

**DECLARATION FOR THE
SECOND EXPLANATION OF SIGNIFICANT DIFFERENCES
ELIZABETH MINE SUPERFUND SITE
STRAFFORD/THETFORD, VERMONT
2015**

DRAFT FOR PUBLIC COMMENT

Site Name and Location

Elizabeth Mine Superfund Site
Strafford/Thetford, Orange County, Vermont
EPA ID #: VTD988366621
Site ID #: 0102071

Lead Agency

United States Environmental Protection Agency

Support Agency

Vermont Department of Environmental Conservation

Statement of Purpose

This decision document sets forth the basis for the determination to issue the attached Second Explanation of Significant Differences (2015 ESD) for the 2006 Record of Decision at the Elizabeth Mine Superfund Site (Site), specifically pertaining to Phase 2 of the Remedial Action. The U.S. Environmental Protection Agency (EPA) developed this decision document after consulting with the Vermont Department of Environmental Conservation (VTDEC).

This draft 2015 ESD has been prepared to provide the public with an explanation of and an opportunity to comment on EPA's proposed modification of the selected remedy for the Site. EPA is seeking public comment on this draft ESD pursuant to 40 C.F.R. § 300.825(b). In accordance with Section 117(d) of CERCLA, 42 U.S.C. § 9617(d), and the NCP at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this draft ESD and the Administrative Record will be available for public review at the following locations and may be reviewed at the times listed:

U.S. Environmental Protection Agency
Records Center
5 Post Office Square, Suite 100
Boston, MA 02109
617-918-1440
Monday-Friday: 9:00 am - 5:00 pm
Saturday and Sunday: Closed

Norwich Public Library
368 Main St, Norwich, VT 05055
(802) 649-1184
Monday – 1:00 – 8:00
Tuesday, Wednesday,
Friday – 10:00 – 5:30
Thursday – 10:00 – 8:00
Saturday – 10:00 – 3:00

The draft ESD and administrative record index along with other Site information can be viewed at: <http://www.epa.gov/region1/superfund/sites/elizmine>.

Once EPA reviews any comments are received after the public comment period ends, EPA will issue a Responsiveness Summary and will determine whether the proposed remedial action needs to be modified or changed. A Final ESD, with the attached responsiveness summary will then be issued.

Statutory Basis for Issuance of the ESD

Pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9617(c), and the National Contingency Plan (NCP) at 40 C.F.R. § 300.435(c)(2)(i), if EPA determines that the remedial action being undertaken at a site differs significantly from the Record of Decision (ROD) for that site, EPA shall publish an Explanation of Significant Differences and the reasons such changes are being made. According to 40 C.F.R. § 300.435(c)(2)(i), and EPA guidance (Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-23-P, July 1999), an Explanation of Significant Differences, rather than a ROD Amendment, is appropriate where the adjustments being made to the ROD are significant but do not fundamentally alter the remedy with respect to scope, performance or cost. EPA has determined that the adjustments to the ROD provided in this ESD are significant but do not fundamentally alter the overall remedy for the Site with respect to scope, performance, or cost. Therefore, this ESD is being properly issued.

Background

The Site was proposed for inclusion on the National Priorities List (NPL) in December 2000. The Site was finalized on the NPL on June 14, 2001 (F.R. Vol. 66, No. 116, pages 32235-32242). EPA began the Remedial Investigation (RI) and Feasibility Study (FS) at the Site in 2001.

In March 2002, EPA issued a proposed plan for a Non-Time-Critical Removal Action (NTCRA) to address the acid mine drainage at the Elizabeth Mine. An Action

Memorandum authorizing the NTCRA was signed September 3, 2002. The NTCRA began in 2006 and has three phases.

- Phase 1 NTCRA: The Phase 1 NTCRA was implemented from 2006-2010. The Phase 1 NTCRA activities included the construction of about 6,000 linear feet of surface water diversion channels; a 1,150-linear foot shallow groundwater diversion trench; and an interim water treatment system.
- Phase 2 NTCRA: The Phase 2 NTCRA began in 2009 and is ongoing. The Phase 2 NTCRA activities include: excavation and consolidation of approximately 400,000 cubic yards of waste rock; installation of a 45-acre cover system over Tailing Pile 1 (TP-1) and Tailing Pile 2 (TP-2); construction of 300 linear feet of surface water diversion channels; continued operation of the interim water treatment system; and restoration of areas disturbed by the NTCRA activities.
- Phase 3 NTCRA: The Phase 3 NTCRA involves the construction of a passive treatment system to remove iron from the leachate discharging from TP-1. The Phase 3 NTCRA has been designed but not yet implemented.

In March 2003, EPA initiated a Time-Critical Removal Action (TCRA) in response to the instability of the tailing dam. The TCRA began in the spring of 2003 with the installation of graded filters over the areas where the piping of dam material was observed. During the Fall of 2003, a 36-inch diversion pipe and spillway was installed to replace the existing decant drainage system that formerly transmitted Copperas Brook through the lower portion of TP-1. The final component of the TCRA was implemented during 2004 and 2005 and included construction of a soil buttress to stabilize the north face of TP-1. The buttress construction involved the placement of approximately 67,000 cubic yards of soil obtained from both on-site and off-site sources.

The RI/FS was completed in July 2006 when EPA issued a Proposed Plan for proposed remedial action. A Record of Decision (ROD) was signed in September 2006 to address five areas of the site not addressed by the TCRA or NTCRA. The Remedial Action (RA) included in the ROD for the Site has one Operable Unit (OUI) that includes three separate phases:

- Phase 1 Remedial Action: Upper and Lower Copperas Factories;
- Phase 2 Remedial Action: Lord Brook Watershed Source Areas; and
- Phase 3 Remedial Action: Site-Wide Groundwater, Sediments, and World War II Era Infrastructure Area (WWII).

The Remedial Design for Phase 1 of the Remedial Action, which addressed the lead contamination at the Copperas Factories, was initiated in 2006. The ROD anticipated that all of the lead contaminated soil at the Copperas Factories would be covered in place. An ESD for the Phase 1 Remedial Action component of the 2006 ROD was signed in 2008 to allow some of the lead contaminated soil to be excavated and placed beneath the cover system installed on TP-1 and TP-2 as part of the NTCRA (2008 ESD). The Phase 1 Remedial Action design for the lead cleanup at the Copperas Factories was completed

in 2008. The Phase 1 Remedial Action began in June 2009 and was completed in September 2010. The first Five-Year Review for the Site was completed in 2014.

The Remedial Design for the Phase 2 Remedial Action component of the 2006 ROD was completed in September 2014. As a result of the remedial design process, certain modifications to the Phase 2 Remedial Action, as called for in the 2006 ROD, were identified that are the subject of this 2015 ESD. The Remedial Design for the Phase 3 Remedial Action component of the 2006 ROD is ongoing.

Overview of the 2015 ESD

This 2015 ESD documents the following changes to the Phase 2 component of the 2006 ROD:

- As a result of the NTCRA, all of the material in TP-4, the majority of the waste rock at the South Mine, and the waste rock found along the outlet haulage-way for the South Open Cut was removed and disposed of under the engineered covers at TP-1 and TP-2, rather than in the South Open Cut as called for in the ROD;
- The South Open Cut and South Mine pit lakes will be eliminated by placing fill in the South Open Cut and South Mine to significantly reduce the source of acid mine drainage;
- Excavation of an additional volume of mine waste from the South Mine and South Open Cut. This material will be consolidated beneath soil covers to be installed at the South Open Cut and South Mine (wetlands may be established on top of the covers in each area);
- Treated water from the dewatering of the South Open Cut and South Mine pit lakes during the implementation of the Remedial Action may be discharged to Copperas Brook, tributaries of Lord Brook, and/or the underground workings rather than only into the tributaries of Lord Brook, as called for in the ROD;
- Updated analysis of ARARs compliance regarding the ESD modifications to the remedy in the South Open and South Mine pit lakes areas; and
- Updated cost for the Phase 2 component of the 2006 ROD, based on the ESD modifications to the remedy.

Declaration

EPA has evaluated the requirements of the applicable federal Clean Water Act standards, and determined that the 2006 ROD's finding that the remedy is the least environmentally damaging practicable alternative to protect downstream federally regulated wetland and aquatic resources from acid rock drainage is still applicable in regards to the modifications to the remedy made through this ESD. Under the revised remedy, alteration of historic mine features will be unavoidable (including filling of the pit lakes),

but will be subject to mitigation measures determined as part of the design process, in consultation with the State Historic Preservation Officer and interested stakeholders.

For the foregoing reasons and as explained herein, by my signature below, I approve the issuance of the Second Explanation of Significant Differences for the 2006 ROD at the Elizabeth Mine Superfund Site in Strafford/Thetford, Vermont and the changes stated therein.

Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency – New England

Date

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Lead Agency

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I. INTRODUCTION

This Second Explanation of Significant Differences (2015 ESD) to the 2006 ROD at the Elizabeth Mine Superfund Site (Site) is being issued to document changes to the Phase 2 Remedial Action component of the remedy. EPA had previously issued a 2008 ESD for the 2006 ROD pertaining to the Phase 1 Remedial Action component of the remedy. EPA is required to publish this ESD pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9617(c), and the National Contingency Plan (NCP) at 40 C.F.R. § 300.435(c)(2)(i).

This ESD documents the following changes to the Phase 2 Remedial Action component of the 2006 ROD:

- As a result of the NTCRA, all of the material in TP-4, the majority of the waste rock at the South Mine, and the waste rock found along the outlet haulage-way for the South Open Cut was removed and disposed of under the engineered covers at TP-1 and TP-2, rather than in the South Open Cut as called for in the ROD;
- The South Open Cut and South Mine pit lakes will be eliminated by placing fill in the South Open Cut and South Mine to significantly reduce the source of acid mine drainage;
- Excavation of an additional volume of mine waste from the South Mine and South Open Cut. This material will be consolidated beneath soil covers to be installed at the South Open Cut and South Mine (wetlands may be established on top of the covers in each area);

- Treated water from the dewatering of the South Open Cut and South Mine pit lakes during the implementation of the Remedial Action may be discharged to Copperas Brook, tributaries of Lord Brook, and/or the underground workings rather than only into the tributaries of Lord Brook, as called for in the ROD;
- Updated analysis of ARARs compliance regarding the ESD modifications to the remedy in the South Open and South Mine pit lakes areas; and
- Updated cost for the Phase 2 component of the 2006 ROD, based on the ESD modifications to the remedy.

The basis for these decisions is outlined below.

In accordance with CERCLA § 117(d), 42 U.S.C. § 9617(d), and the NCP at 40 C.F.R. §§ 300.435(c)(2)(i)(A) and 300.825(a)(2), this ESD and its supporting documents will be made available for public inspection and will be added to the Administrative Record file for the Site. The changes included in this ESD were presented to the local community at public meetings held on May 20, 2014 and July 30, 2015. This ESD was subject to a 30 day public comment period from July 31, 2015 to August 30, 2015. The Administrative Record for this ESD is available for public review at the EPA Region 1 Superfund Records Center in Boston, Massachusetts, and the repository located at the Norwich Public Library and at the VTDEC's offices in Montpelier, VT, at the addresses listed below:

U.S. Environmental Protection Agency
 Records Center
 5 Post Office Square, Suite 100
 Boston, MA 02109
 617-918-1440
 Monday-Friday: 9:00 am - 5:00 pm
 Saturday and Sunday: Closed

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II. SITE HISTORY AND CONTAMINATION

Site History

The Site is located in the towns of Strafford and Thetford in east-central Vermont, approximately two miles southeast of the village of South Strafford, on the eastern flank of Copperas Hill. It is approximately 15 miles north of White River Junction and 9 miles west of the Connecticut River. Figure 1 shows the location of the Site.

The Site includes three small watersheds containing Copperas Brook, Lord Brook, and Sargent Brook, which all discharge to the West Branch of the Ompompanoosuc River (WBOR). The West Branch of the Ompompanoosuc River joins the East Branch of the Ompompanoosuc River

just before Union Village Dam. The combined flow forms the Ompompanoosuc River which flows into the Connecticut River about ten miles downstream of the Site.

Deposits at the Site were discovered in 1793. The mine operated from the early 1800s until its closure in 1958. The ore was initially valued for its iron content, and then its pyrrhotite content from which copperas was produced. The Copperas Works were active from about 1810 until the 1880's. Copper mining began about 1830 with intermittent copper mining activity until 1942. The current site features associated with this period include the upper and lower Copperas Factories, South Mine, the North Open Cut along with several shafts and adits. The Elizabeth Mine was most productive from 1943 to 1958 when it was revived using modern mining technology to support the need for copper during WWII and the Korean War. This period included the addition of most of the current site features such as the ore processing buildings, Tailing Pile 1 (TP-1) and Tailings Pile 2 (TP-2), South Open Cut and the associated Tailing Pile 4 (TP-4), and expansion of the North Open Cut. The mine was closed in 1958. By the close of mining operations, the mine property encompassed approximately 1,400 acres and underground workings extended to approximately 1,000 feet (ft) below ground surface (bgs) and 8,000 linear ft with an estimated 5 miles of underground shafts and tunnels. When mining operations were abandoned, many of the underground areas flooded with groundwater. An air vent (also known as the artesian vent), created to provide ventilation for underground work areas, currently discharges acid mine drainage from the underground workings into the WBOR.

The Site was owned by numerous entities during the operational period ending in 1958. The Vermont Copper Company, Inc. acquired the land at the Elizabeth Mine, Ely Mine, and Pike Hill mines in 1942. These holdings were sold to Appalachian Sulfides Inc. in 1954. Following closure of the mine in February 1958, Appalachian Sulfides divided the Elizabeth Mine property and sold it to individual landowners, as well as Pat Mines Inc. By the end of 1962, Appalachian Sulfides had divested all of its property in Vermont. Today, the majority of the areas subject to the cleanup actions at the Elizabeth Mine are owned by five private landowners. Four other private landowners own a portion of the property that will be subject to cleanup action and there are numerous landowners whose property contains a portion of the underground workings. The Phase 2 Remedial Action will occur primarily within one private property.

The Site was proposed for inclusion on the National Priorities List (NPL) in December 2000. The Site was finalized on the NPL on June 14, 2001 (F.R. Vol. 66, No. 116, pages 32235-32242). EPA began the Remedial Investigation (RI) and Feasibility Study (FS) at the Site in 2001.

EPA has implemented a Non-Time Critical Removal Action (NTCRA), Time-Critical Removal Action (TCRA), and Remedial Action (RA) at the Elizabeth Mine. Each response action is summarized below and the general area of each response action is shown on Figure 2.

In March 2002, EPA issued a proposed plan for a Non-Time-Critical Removal Action (NTCRA) to address the acid mine drainage at the Elizabeth Mine. An Action Memorandum authorizing the NTCRA was signed September 3, 2002. The NTCRA began in 2006 and has three phases.

- Phase 1 NTCRA: The Phase 1 NTCRA was implemented from 2006-2010. The Phase 1 NTCRA activities included the construction of about 6,000 linear feet of surface water diversion channels; a 1,150-linear foot shallow groundwater diversion trench; and an interim water treatment system.
- Phase 2 NTCRA: The Phase 2 NTCRA began in 2009 and is ongoing. The Phase 2 NTCRA activities include: excavation and consolidation of approximately 400,000 cubic yards of waste rock; installation of a 45 acre cover system over Tailing Pile 1 (TP-1) and Tailing Pile 2 (TP-2); construction of 300 linear feet of surface water diversion channels; continued operation of the interim water treatment system; and restoration of areas disturbed by the NTCRA activities.
- Phase 3 NTCRA: The Phase 3 NTCRA involves the construction of a passive treatment system to remove iron from the leachate discharging from TP-1. The Phase 3 NTCRA has been designed but not yet implemented.

In March 2003, EPA initiated a Time-Critical Removal Action (TCRA) in response to the instability of the tailing dam. The TCRA began in the spring of 2003 with the installation of graded filters over the areas where the piping of dam material was observed and continued during the fall of 2003 with the installation of a 36-inch diversion pipe and spillway to replace the existing decant drainage system that formerly transmitted Copperas Brook through the lower portion of TP-1. The final component of the TCRA was implemented during 2004 and 2005 and included construction of a soil buttress to stabilize the north face of TP-1. The buttress construction involved the placement of approximately 67,000 cubic yards of soil obtained from both on-site and off-site sources.

The RI/FS was completed in July 2006 when EPA issued a Proposed Plan for proposed remedial action. A Record of Decision (ROD) was signed in September 2006 to address five areas of the site not addressed by the TCRA or NTCRA. The Remedial Action (RA) included in the ROD for the Site has one Operable Unit (OU) that includes three separate phases:

- Phase 1 Remedial Action: Upper and Lower Copperas Factories;
- Phase 2 Remedial Action Lord Brook Watershed Source Areas; and
- Phase 3 Remedial Action: Site-Wide Groundwater, Sediments, and World War II Era Infrastructure Area (WWII).

The Remedial Design for Phase 1 of the Remedial Action, which addressed the lead contamination at the Copperas Factories, was initiated in 2006. The ROD anticipated that all of the lead contaminated soil at the Copperas Factories would be covered in place. An ESD for the Phase 1 Remedial Action component of the 2006 ROD was signed in 2008 to allow some of the lead contaminated soil to be excavated and placed beneath the cover system installed on TP-1 and TP-2 as part of the NTCRA (2008 ESD). The Phase 1 Remedial Action design for the lead cleanup at the Copperas Factories was completed in 2008. The Remedial Action for the Phase 1 Remedial Action began in June 2009 and was completed in September 2010. The first Five-Year Review for the Site was completed in 2014.

The Remedial Design for the Phase 2 Remedial Action component of the 2006 ROD was completed in September 2014. As a result of the remedial design process, certain modifications

to the Phase 2 Remedial Action, as called for in the 2006 ROD, were identified that are the subject of this 2015 ESD. The Remedial Design for the Phase 3 Remedial Action component of the 2006 ROD is ongoing.

Contamination:

Many of the mine waste materials left behind contain sulfide minerals (e.g. pyrrhotite), which generate acid-mine drainage (AMD). AMD occurs when sulfide minerals are exposed to water and oxygen resulting in the creation of sulfuric acid, which then interact with the mine waste and native material to mobilize metals into groundwater and surface water. Erosion also transports the mine waste into streams resulting in contaminated sediment. The AMD and contaminated sediment released from the Elizabeth Mine waste piles resulted in the impairment of Copperas Brook, the WBOR, Lord Brook, and two un-named tributaries to Lord Brook. Leaching from the waste material also contaminated groundwater beneath and adjacent to the waste piles. Contaminated groundwater is also found in the underground mine workings. A small area of the Site was found to contain high levels of lead in the soil because of the use of lead as a lining in vessels used to create copperas at the former Copperas Factories.

The area subject to the Phase 2 Remedial Action is within the Lord Brook watershed which encompasses approximately 2,270 acres in the southeastern portion of the Site. This watershed contains three major sources of contamination that area associated with the Site:

- The South Mine consists of an approximate 250-foot-long rock cut forming a pit lake and underground cavern with an approximate maximum depth of 20 feet. Sources of contamination and AMD at the South Mine include the exposed hanging and foot walls of the cut, residual waste rock, and exposed sulfidic bedrock. During periods of high flow (e.g., spring snow melt), water in the pit lake discharges to a drainage channel that eventually flows into a perennial tributary of Lord Brook. As part of the NTCRA, 32,000 cubic yards of waste rock soil from an approximate 4.2 acre, 300 by 600 foot, area adjacent to the South Mine pit lake was excavated to provide fill needed for the grading to install the cover system over Tailing Pile 1 and Tailing Pile 2. The excavation left exposed bedrock over much of this area. Areas where soil remained were seeded and now support sparse vegetation. A drainage swale lined with “7-inch minus” rip rap extends approximately 350 feet from the outlet of the pit lake to where the natural stream channel (and point of compliance for the remedy’s water quality standards) begins at the edge of the waste rock removal area. An area of waste rock, about 1-2 acres in extent and estimated to contain less than 10,000 cubic yards of waste rock, remains at the South Mine.
- The South Open Cut is a WWII-era mine feature developed in the early 1950s and located north of the South Mine. The cut is approximately 1,600 feet long with a maximum depth of 90 feet near the north end. The cut is oriented approximately south to north along the strike of the ore body and was excavated into the ore body from ground surface. A haulage way was cut through the east wall of South Open Cut to facilitate rock and ore removal during the period of mine operation. The portion of the South

Open Cut located north of the Haulage Way consists of a pit lake containing approximately 3.6 million gallons of water. The pit lake discharges seasonally through the Haulage Way. Drainage through the Haulage Way flows eastward beneath Copperas Road, along the southern flank of the former location of TP-4, and eventually into a perennial tributary of Lord Brook. The approximate 500 foot portion of South Open Cut south of the Haulage Way is known as the Dry Crevasse. Its depth varies from the ground surface at its south end to approximately 25 feet at the Haulage Way. As its name implies, the Dry Crevasse is above the surface elevation of the pit lake. The majority of the waste rock between Copperas Road and the South Open Cut Haulage Way was removed between December 29, 2011, and February 24, 2012, to provide fill material necessary to achieve final grade for the NTCRA cover system on TP-1 and TP-2. The NTCRA work consisted of excavating 6,210 cubic yards of waste rock and soil from an approximate 1.3 acre, 300 by 125 foot, area between Copperas Road and the Haulage Way down to native till or bedrock. The excavation left exposed bedrock over much of this area. Areas where the excavation did not extend to bedrock were sloped back and covered with 7-inch minus rip rap.

- Waste rock pile Tailing Pile 4 (TP-4) was located east of the South Open Cut and Copperas Road and contained boulders and cobbles of wall rock and some waste ore removed as part of the surface mining at the South Open Cut. TP-4 was approximately 30 feet high and covered an area of approximately 1 acre. All of TP-4 was removed to provide fill material necessary to achieve final grade for the NTCRA cover system on TP-1 and TP-2. The NTCRA work consisted of excavating 36,500 cubic yards of waste rock from this area. After using stone to stabilize the ground surface after waste rock removal, the majority of the stone was removed and the area was naturally restored. A stone line drainage feature remains that carried the discharge from the South Open Cut to the tributary of Lord Brook.

The three source areas drain into an unnamed tributary of Lord Brook. One tributary originates from the South Mine and the other from the South Open Cut after flowing through TP-4. Surface water analytical data collected to date indicated the following, as identified in the 2006 ROD:

- Contaminated drainage from the South Mine contained total and dissolved aluminum, cadmium, copper, zinc, and occasionally dissolved iron, lead, nickel, and selenium at concentrations that exceeded surface water quality criteria. The sources of these metals are discharges from the South Mine pit lake during periods of high flow along with runoff and groundwater seepage through the waste ore materials located along the east and north sides of the South Mine. Data collected from 2012 to 2014, after the waste rock removal, confirmed that the South Mine remains a significant source of copper, iron, and zinc and continues to cause the unnamed tributary to exceed federal and state water quality standards. In addition, surface water and sediment toxicity testing performed in 2013 confirmed that the surface water discharge from the South Mine and sediment in the unnamed tributary are toxic to aquatic life. A benthic community assessment performed in 2013 further documented that the unnamed tributary flowing from the South Mine is impaired with a benthic community having much less abundance and diversity than the reference location.

- Contaminated drainage from the South Open Cut and TP-4 contain concentrations of total and/or dissolved aluminum, cadmium, copper, zinc, and occasionally iron, mercury, nickel and/or lead at concentrations exceeding surface water quality criteria. Data collected from 2012 to 2014, after the waste rock removal, confirmed that the discharge from the South Open Cut remains a significant source of copper, iron, and zinc and continues to cause the unnamed tributary to exceed federal and state water quality standards. In addition, surface water and sediment toxicity testing performed in 2013 confirmed that the surface water discharge from the South Open Cut and sediment in the unnamed tributary are toxic to aquatic life. A benthic community assessment performed in 2013 further documented that the unnamed tributary flowing from the South Open Cut is impaired with a benthic community much less abundance and diversity than reference location.

Data collected since 2012, include benthic community assessments and toxicity testing, suggest that the removal of TP-3, partial removal of the South Mine waste rock, and partial removal of the South Open Cut waste rock has reduced contaminant loading to Lord Brook. Lord Brook immediately below the confluence with the unnamed tributaries has a healthy, non-impaired, benthic and fish community. Toxicity testing in 2013 also documented that the surface water and sediments of Lord Brook are not toxic to aquatic organisms.

III. THE SELECTED REMEDY

The 2006 ROD sets forth the first and final selected remedy for the Elizabeth Mine Site. Two additional response actions, a NTCRA and TCRA, had been selected for the Site earlier by EPA. The remedy selected in the 2006 ROD targeted the remediation of five areas of the Site, not fully addressed by the TCRA or NTCRA, that pose unacceptable threats to human health and the environment. These five areas were then separated into three phases for the purpose of the remedial design and remedial action. The Copperas Factories component of the 2006 ROD was the Phase 1 Remedial Action and this cleanup is complete. The Lord Brook Source Areas component of the 2006 ROD is the Phase 2 Remedial Action and is the subject of this ESD. The remaining three components of the 2006 ROD (Sediments, WWII Infrastructure Area, and Site-Wide Groundwater) are designated as the Phase 3 Remedial Action, which is still undergoing design. Only the Phase 2 Remedial Action is listed below.

The 2006 ROD description of the Phase 2 selected remedy is provided below and shown in Figure 3.

Lord Brook Source Area (LBSA), Alternative LBSA 4 – Partial consolidation of surficial mine waste and surface water diversion with discharge of water to tributary of Lord Brook or groundwater. This alternative minimizes the discharge of acid rock drainage (ARD) from the three Lord Brook Source Areas (South Open Cut, South Mine, and TP-4). To accomplish this, exposed waste rock from TP-4 and a portion of the waste rock from the South Mine will be consolidated into the dry portion of the South Open Cut and placed under a cover that will promote surface run-off. The majority of the buried waste rock surrounding the South Open Cut or South Mine will remain in place to minimize disturbance to the forest and the historic

features. The amount of material removed from the South Mine area will be determined during design. It is possible that the pit lake within the South Mine may be drained to allow for the removal of waste rock that may be located beneath the pit lake. The South Mine pit lake would be allowed to re-establish itself. The South Open Cut pit lake would also remain and would have an increased water level due to the installation of a dam at the outlet. The design would determine the optimal location for a dam to prevent the uncontrolled release of water from the South Open Cut pit lake. EPA has determined that LSBA 4 is the least environmentally damaging practicable alternative to achieve the protection of downstream wetlands and aquatic resources from acid rock drainage. To the extent federally regulated wetlands are identified outside the limits of the waste management area, the altered resources will be restored. The design and construction activities will include measures to minimize the impacts on wetlands through the use of best management practices. EPA has also determined that there will be unavoidable impacts to historic resources. Mitigation measures, if required under applicable historic preservation standards, will be undertaken.

The primary elements of alternative LBSA 4 were:

- Construction of surface water diversions around the South Mine and the South Open Cut/TP-4.
- Excavation of waste rock from the South Mine, with consolidation into the dry portion of South Open Cut. The amount of material to be re-located will be determined during the design. The objective will be to minimize the extent of disturbance to areas that are not contributing to the acid rock drainage release and to also minimize the impact to historic features. The South Mine pit lake would be allowed to restore itself and serve as a detention basin.
- Excavation of TP-4 waste rock and waste ore with consolidation into the dry portion of the South Open Cut.
- Installation of a dam in the vicinity of the haul road from the South Open Cut to contain the South Open Cut pit lake and allow for a controlled release of water from the pit lake. The dammed pit lake also will inundate additional areas of exposed rock and create conditions that will reduce the production of acid rock drainage.
- Discharge of water from the South Open Cut and South Mine pit lakes via either direct discharge to surface water into the tributary to Lord Brook or infiltration into the ground. Discharge of the water from the South Open Cut to the Underground Workings will also be evaluated. An estimated flow of 2 gallons per minute for the South Open Cut and 5 gallons per minute from the South Mine are estimated as the long-term discharge rates.
- Covering of areas of consolidated mine wastes in the cuts with a vegetative soil cover to act as a contact barrier and to promote vegetative growth and possible addition of lime or other buffering agents.
- Covering areas from which waste rock has been excavated (*e.g.*, TP-4) to promote vegetative growth and possible addition of lime or other buffering agents.
- Performing maintenance and inspections of the covers.

- Performing monitoring of the unnamed tributaries of Lord Brook and Lord Brook to determine if the actions have restored these waters to federal Clean Water Act and Vermont Class B Water Quality Standards at compliance points downgradient from the area.
- Performing monitoring of groundwater if discharges are infiltrated into the ground.
- Institutional controls, such as restrictive covenants, to protect the cleanup action from damage and to ensure that buried waste rock is not exposed in the future. Periodic inspections would be performed to ensure compliance with the institutional controls.
- A review of the remedy, at a minimum, every 5 years to determine whether the cleanup action remains protective of human health and the environment.

IV. BASIS FOR THIS ESD

This ESD documents the following changes to the Phase 2 component of the 2006 ROD:

- As a result of the NTCRA, all of the material in TP-4, the majority of the waste rock at the South Mine, and the waste rock found along the outlet haulage-way for the South Open Cut was removed and disposed of under the engineered covers at TP-1 and TP-2, rather than in the South Open Cut as called for in the ROD.
- The South Open Cut and South Mine pit lakes will be eliminated by placing fill in the South Open Cut and South Mine to significantly reduce the source of acid mine drainage;
- Excavation of an additional volume of mine waste from the South Mine and South Open Cut. This material will be consolidated beneath soil covers to be installed at the South Open Cut and South Mine (wetlands may be established on top of the covers in each area);
- Treated water from the dewatering of the South Open Cut and South Mine pit lakes during the implementation of the Remedial Action may be discharged to Copperas Brook, tributaries of Lord Brook, and/or the underground workings rather than only into the tributaries of Lord Brook, as called for in the ROD;
- Updated analysis of ARARs compliance regarding the ESD modifications to the remedy in the South Open and South Mine pit lakes areas; and
- Updated cost for the Phase 2 component of the 2006 ROD, based on the ESD modifications to the remedy.

In the 2006 Feasibility Study, Proposed Plan, and ROD, the selected was alternative “Lord Brook Source Area Alternative 4 (LBSA-4)”. Another alternative “Lord Brook Source Area 3 (LBSA-3)” that eliminated acid mine drainage by filling the South Mine and South Open Cut pit lakes, was also identified in the 2006 Feasibility Study, Proposed Plan, and ROD. As presented in these documents both LBSA3 and LBSA4 scored very similar in all aspects of the two primary (protection of human health and the environment and compliance with ARARs) and five balancing criteria (long-term effectiveness and permanence; short-term effectiveness; reduction in toxicity, mobility, or volume through treatment; implementability, cost) designated by the NCP to evaluate alternatives. Alternative LBSA-4 was selected at the time based on the

assumption that the flow from the South Mine and South Open Cut could be regulated using practical, reliable, low cost methods so that discharges can meet the water quality standards at the compliance points. With this assumption, LBSA-4 was determined to be more compliant with ARARs, particularly the National Historic Preservation Act, since it preserved more of the pit lake and open cut features, although it did include partial filling of both the South Mine and South Open Cut pit lakes. The impact to downstream aquatic resources and wetlands were similar for both LBSA4 and LBSA3 since the man-made pit lakes were determined not to be regulated under the federal Clean Water Act and state regulations. Since both alternatives achieve downgradient water quality standards and control outflows to prevent downstream flooding, both were determined to meet federal and state wetlands and floodplain protection standards.

The Phase 2 Remedial Action Design determined that there is no practical way to implement a low maintenance and reliable method to regulate the flow and treat the water. Because the pit lakes are open water systems, the design team was not able to develop an outflow device or dam structure that would achieve this objective with the additional requirement that it require minimal maintenance and operate in Vermont weather conditions. In addition, the design evaluation determined that any discharge from the South Open Cut or South Mine would require treatment. Therefore, the complete filling, as opposed to the partial filling, of the pit lakes to eliminate the source of contamination becomes the most protective and ARAR compliant approach to achieve the cleanup goals. The complete filling of the pit lake as described in this ESD is an approach that was already subject to public comment. It was rated equal or better than the selected cleanup alternative LBSA4 for the criteria of "Protection of Human Health and the Environment" and "Long-term Protectiveness and Permanence" and comparatively rated for the criteria of "Implementability" and "Short-term Effectiveness" in the 2006 ROD along with the associated Feasibility Study and Proposed Plan.

Under this ESD's modified remedy the acid mine drainage discharge from the South Mine and South Open Cut pit lakes will be eliminated by filling the pit lakes with waste rock and installation of a soil cover. Under this ESD's modified remedy treatment of the South Mine and South Open Cut pit lake water will occur as a result of the permanent dewatering of these features to implement the cleanup (requiring a greater volume of water to be treated than under the ROD remedy). Under this ESD, the possible options for where treated water may be discharged during remedy implementation has been expanded to include into Copperas Brook and/or the underground workings, as well as into the tributaries to Lord Brook. The ROD only identified the Lord Brook tributaries as discharge points for treated water from the remediation. Figure 3 shows the cleanup based on the 2006 ROD and Figure 4 shows the revised Phase 2 cleanup based on the final design and this 2015 ESD. The points of compliance for the Phase 2 cleanup are shown in Figure 5 and are designated SC4 (South Open Cut point of compliance) and SM1 (South Mine point of compliance).

Additional detail regarding each of the following changes to the Phase 2 component of the 2006 ROD are provided below.

As a result of the NTCRA, all of the material in TP-4, the majority of the waste rock at the South Mine, and the waste rock found along the outlet haulage-way for the South Open Cut was removed and disposed of under the engineered covers at TP-1 and TP-2, rather than in the South Open Cut as called for in the ROD.

As part of the NTCRA planning activities, EPA identified the need for a substantial amount of material to create the design grade for the TP-1 and TP-2 final cover system. The waste rock at TP-4, the South Mine, and at the haulage-way of the South Open Cut represented a source of material that would allow EPA to achieve the design grades and would avoid the additional local road impacts, greenhouse gas emissions, and other issues associated with hauling that material from an off-site location. Because the material was to be placed under the cover system, the use of AMD-generating material was acceptable. As a result, EPA removed all of TP-4 (about 36,500 cubic yards), and most of the waste rock located at the South Mine (32,000 cubic yards) and the haulage-way for the South Open Cut (6,210 cubic yards) as fill for use under the NTCRA cover system. The Remedial Design for the Phase 2 Remedial Action included the determination of how much additional waste rock removal would be required for the South Mine and at the haulage-way for the South Open Cut. Temporary restoration of the areas subject to excavation as part of the Phase 2 Remedial Action was performed during the NTCRA. Final restoration of these areas will still occur as part of the Phase 2 Remedial Action, as called for in the ROD.

The South Open Cut and South Mine pit lakes will be eliminated by placing fill in the South Open Cut and South Mine to significantly reduce the source of acid mine drainage.

The 2006 ROD included a reliance on a flow controlled outlet for the South Mine and South Open Cut to accomplish a significant reduction in flow from the South Mine and South Open Cut that would allow discharge to the tributaries of Lord Brook without violating federal or state water quality standards. As a result of the design evaluations, a reliable and low maintenance passive treatment that could accommodate the anticipated discharges and meet this objective could not be identified. A critical issue was the open nature of the pits, which required management and treatment of stormwater. This required the design of a dam to use the pit lakes as storage and regulate the discharge of flow. Due the remoteness of the Site and winter weather conditions, the design did not identify a low maintenance, practical method for achieving the flow regulation. Alternative approaches to meet the cleanup objectives were evaluated. The outcome of this evaluation was that source control measures to eliminate the pit lakes would be the most cost effective way to achieve the cleanup levels at the downstream points of compliance on the Lord Brook tributaries. As a result, the final design for the Lord Brook Source Area cleanup includes the filling of the South Mine and South Open Cut pit lakes. Mine waste and other fill will be placed in the pits and a soil cover will be installed over the fill (wetlands may also be established on top of the covers in each pit lake area). There may be some residual drainage from the South Open Cut and/or South Mine that will require treatment. The flow of any residual drainage from the South Open Cut and/or South Mine should be less than five gallons per minute and would be a steady flow amenable to passive treatment, if needed, to prevent any exceedance of water quality standards downstream at the compliance point on the unnamed Lord Brook tributary.

Excavation of an additional volume of mine waste from the South Mine and South Open Cut. This material will be consolidated beneath soil covers to be installed at the South Open Cut and South Mine (wetlands may be established on top of the covers in each area).

The waste rock at TP-4, the South Mine, and surrounding the South Open cut was a source of AMD that was impacting the tributaries to Lord Brook. The 2006 ROD included the excavation of waste rock from TP-4 and the South Mine along with the consolidation of this material into the dry portion of the South Open Cut. The 2006 ROD also states that amount of material to be re-located will be determined during the design. The 2006 ROD estimated that 10,000 cubic yards of waste rock would require removal at the South Mine and did not specify the removal of waste rock at the South Open Cut. The remedial design identified the need for more substantial waste rock removal to achieve the cleanup objectives. The Remedial Design determined that all of the exposed mine waste at the South Mine will require excavation and placement under a cover system and that all of the waste rock along the haulage-way for the South Open Cut would need to be covered with soil or excavated and placed under a soil cover. As part of the NTCRA, 32,000 cubic yards of waste rock from the South Mine has been excavated and placed under the TP-1 and TP-2 cover system. Based on the Remedial Design, an additional 10,000 cubic yards of waste rock at the South Mine will require excavation and placement under as soil cover at the South Mine or South Open Cut. An additional estimated 12,000 cubic yards of waste rock along the west rim of the South Open Cut and along the haulage-way will also be excavated and consolidated beneath a soil cover. The removal and covering of the exposed waste will further reduce the acid mine drainage from the South Mine and South Open Cut. As part of the final design, shallow wetlands may be created on top of the covers over the pit lakes.

Treated water from the dewatering of the South Open Cut and South Mine pit lakes during the implementation of the Remedial Action may be discharged to Copperas Brook, tributaries of Lord Brook, and/or the underground workings rather than only into the tributaries of Lord Brook, as called for in the ROD.

Under the original cleanup plan, some amount of the water in the South Mine and South Open Cut pit lakes would have been removed to allow for performance of the cleanup action. This water would have been treated and discharged in compliance with federal and state water quality standards to the tributaries of Lord Brook. As part of the revised cleanup plan presented in the Remedial Design and this ESD, the majority of the water within the South Mine and South Open pit lakes will be removed as part of the effort to fill these pit lakes. The water in the pit lakes will be treated and discharged in compliance with federal and state water quality standards to either the tributaries of Lord Brook, Copperas Brook, and/or the underground workings.

Updated analysis of ARARs compliance regarding the ESD modifications to the remedy in the South Open and South Mine pit lakes areas.

There are no substantive changes to the ARARs identified in the September 2006 ROD, but this ESD includes an updated analysis on how the ESD-modified remedy remains ARAR compliant (Attachment C). As previously discussed, above, since EPA has determined that there is no

practical way to implement the ROD remedy as a low maintenance and reliable method to regulate flow discharging from the pit lakes, the ESD-modified remedy that includes filling the pit lakes to eliminate the contamination source becomes the most ARAR-compliant approach to achieve cleanup goals.

EPA has re-evaluated the requirements of the applicable federal Clean Water Act standards and determined that the revised cleanup approach remains the least environmentally damaging practicable alternative to protect downstream federally regulated wetland and aquatic resources from acid rock drainage. No federal jurisdictional wetlands are present within the area to be altered by the revised remedy, although State jurisdictional Class 3 wetlands will be altered. Mitigation measures, as practicable, to compensate for the alteration of the Class 3 wetlands will be incorporated into the design of the revised remedy. Figure 6 shows the delineated wetlands within the Phase 2 RA area and Figure 7 shows the wetlands after the Phase 2 Remedial Action.

The adverse effects to historic resources from the filling of the pit lakes have also been determined to be unavoidable (subject to mitigation measures, to be determined as part of the design process, in consultation with the State Historic Preservation Officer and interested stakeholders).

Updated cost for the Phase 2 component of the 2006 ROD, based on the ESD modifications to the remedy.

The estimated cost for the Lord Brook Source Area component of the 2006 ROD was \$4.1 million, based on the 2006 Feasibility Study. The estimated cost has been revised based on the changes to the cleanup plan and the eight-year period since the ROD was signed. The revised estimated for the Lord Brook Source Area component of the 2006 ROD is \$9.8 million. The estimated capital costs are \$10 million and the 30 year present value of the operation and maintenance (monitoring) is \$328,000. The cost increase is due to the increased cost for the components of the 2006 ROD due to the 9 year time period since the ROD was signed and the additional cost associated with the items identified in the ESD as modifications to the 2006 ROD. The updated estimate for the components included in the 2006 ROD is \$5.8 million and the estimated additional cost associated with the items identified in the ESD as modifications to the 2006 ROD is \$4 million.

V. DESCRIPTION OF SIGNIFICANT DIFFERENCES

This ESD documents the following changes to the OU1 ROD:

2006 ROD for LBSA-4 (Phase 2 Remedial Action)	Changes resulting from ESD
ARARs identified in the ROD for the selected remedy.	There are no substantive changes to the ARARs identified in the ROD, but the ESD includes an updated analysis on how the ESD-modified remedy remains ARAR compliant (Attachment C).
Construction of surface water diversions around the South Mine and the South Open Cut/TP-4.	No significant change, surface water diversions remain in design, although the location of the diversions will be modified from what was shown in the ROD.
Under the remedy the waste rock along the rim of the South Open Cut and along the haulage way would be left in place.	Excavation and consolidation of waste rock along West rim of South Open Cut and along haulage-way.
Excavation of waste ore from the South Mine, with consolidation into the South Open Cut. The amount of material to be re-located will be determined during the design. The objective will be to minimize the extent of disturbance to areas that are not contributing to the acid rock drainage release and to also minimize the impact to historic features. The South Mine pit lake would be allowed to restore itself and serve as a detention basin.	The majority of the waste rock at the South Mine was excavated as part of NTCRA and disposed of under the TP-1 and TP-2 covers, rather than in the South Open Cut. The design determined that all of the accessible waste rock at the South Mine should be excavated and consolidated under a soil cover at either the South Open Cut or South Mine pit lakes. The South Mine pit lake will be eliminated as a source of acid mine drainage.
Excavation of TP-4 waste rock and waste ore with consolidation into the dry portion of the South Open Cut.	TP-4 was excavated as part of NTCRA and disposed of under the TP-1 and TP-2 covers, rather than in the South Open Cut. Final restoration of former TP-4 area will occur as part of the Phase 2 Remedial Action, as called for in the ROD.
Installation of a dam in the vicinity of the haul road from the South Open Cut to contain the South Open Cut pit lake and allow for a controlled release of water from the pit lake. The dammed pit lake also will inundate additional areas of exposed rock and create conditions that will reduce the production of acid rock drainage.	The Phase 2 design determined that the dam would not be a practical solution to control the release of water from the South Open Cut pit lake. The Phase 2 design requires filling of the South Open Cut pit lake to reduce acid mine drainage.
Discharge of water from the South Open Cut and South Mine pit lakes via either direct discharge to surface water into the tributary to Lord Brook or infiltration into the ground. Discharge of the water from the South Open Cut to the Underground Workings will also be evaluated. An estimated flow of 2 gallons per minute for the South Open Cut and 5 gallons per minute from the South Mine are estimated as the long-term discharge rates.	Regulating the stormwater flow from the South Open Cut and South Mine pit lakes was determined not to be a practical option. The water within the South Mine and South Open Cut pit lakes will be permanently removed to allow for the implementation of the cleanup action. The water will be treated prior to discharge to the tributaries of Lord Brook, Copperas Brook, and/or the underground workings. The only residual flow will be leachate than may discharge via groundwater flow from the South Mine and South Open Cut. With the filling in the south open cut and south mine pit lakes, the long-term flow rates are expected to be similar or less than the 2 gpm from the South Open Cut and 5 gpm from the South Mine anticipated from the original ROD remedy.
Covering of areas of consolidated mine wastes in the cuts with a vegetative soil cover to act as a contact barrier and to promote vegetative growth and possible addition of lime or other buffering agents.	No significant change: All consolidated mine waste will be covered with soil and buffering agents will be added.
Covering areas from which waste rock has been excavated (e.g., TP-4) to promote vegetative growth and possible addition of lime or other buffering agents.	Areas where waste rock has been excavated will be covered with soil or left as exposed bedrock.
Performing maintenance and inspections of the covers, monitoring of the unnamed tributaries of Lord Brook and Lord Brook, Institutional controls, and Five-Year Reviews.	No change.
Estimated Cost: Capital \$3.75 Present Value of Operation & Maintenance: \$0.26	Updated estimated cost of the components included in the 2006 ROD is \$5.8 million. The additional cost associated with the items identified in the ESD as modifications to the 2006 ROD is \$4 million. Total Estimated Cost: Capital: \$9.8 million

Change in Expected Outcomes

There is no change in the expected outcome for the Remedial Action. The expected outcome is that the surface water at the points of compliance will comply with federal and state water quality standards and allow for biological recovery of the tributaries of Lord Brook.

VI. Support Agency Comments

VTDEC participated with EPA in developing the changes to the selected remedy described herein. The State is reviewing the ESD and will provide its final comments and/or approval after the close of the public comment period.

VII. Statutory Determinations

There are no substantive changes to the applicable or relevant and appropriate requirements (ARARs) identified in the September 2006 ROD as a result of remedy changes documented in this ESD.

EPA has evaluated the requirements of the applicable federal Clean Water Act standards, and determined that the 2006 ROD's finding that the remedy is the least environmentally damaging practicable alternative to protect downstream federally regulated wetland and aquatic resources from acid rock drainage is still applicable in regards to the modifications to the remedy made through this ESD. EPA has also determined that the adverse effects to historic resources are unavoidable in order to protect public health and the environment.

EPA believes that the remedy as adjusted herein remains protective of human health and the environment and satisfies the requirements in Section 121 of CERCLA. The changes made in this ESD have not changed the remedial action objectives for the 2006 ROD.

VIII. Public Participation Compliance

EPA is providing a 30-day public comment period on this ESD from July 31, 2015 through August 30, 2015. Notice of availability for review of the ESD and the Administrative Record was published in the _____ newspaper on _____, encouraging the public to submit comments on this ESD. Any significant comments received during the public comment period will be addressed in a responsiveness summary (Attachment D). In accordance with Section 117(d) of CERCLA and Section 300.825(a) of the NCP, the final ESD and supporting documentation shall become part of the Administrative Record for the Site. This ESD and the Administrative Record are available for public review at the locations and times listed in Section I above.

ATTACHMENT A

VTDEC Concurrence Letter (To be submitted with the Final ESD)

ATTACHMENT B

Figures

ATTACHMENT C

Updated ARARs Tables.

ATTACHMENT D

Responsiveness Summary (To be attached to the Final ESD)

DRAFT

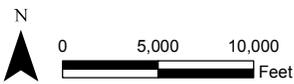
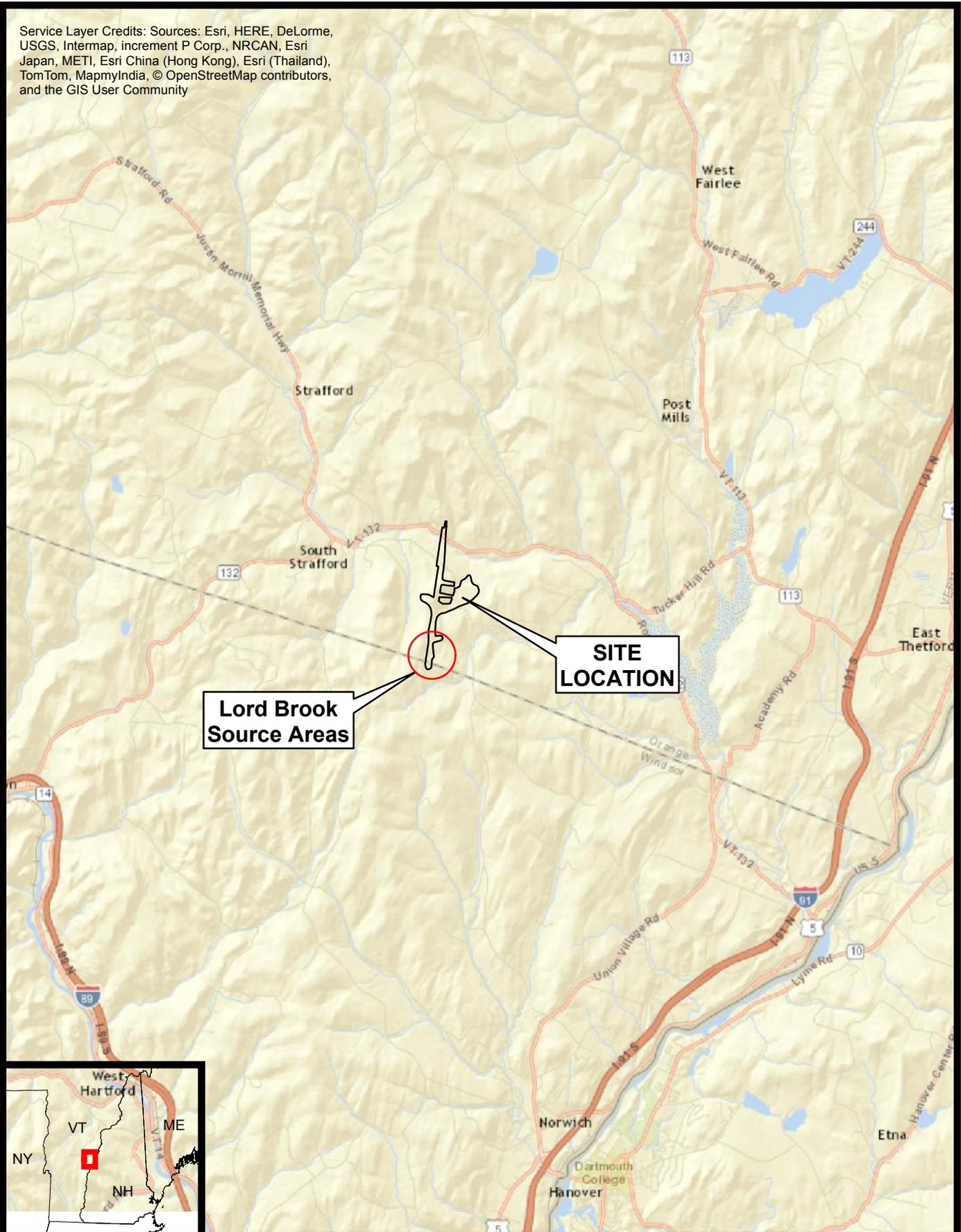
Elizabeth Mine
Phase 2 Remedial Action
Explanation of Significant Differences
Attachments

Elizabeth Mine
Phase 2 Remedial Action
Explanation of Significant Differences
Attachment A – State Concurrence Letter

Elizabeth Mine
Phase 2 Remedial Action
Explanation of Significant Differences
Attachment B- Figures

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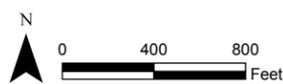
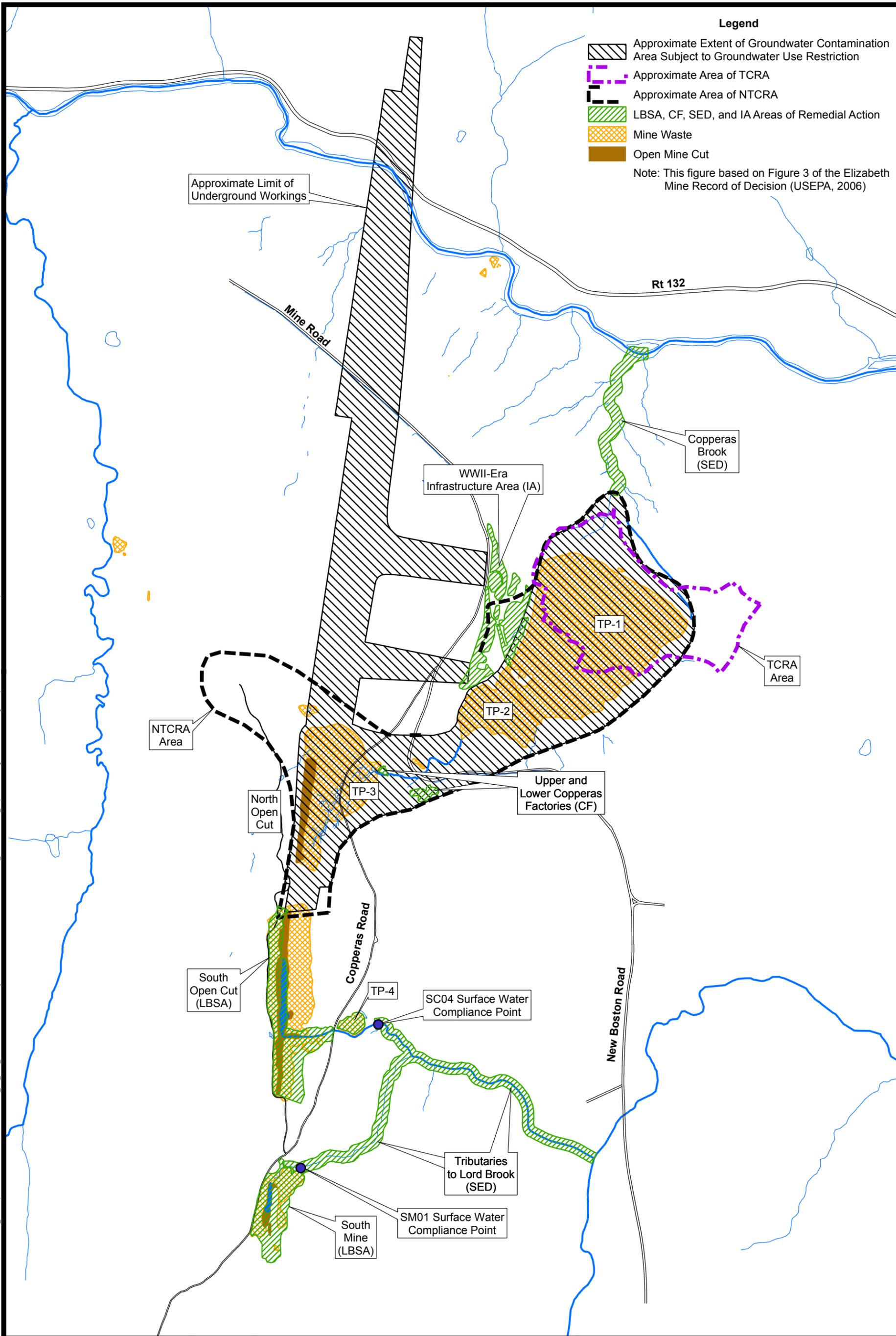
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Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

Site Location Map

Figure 1

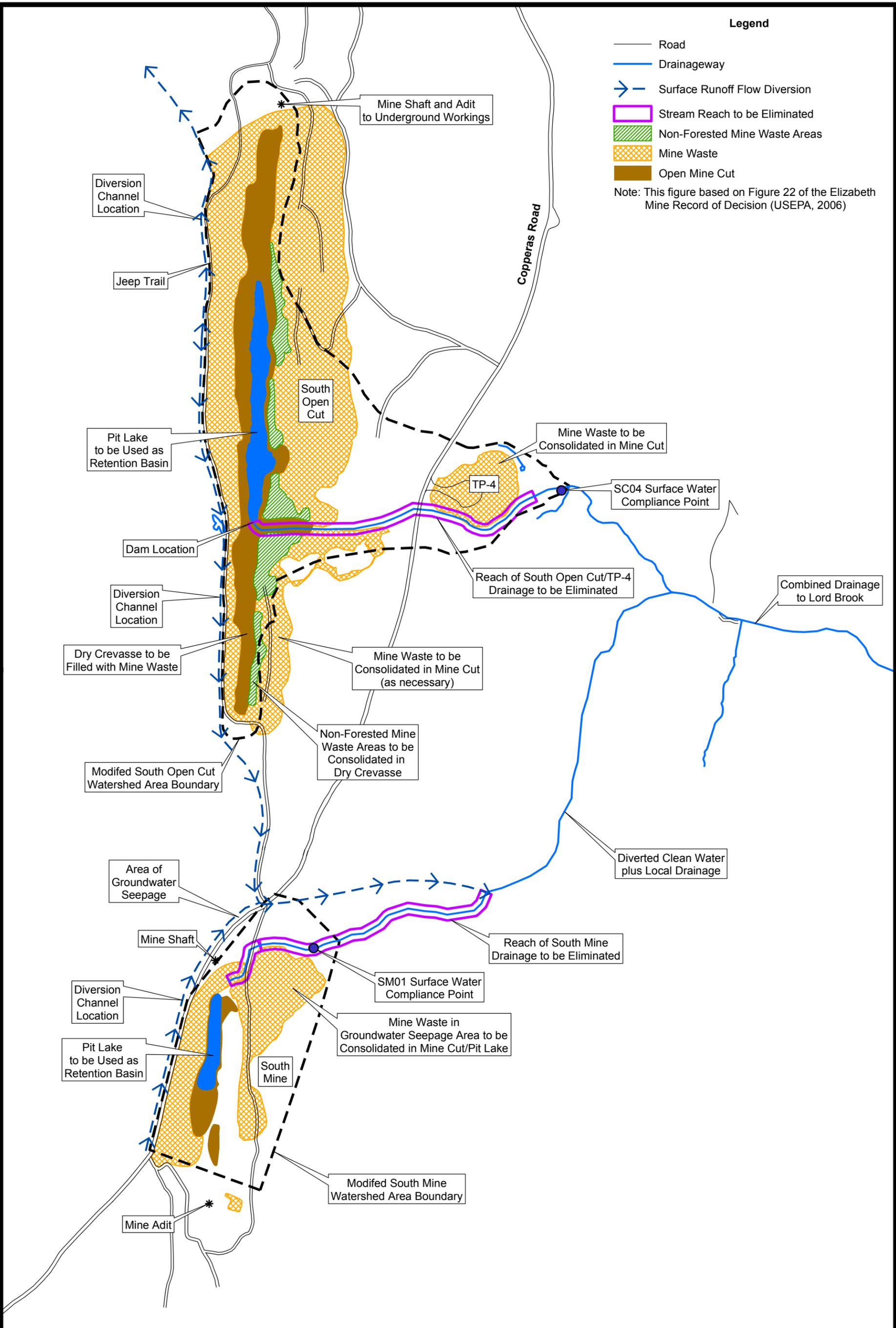


Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

TCRA, NTCRA, and
Remedial Action Areas

Figure 2

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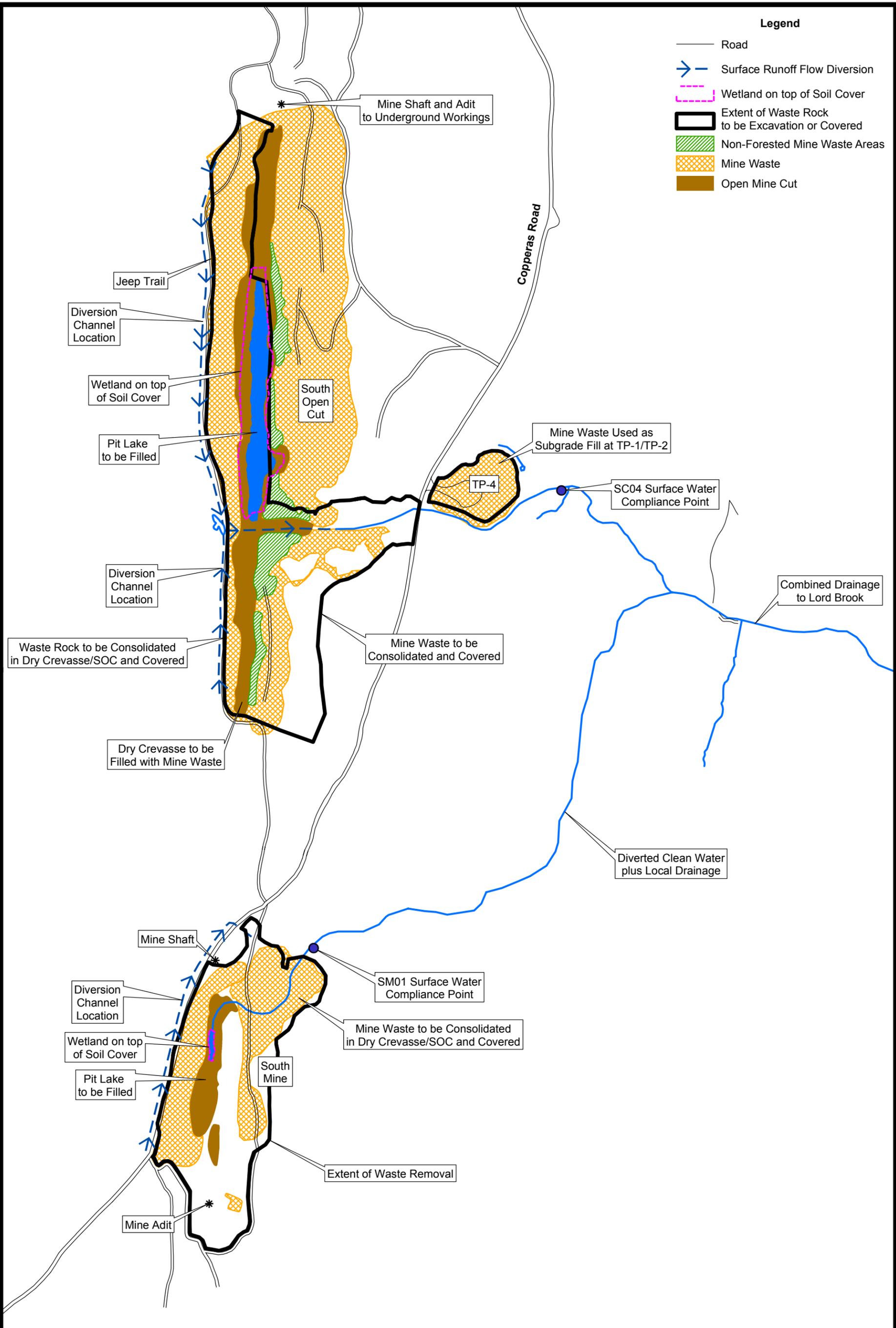


Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

Lord Brook Source Areas
ROD Alternative LBSA-4

Figure 3

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Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

Modified Lord Brook Source Areas
Alternative LBSA-4

Figure 4



Legend

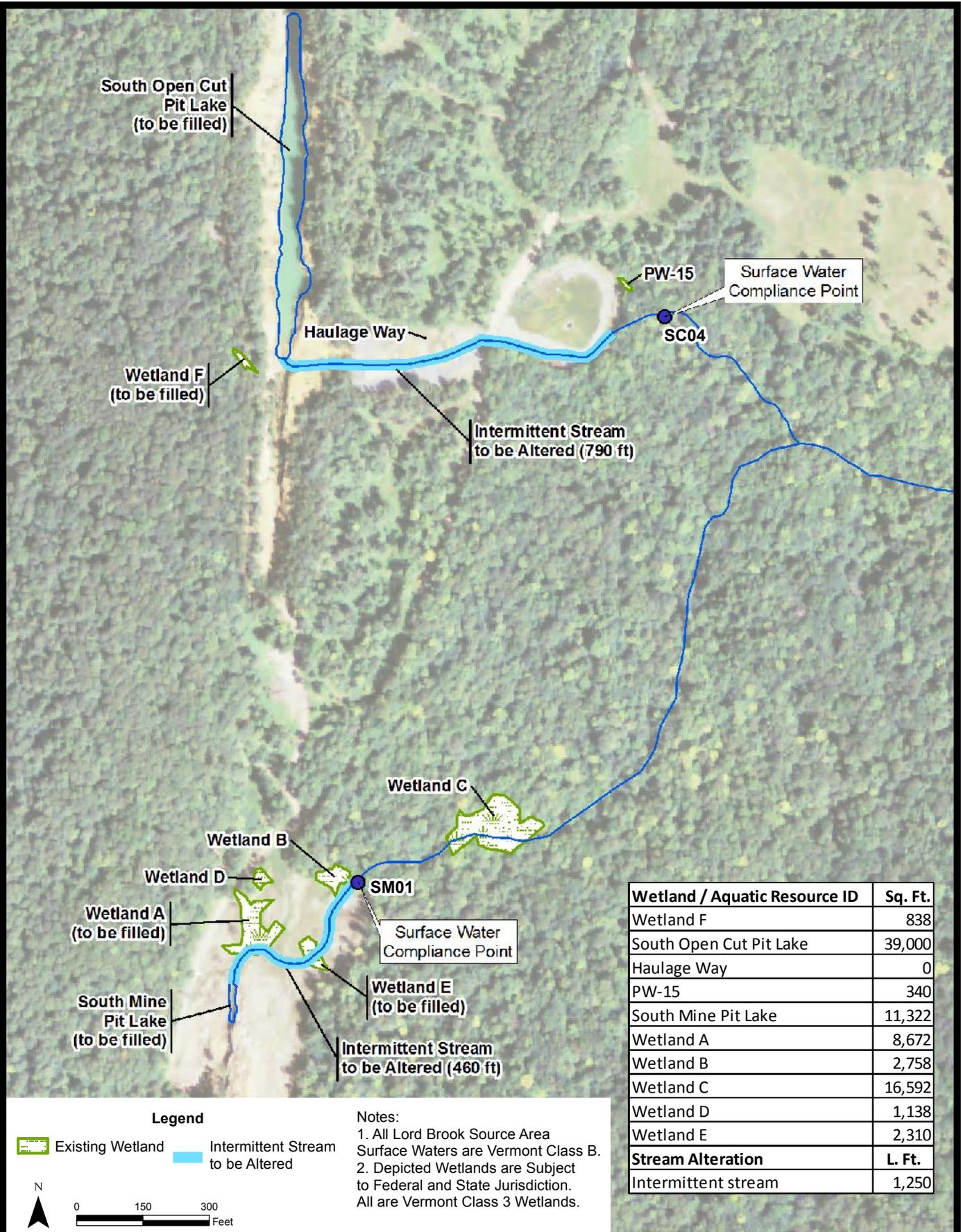
- Sample Location

0 150 300 Feet



Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

South Mine and South Open Cut
Surface Water Sample Locations
Figure 5

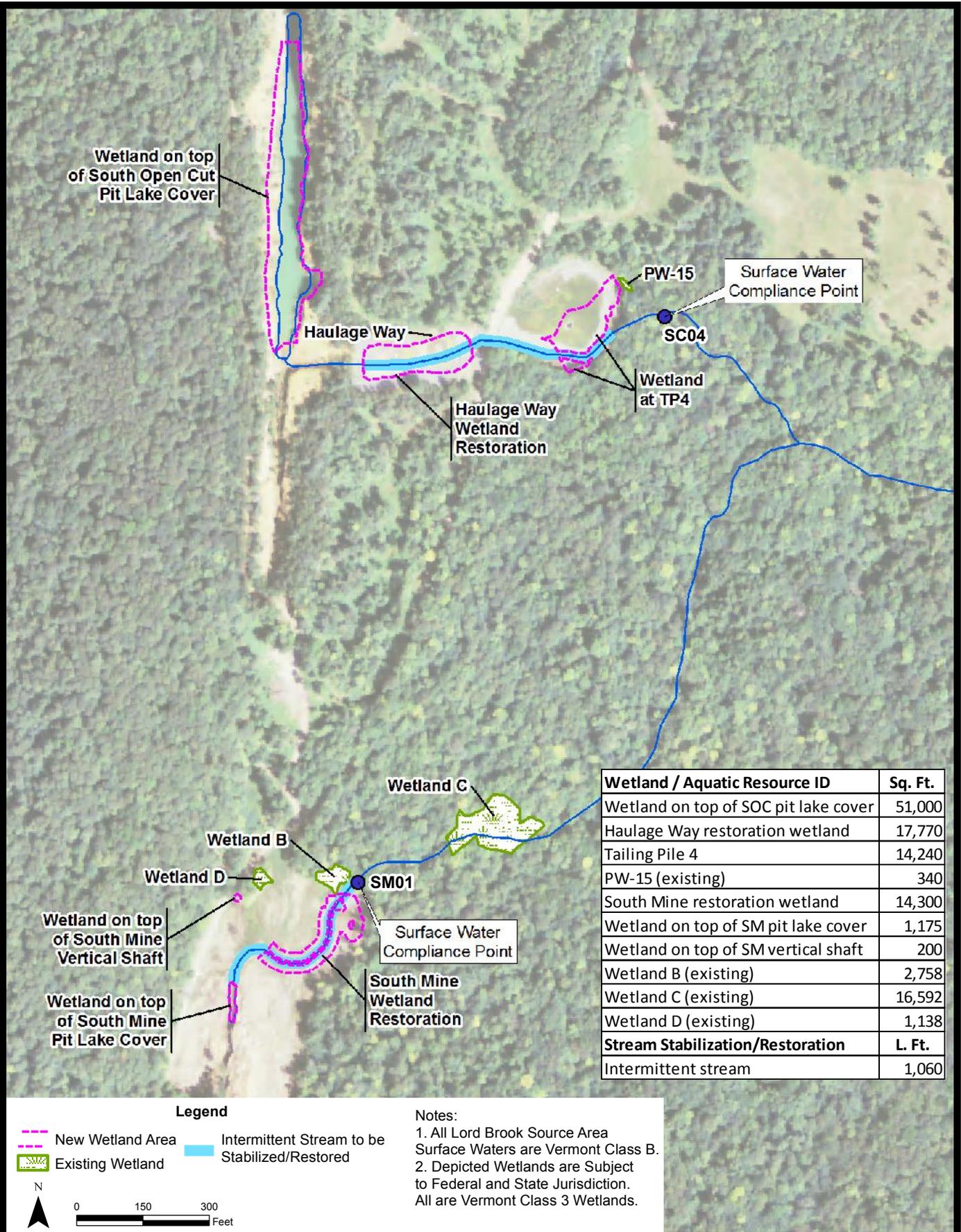


Wetland / Aquatic Resource ID	Sq. Ft.
Wetland F	838
South Open Cut Pit Lake	39,000
Haulage Way	0
PW-15	340
South Mine Pit Lake	11,322
Wetland A	8,672
Wetland B	2,758
Wetland C	16,592
Wetland D	1,138
Wetland E	2,310
Stream Alteration	L. Ft.
Intermittent stream	1,250



Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

Pre-remediation Wetlands and Aquatic Resources at Lord Brook Source Areas
Figure 6



Legend

- New Wetland Area
- Existing Wetland
- Intermittent Stream to be Stabilized/Restored

N

0 150 300 Feet

Notes:

1. All Lord Brook Source Area Surface Waters are Vermont Class B.
2. Depicted Wetlands are Subject to Federal and State Jurisdiction. All are Vermont Class 3 Wetlands.



Phase 2 RA Explanation of Significant Differences
Elizabeth Mine Superfund Site
South Strafford, Vermont

Modified Remedial Action Wetlands and Aquatic Resources at Lord Brook Source Areas
Figure 7

Elizabeth Mine
Phase 2 Remedial Action
Explanation of Significant Differences
Attachment C – Updated ARAR Tables

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
CHEMICAL-SPECIFIC ARARs				
STATE ARARs				
Vermont Water Quality Standards, Appendix C	Relevant and Appropriate	Establishes numerical standards for the protection of human health and aquatic biota for surface waters. All of the surface water at the Site are expected to meet criteria required for Class B waters.	Alternative LBSA- 4B would be designed and implemented to support criteria required for Class B waters for the surface water segments not in compliance.	No change in requirements to meet these water quality standards at the compliance points in the Lord Brook tributaries, although the design and implementation of the remedy upstream of the points of compliance has been modified under the ESD.
FEDERAL ARARs				
Clean Water Act (CWA), Federal Ambient Water Quality Criteria <u>National Recommended Water Quality Criteria</u> , 40 C.F.R. § 122.44	Relevant and Appropriate	These standards were used to develop numerical standards for the protection of human health and aquatic biota quality for surface water and sediment at and downstream of the compliance points.	This alternative would comply with these requirements since acid rock drainage will be partially consolidated and surface water flow altered. Standards used to develop water quality and sediment cleanup standards for the waterways at and downstream of the points of compliance.	These standards are now referred to as National Recommended Water Quality Criteria (NRWQC). No change in these requirements to meet water quality and sediment standards at the compliance points in the Lord Brook tributaries, although the design and implementation of the remedy upstream of the points of compliance has been modified under the ESD.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
EPA National Recommended Water Quality Criteria - EPA 822-R-02-047, EPA 2002.	To Be Considered	This guidance regarding the NRWQC is based on data and scientific judgments about the relationship between pollutant concentrations and environmental and human health effects. They provide guidance to states in adopting water quality standards in support of the CWA. They are not regulations in themselves, and do not impose legally binding requirements. These criteria were considered in the establishment of site-specific cleanup levels and delineation criteria for surface water when Vermont Water Quality Standards and National Recommended Water Quality Criteria were not available.	LBSA-4 meets these standards by taking actions to control upgradient acid rock drainage to achieve water quality criteria.	No change in this guidance used to establish water quality and sediment standards at the compliance points in the Lord Brook tributaries, although the design and implementation of the remedy upstream of the points of compliance has been modified under the ESD.
EPA Risk Reference Doses (RfDs)	To Be Considered	Risk reference doses (RfDs) are estimates of daily exposure levels that are unlikely to cause significant adverse non-carcinogenic health effects over a lifetime.	This alternative will meet this standard, since the actions taken will address site risks through consolidation of mine waste and elimination of acid rock drainage so that it does not pose a risk.	This guidance used to determine that the mine waste and acid rock drainage does not pose a non-carcinogenic human health risk.
EPA Carcinogen Assessment Group, Cancer Slope Factors (CSFs)	To Be Considered	CSFs are used to compute the incremental cancer risk from exposure to contaminants and represent the most up-to-date information on cancer risk from EPA's Carcinogen Assessment Group.	This alternative will meet this standard, since the actions taken will address site risks through consolidation of mine waste and elimination of acid rock drainage so that it does not pose a risk.	This guidance used to determine that the mine waste and acid rock drainage does not pose a carcinogenic human health risk.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/00 1F (March 2005)	To be Considered	Provides guidance on conducting risk assessments involving carcinogens	Until updated or replaced, this guidance will be used by EPA to evaluate all risk assessments on carcinogenicity conducted in the future at the Site.	This guidance used to determine that the mine waste and acid rock drainage does not pose a carcinogenic human health risk.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To be Considered	Provides guidance on conducting risk assessments involving carcinogens' effects on children	Until updated or replaced, this guidance will be used by EPA to evaluate all risk assessments on carcinogenicity conducted in the future at the Site.	This guidance used to determine that the mine waste and acid rock drainage does not pose a carcinogenic human health risk to children.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
LOCATION-SPECIFIC ARARS				
STATE ARARs				
Vermont Wetlands Protection and Water Resources Management Act, 10 V.S.A. Chapter 37; Vermont Wetlands Rules	Applicable	These standards establish criteria for protecting Class I and Class II wetlands, which are considered significant wetlands, and set forth standards for permitting activities in these wetlands and their accompanying buffer zones. The activities must not have undue adverse impacts on the significant functions of the wetland. Class III wetlands are defined, but are considered sub-jurisdictional under these rules (they are addressed under the Vermont State Land Use And Development Plans Act, 10 V.S.A. Chapter 151, below).	No Class I or Class II wetlands were identified in the area to be impacted by the Lord Brook Alternatives. Alternative LBSA- 4 would have an unavoidable undue adverse impact on low functional value Class III wetlands in the vicinity of the Lord Brook Source Areas.	As a result of the filling of the South Mine and South Open Cut pit lakes, the modified remedy will alter more Class III wetlands than the remedy described in the 2006 ROD. The 2006 ROD identified that about 0.8 acres of impaired Class III wetlands would be impacted and restored with 1.1 acres (the South Mine and South Open Cut pit lakes) remaining as impaired surface water bodies/wetlands. The modified remedy will result in impact to all 1.9 acres of waterbodies/Class III wetlands (including the South Mine and South Open Cut pit lakes) but will also result in restoration/creation of 2.8 acres of wetlands, including functional wetlands in place of the impaired pit lakes. By filling the pit lakes, downstream wetland resources will be better protected because the modified remedy does not rely

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
				on the maintenance of a passive treatment system to achieve water quality standards, particularly during peak rain/snow melt periods.
Vermont's State Land Use and Development Plans Act (Act 250), 10 V.S.A. Chapter 151	Applicable	<p>Issues to be addressed in assessing compliance with Act 250 include substantive environmental and facility siting requirements necessary to demonstrate that the activity:</p> <ul style="list-style-type: none"> • will not result in undue water and air pollution (including construction-related dust) (criterion 1); • will protect headwaters (criterion 1(A)); • will meet all standards for disposal of wastes (criterion 1(B)); • will protect floodways (criterion 1(D)); • will, whenever feasible, maintain the natural condition of streams (criterion 1(E)); • will not violate the rules relating to significant wetlands (Class II and III; (criterion 1(G)); 	Alternative LBSA-4 will be designed to minimize impacts on wetlands, include measures for erosion control and dust mitigation, and minimize impacts to historic sites as appropriate. The EPA has determined that unavoidable impacts to wetlands and historic resources are necessary to abate the release of acid mine drainage.	The modified remedy will protect resources regulated under these standards by protecting water quality and downstream wetlands/waterways. Although the pit lakes and other Class III wetlands will be filled, mitigation measures (including establishing wetlands on top of the pit lake covers) will be taken. Unstable mine features will be stabilized reducing safety hazards while taking into account the preservation of historic features, as practicable. Mitigation measures will be taken, as required, to document altered historic mine features.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
		<ul style="list-style-type: none"> • will not cause unreasonable soil erosion (criterion 4); • will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites or rare and irreplaceable natural areas (criterion 8); • will not destroy or significantly imperil necessary wildlife habitat or any endangered species (criterion 8(A)); and • extraction of earth resources will not have an unduly harmful impact upon the environment or surrounding land uses and development and upon approval of a site rehabilitation plan which insures that upon completion of the extracting or processing operation the site will be left in a condition suited for an approved alternative use or development (criterion 9(E)). 		
Vermont Regulation of Stream Flow Act,	Applicable	Regulates and permits activities that interrupt the natural flow of water in watercourses to protect against damage to aquatic life, prevent creation of flood	Alternative LBSA-4B will be designed to minimize the impact of the cleanup on the unnamed tributaries to Lord Brook below the point of compliance. Permanent	The modified remedy will better protect stream resources because it does not rely on the maintenance of a passive treatment system to

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
10 V.S.A. Chapter 41		hazards, and protect from damaging the rights of riparian owners.	alteration of the streams (intermittent ephemeral streams) above the point of compliance will occur as an unavoidable consequence of the activities required to restore the stream to meet Vermont Class B Water Quality Standards below the point of compliance.	achieve water quality standards and control stream flows in the Lord Brook tributaries, particularly during peak rain/snow melt periods.
Vermont Protection of Endangered Species Act, 10 V.S.A., Chapter 123	Applicable	At the time of the original ROD in 2006, there were two bat species the Small Footed Bat (<i>Myotis leibii</i>) and Indiana Bat (<i>Myotis sodalis</i>) are listed as threatened or endangered species in Vermont and only the small-footed bat was documented at the site and may be found in the mine tunnels at the South Open Cut.	Alternative LBSA-4 The area contains potential habitat for listed bat species. There will be continued coordination with State wildlife officials during implementation of the remedy and, if required, remedial measures will be conducted in compliance with these standards.	Since the ROD, three additional bat species have been added as endangered species under the Act: little brown bat (<i>Myotis lucifugus</i>), tri-colored bat (<i>Perimyotis subflavus</i>) and Northern long-eared bat (<i>Myotis septentrionalis</i>). The modified remedy will not have an adverse impact on threatened or endangered species. Endangered bats have not been identified using the mine tunnels at the South Open Cut.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
FEDERAL ARARs				
Federal Protection of Wetlands, Executive Order 11990, 40 CFR 40 CFR Part 6, App. A	Applicable	<p>Prohibits activities that adversely affect a federally regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.</p> <p>Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy and modification of wetlands. Requires soliciting public comment on any disturbance of federally regulated wetlands.</p>	<p>There will be unavoidable impacts on to federally regulated wetlands during the implementation of the remedy which would occur in order to abate the ongoing impacts to the wetlands and surface water surrounding the Lord Brook Source Areas. A wetlands delineation would be implemented as a component of the design for Alternative LBSA 4. The design and implementation of Alternative LBSA 4 includes all practicable measures to minimize harm to wetlands. EPA has sought public comment regarding the potential impacts to wetlands at the Site.</p>	The regulations promulgating the substantive requirements of the wetlands Executive Order have been removed from Code of Federal Regulations. In its place EPA is adding relevant and appropriate FEMA regulations (see below) which promulgate the substantive requirements of the wetlands Executive Order.
Floodplain Management and Protection of Wetlands, 44 C.F.R. § 9	Relevant and Appropriate	Federal Emergency Management Agency (FEMA) regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands. Under these regulations no activity that adversely affects a federal jurisdictional wetland shall be permitted if a practicable alternative with lesser effects is available. Action to avoid, whenever possible, the long- and short-term	Not cited in the ROD.	Former wetland regulations that incorporated Executive Order 11990 at 40 C.F.R. Part 6, Appendix no longer exist so have been replaced by requirements to meet the Executive Order standards at 44 C.F.R. § 9. No federal jurisdictional wetlands are located in the area to be altered by the modified remedy. The modified remedy will protect downstream federal jurisdictional

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
		impacts on wetlands and to preserve and enhance wetlands.		wetlands and will not alter downstream floodplain resources.
Federal Clean Water Act, Section 404, 33 U.S.C. § 1344; 40 C.F.R. Part 230; 33 C.F.R. Parts 320-323	Applicable	Prohibits the discharge of dredge or fill material into a federally-regulated aquatic ecosystem, if a practicable alternative with lesser effects is available. For any alternative selected that may dredge or fill a water of the U.S., a finding that No Practicable Alternative was available and that the general prohibitions in 40 C.F.R. § 230.10 and the factual determinations of 40 C.F.R. § 230.11 were unavoidable is required.	Alternative LBSA-4 would include potential dredge and fill activities associated with the installation of conveyance channels to collect and treat the acid rock drainage and the excavation and re-location of TP-4. The implementation would use BMPs to minimize the impacts of the cleanup, particularly on downstream surface water resources. This alternative is the least damaging practicable alternative, since LBSA-4 is both protective of wetlands and aquatic resources and addresses site risks.	The excavation and relocation of TP-4 was conducted as part of the NTCRA rather than the LBSA-4 remedy. Final restoration of the area will still be conducted as part of the ROD remedy. The revision of the remedy through the ESD will occur upgradient of federal jurisdictional wetlands and will be conducted to protect downstream wetland resources.
Fish and Wildlife Coordination Act, 16 U.S.C. § 661 <i>et seq.</i> , as amended; 40 CFR 6.302	Applicable	Consultation with the U.S. Fish and Wildlife Service and appropriate state wildlife agency is required for modification of a body of water or federally-listed endangered or threatened species habitat. Consultation to develop measures to prevent, mitigate, or compensate for the loss of fish and wildlife or federally listed endangered or threatened species habitat.	The implementation of the design and cleanup for Alternative LBSA-4B will be coordinated with the U.S. Fish and Wildlife Service.	Regulations under 40 C.F.R. § 6.302 have been removed from the federal Code of Federal Regulations. However, the statutory requirements under the Act to consult are still in effect.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
Federal Endangered Species Act of 1973 (ESA), 16 U.S.C. § 1531 <i>et seq.</i> ; 33 C.F.R. Part 320	Applicable	The purpose of the ESA is to “conserve the ecosystems upon with threatened and endangered species depend” and to conserve and recover listed species. Federal agencies must consult with the U.S. Fish and Wildlife Service to ensure that the actions they authorize, fund, or carry out will not jeopardize listed species. The law provides for critical habitat designations for listed species. Critical habitat designations affect Federal agency actions and federally funded or permitted activities.	The area contains potential habitat for listed bat species. There will be continued coordination with federal wildlife officials during implementation of the remedy and, if required, remedial measures will be conducted in compliance with these standards.	The Northern Long-Eared Bat (<i>Myotis septentrionalis</i>) is listed as a threatened species under the Act. Bat surveys have documented the presence of this species at the Elizabeth Mine.
National Historic Preservation Act (NHPA), Section 106, 16 U.S.C. § 470 <i>et seq.</i> ; 36 C.F.R. Part 800	Applicable	Section 106 of the NHPA requires EPA to take into account the effect of all of its actions on historic properties. In consultation with the State Historic Preservation Officer (SHPO), the EPA has determined the Elizabeth Mine Site eligible for the National Register. The consultation is to identify potential adverse effects on historic properties and seek ways to avoid, minimize or mitigate any such effects on historic properties.	EPA has determined that unavoidable adverse impacts will occur to historic resources at the Site. Alternative LBSA-4B would minimize the potential impacts by collecting and treating the discharge from the South Open Cut. The South Mine and South Open Cut areas would be graded and partially filled and some visual impacts would be associated with the collection and storage systems implemented as part of the Alternative. EPA will consult with the SHPO and the community regarding the loss of historic resources.	The revised remedy will alter more of the historical mine features, including eliminating the pit lakes. Visible mine features will be preserved to the extent practicable and additional mitigation measures will be taken as required. EPA will continue to consult with the SHPO and interested community members regarding the alteration of historic resources.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
Archeological and Historic Preservation Act, 16 U.S.C. § 469 <i>et seq.</i> ; 36 C.F.R. Part 65	Applicable	This standard requires that, whenever any federal agency finds or is made aware that its activity in connection with any construction project or federally licensed project, activity, or program may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data such agency shall undertake the recovery, protection, and preservation of such data or notify the Secretary of the Interior. The undertaking could include a preliminary survey (or other investigation as needed) and analysis and publication of the reports resulting from such investigation.	No significant scientific, pre-historic, historical, or archaeological data has been identified as a result of the site surveys. No data recovery efforts will be necessary for Alternative LBSA-4B.	The revised remedy is not expected to alter any significant scientific, pre-historic, or archeological resources, but site surveys will confirm the determination prior to implementation of the revised remedy.
ACTION-SPECIFIC ARARS				
STATE ARARs				
Vermont Water Pollution Control Act, 10 V.S.A. Chapter 47; Vermont Water Quality Standards Ch 1, 2, and 3 and Appendix C and D; and Vermont	Applicable	Establishes water quality standards for surface waters and applies to alternatives that call for monitoring surface water bodies on- and off- site. The regulations stipulate requirements for discharges to surface waters, compliance with NPDES standards, and meeting stormwater management requirements.	Certain impaired waters upgradient of the compliance point will be eliminated to remove acid and metal discharges so that surface waters below the compliance point will meet Class B waters standards. Under alternatives LBSA-4B the impaired water will be partially eliminated and other portions will be incorporated into the	The modified remedy, included potential increased discharges to surface waters, will be implemented in compliance with these standards. There are no changes to the monitoring requirements.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
National Pollutant Discharge Elimination System (NPDES) Regulations Ch. 13			storage system for the collection and treatment systems. This will enable the treatment of the impaired water to result in the discharge of water that meets water quality standards at the compliance point. Monitoring will assess continued attainment of water quality standards at the compliance points and institutional controls will prevent alteration of the remedy.	
Vermont Stormwater Management Act, 10 V.S.A. § 1263 and § 1264; Vermont Stormwater Management Rule, Env. Prot. R. Ch. 18	Applicable	Activities that create more than one acre of impervious surfaces, including roads, and expansions to existing impervious surfaces that result in a total of one acre of impervious surfaces or more must implement measures to address the storm-water discharges from the impervious surfaces.	Alternative LBSA-4B would include measures to comply with these requirements through the design of measures to mitigate the release of stormwater from impervious surfaces.	The modified remedy will be conducted in compliance with these standards.
Vermont Dam Statute, 10 VSA Chapter 43	Applicable	This statute governs all dams that are constructed that impound more than 500,000 cubic feet of water and sediment. Substantive environmental and facility siting standards that pertain to alternatives that include damming are applicable	The dam at the South Open Cut will be constructed and maintained in compliance with all substantive environmental standards.	Under the modified remedy no dam will be constructed since the South Open Cut pit lake will be filled. As a result, this ARAR is no longer relevant to the Phase 2 Remedial Action.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
<u>Vermont Environmental Protection Rule, Chapter 11, Underground Injection Control Regulations</u>	Relevant and Appropriate	Substantive requirements for injection of substances into groundwater for <i>in situ</i> groundwater treatment.	If drainage from the site is discharged into a groundwater infiltration system then the substantive environmental provisions will be relevant and appropriate.	No change to these discharge standards. Under the modified remedy potentially a significantly larger volume of water than anticipated under the ROD as a result of the dewatering of the pit lakes may be discharged underground.
Vermont Air Pollution Control Act, 10 V.S.A. Chapter 23 and Air Pollution Control Regulations Env. Prot. R. Ch. 5	Relevant and Appropriate	Establishes authority for a coordinated statewide program of air pollution prevention, abatement and control. Lists prohibited activities affecting air quality and establishes primary and secondary ambient air quality standards for sulfur oxides, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead. The secondary standard for particulate matter is 150 micrograms per cubic meter, 24 hour average, not to be exceeded more than once per year.	Alternative LBSA-4B will be designed to comply with these requirements. Cleanup actions and long term maintenance of the cap/cover will be designed and implemented to meet these requirements by limiting particulate matter emissions.	No change to these air standards.
Vermont Handbook for Erosion Prevention and Sediment Control, Released in 2006.	To Be Considered	A compilation of information from various sources released by the Vermont Department of Environmental Conservation for use in developing the erosion prevention and sediment control	The manual will be used as guidance in the development of the Sediment and Erosion Control Plan.	No change to these standards.

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
		plans required for construction-related stormwater discharge permitting.		
FEDERAL ARARs				
Federal Clean Water Act, Section 402 - National Pollution Discharge Elimination System (33 U.S.C. § 1342; 40 C.F.R. §§ 122-135, 131)	Applicable	These regulations contain discharge limitations, monitoring requirements and best management practices for discharges into navigable waters, i.e., surface waters.	Impaired waters upgradient of the compliance point will be eliminated to remove acid and metal discharges so that surface waters below the compliance point will meet Class B waters standards. Alternatives LBSA-4B will partially eliminate the impaired water and other portions will be incorporated into the storage system for the collection and treatment systems. This will enable the treatment of the impaired water to result in the discharge of water that meets water quality standards at the compliance point. Monitoring will assess continued attainment of water quality standards at the compliance points and institutional controls will prevent alteration of the remedy.	The modified remedy, including potential increased discharges to surface waters, will be implemented in compliance with these standards. There are no changes to the monitoring requirements.
Clean Water Act - Stormwater	Applicable	Applicable to construction activity including clearing, grading and	Construction activities and long-term maintenance will use best management	The modified remedy will be conducted in compliance with

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
Requirements for Construction Sites, 40 C.F.R. § 122.26		excavation, except operations that result in the disturbance of less than five acres of total land area.	practices to comply with these requirements.	these standards.
Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. §§ 1201-1328; 30 C.F.R. §§ 816 and 817	Relevant and Appropriate	Directly applies only to coal sites. Contains narrative standards that require the use of the best technology currently available to minimize disturbances and adverse impacts of the mining operation on fish, wildlife, and related environmental values. Many of the requirement target land reclamation rather than hazardous substances. Requires the covering of acid generating materials and grades that promote drainage.	Alternative LBSA-4B will be designed to minimize the exposure of acid generating material, as appropriate, and promote drainage of mine waste.	The modified remedy will be conducted in compliance with these standards.
Clean Water Act – Groundwater Injection Standards, 40 C.F.R. §§ 144, 146, 147	Relevant and Appropriate	Standards for release contaminants into groundwater via injection wells. Relevant and appropriate to alternatives utilizing infiltration into groundwater.	If drainage from the site is discharged into a groundwater infiltration system then the substantive environmental provisions will be relevant and appropriate.	No change to these discharge standards. Under the modified remedy potentially a significantly larger volume of water than anticipated under the ROD as a result of the dewatering of the pit lakes may be discharged underground.
EPA Specifications for Geotechnical Analysis for Review	To Be Considered	Provides guidelines for proper construction safety design.	Guidance to be used in construction the dam at the South Open Cut.	Under the modified remedy no dam will be constructed since the South Open Cut pit lake will be

Appendix C
 Second Explanation of Significant Differences
 Revised ARARs for the Phase 2 of the Remedial Action Areas
 (Modifying ROD Table 92)
 Lord Brook Source Areas
 Elizabeth Mine Superfund Site, Strafford, Vermont

REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action Taken to Comply with ARARs (As Described in the ROD Table 92)	Change as a Result of the Second ESD
<i>of Dike Stability,</i> EPA Contract No. 68-03-3183				filled. As a result, this ARAR is no longer relevant to the Phase 2 Remedial Action.

Elizabeth Mine
Phase 2 Remedial Action
Explanation of Significant Differences
Attachment D – Responsiveness Summary