Ely Copper Mine
Public Information Meeting

July 27, 2011

Ely Mine Operational History

- Operated from mid-1850's – 1905.
- Major period of operation was 1870's and 1880's.
- All underground mining completed by 1900.
- Processed waste from Pike Hill Mine (Eureka, Union, Bicknell).
- Limited activity around 1900 (Westinghouse).
- 1917-1918 short period of activity with a flotation mill to process waste ore in dumps.
- 50,000 cubic yards shipped to Elizabeth Mine in 1949 and 1950.
- 17,500 tons of copper total.

Historic Context for Ely Mine

- 3rd largest copper producer in US 1873 and 1875.
- 700 foot long smelter with 24 furnaces.
- Eligible for National Register of Historic Places as part of Orange County mining district along with Elizabeth Mine and Pike Hill Mine.
- "Ely War" – labor unrest.
- Several phases of mining and beneficiation represented at the Site: underground mining, ore roasting, smelting, limited floatation tailing.

Mining-related Superfund Sites in New England

<u>4 National Priorities List Sites</u>

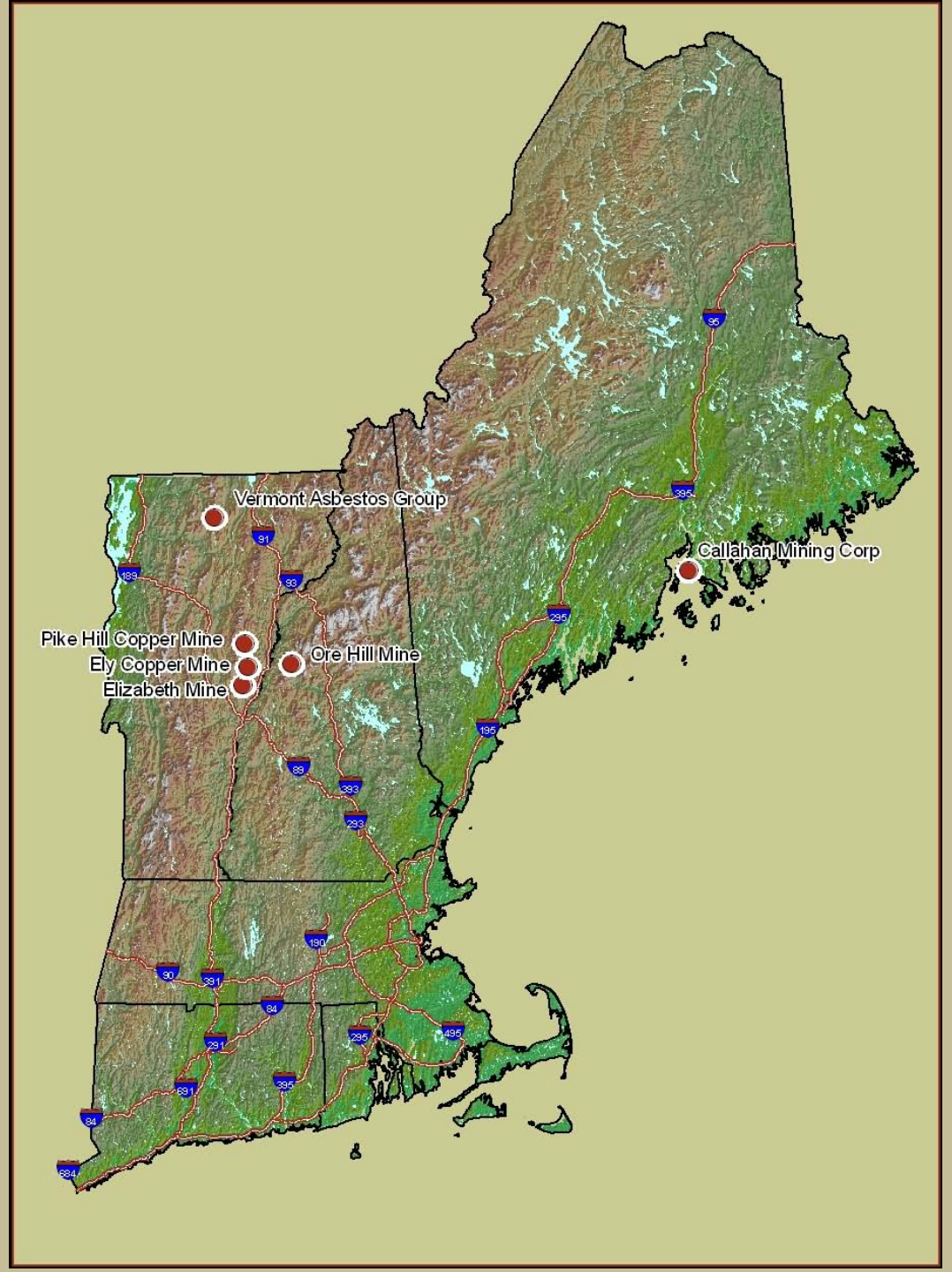
- Elizabeth Mine (2001)
- Ely Copper Mine (2001)
- Pike Hill Copper Mine (2004)
- Callahan Mining Corp (2002)

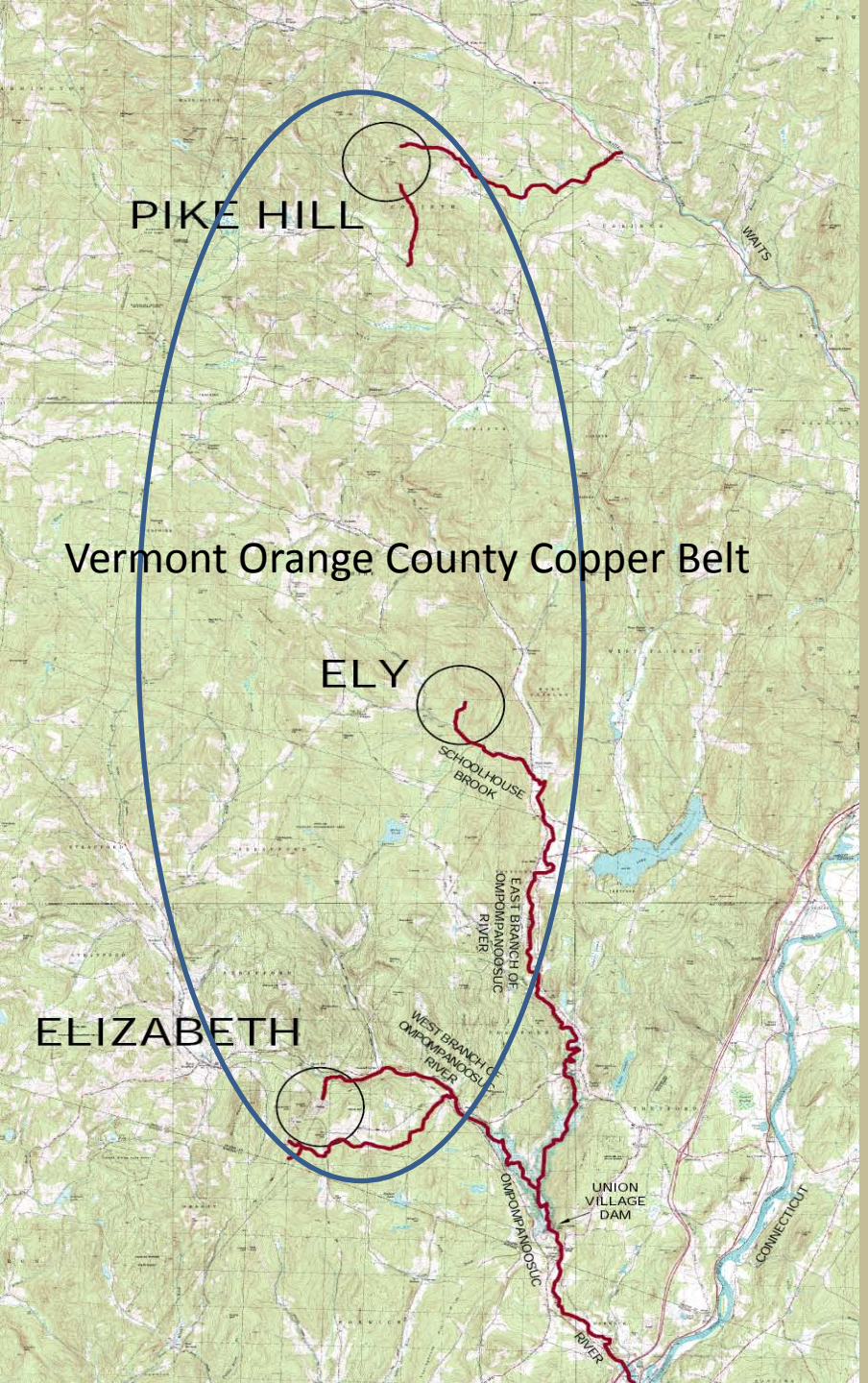
<u>1 EPA Removal Action</u>

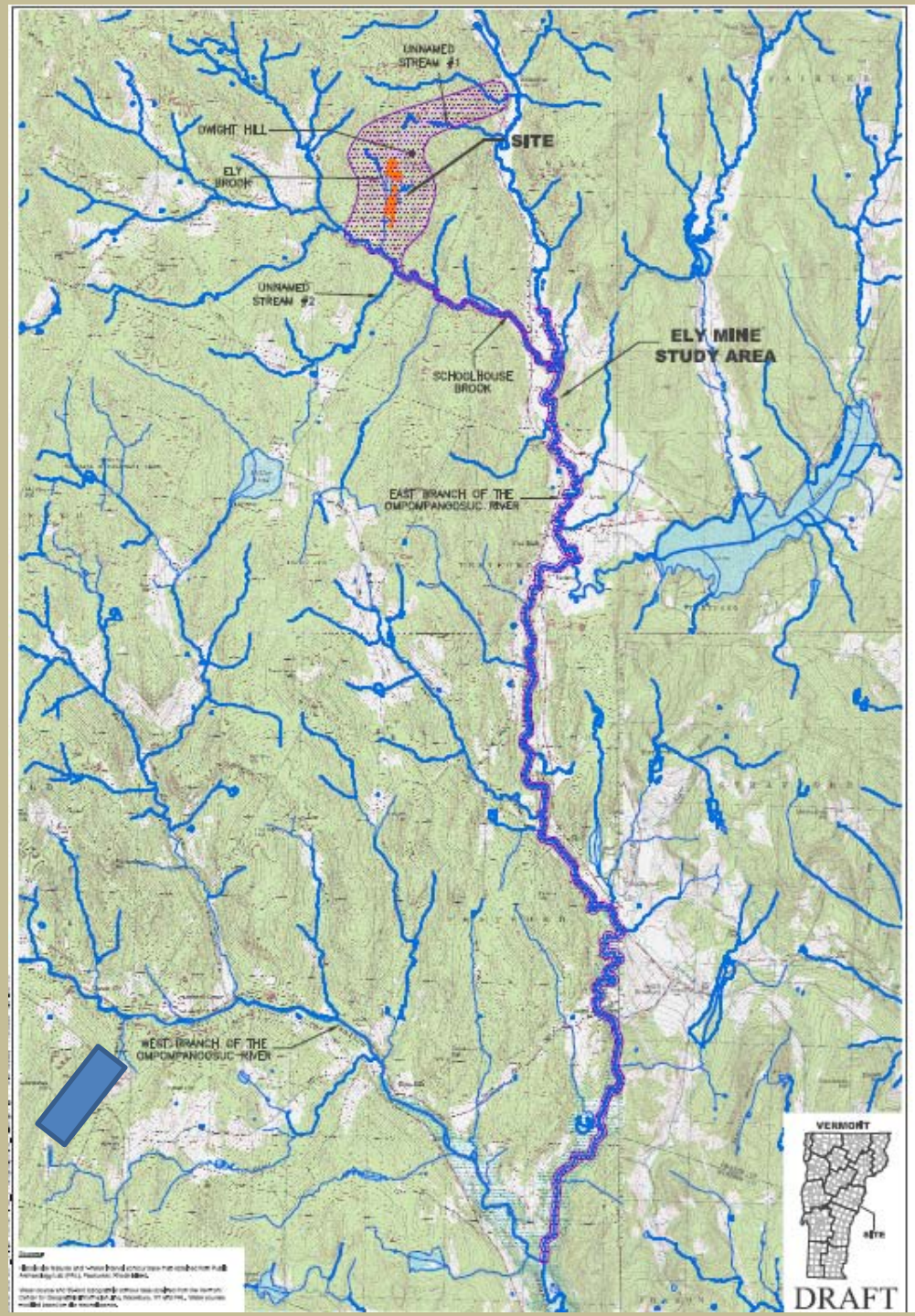
- Vermont Asbestos Group (2007 – 2008)

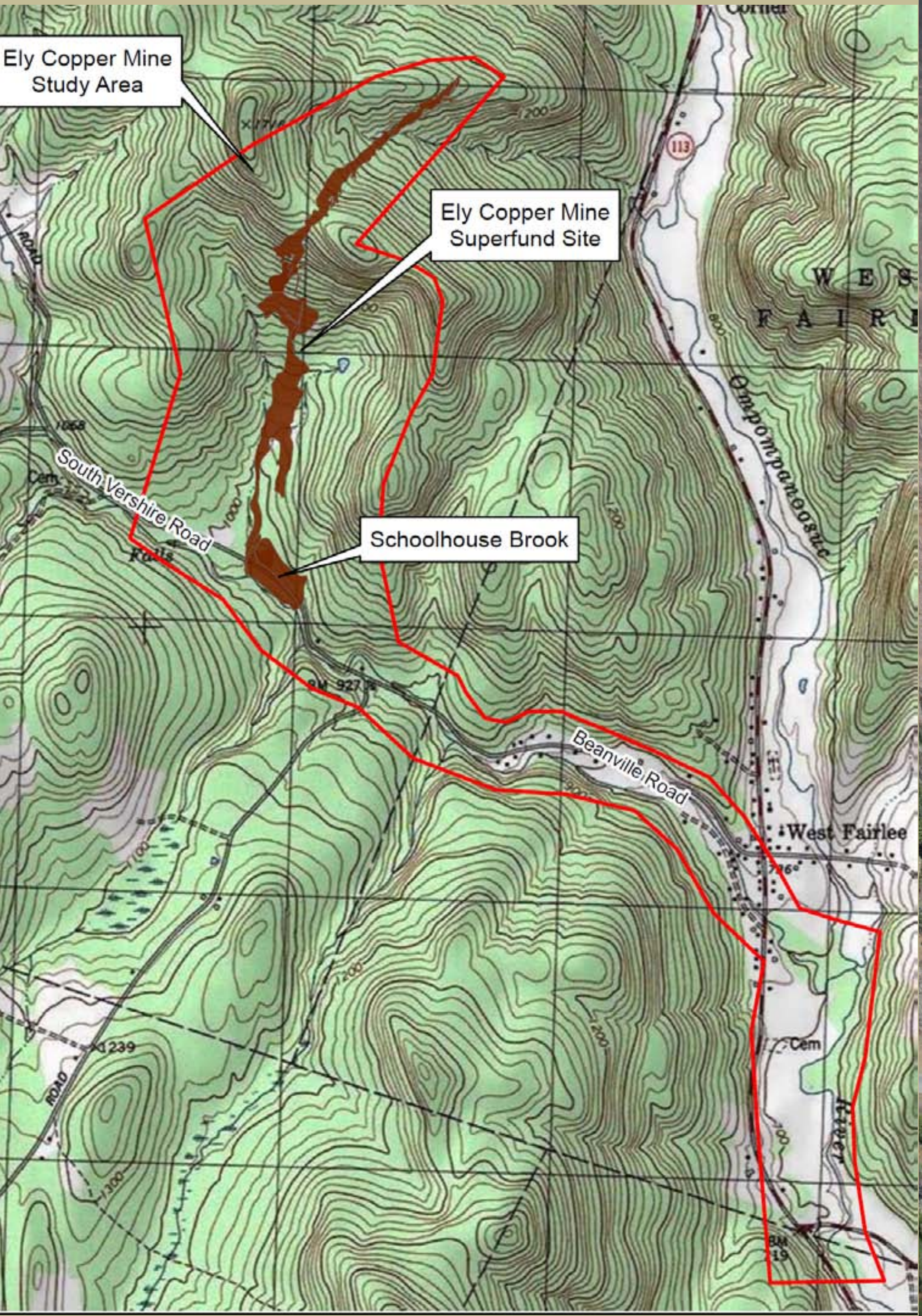
<u>1 Forest Service Removal (NTCRA)</u>

- Ore Hill Mine




PIKE HILL
Vermont Orange County Copper Belt
ELY
ELIZABETH
SCHOOLHOUSE BROOK
EAST BRANCH OF OMPOMPANOOSUC RIVER
WEST BRANCH OF OMPOMPANOOSUC RIVER
OMPOMPANOOSUC RIVER
UNION VILLAGE DAM
CONNECTICUT
WAITS


UNNAMED STREAM #1
DWIGHT HILL
SITE
ELY BROOK
UNNAMED STREAM #2
SCHOOLHOUSE BROOK
ELY MINE STUDY AREA
EAST BRANCH OF THE OMPOMPANOOSUC RIVER
WEST BRANCH OF THE OMPOMPANOOSUC RIVER
VERMONT
DRAFT



Ely Copper Mine Study Area
Ely Copper Mine Superfund Site
Schoolhouse Brook
South Vershire Road
Beanville Road
West Fairlee
Ompompanoosuc
River

Remedial Investigation (RI)

Investigation activities at the Site from 2002 – 2010 focused on:

- Is the contamination at the Site a threat to public health (now or in the future)?
- Is the contamination at the Site causing harm to the local ecology?
- What is the extent of any soil, groundwater, surface water, or sediment contamination?
- What can be done to protect the public and the environment?

Sources of Contamination

Lower Waste Area and Upper Waste Area

Waste rock (sulfide ore-bearing rock) that did not contain enough copper to process during mining operations.

Tailings Area

Tailings (finely ground sulfide ore) that were left behind from copper extraction processes at the flotation mill.

Ore Roast Bed

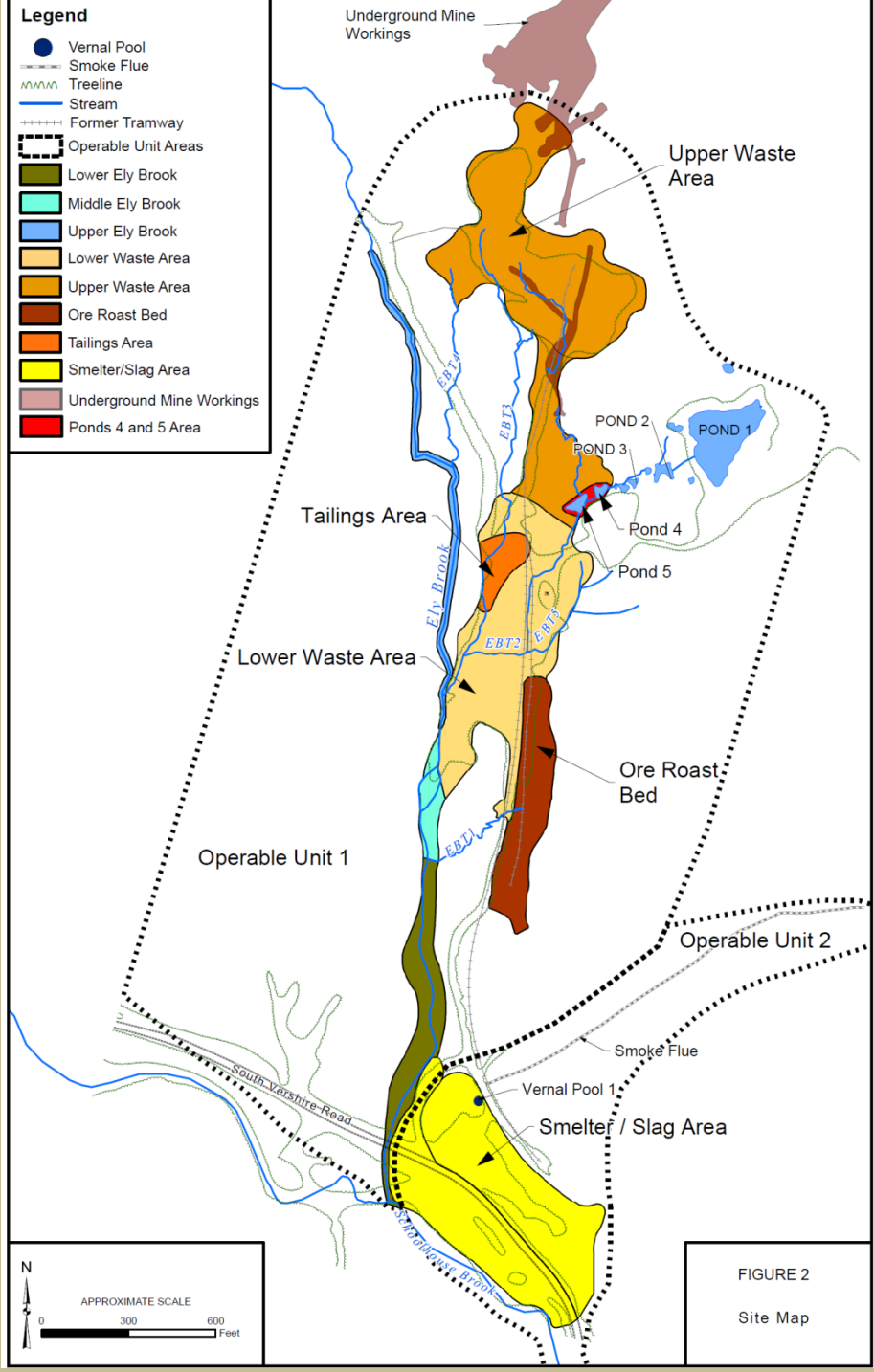
Waste rock from ore roasting, a process that made it easier to remove the copper from the rock.

Smelter/Slag Area

Waste rock, oxidized ore, slag and building demolition debris, most of which are associated with on-site smelting operations.

Underground Mine Workings

Contaminated groundwater and leachate (water that passed through contaminated soil and now contains some of the contaminants) in underground mine tunnels and shafts, some of which eventually drain to Ely Brook.



Operable Units

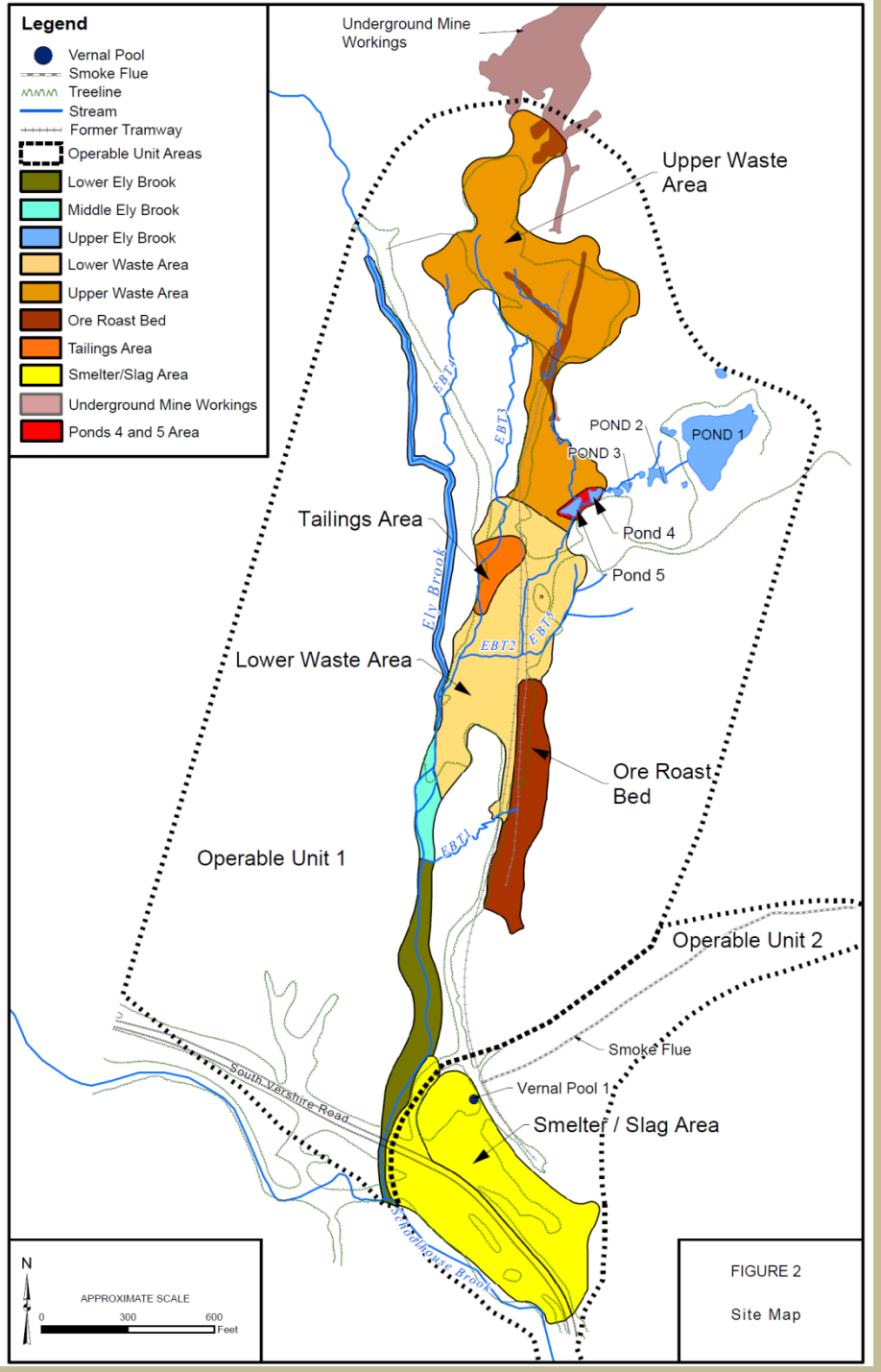
EPA will be implementing the Ely Mine cleanup action in phases or "Operable Units."

Operable Unit 1 (OU1)

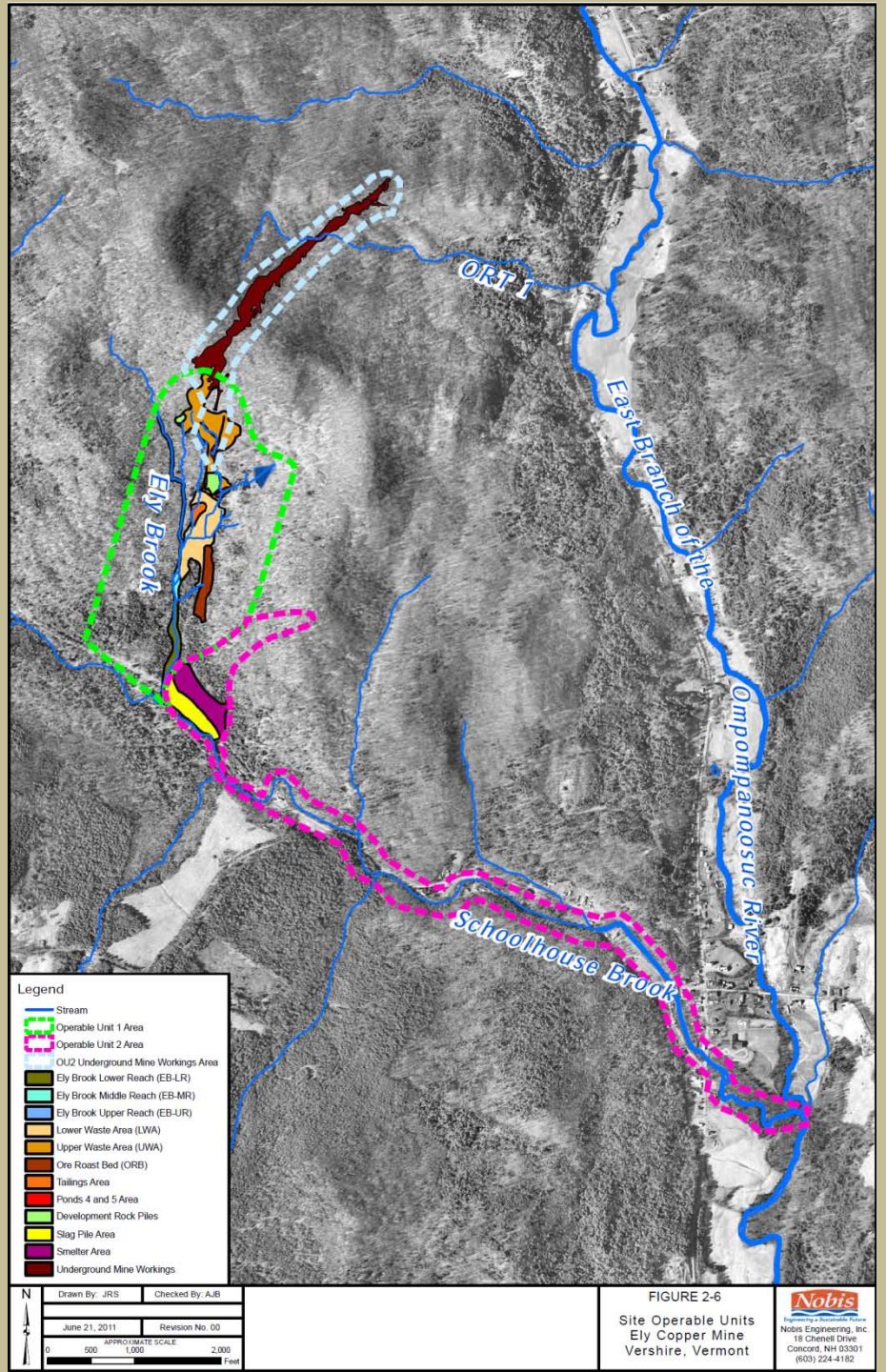
- Lower Waste Area
- Upper Waste Area
- Tailings Area
- Ore Roast Bed
- Sediment of Ely Brook, its tributaries, and Ponds 4 and 5

Operable Unit 2 (OU2)

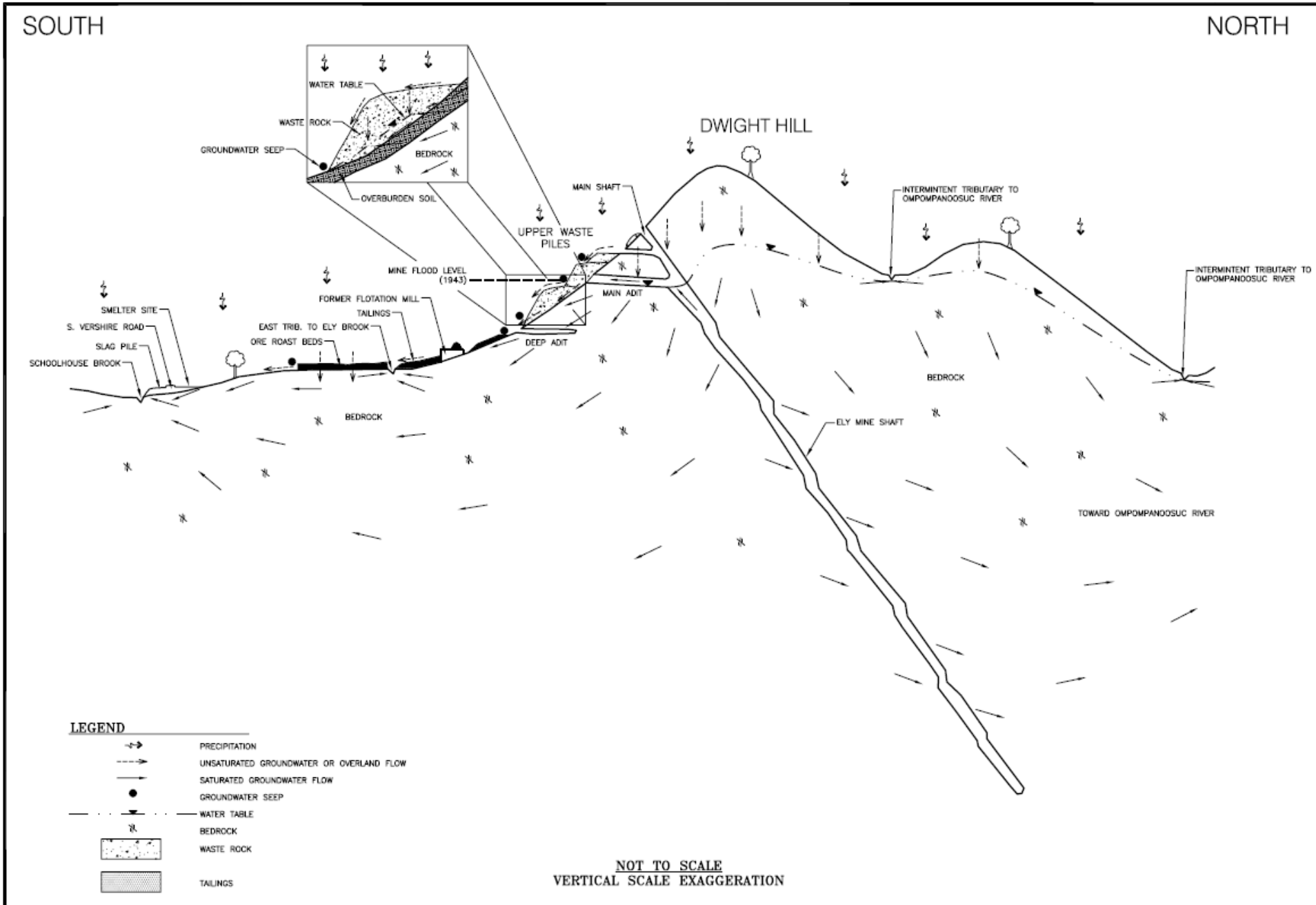
- Smelter/Slag Area
- Underground Mine Workings
- Sediment of Schoolhouse Brook
- Site Groundwater



Map showing OU1 and OU2 areas

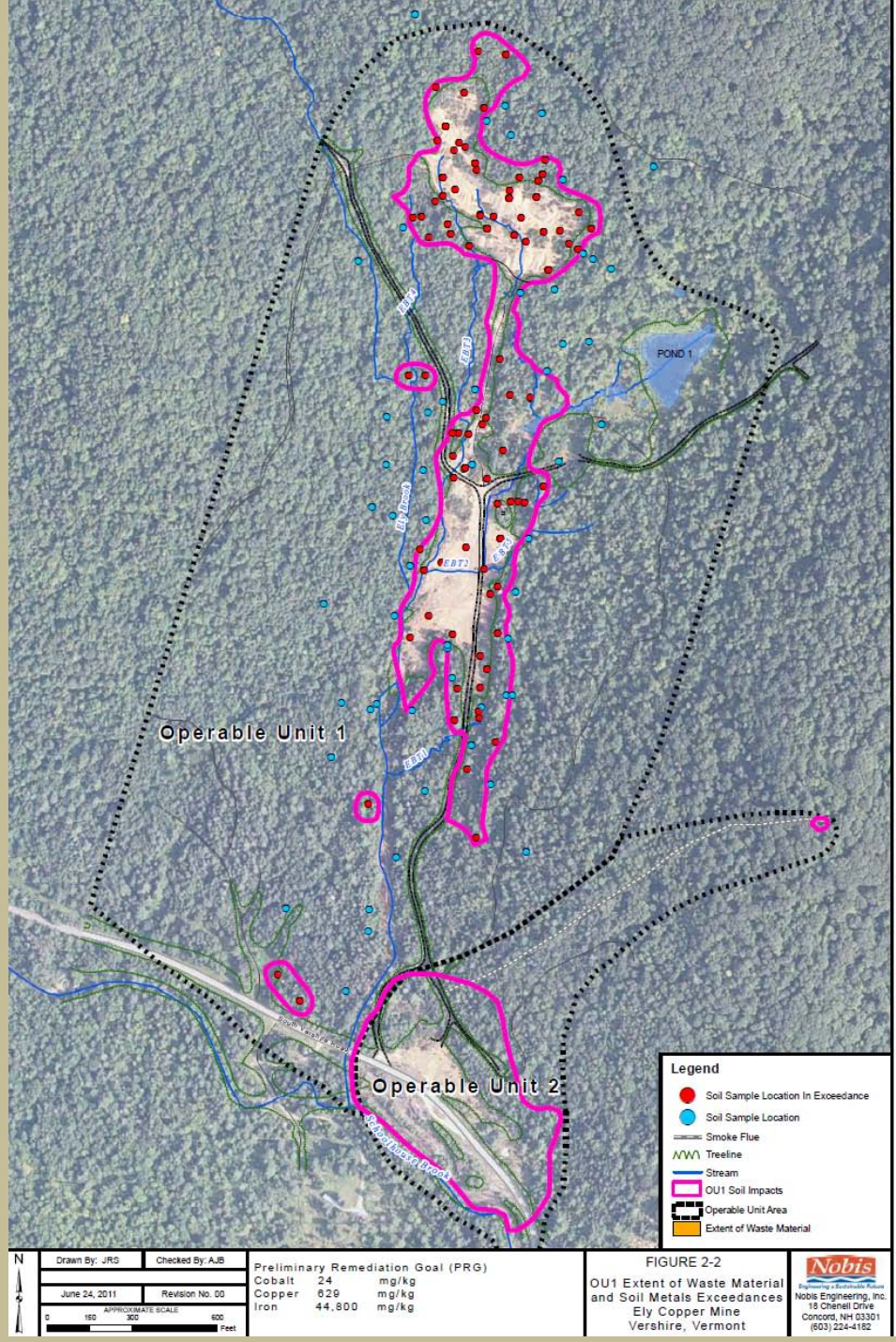


Ely Mine Underground Workings (OU2)



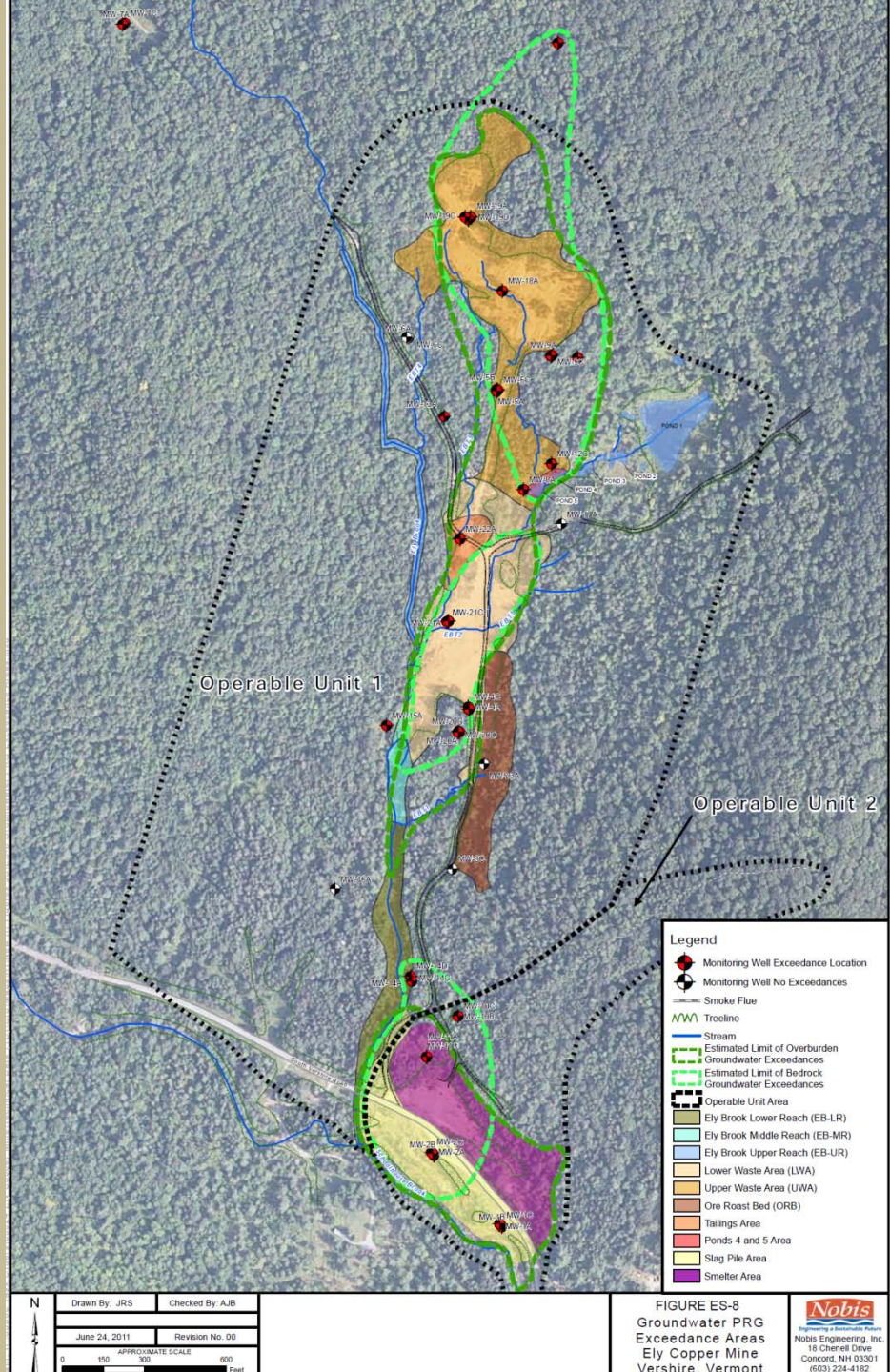
Major Findings of Human Health Risk Assessment:

- Soils with high levels of cobalt, copper and iron may be harmful to children that live on or near the Site (350 days per year exposure frequency).
- Contact with the soil, sediment, and surface water during recreational activities (ATV-riding, wading, etc.) do not represent an unacceptable risk to human health.



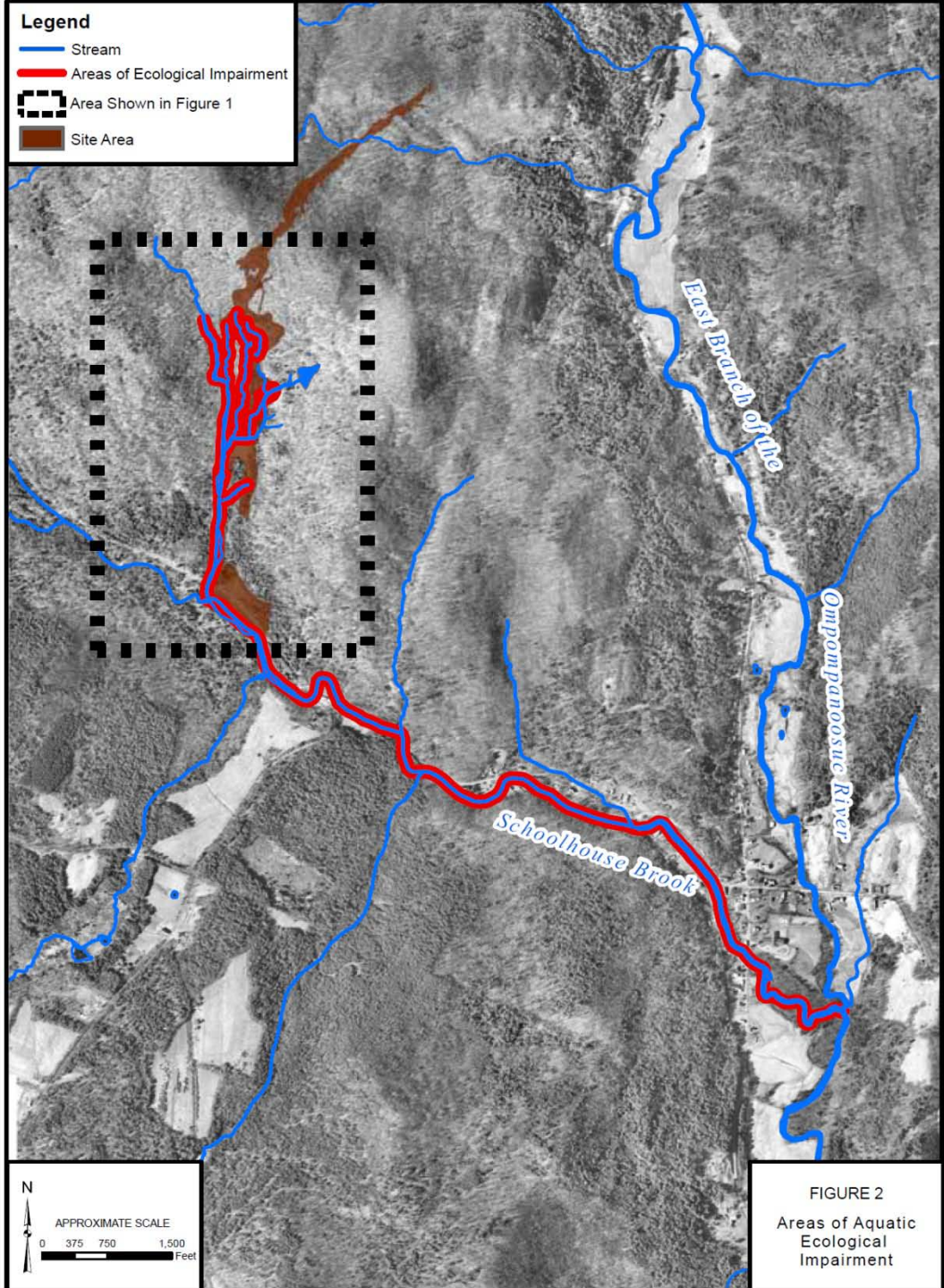
Major Findings of Human Health Risk Assessment:

- Groundwater with high levels of mine related contamination (aluminum, cadmium, cobalt, copper, iron and manganese) is not acceptable for drinking.



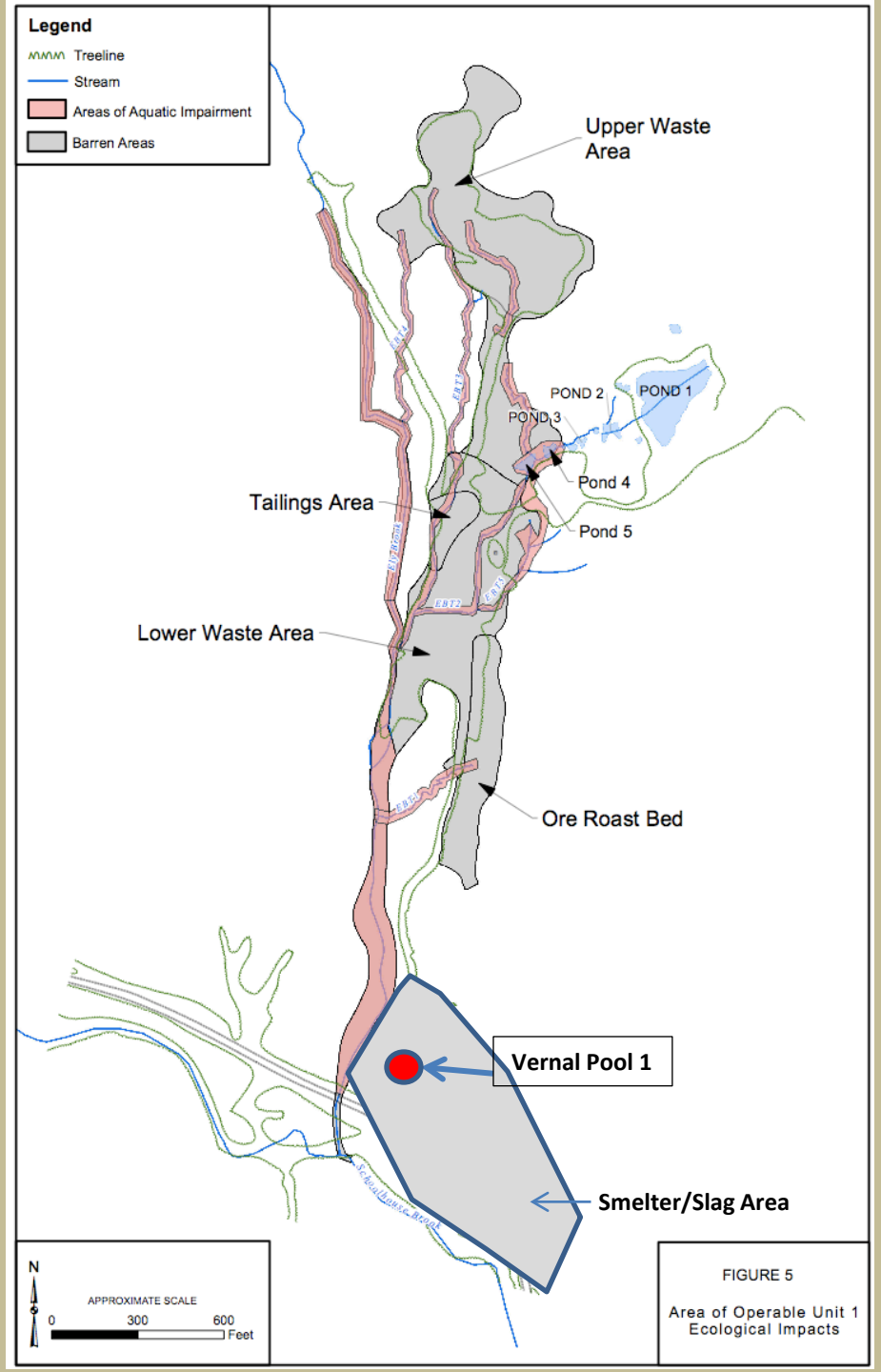
Major Findings of Ecological Risk Assessment:

- Acid rock drainage has caused a severe impact to the benthic and fish communities in Ely Brook and Schoolhouse Brook.
  - Aluminum, cadmium, copper, iron, and zinc are the major surface water COCs.
- Mine waste in the sediment of Ely Brook and Schoolhouse Brook is harmful to benthic organisms (organisms that live in or just above the sediment).
  - Copper is the only major sediment COC.
- Ecological modeling suggests that sediment could represent a threat to swallows and bats based on metal accumulation in emergent insects.
  - Copper and selenium are the predicted COCs for emergent insects.

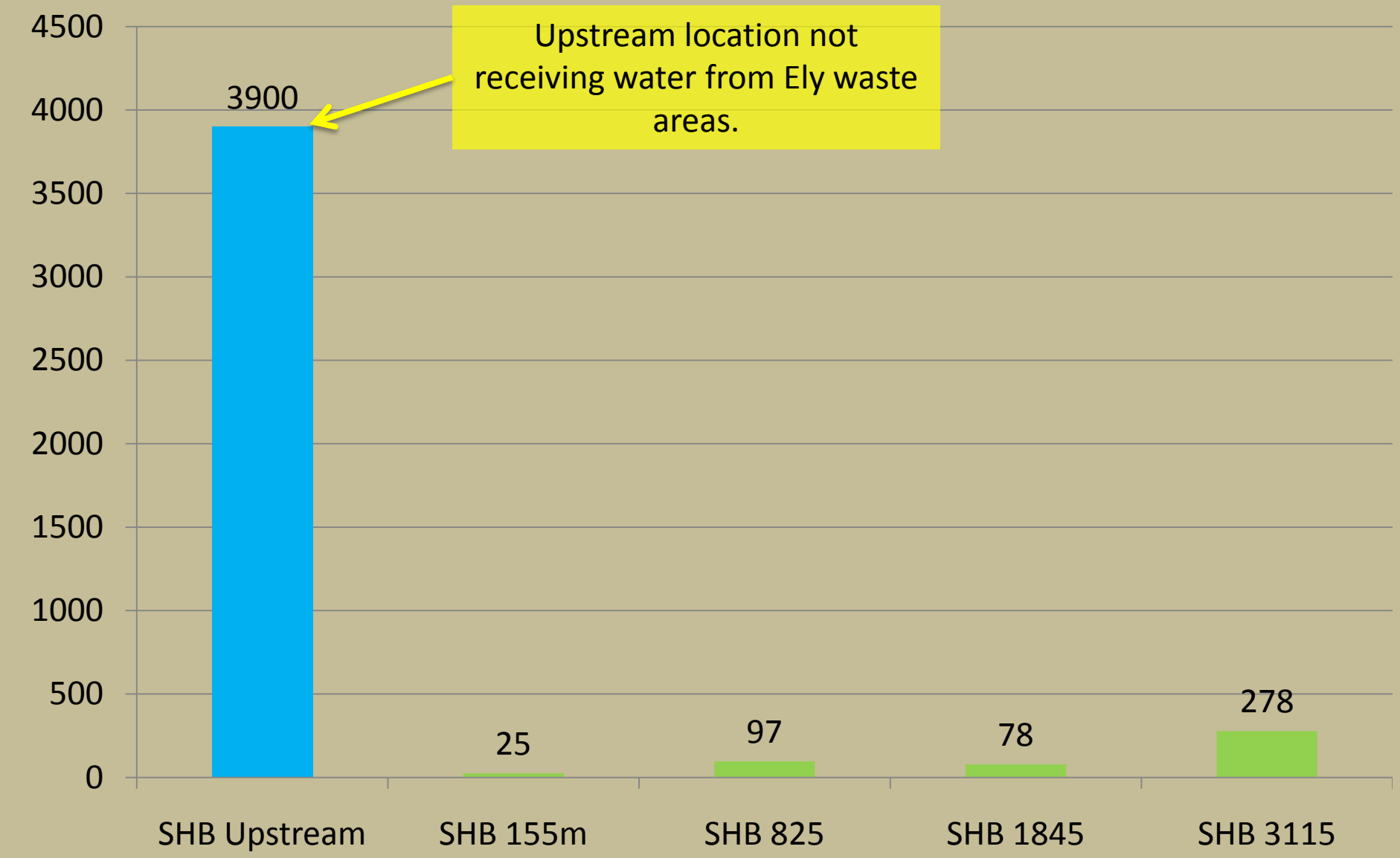


Major Findings of Ecological Risk Assessment:

- There is a severe impact to amphibians and water column invertebrates in Ponds 4 and 5.
- The water and sediment found in Vernal Pool 1 within the Smelter/Slag Area is toxic to amphibians.
  - Elevated levels of cadmium and copper.
- The barren areas of the Site are considered ecologically impaired due to the acidic conditions that prevent the growth of vegetation.



Number of Benthic Organisms per Square Meter



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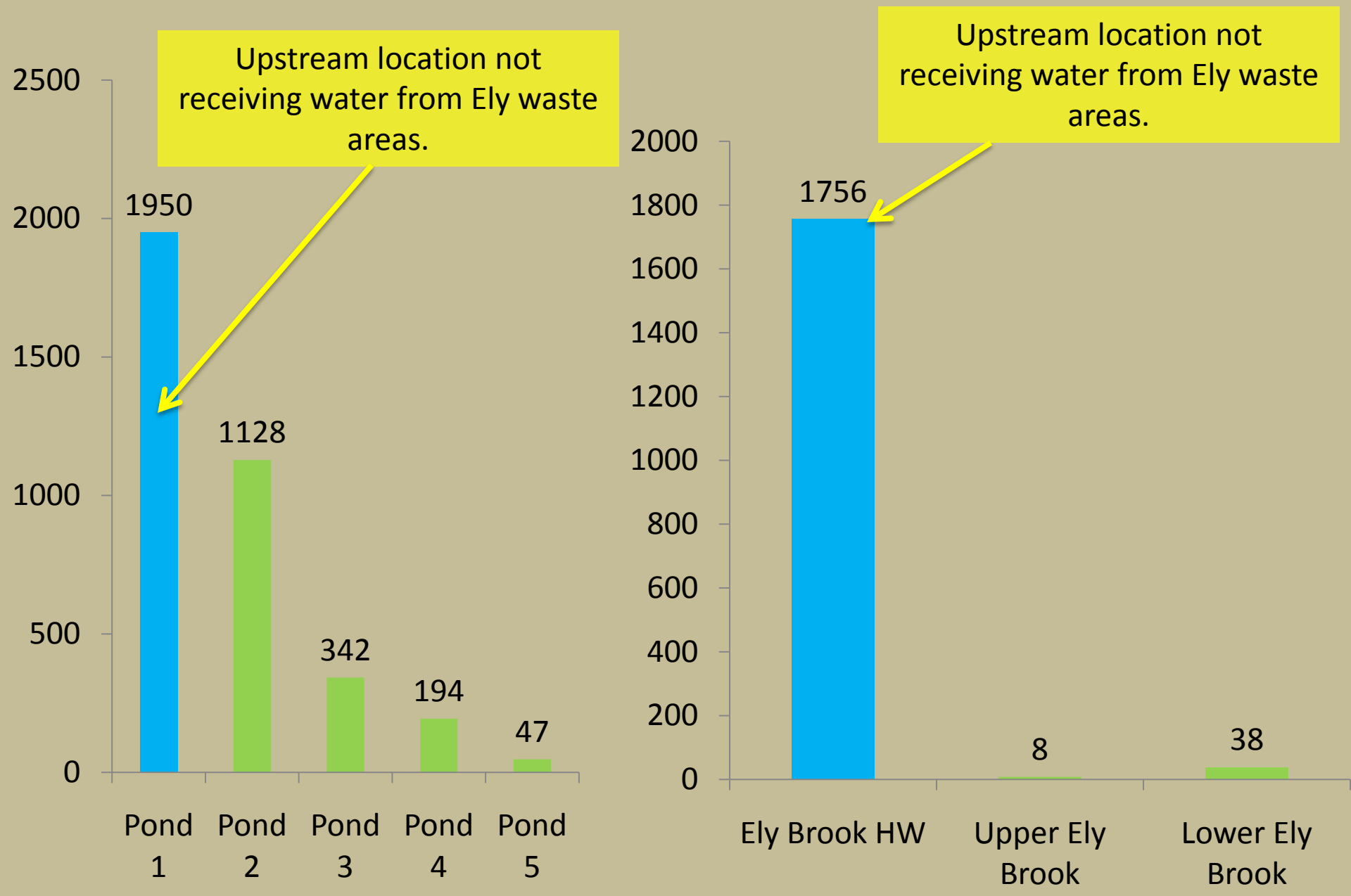
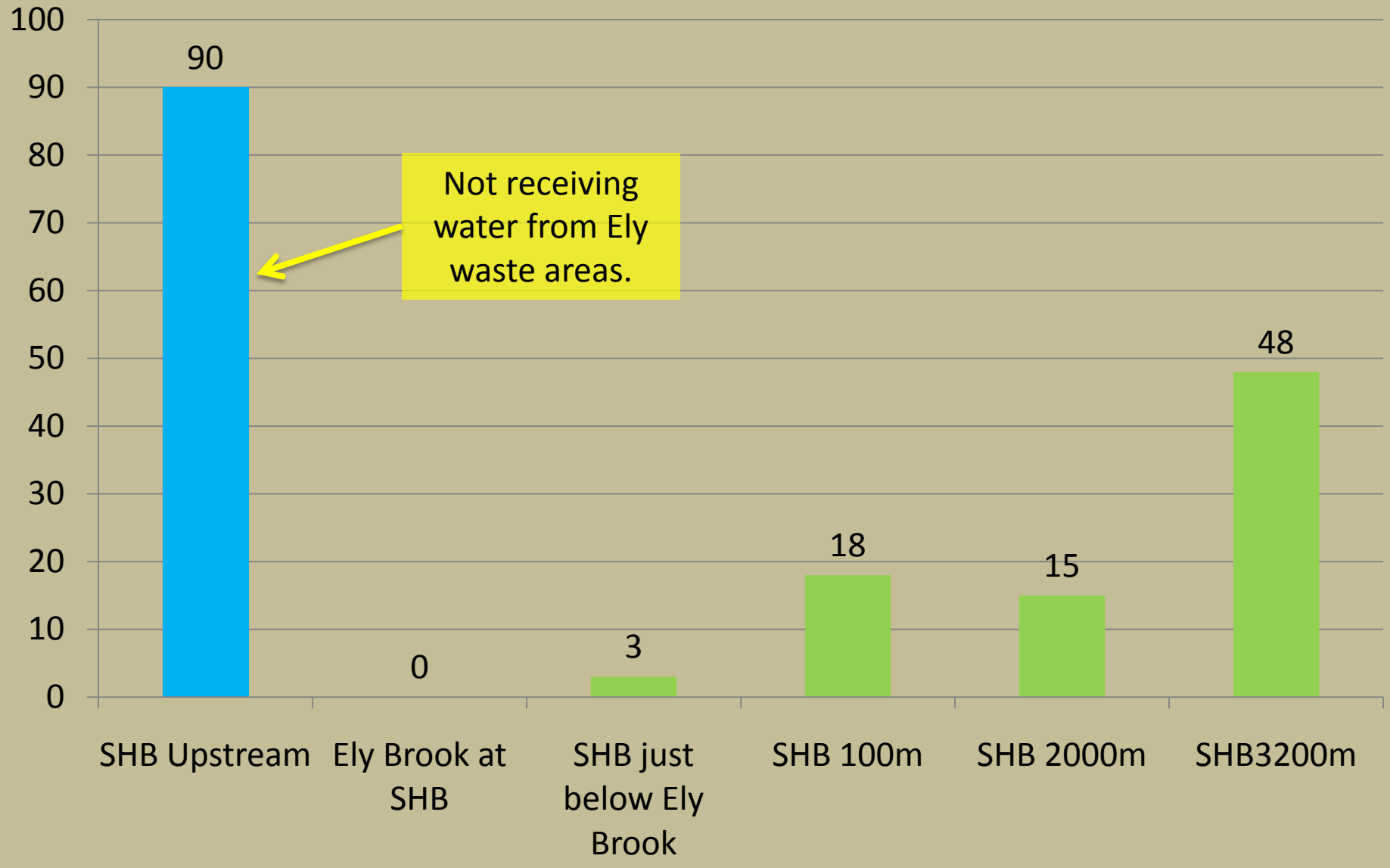
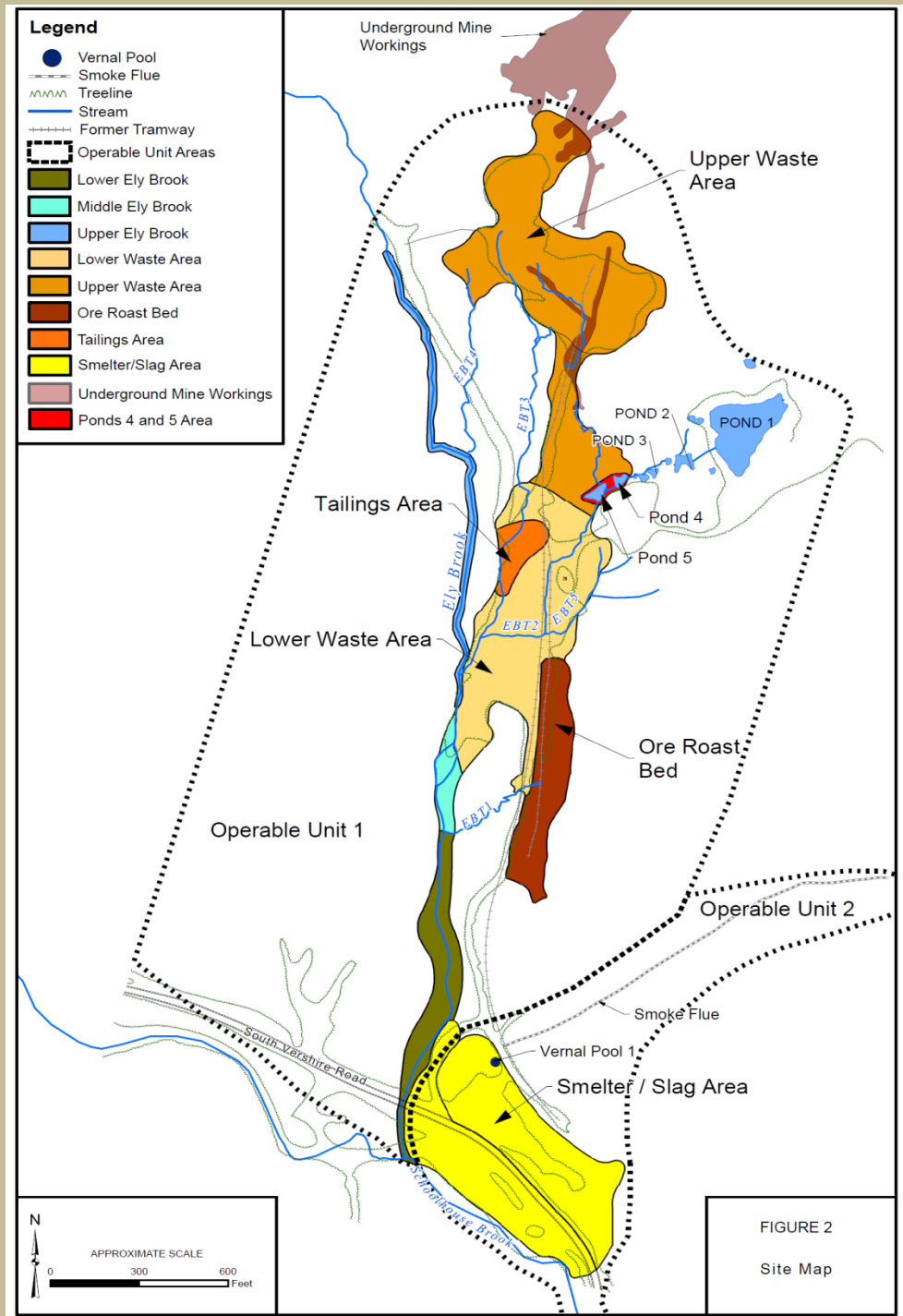


PERCENT SURVIVAL FOR FISH EXPOSED TO SURFACE WATER



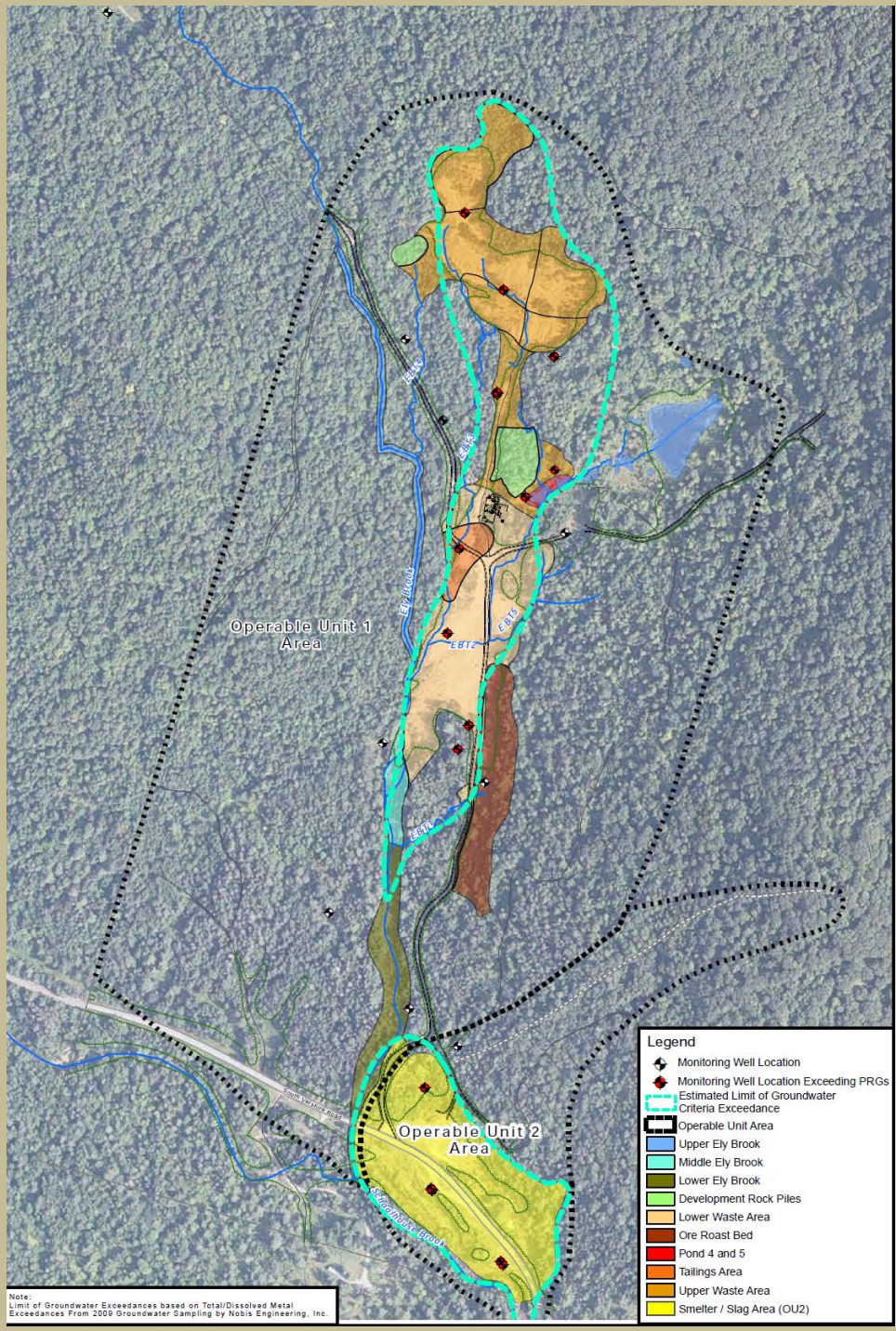
RI Findings

- Cobalt, copper, and iron are found above levels that would not be safe for residential use in all of the waste areas at the Site.
- The major sources of acid rock drainage are: Upper Waste Area, Lower Waste Area, and Tailings Area.
- Sediment in Ely Brook is toxic as a result of the deposition of mine waste.
- Smelter/Slag Area may not be significant source of surface water contamination.
- The private water supplies in the area have not been impacted by the Site contamination.



RI Findings (continued)

- Overburden and shallow bedrock groundwater is contaminated in areas beneath and adjacent to the Upper Waste Area, Lower Waste Area, Tailings Area, and Smelter/Slag Area.
- The groundwater contains levels of cadmium, cobalt, copper, iron, and manganese that would unsafe for consumption.
- Deep bedrock groundwater contamination is quite limited due to the upward flow of groundwater.
- Groundwater contamination associated with underground workings requires further investigation (OU2)

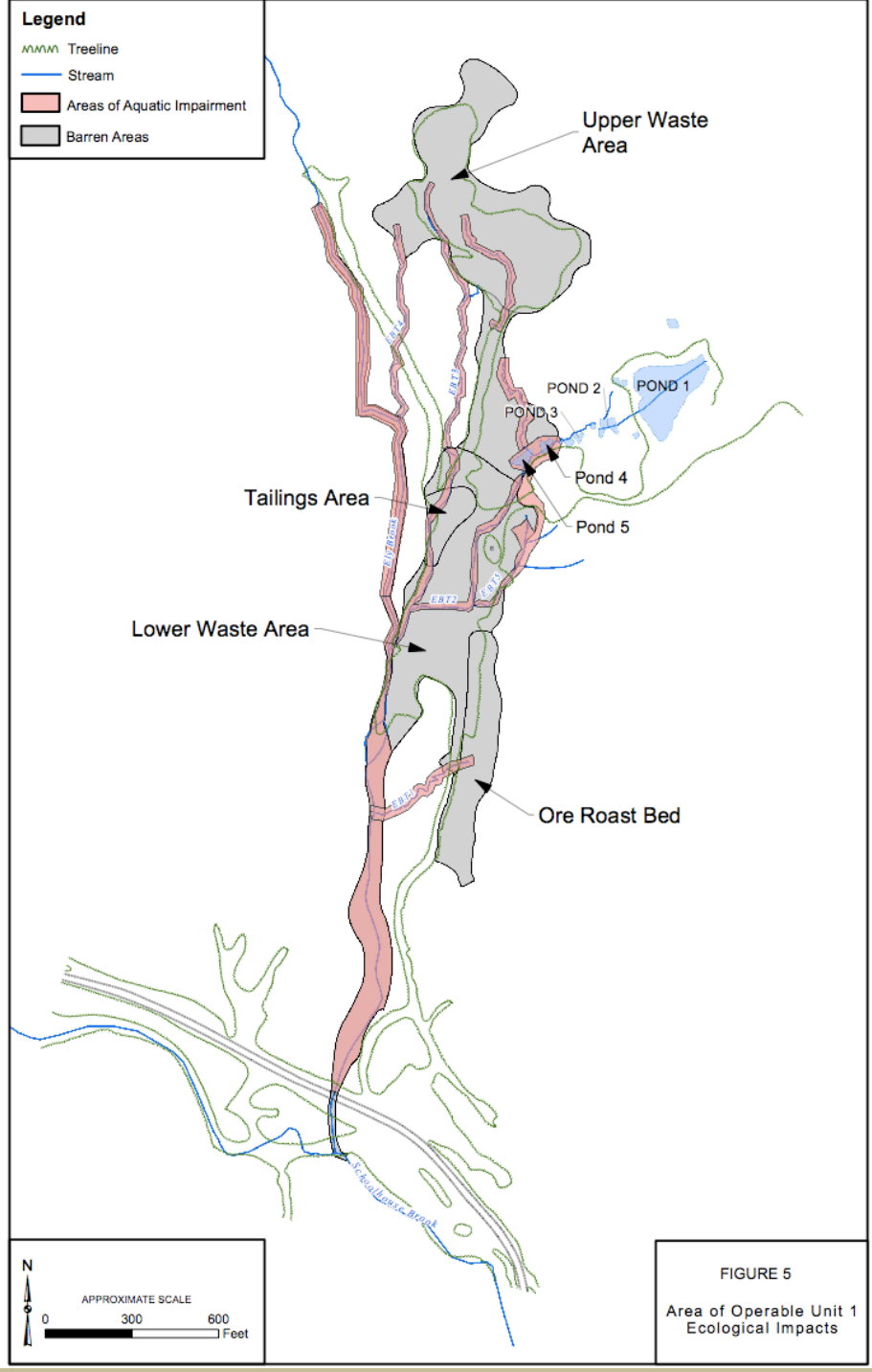


Feasibility Study

EPA developed a Feasibility Study to identify cleanup options for OU1.

The objectives of the OU1 cleanup are:

- Prevent formation of acid rock drainage to allow for the restoration of the surface water in Ely Brook and Ponds 4 and 5 to State of Vermont and Federal water quality standards.
- Prevent individuals (especially children) from coming into contact with soil/waste with levels of cobalt, copper, and iron above levels safe for residential use.
- Prevent aquatic organisms from coming into contact with sediment containing copper above safe levels for ecological receptors.
- Restore barren areas of site to promote healthy plant and invertebrate communities.

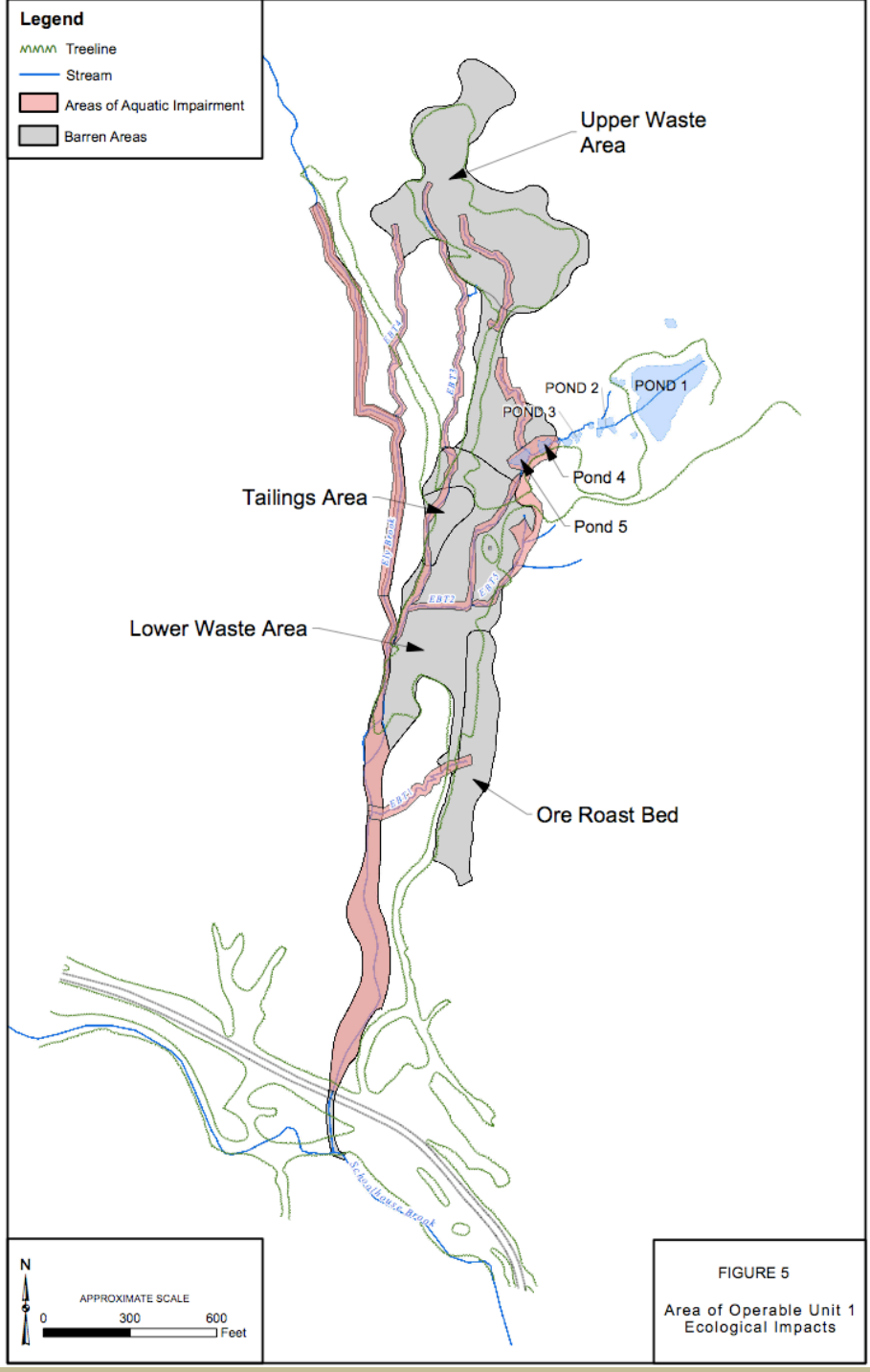


Feasibility Study

The safe levels of soil for individuals and sediment for ecological receptors are listed below.

Soil (mg/kg)	Human Health Cleanup Level
Cobalt	24
Copper	629
Iron	44,800

Sediment (mg/kg)	Ecological Cleanup Level
Copper	149



Feasibility Study

Areas included in OU1 Cleanup:

Upper Waste Area

- 8.5 acres
- 73,000 cubic yards

Tailings Area

- 0.7 acres
- 4,000 cubic yards

Lower Waste Area

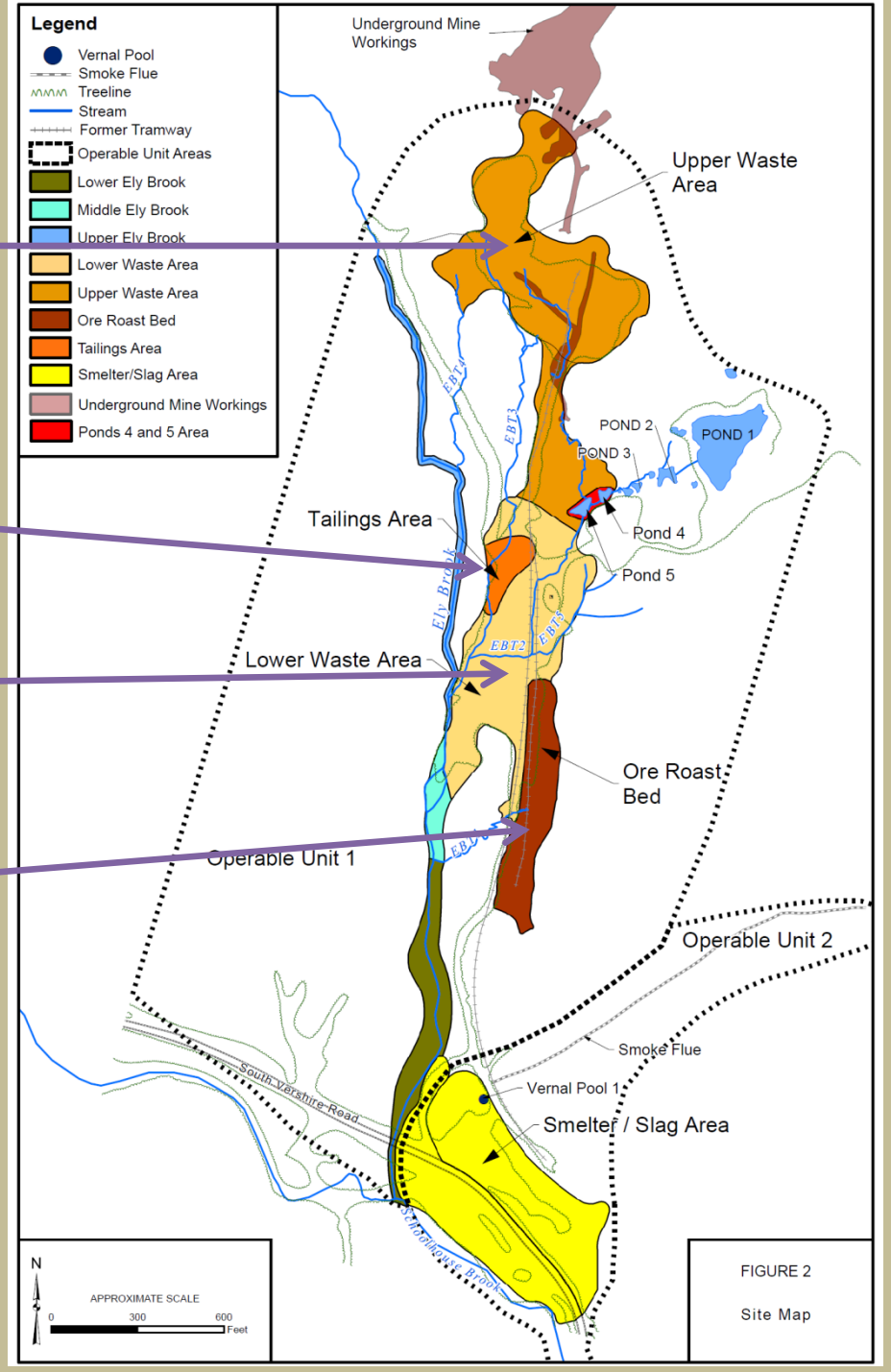
- 6.4 acres
- 29,000 cubic yards

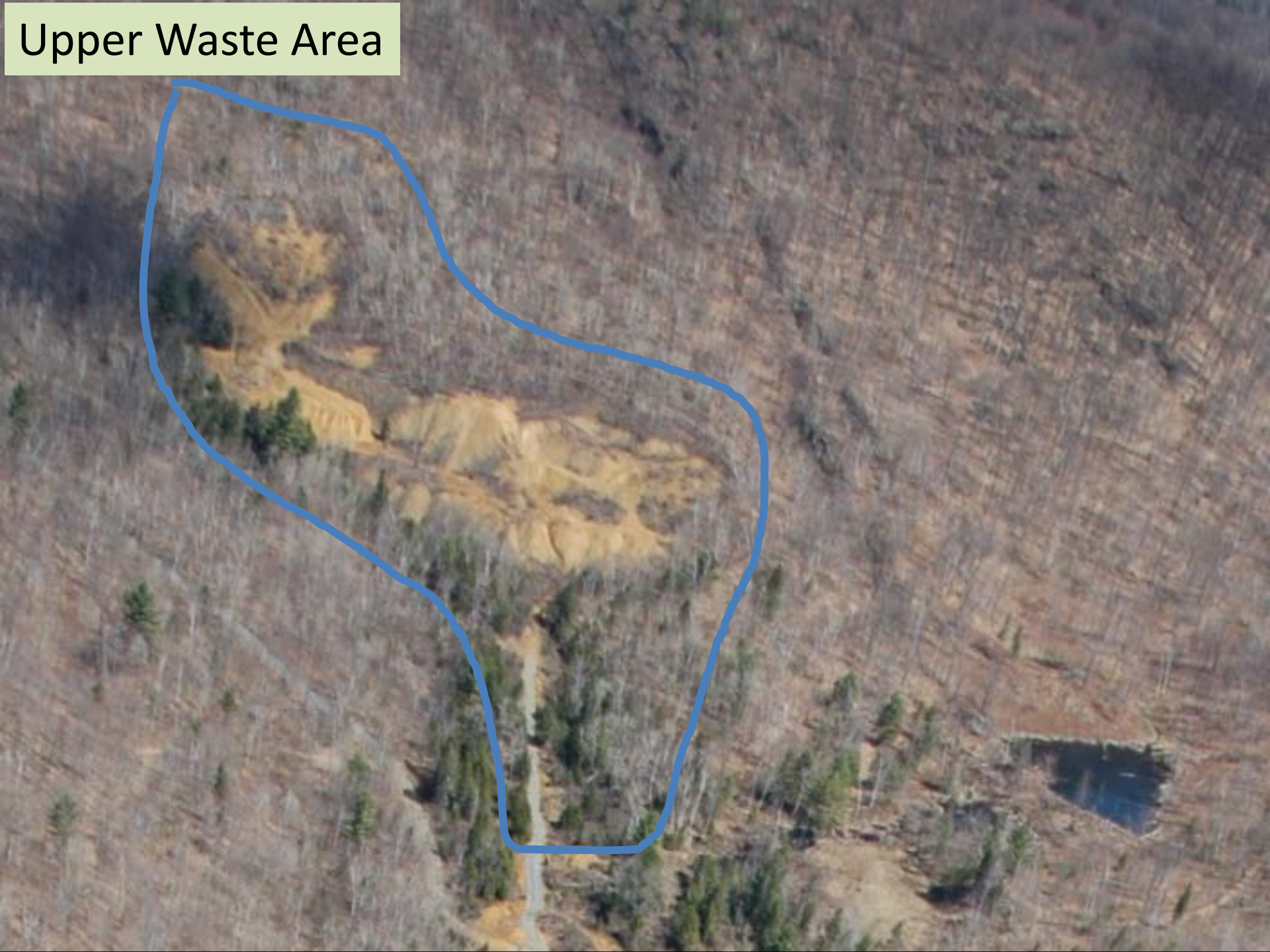
Ore Roast Bed

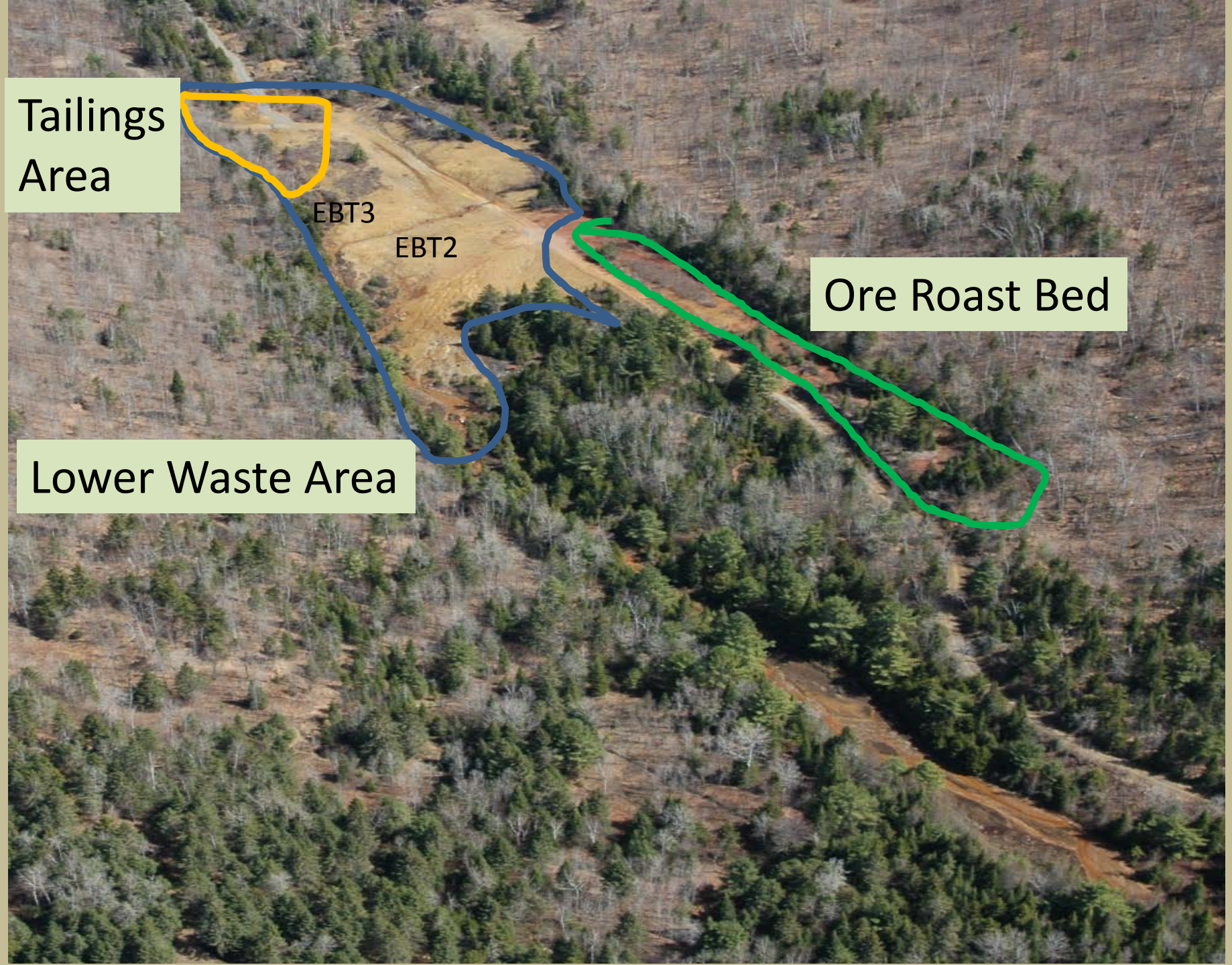
- 2 acres
- 10,000 cubic yards

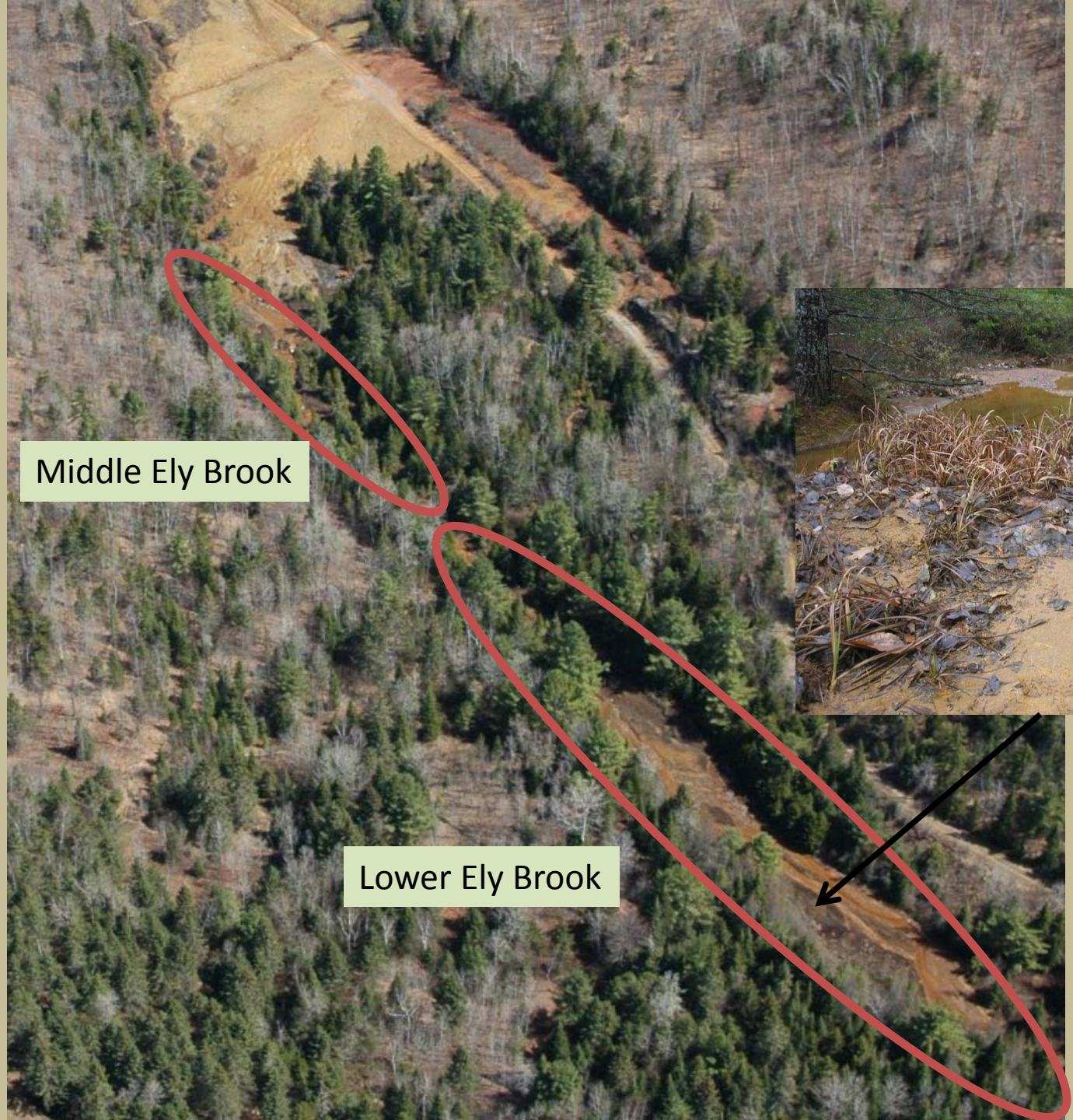
Sediment of Ely Brook and Ponds 4 and 5

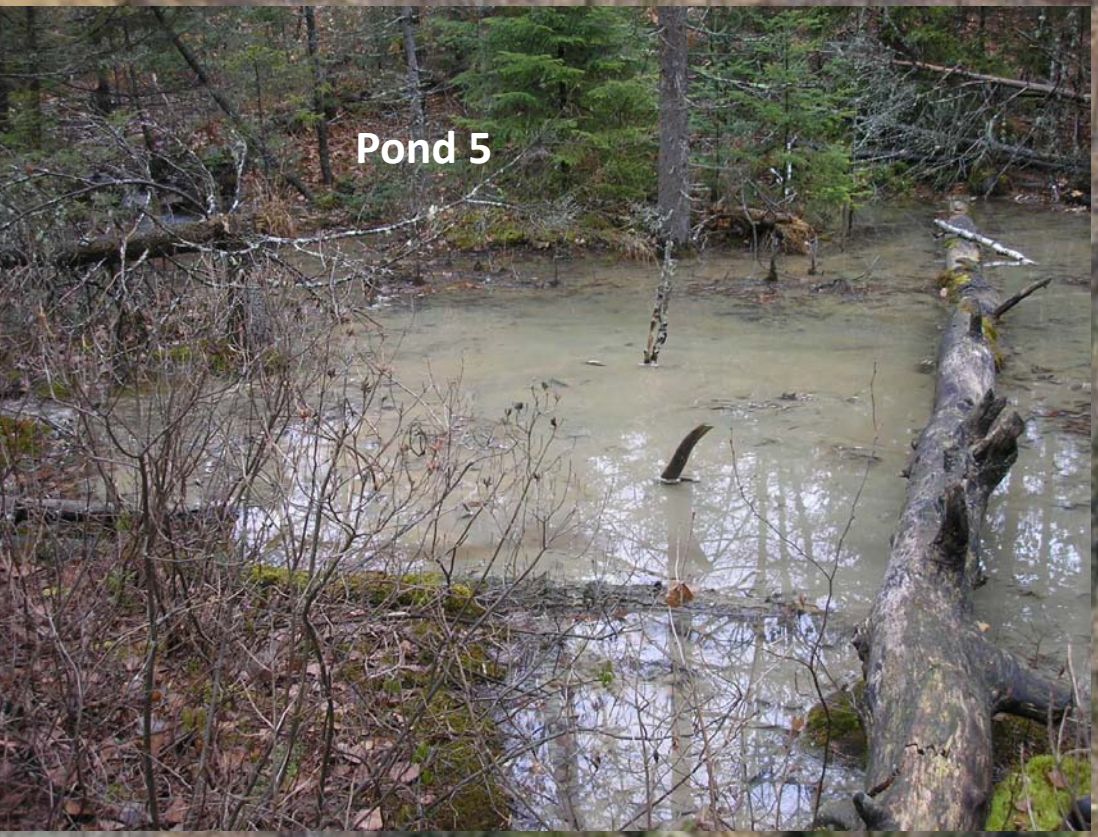
- About 6,000 linear feet
- 5,000 cubic yards




Upper Waste Area


Tailings Area
EBT3
EBT2
Ore Roast Bed
Lower Waste Area


Middle Ely Brook
Lower Ely Brook



Pond 1

Pond 2

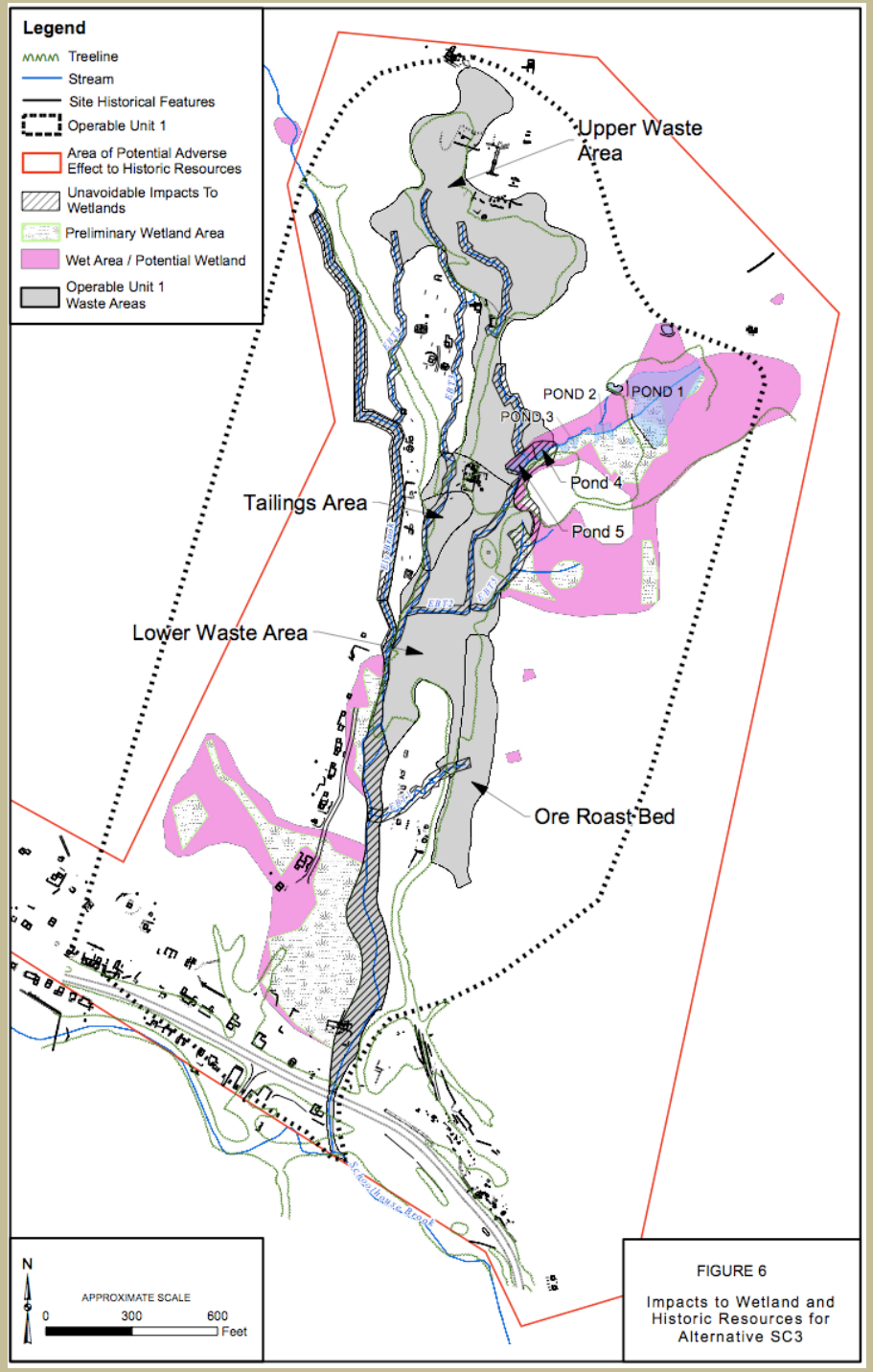
Pond 3

Pond 4

Pond 5

Feasibility Study

- Factors to consider when evaluating cleanup options for the Site:
  - Large volume of waste material at the Site make most treatment options impractical.
  - Shallow groundwater within the Upper Waste Area, Tailings Area, and Lower Waste Area may not allow a successful cleanup if waste material is left in place.
  - The waste within the Lower Waste Area is partially saturated due to very shallow groundwater.
  - Impacts to clean wetland areas must be minimized and contaminated wetland areas should be restored after cleanup to a functional habitat.
  - Adverse effects to historic resources should be minimized.
  - Bats area a critical species to consider in cleanup plans.

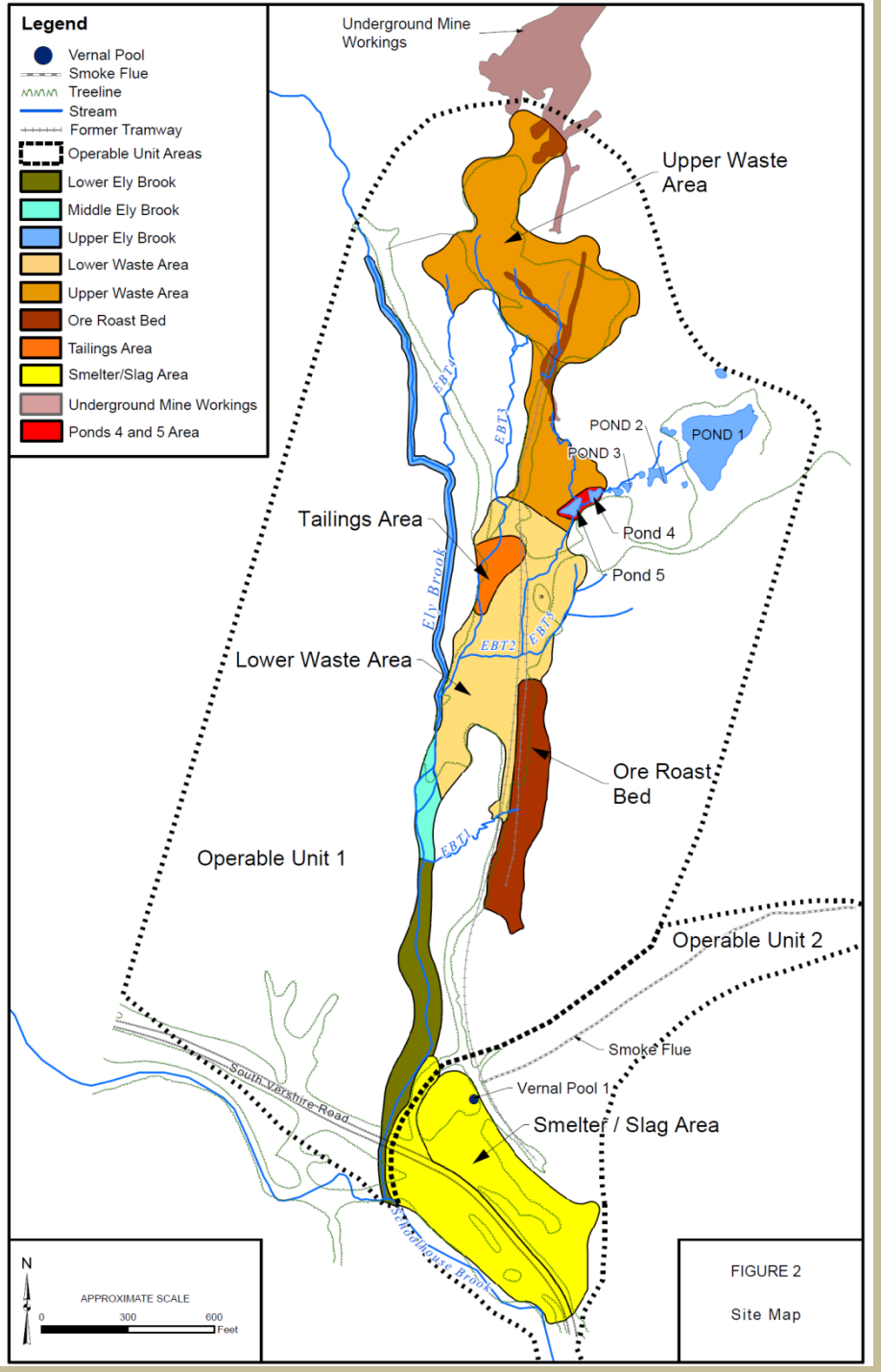


What can be done to prevent acid rock drainage and protect the public and environment from contamination?

- Isolate the waste material from water and oxygen.
- Create a barrier to human contact and erosion.

Common ways to accomplish this:

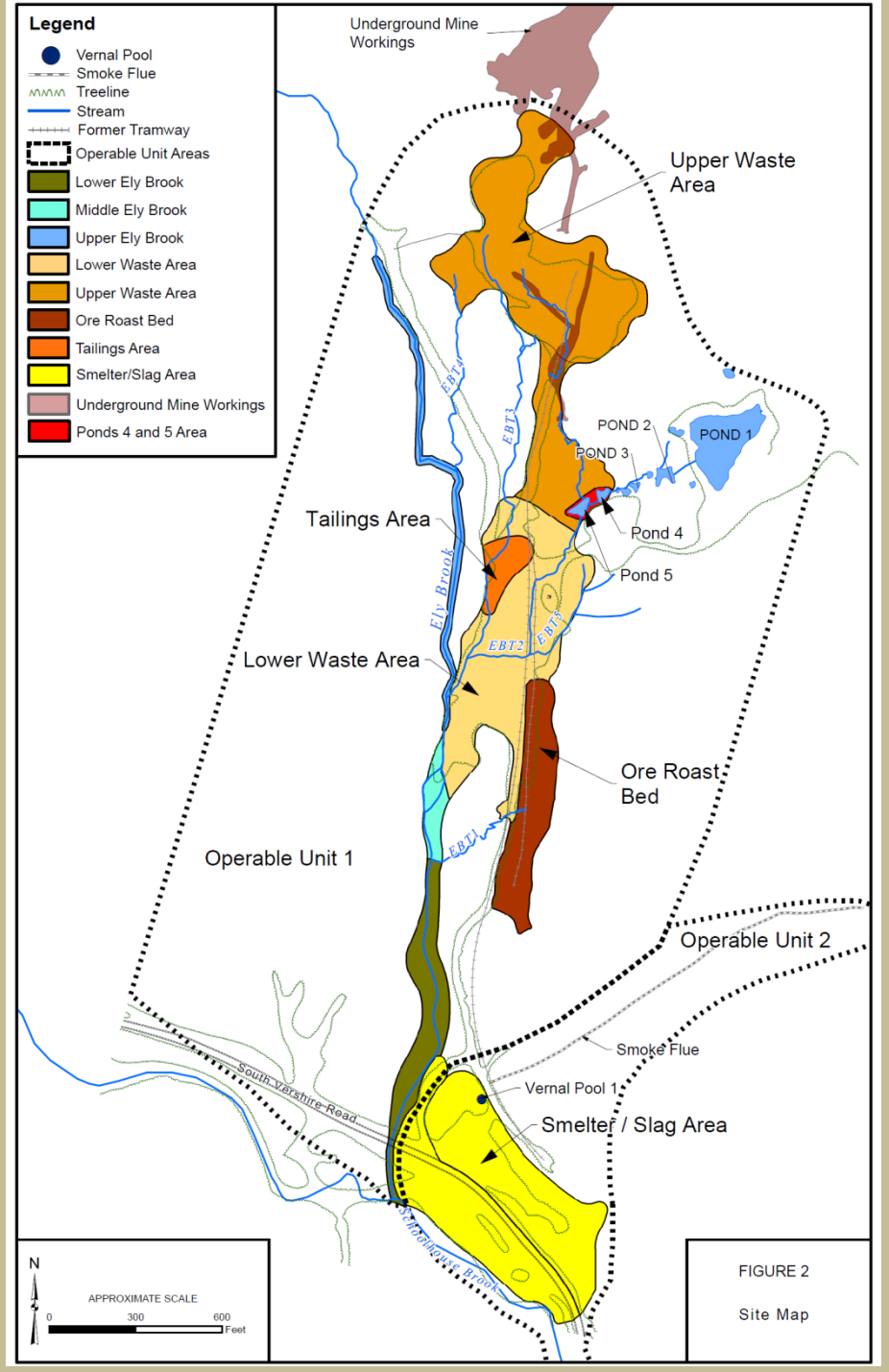
- Remove the material and place in secure disposal facility.
- Cover the material to prevent contact and erosion.
- Install infiltration barrier cover system to prevent contact with water and oxygen.



Feasibility Study

Limited number of alternatives retained after screening (similar to a landfill):

- SC1: No Action
- SC2: Waste containment in the Lower Waste Area Cell and Ore Roast Bed
- SC3: Waste containment in the West Cell and in the Ore Roast Bed
- SC4: Off-site disposal and waste containment in the Ore Roast Bed



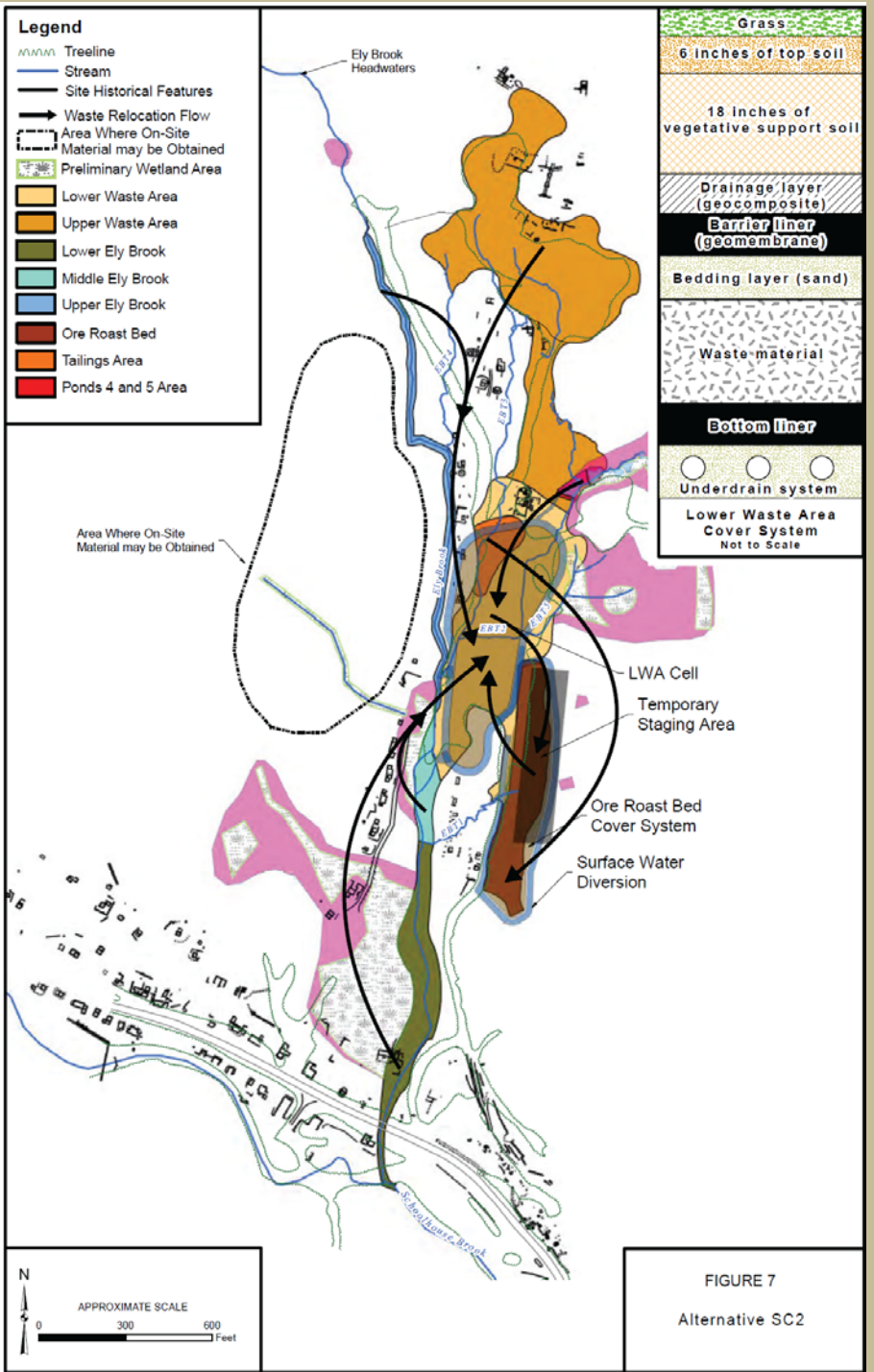


FIGURE 7

Alternative SC2

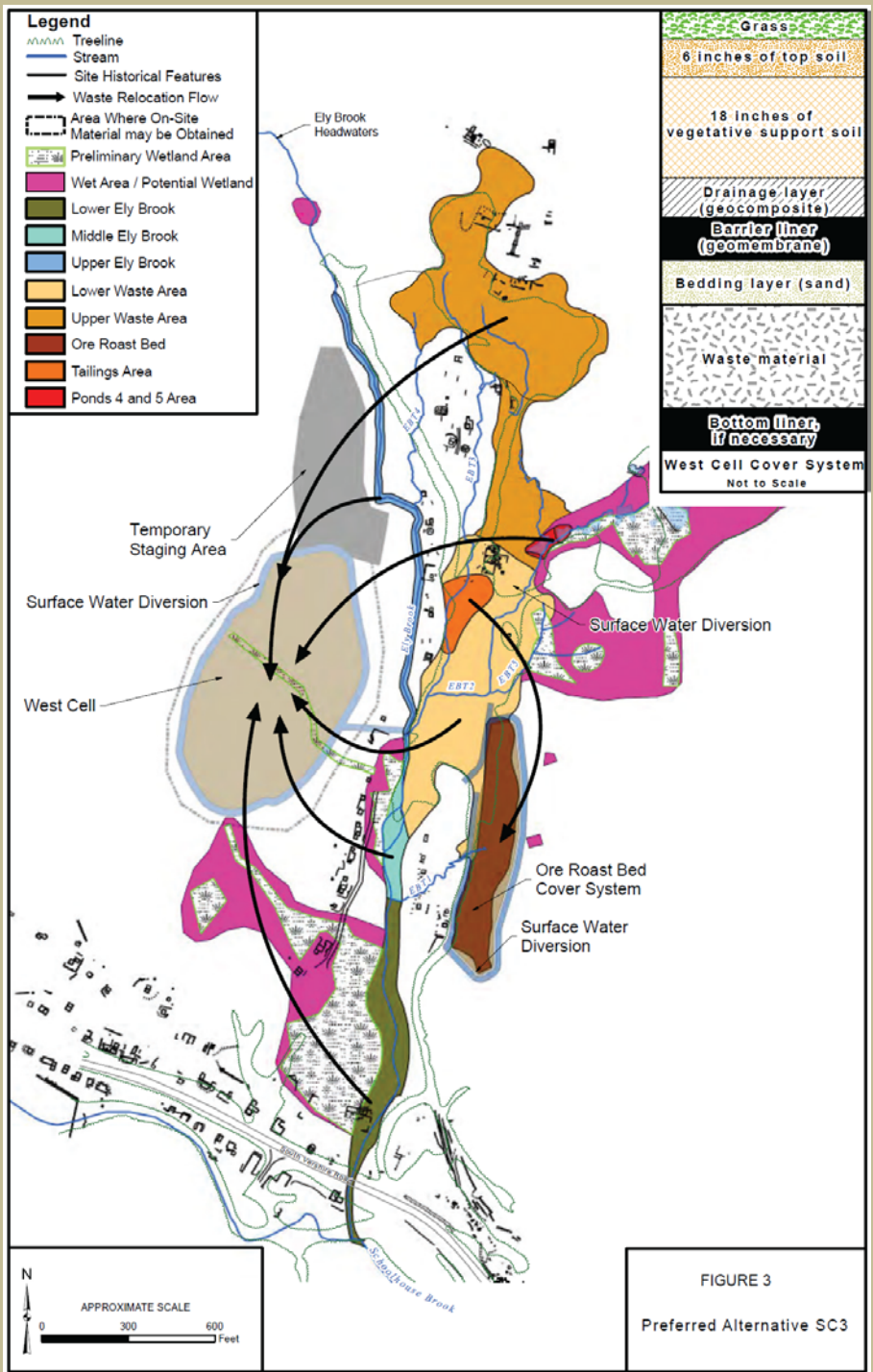


FIGURE 3

Preferred Alternative SC3

West Cell – SC3

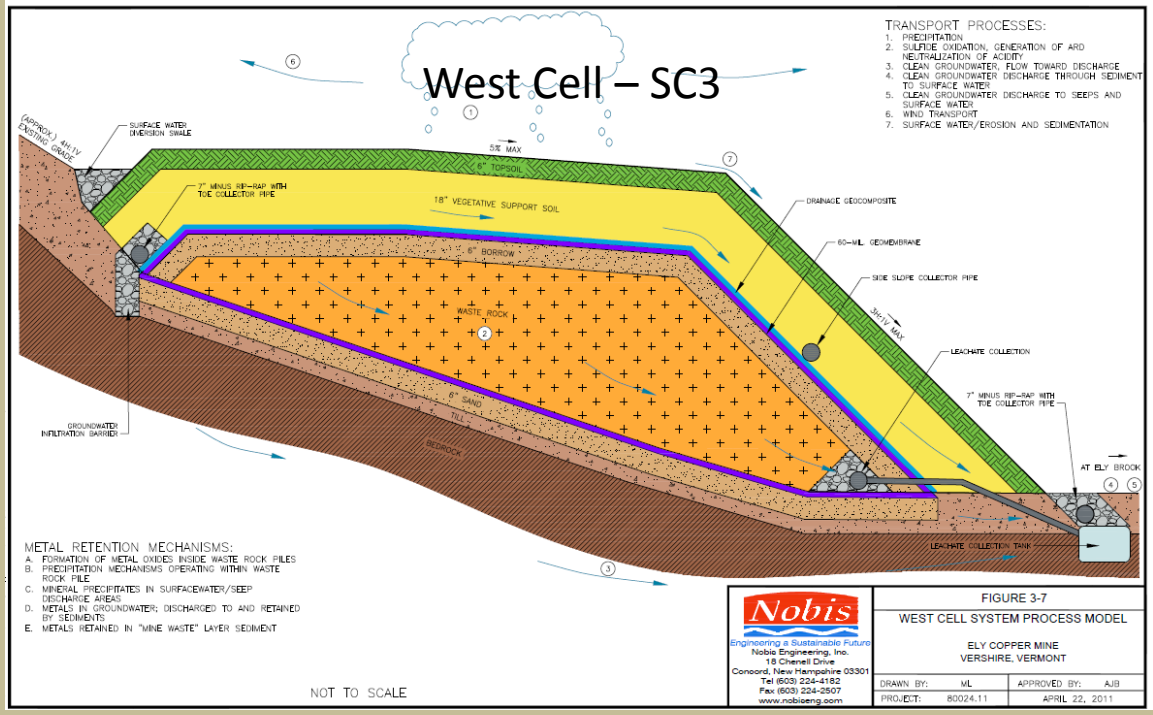


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FIGURE 3-7
WEST CELL SYSTEM PROCESS MODEL
ELY COPPER MINE
VERSHIRE, VERMONT

DRAWN BY:	ML	APPROVED BY:	AJB
PROJECT:	80024.11		APRIL 22, 2011

Lower Waste Area Cell – SC2

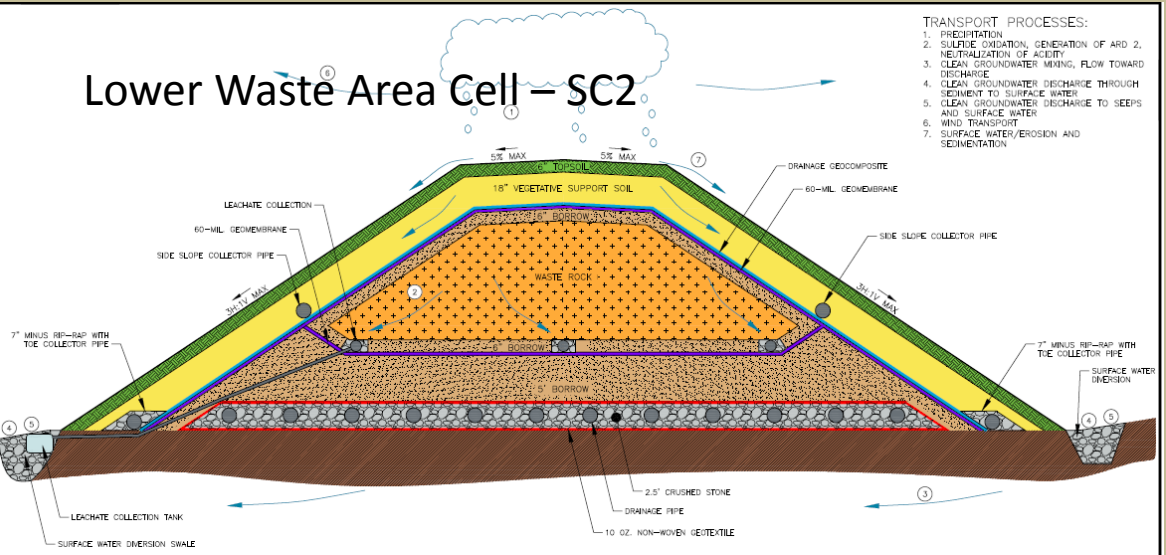

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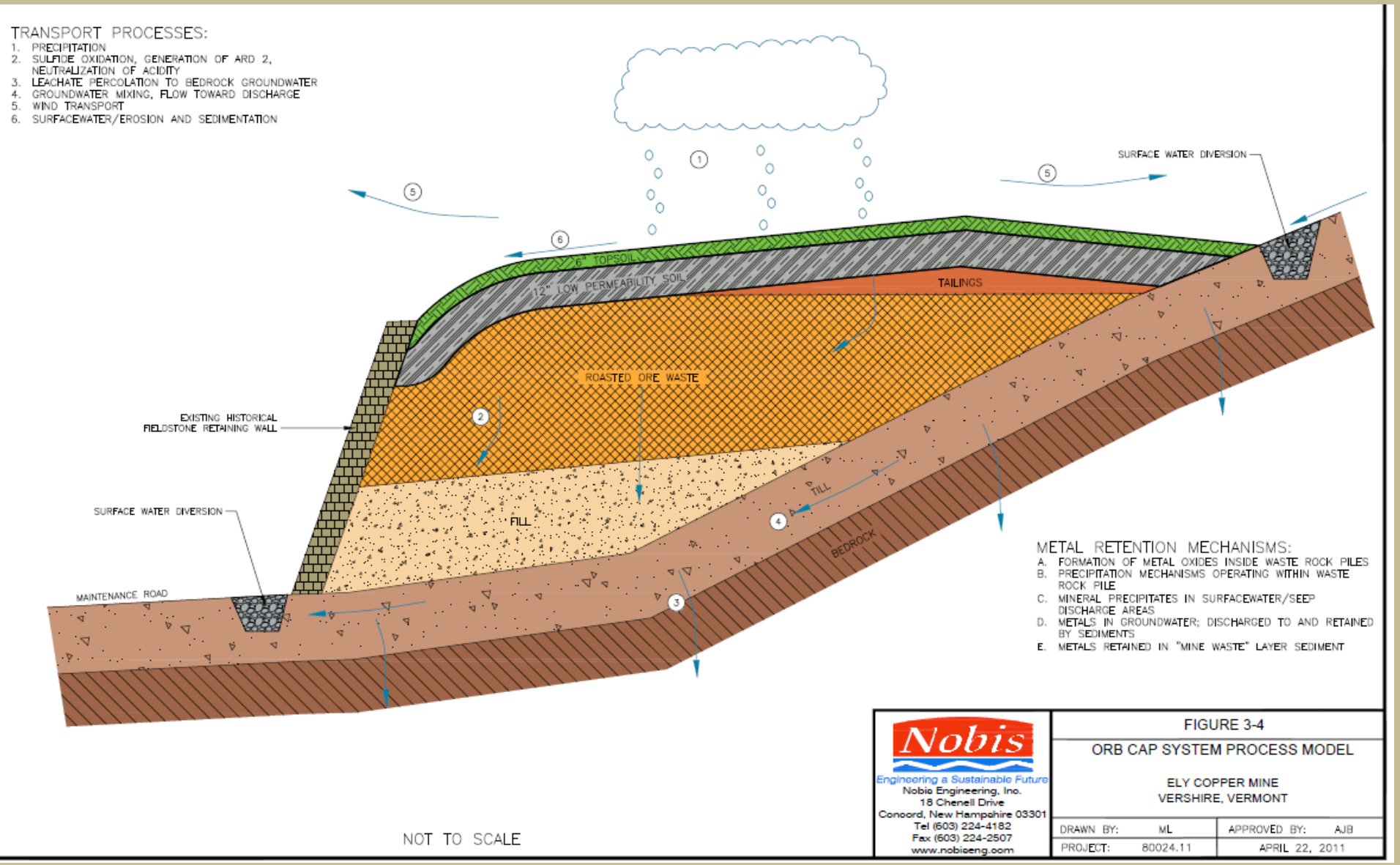
FIGURE 3-2
LWA CELL SYSTEM PROCESS MODEL
ELY COPPER MINE
VERSHIRE, VERMONT

DRAWN BY:	ML	APPROVED BY:	AB
PROJECT:	80024.11		APRIL 22, 2011

Ore Roast Bed Cell



THE NINE CRITERIA FOR CHOOSING A CLEANUP

As required by federal regulations, EPA uses nine criteria to compare alternatives and select a final cleanup plan. EPA has already evaluated how well each of the cleanup alternatives developed for the Ely Copper Mine Superfund site meets the first seven criteria (see table on Page 9). Once comments from the state and the community are received (the seventh and eighth criterion), EPA will select the cleanup plan.

1. Overall protection of human health and the environment: Will it protect you and the plant and animal life on and near the Site? EPA will not choose a plan that does not meet this basic criterion.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): Does the alternative meet all required federal and state environmental statutes, regulations and requirements? The chosen cleanup plan must meet this criterion.

3. Long-term effectiveness and permanence: Will the effects of the cleanup plan last or could contamination cause future risk?

4. Reduction of toxicity, mobility or volume through treatment: Using treatment, does the alternative reduce the harmful effects of the contaminants, the spread of contaminants, and the amount of contaminated material?

5. Short-term effectiveness: How soon will site risks be adequately reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?

6. Implementability: Is the alternative technically feasible? Are the right goods and services (i.e. treatment machinery, space at an approved disposal facility) available for the plan?

7. Cost: What is the total cost of an alternative over time? EPA must find a plan that gives necessary protection for a reasonable cost.

8. State acceptance: Does the State (in Vermont represented by the Department of Environmental Conservation (VT DEC)) agree with EPA's proposal?

9. Community acceptance: What objections, suggestions or modifications do the public offer during the comment period?

Comparison of Alternatives

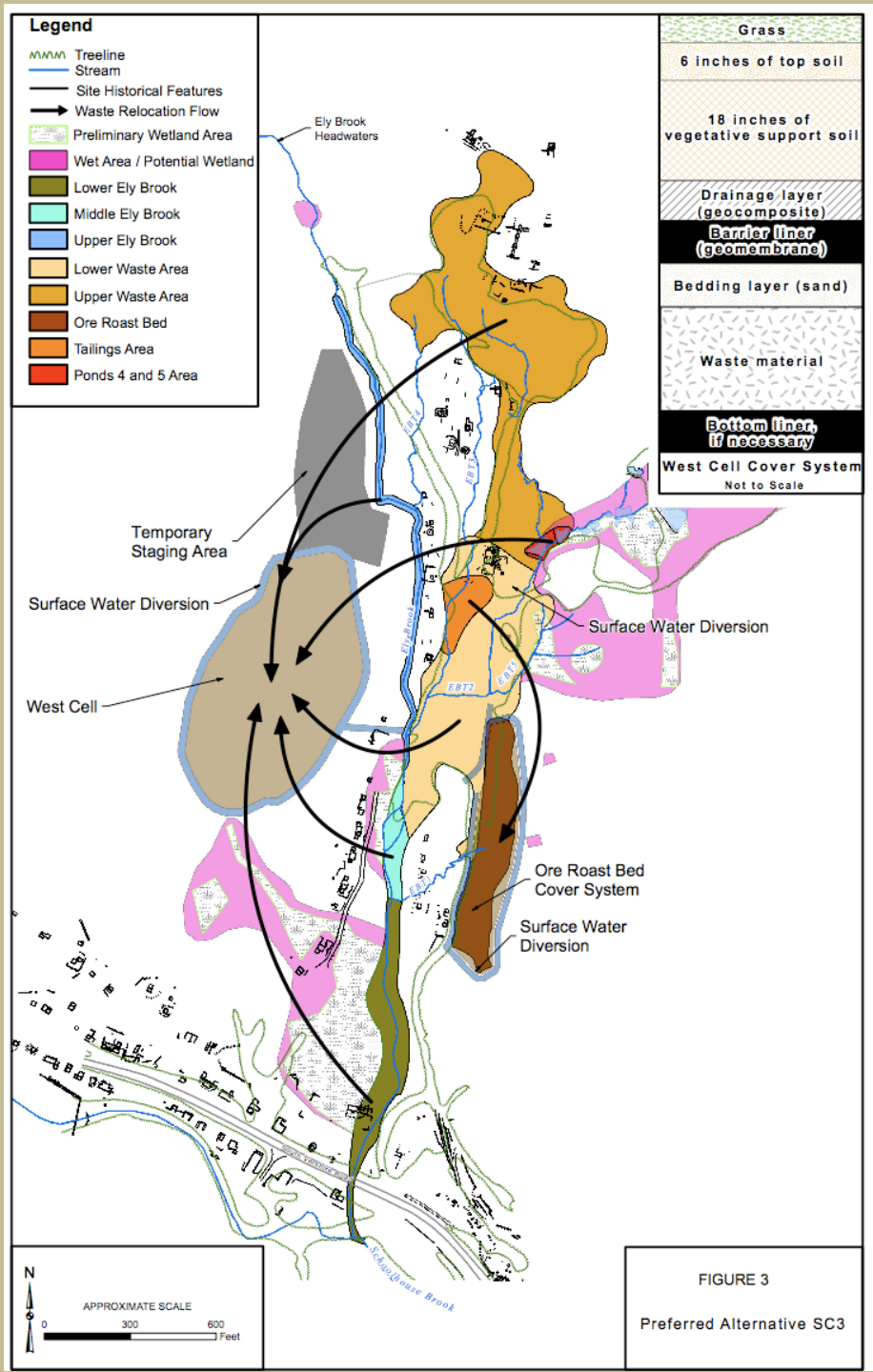
Nine Criteria	SC1	SC2	~SC3	SC4
	No Action	Waste Containment in the Lower Waste Area Cell and Ore Roast Bed	**Waste Containment in the West Cell and Ore Roast Bed**	Off-site Disposal and Waste Containment in he Ore Roast Bed
Protects Human Health & Environment	N	Y	Y	Y
Meets Federal & State Requirements	N	Y	Y	Y
Provides Long-Term Protection	N	Y	Y	Y
Reduces Mobility, Toxicity & Volume through Treatment	N	°	°	°
Provides Short-Term Protection	N	Y	Y	Y
Implementable	Y	Y	Y	Y
Cost (Millions of Dollars)[1]	0.113	19	18	30
State Agency Acceptance	To be determined after the public comment period			
Community Acceptance	To be determined after the public comment period			

[1] Based on 30 years of costs.

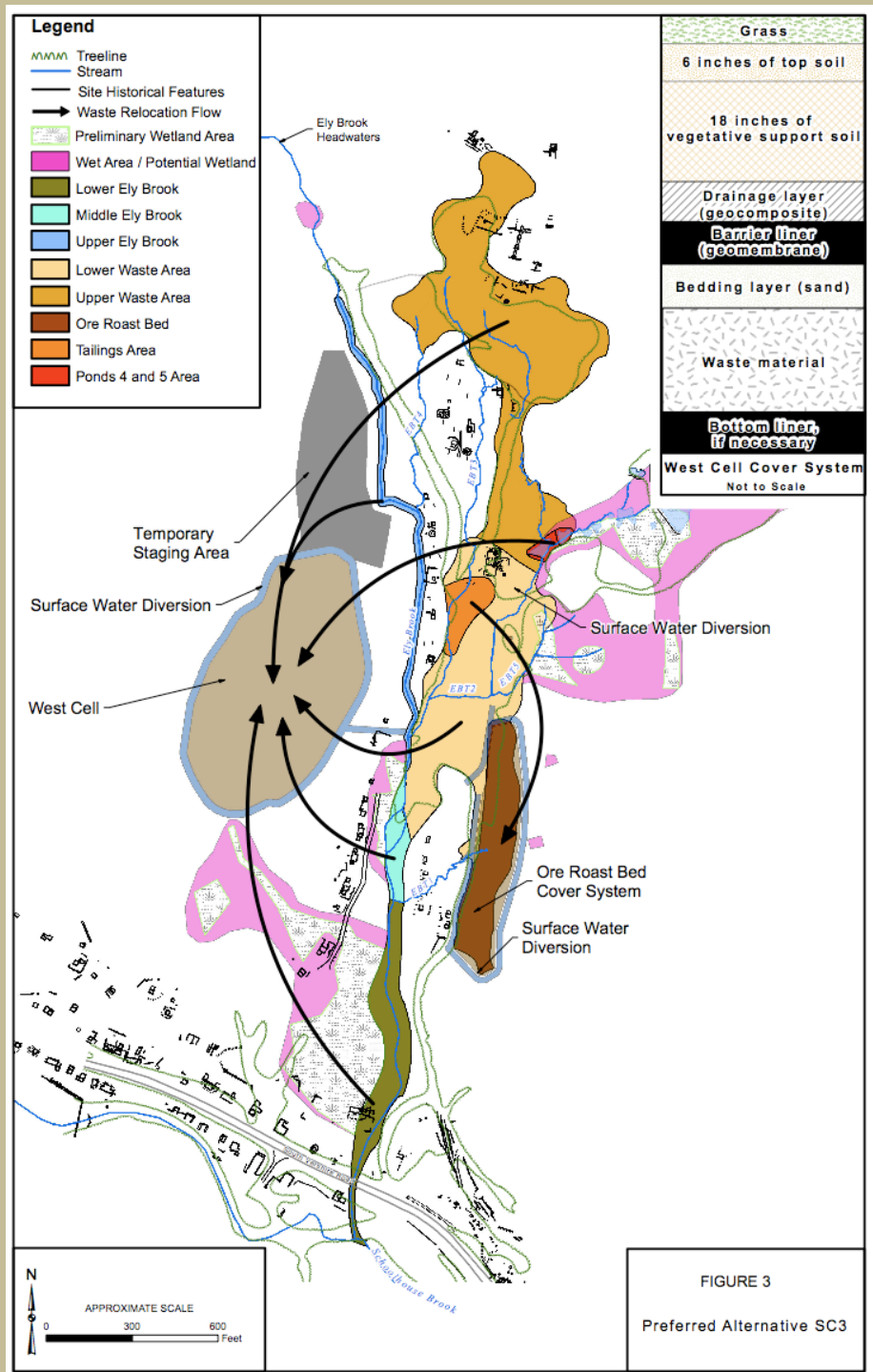
~ EPA's preferred option and the least environmentally damagin practicable alternative
° Partially meets criterion
Y Meets or exceeds criterion
N Does NOT meet criterion

The EPA proposed cleanup alternative for Operable Unit 1 (OU1) of the Ely Copper Mine Superfund Site includes:

- Excavation of about 107,000 cubic yards of contaminated waste rock, soil, and sediment from the Upper Waste Area, Lower Waste Area, Ely Brook, and Ponds 4 and 5, and consolidation within a containment cell with a low permeability cover system to be constructed west of Ely Brook within the Site (the West Cell).
- Excavation of about 4,000 cubic yards of contaminated tailings from the Tailings Area, and consolidation within a containment cell with a low permeability cover system to be constructed over the Ore Roast Bed.
- The cleanup action would also include land-use restrictions to protect the engineered structures and restored areas along with long-term monitoring and periodic reviews of the cleanup performance.
- The approximate cost of this proposed cleanup plan is $18 million.



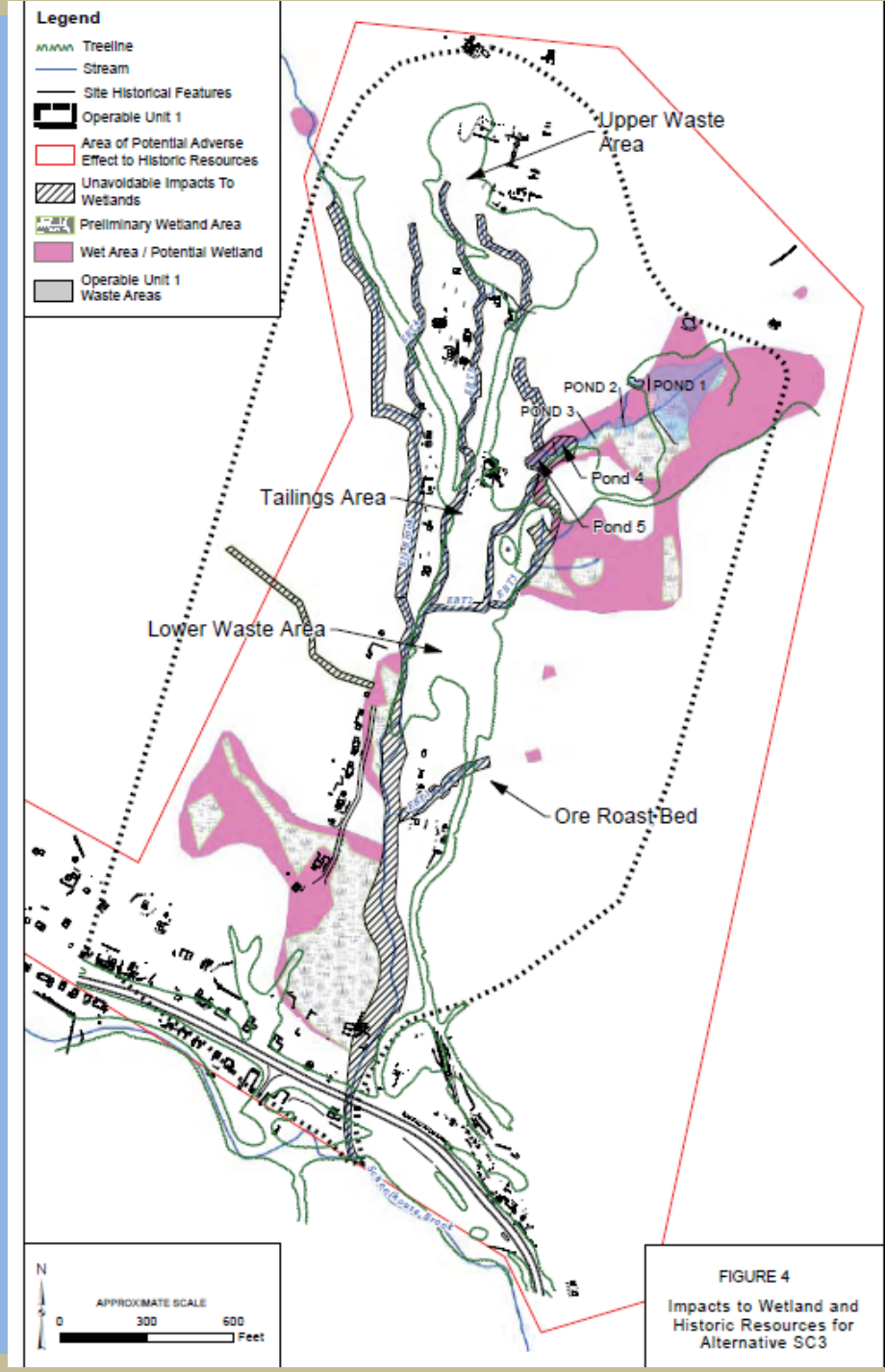
- Why does EPA recommend option SC3:
  - Protects public health and environment for lowest cost.
  - Least impacts to environment, including wetlands.
  - Avoids technical and maintenance issues associated with SC2 (groundwater under-drain) and implementation issues with SC4 (road repairs and facility approvals).



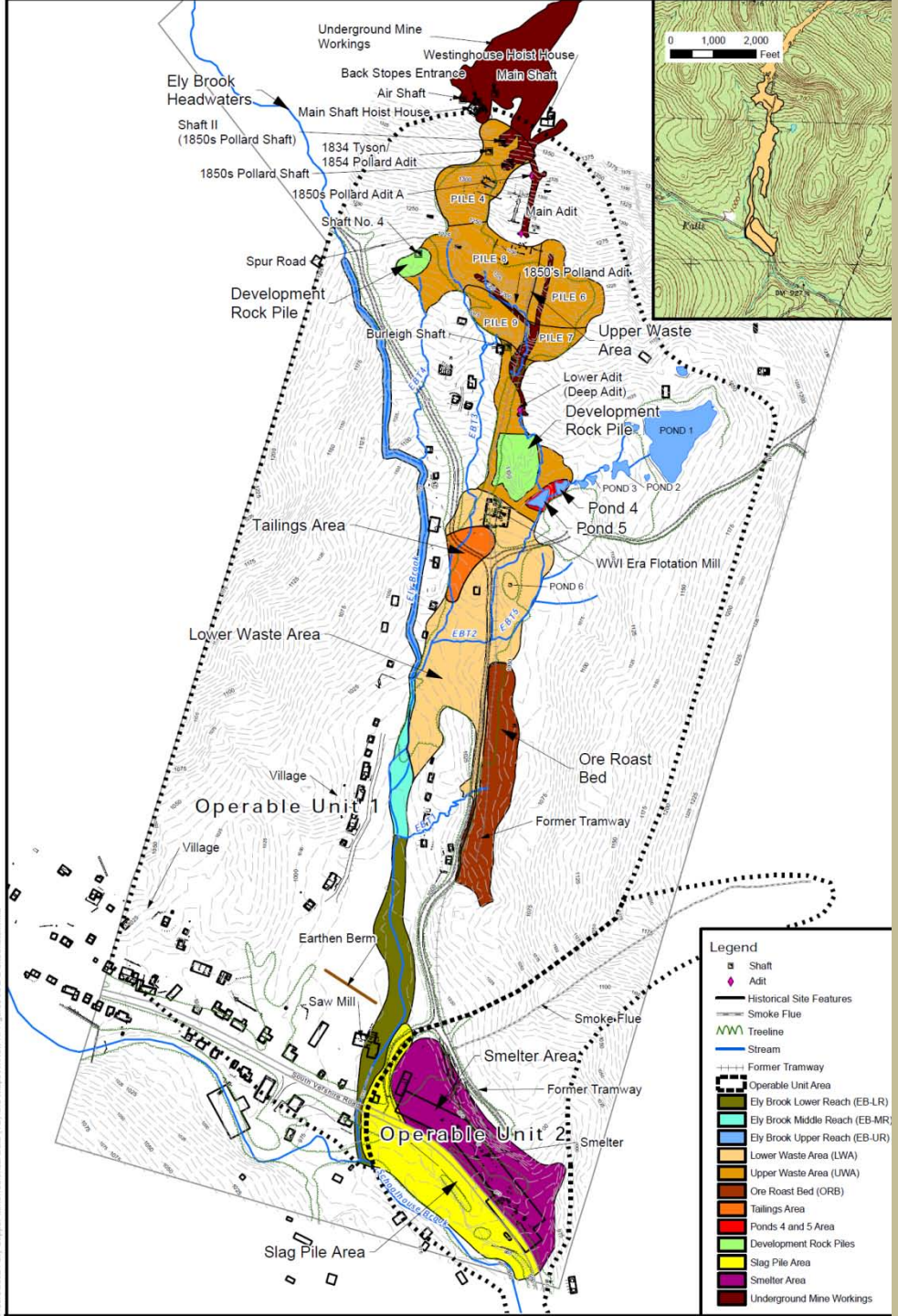
Public Comment is also being sought on two critical issues:

The EPA determination that the proposed alternative (SC3) is the least environmentally damaging practicable alternative for protecting wetland and floodplain resources.

The EPA determination that the cleanup's effects on historic resources at the Site are unavoidable.

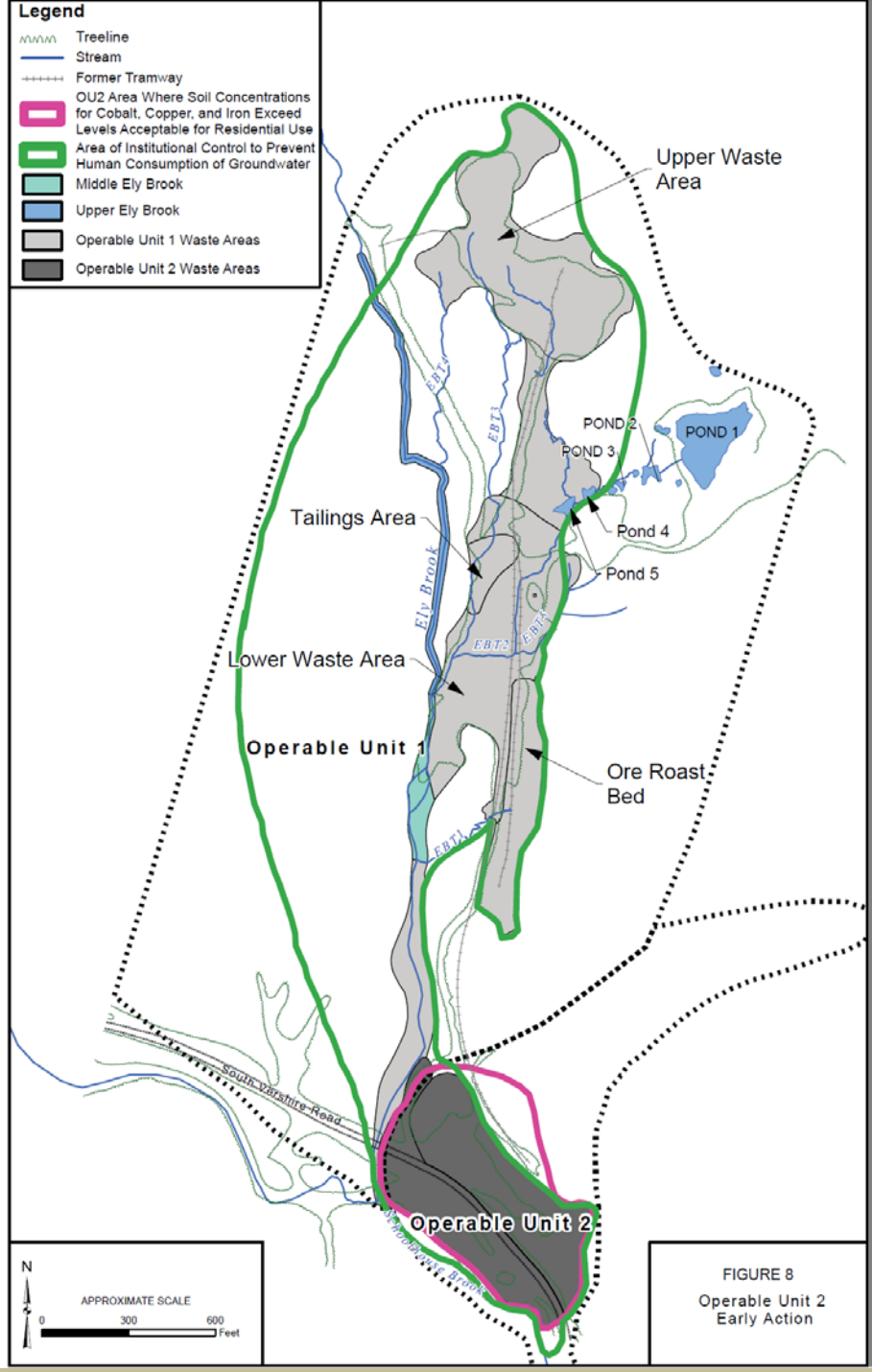


Map of Ely Mine Historic Features



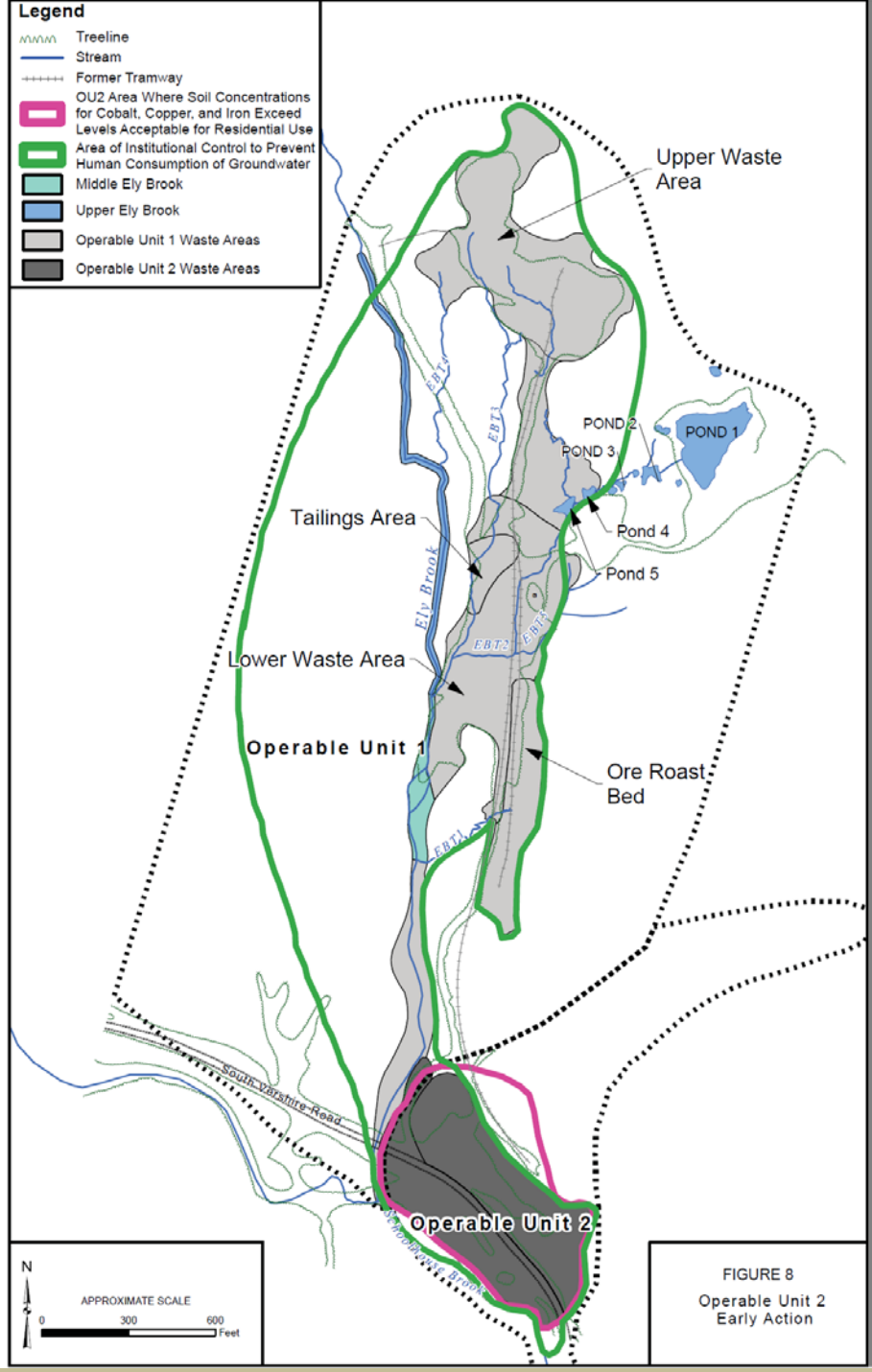
EPA is also seeking public comment regarding an “Early Action” for OU2.

- The Early Action is a limited cleanup response that is intended to:
  - Prevent use of the property that could result in residential use of the Smelter/Slag Area
    - No residential development within or adjacent the Smelter/Slag Area; and
  - Prevent consumption of contaminated groundwater by restricting the locations where water supply wells can be installed.
- A final cleanup decision for OU2 would occur in the future once the studies for the site-wide groundwater, underground workings, and Smelter/Slag Area are completed.



Early Action:

- The extent of the possible land-use restrictions is shown on the map.
- The extent of the groundwater restriction west of Ely Brook may be adjusted depending upon the location of the West Cell, since the groundwater is clean in that area.
- Land use for areas outside the limits of the Early Action and OU1 land-use restrictions would be subject to local zoning and state regulations.



Ely Mine Cleanup Decision (ROD) Schedule

- Public Information Meeting on July 27, 2011
- Public comment period from July 28, 2011 thru Aug 27, 2011
- Public Hearing on August 25, 2011
- EPA will consider all comments received and develop a response to comments document that will be released along with the Record of Decision for the cleanup proposal.

Public Informational Meeting

Wednesday, July 27, 2011

Vershire Town Center Building

27 Vershire Center Rd

Vershire, VT 05079

Formal Public Hearing

Thursday, August 25, 2011

Vershire Town Center Building

27 Vershire Center Rd

Vershire, VT 05079

For More Detailed Information About the Cleanup Proposal:

The Administrative Record, which includes all documents that EPA has considered or relied upon in proposing this cleanup plan for the Ely Copper Mine Superfund Site, including the Feasibility Study, its wetland and floodplain findings, and its findings on impacts to historical resources, is available at the following information repositories:

EPA Records and Information Center
5 Post Office Square, First Floor
Boston, Massachusetts
(617) 918-1440

Vershire Town Office
Town of Vershire
6894 VT Route 113
Vershire, VT 05079

Information is also available for review on-line at:
www.epa.gov/region1/superfund/sites/ely.

Provide EPA with your written comments about the cleanup proposal for the Ely Copper Mine Superfund site.

Three ways to comment.

1. Speak your comments into the public record at the August 25, 2011 Public Hearing; or
2. Mail/fax any written comments, postmarked no later than August 27, 2011 to:

Edward Hathaway, RPM
ME/VT/CT Superfund Section
5 Post Office Square
Suite 100 (OSRR07-1)
Boston, MA 02109-3912
Fax (617) 918-0372
or

3. Email comment by the end of the day on August 27, 2011 to:
hathaway.ed@epa.gov

Site Contacts

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Additional information is also available at the EPA website for the Ely Mine at:

http://www.epa.gov/ne/superfund/sites/ely