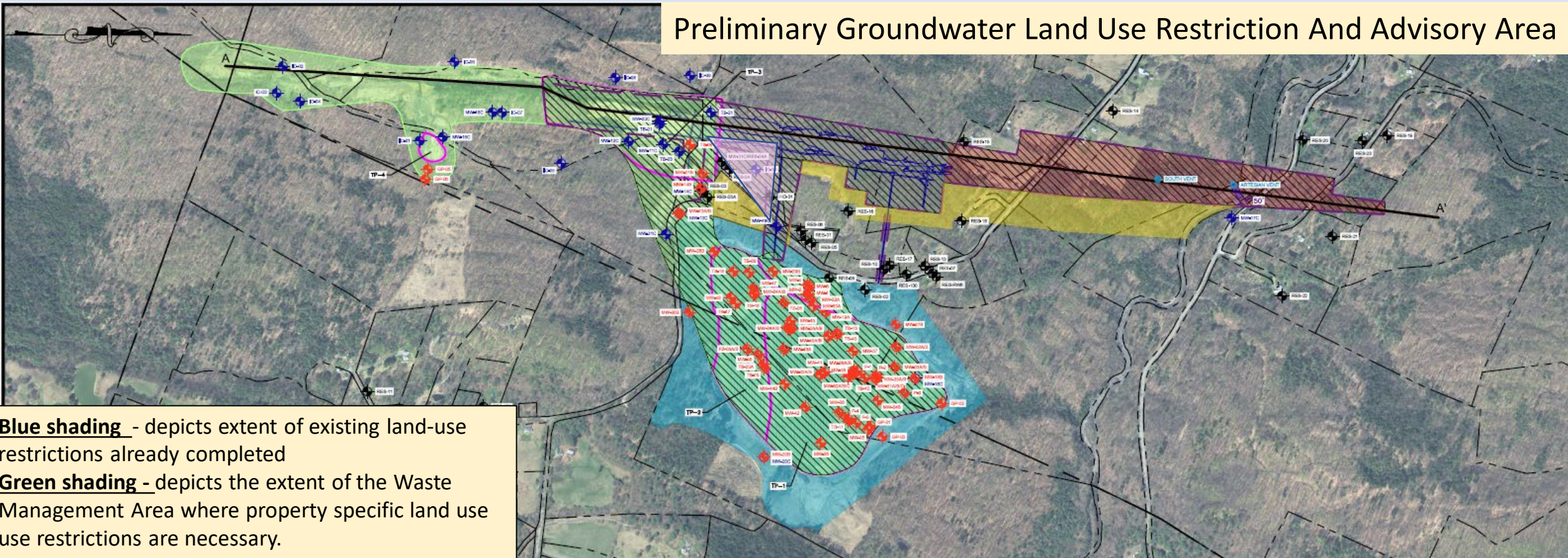
DATE: FEBRUARY 9, 2021  
 NOBIS PROJECT NO. 84506.00  
 DRAWN BY: AD  
 CHECKED BY: BK  
 CAD DRAWING FILE: Waste Management Areas.dwg

SHEET TITLE

**WASTE MANAGEMENT AREAS**

FIGURE  
**WMA-1**

# Preliminary Groundwater Land Use Restriction And Advisory Area



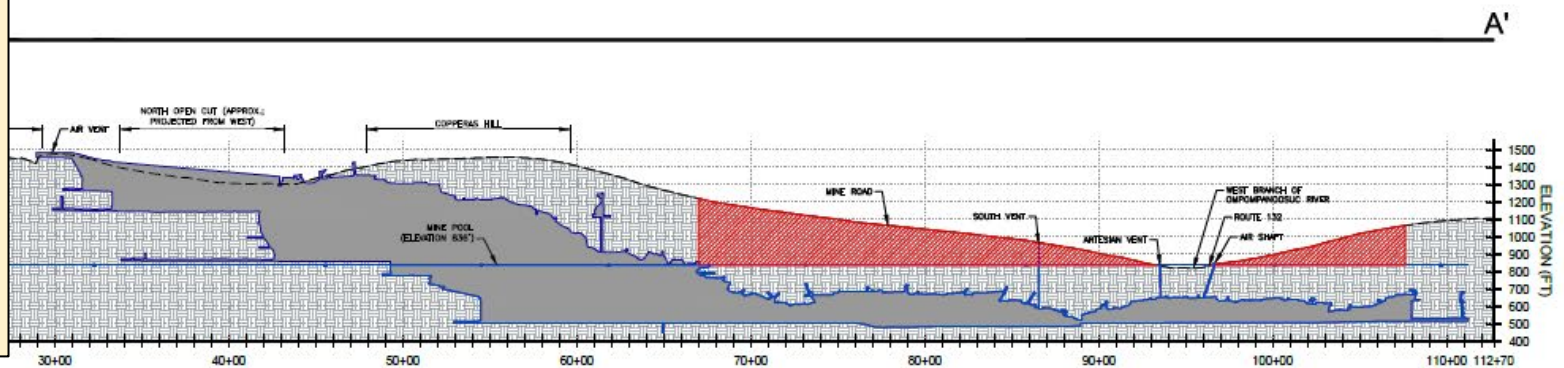
**Blue shading** - depicts extent of existing land-use restrictions already completed

**Green shading** - depicts the extent of the Waste Management Area where property specific land use restrictions are necessary.

**Purple Line and cross hatching** - depict the areas most likely to reside above the Underground Workings where some form of well installation restriction is necessary.

**Pink Shading** - area of groundwater contamination outside the Waste Management Area and not within the Underground Workings.

**Yellow Shading** - depicts area where there may be an advisory due to uncertainty regarding the distance from the Underground Mine workings that a well should be located.



Elizabeth Mine Update June 2021  
Summary

- Summary:
  - Major site activities in 2021 include:
    - Closure of the 1898 Adit
      - Copperas Road will be closed from May – August 2021.
      - Short-term closures of Mine Road may be necessary.
    - Repair of the Tyson Road bridge deck (nearly complete).
    - Installation of 2 additional monitoring wells (complete).
    - Sampling of groundwater, surface water, sediment, and residential wells (ongoing).

Elizabeth Mine Update June 2021  
Summary

- Summary:
  - Major site activities in 2021 that will extend in 2022 include:
    - Continued work to secure land-use restrictions on properties within the Waste Management Area (ongoing).
    - Continued work to develop groundwater use restrictions for areas where groundwater contamination may be located (ongoing).
    - Transition of the site management from EPA to VTDEC (ongoing).

# Elizabeth Mine Site Contacts

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Fax: [617-918-0617](tel:617-918-0617)  
Email: [swatts.darriel@epa.gov](mailto:swatts.darriel@epa.gov)

You can view the information about the Elizabeth Mine at:  
[www.epa.gov/superfund/elizmine](http://www.epa.gov/superfund/elizmine)