COEUR WHARF™
WHARF RESOURCES (USA) INC.

October 1, 2021

Ms. Roberta Hudson
SD DANR, Minerals & Mining
Joe Foss Building
523 East Capitol Ave.
Pierre, SD 57501-3182

RE: Wharf Boston Expansion Large-Scale Mining Permit

Dear Ms. Hudson:

Wharf Resources (U.S.A.), Inc. will be applying for a large-scale mining permit on land immediately adjacent and south of the Wharf Mine in Lawrence County, South Dakota in late 2021. The unique and scenic boundary for the new expansion area includes approximately 50 acres. New mining disturbance will affect approximately 50 acres.

As the first phase of the permitting process, the required "Request for Determination of Special, Exceptional, Critical, or Unique Lands and Intent to Operate" form, a map showing the location of the proposed expansion area, narratives describing the mining operation, and assessment of special, exceptional, critical, or unique status are enclosed. Documentation from the Lawrence County Register of Deeds offices stating this information is on file for public viewing will be provided, when available.

If you have any questions or require further information, please contact me at 605.584.4177.

Sincerely,

Ken Nelson
Mine General Manager

Enclosure

cc: Mr. Matt Zietlow, Wharf Resources (U.S.A.), Inc.|
Ms. Amy Allen, Wharf Resources (U.S.A.), Inc.|
Ms. Crystal M. Hocking, RESPEC
Mr. Ted Spencer, South Dakota State Historic Preservation Office
Ms. Lisa Nesselbeck, SD Archaeological Research Center
Mr. Stan Michals, SD Game, Fish, & Parks

10928 Wharf Road • Lead, South Dakota 57754-9710
Telephone (605) 584-1441 • Fax (605) 584-4184

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Mr. Jim Hagen, SD Department of Tourism
Ms. Davida Hansen, Lawrence County Register of Deeds

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Telephone (605) 584-1441 • Fax (605) 584-4184

Department of Agriculture and Natural Resources
Minerals and Mining Program
523 East Capitol Avenue
Pierre, South Dakota 57501-3182
605 773-4201; Fax: 605 773-5286

REQUEST FOR DETERMINATION OF SPECIAL, EXCEPTIONAL, CRITICAL, OR UNIQUE LANDS AND NOTICE OF INTENT TO OPERATE

Pursuant to SDCL 45-6B and ARSD 74:29:10

Operator's name: Wharf Resources (U.S.A.), Inc.

Mailing address: 10928 Wharf Road
Lead, South Dakota 57754

Telephone: 605-584-1441

Local address: Same as office address.

Telephone: Same as office telephone.

Legal description: Portions of Sections 2 and 3, Township 4 North, Range 2 East.

County: Lawrence

Name and address of surface owner: Wharf Resources (U.S.A.), Inc.
10928 Wharf Road
Lead, South Dakota 57754

Name and address of mineral owner: Mineral Owner Excluding Precambrian: Wharf Resources (USA), Inc.

Mineral Owner Precambrian: Wharf Resources (USA), Inc. - 50% and
Homestake Mining Company of CA - 50%
11457 Bobtail Gulch Street
Lead SD, 57754

Name and address of surface owners within 500 feet of the proposed mining operation:

See Appendix A in the attached document.

I declare and affirm under the penalties of perjury that this claim (petition, application, information) has been examined by me, and to the best of my knowledge and belief, is in all things true and correct.

Signature

Date: 9/30/21

Title: Mine General Manager

FOR DEPARTMENT USE ONLY

The land described in this Request for Determination of Special, Exceptional, Critical, or Unique Lands and Notice of Intent to Operate _____ is _____ is not eligible for inclusion on the list of special, exceptional, critical, or unique lands.

_____ Date: _____

Secretary, Department of Agriculture and Natural Resources

Operator appeal date: _____ Intervenor contest date: _____

The land described in this Request for Determination of Special, Exceptional, Critical, or Unique Lands and Notice of Intent to Operate _____ is _____ is not eligible for inclusion on the list of special, exceptional, critical, or unique lands.

_____ Date: _____

Chairman, SD Board of Minerals and Environment

Instructions for Request for Determination of
Special, Exceptional, Critical, or Unique Lands & Notice of Intent to Operate

Please reference ARSD 74:29:10

1. Complete the Request for Determination of Special, Exceptional, Critical, or Unique Lands & Notice of Intent to Operate pursuant to the requirements of ARSD 74:29:10:03. Please include the following:

   - A map showing sufficient information to locate the area of the proposed mining operation, including access routes and the approximate size and location of areas where surface resources will be disturbed pursuant to 74:29:10:03(03).

   - A general description of the type of mining operation proposed and how it would be conducted pursuant to 74:29:10:03(5).

   - A detailed assessment of whether the lands included in the proposed mining operation meet the criteria of SDCL 45-6B-33.3 including all information and data necessary to support the assessment and its conclusions pursuant to 74:29:10:03(6).

2. At least 60 days prior to the submission of a mine permit application, submit the Request for Determination of Special, Exceptional, Critical, or Unique Lands & Notice of Intent to Operate to:

   Department of Agriculture and Natural Resources
   Minerals and Mining Program
   523 East Capitol Avenue
   Pierre, SD 57501-3182

3. Submit a copy of the Request for Determination of Special, Exceptional, Critical, or Unique Lands & Notice of Intent to Operate to the Register of Deeds of the county where the proposed mining operation is located. You will need to obtain proof of filing the Request with the Register of Deeds and submit that proof to the Department of Agriculture and Natural Resources, Minerals and Mining Program.

4. A copy of the Request for Determination of Special, Exceptional, Critical, or Unique Lands & Notice of Intent to Operate must be submitted to the following agencies. Proof of submitting the Request to each agency will need to be submitted to the Department of Agriculture and Natural Resources, Minerals and Mining Program.

   Lisa Nesselbeck
   Senior Archaeologist
   Archaeological Research Center
   PO Box 1257
   Rapid City, SD 57709-1257

   Stan Michals
   Department of Game, Fish, & Parks
   4130 Adventure Trail
   Rapid City, SD 57702-4804

   Ted Spencer
   State Historical Society
   900 Governors Drive
   Pierre, SD 57501-2200

   Jim Hagen
   Department of Tourism
   Capitol Lake Plaza
   500 East Capitol
   Pierre, SD 57501-3385

WHARF BOSTON EXPANSION PROJECT REQUEST FOR DETERMINATION OF SPECIAL, EXCEPTIONAL, CRITICAL, OR UNIQUE LANDS AND NOTICE OF INTENT TO OPERATE

PREPARED FOR

South Dakota Department of Agriculture and Natural Resources
Minerals & Mining Program
523 East Capitol Avenue
Pierre, South Dakota 57501

OCTOBER 2021

WHARF BOSTON EXPANSION PROJECT REQUEST FOR DETERMINATION OF SPECIAL, EXCEPTIONAL, CRITICAL, OR UNIQUE LANDS AND NOTICE OF INTENT TO OPERATE

PREPARED BY

Wharf Resources (U.S.A.), Inc.
10928 Wharf Road
Lead, South Dakota 57754

PREPARED FOR

South Dakota Department of Agriculture and Natural Resources
Minerals & Mining Program
523 East Capitol Avenue
Pierre, South Dakota 57501

OCTOBER 2021

CONTRIBUTORS TO THE REPORT

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Lead, South Dakota 57754

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P.O. Box 725
Rapid City, South Dakota 57709

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Gillette, Wyoming 82718

BKS Environmental Associates, Inc.
P.O. Box 3467
Gillette, Wyoming 82717

GEI Consultants, Inc.
4601 DTC Boulevard, Suite 900
Denver, Colorado 80237

Quality Services, Inc.
1621 Sheridan Lake Road, Suite A
Rapid City, South Dakota 57702-3432

Dr. Michael Madden
63 Langdon Road
Buffalo, Wyoming 82834

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1.0 INTRODUCTION

This document is submitted in support of Wharf Resources (U.S.A.), Inc. (Wharf) to obtain the required permits and licenses to operate at the Wharf Boston Expansion area of the existing heap-leach gold operations under Administrative Rules of South Dakota (ARSD) 74:29. This application includes approximately 47.4 acres of newly proposed mine area to provide for the continuation of current mining operations. The Boston Expansion area will extend the life of the mine for an additional 1 to 3 years, or until 2028 to potentially 2030.

Per South Dakota regulations, a Large-Scale Mine Permit is required for operations that mine and disturb more than 10 acres of land and extract more than 25,000 tons of material annually as well as any operation that uses cyanide or other chemical or biological leaching agents. A prospective mining operator must request of the South Dakota Department of Agriculture and Natural Resources (SD DANR) to determine whether or not the lands included in the proposed mining operation constitute special, exceptional, critical, or unique lands by submitting a Notice of Intent to Operate to the SD DANR. To fulfill the requirement, South Dakota Codified Law (SDCL) 45-6B-33.3 and ARSD 74:29:10:02 require the operator to submit a Request for Determination of Special, Exceptional, Critical, or Unique Lands. The SD DANR necessitates that the request be submitted and published at least 60 days before the Large-Scale Mine Permit application is submitted.

1.1 LAND CLASSIFICATION

SDCL 45-6B-33 specifies the following classifications:

1. Land is unsuitable for mining if:
    a. Reclamation of the affected land pursuant to the requirements of this chapter is not physically or economically feasible.
    b. Substantial deposition of sediment in stream or lake beds, landslides, or water pollution cannot feasibly be prevented.
    c. The land to be affected by a proposed mining operation includes land that is special, exceptional, critical, or unique as defined in § 45-6B-33.3 and satisfactory mitigation is not possible.
    d. The proposed mining operation will result in the loss or reduction of long-range productivity of aquifer, public and domestic water wells, watershed lands, aquifer recharge areas, or significant agricultural areas.
    e. The biological productivity of the land is such that the loss would jeopardize threatened or endangered species of wildlife indigenous to the area.
    f. The board finds that any probable adverse socioeconomic impacts of the proposed mining operation outweigh the probable beneficial impacts of the operation.
2. Land is deemed to be special, exceptional, critical, or unique if it possesses one or more of the following characteristics:
    a. The land is so ecologically fragile that, once it is adversely affected, it could not return to its former ecological role in the reasonably foreseeable future.

b. The land has such a strong influence on the total ecosystem of which it is a part that even temporary effects felt by it could precipitate a systemwide ecological reaction of unpredictable scope or dimension.
c. The land has scenic, historic, archaeological, topographic, geologic, ethnologic, scientific, cultural, or recreational significance.

1.2 CLEARANCE

The ultimate goal of this application process is to identify those lands, if any, that are eligible for inclusion on South Dakota's preliminary list of special, exceptional, critical, or unique lands. Lands determined to be special, exceptional, critical, or unique may require special conditions in the Large-Scale Mine Permit to protect or mitigate impacts of mining-related activities. ARSD 74:29:10:15 defines the stage for when mining is deemed applicable for the land under consideration as "Clearance" as follows:

> *The lands described in a notice of intent to operate shall be considered cleared for special, exceptional, critical, or unique land characteristics if the department determines that the lands do not constitute special, exceptional, critical, or unique land and no nominating petitions pertaining to lands described in the notice are filed. The clearance shall remain in effect for seven years. If a mine permit application is not submitted within the seven-year period, the board may declare the clearance void and the lands may be reevaluated for special, exceptional, critical, or unique land characteristics.*

1.3 SCOPE OF WORK

Wharf conducted a detailed assessment of the lands included in the proposed mining operation expansion according to the criteria outlined in SDCL 45-6B-33.3. All of the information and data necessary to support the assessment and its conclusions are included in this report application to comply with ARSD 74:29:10:03(6) requirements.

The objectives of the assessment were to evaluate the land so that SD DANR can determine if the lands included in the proposed operation met the following criteria of SDCL 45-6B-33.3:

1. The land is so ecologically fragile that, once it is adversely affected, it could not return to its former ecological role in the reasonably foreseeable future.
2. The land has such a strong influence on the total ecosystem of which it is a part that even temporary effects felt by it could precipitate a systemwide ecological reaction of unpredictable scope or dimension.
3. The land has scenic, historic, archaeologic, topographic, geologic, ethnologic, scientific, cultural, or recreational significance.

These assessments were completed to determine (1) the ecological condition of the proposed mining expansion, (2) if the area is ecologically fragile, and (3) if ecological disturbances will precipitate into a systemwide ecological response. Categories of the assessments include the following:

- Scenic
- Historic
- Archaeologic

- Topographic
- Geologic
- Ethnologic
- Scientific
- Cultural
- Recreational.

This application report consists of seven chapters, including this introduction. Chapters 2.0 and 3.0 describe the proposed mining area and proposed mining operation, respectively. Land-use impacts with respect to land that is ecologically fragile are explained in Chapter 4.0, and summaries of the baseline studies are included in Chapter 5.0. Chapter 6.0 provides a summary of the application, and references are provided in Chapter 7.0. Appendices include landowner information and information regarding the baseline investigations. Baseline reports in electronic format will be included as a part of the Large-Scale Mine Permit application.

1.4 PRELIMINARY LIST OF SPECIAL, EXCEPTIONAL, CRITICAL, OR UNIQUE LANDS

The Boston Expansion area is close to two sites listed on the state's preliminary list of special, exceptional, critical, or unique lands (SDCL 45-6B-104): Spearfish Canyon and the Terry Cemetery. The Boston Expansion area is approximately 2 miles east of Spearfish Canyon and 1.3 miles northwest of the Terry Cemetery. No designated areas of Spearfish Canyon or the Terry Cemetery are included in this application.

2.0 PROPOSED MINING AREA

Wharf has proposed to expand its existing gold mine operations in the area known as the Boston Expansion, which is located on the southern edge of the Wharf Mine along the Portland Ridgeline. The project area, shown in Figure 2-1, is located approximately 4 miles west of Lead, South Dakota, in the Bald Mountain Mining District. The existing Wharf Mine is located in Sections 1, 2, 3, and 4, T4N, R2E and Sections 25, 26, 33, 34, 35, and 36, T5N, R2E of the Black Hills Meridian, Lawrence County, South Dakota. Golden Reward Mine is located in Sections 1 and 12, T4N, R2E and Sections 6 and 7, T4N, R3E.

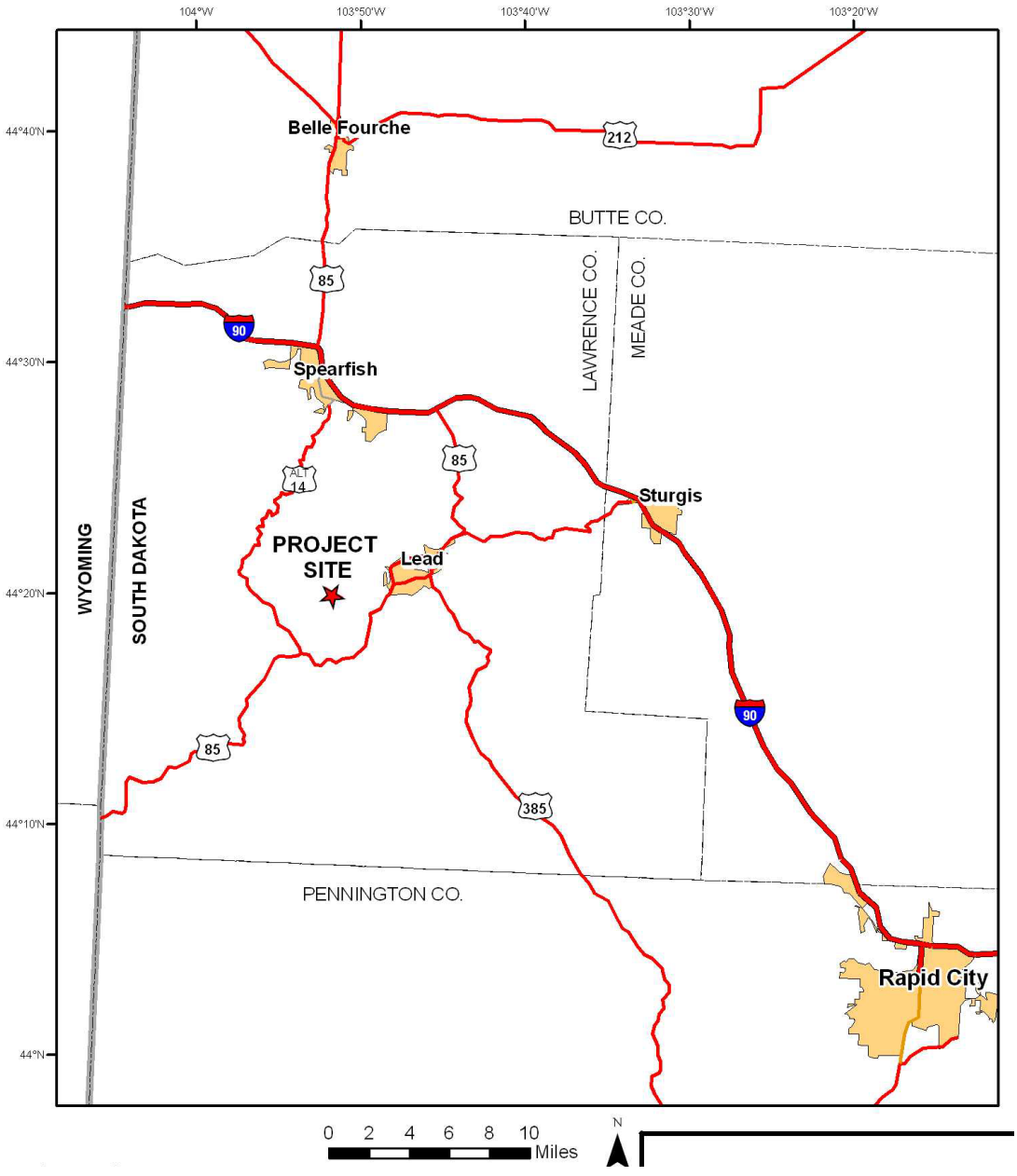

Figure 2-1. Project Location Map.

The Boston Expansion area to be considered for evaluation under this special, exceptional, critical, or unique permit application includes approximately 47.4 acres of private land located in Sections 2 and 3, T4N, R2E. The Boston Expansion project study area is illustrated in Figures 2-2 and 2-3. The solid blue outline represents the current permitted mine boundaries for Wharf and Golden Reward, and the dashed blue line represents the disturbance boundary. The solid pink outline represents the proposed Boston Expansion area as well as the unique and scenic study area boundary for this application. The proposed disturbance areas are shown as a dashed pink outline in Figure 2-3 and do not necessarily represent new pit boundaries. Approximately 47.4 acres are included in the mine permit boundary expansion. A total of 48.7 acres of new disturbance are proposed, which includes 40.6 acres outside the existing permit boundary and 8.1 acres of new disturbance that is within the existing permit boundary but outside the current approved disturbance boundary. Existing facilities and transportation routes will be used for transporting and processing ore and waste rock. Surface disturbances will be spread throughout the proposed disturbance area. Appendix A lists the surface owners of properties within 500 feet adjacent to the proposed surface disturbances. All of the lands within the Boston Expansion area are under Wharf surface and mineral ownership.

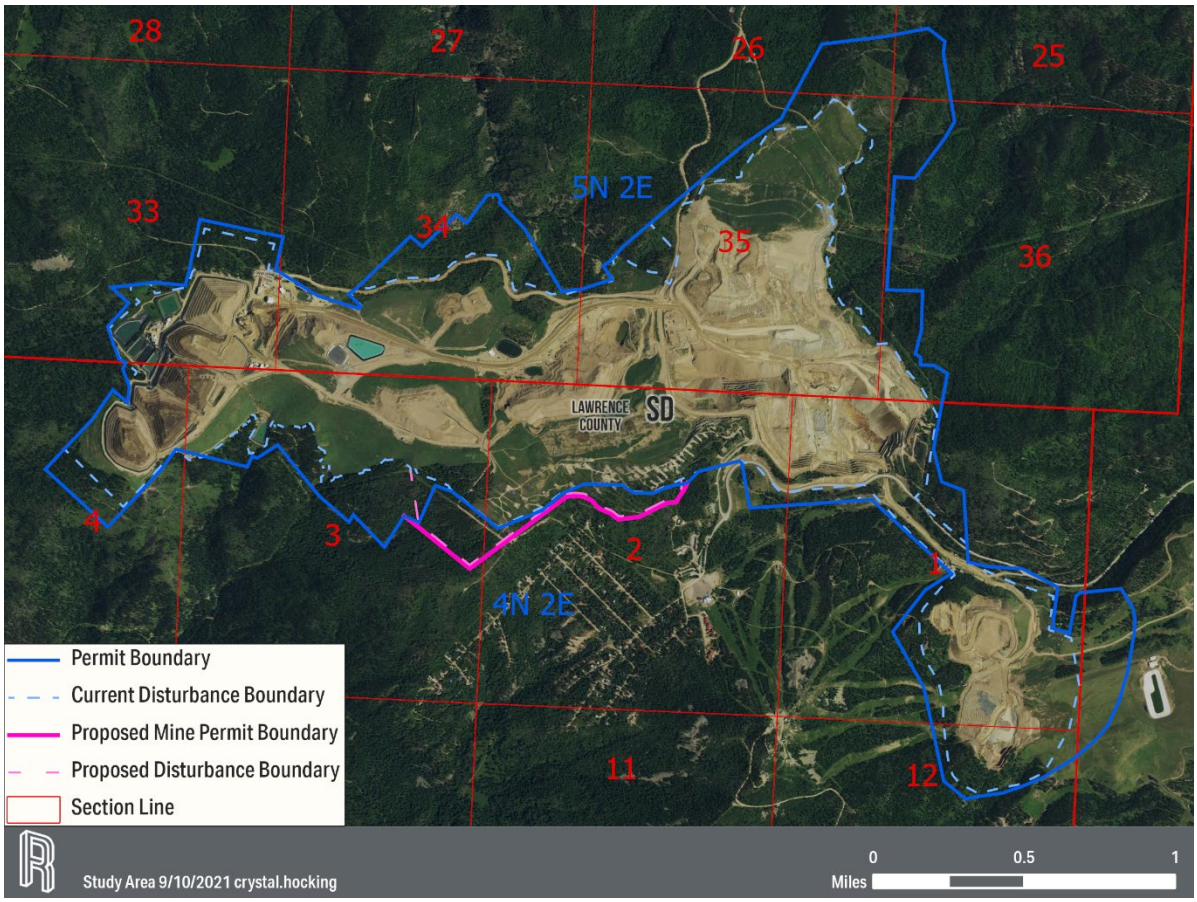

Figure 2-2. Project Disturbance Map.

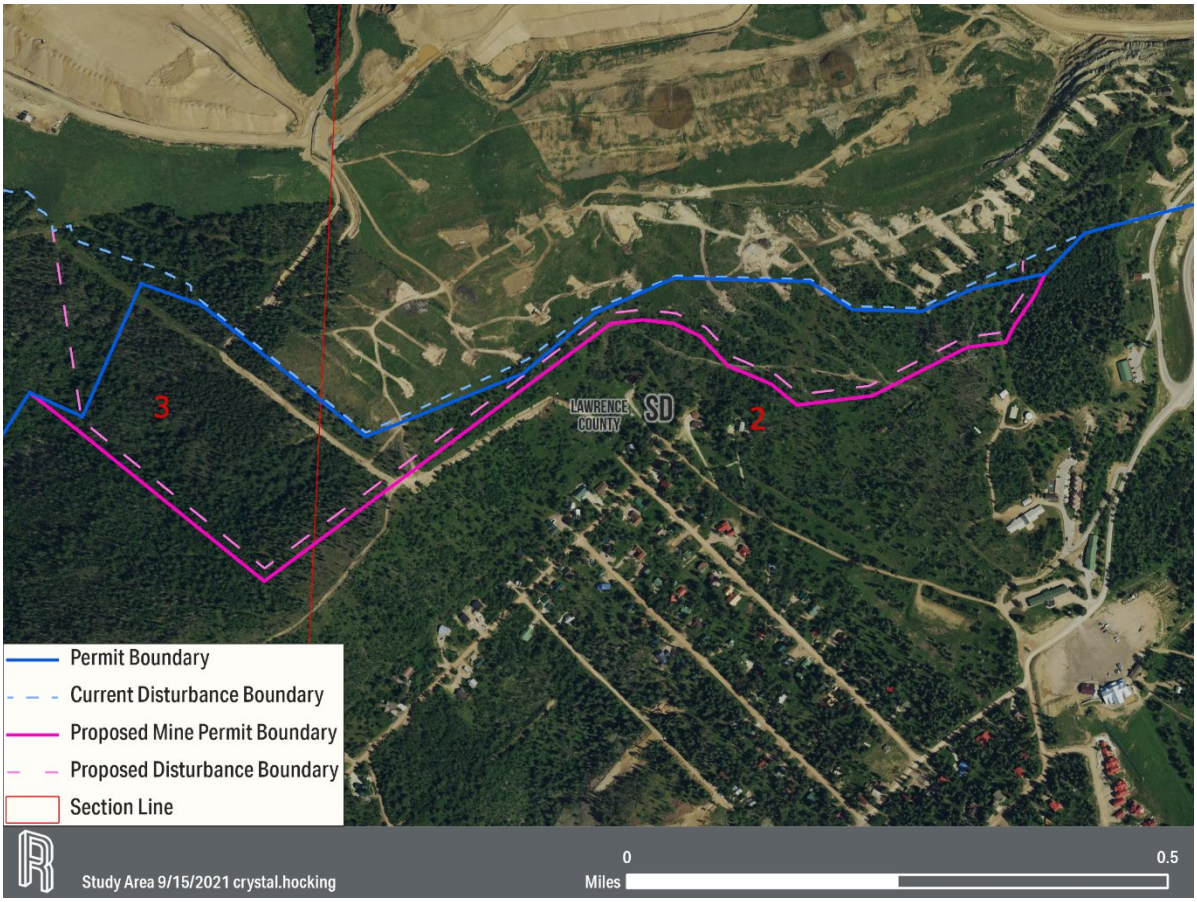

Figure 2-3. Boston Expansion Area.

3.0 DESCRIPTION OF THE PROPOSED MINING OPERATION

Wharf proposes to expand existing mine operations to the south of its current mine permit boundary. The Wharf Mine is located approximately 4 miles west of Lead, South Dakota, in Lawrence County. The property is accessed by Wharf Road and Highway 473, which leads west from Lead. The proposed Boston Expansion is classified as a large-scale mine under South Dakota regulations and will contain approximately 47.4 total acres. Approximately 50 acres are included in this Request for Determination of Special, Exceptional, Critical, or Unique Lands with approximately 48.7 acres of disturbance (see Figure 2-2). Mining the Boston Expansion area is anticipated to increase the mine life by 1 to 3 years, thus extending the total mine life from 2027 to 2028 to potentially 2030.

Mining in the Boston Expansion area will be an open-pit, truck-and-shovel operation like other ongoing operations at Wharf Mine. The proposed project will involve open-pit mining and overburden disposal. Ore extracted from the expansion areas will be trucked to the existing permitted Wharf Mine heap-leaching facility for processing. The proposed project does not require moving or relocating any processing equipment. Processing gold at the Wharf Mine process plant will not change as a result of the expansion project. Ore will continue to be milled at Wharf's crushing plants, and gold will be heap leached on one of the heap-leach pads. The process solution percolated through the leach pad, which is designed to dissolve the gold, will be liquid sodium cyanide as is currently used.

As new mine areas are developed, waste rock and additional overburden material will be used to backfill previously mined areas. Neutralized spent ore will be deposited into the permitted localities that may include the Clinton Expansion area (American Eagle and Deep Portland Pits), Green Mountain, or other permitted localities to be determined; however, final plans will be submitted with the Large-Scale Mine Permit and Groundwater Discharge Permit applications.

The planned preliminary postmining land use is a mixture of woodland grazing and recreation. Woodland grazing is the land use that Wharf has previously reclaimed to and has provided beneficial uses, such as habitat for many species. Reclaiming disturbed areas will be accomplished by recontouring, topsoiling, and revegetating the land in accordance with accepted reclamation techniques. Further reclamation details will be provided in the Large-Scale Mine Permit application.

Wharf currently has several active state mining permits, which are listed in chronological order in Table 3-1. As of January 1, 2021, Wharf Mine comprises 1,979 permitted acres, which includes 1,273 acres that have been previously disturbed, and 269 reclaimed acres (this includes lands at Wharf Mine as well as the Liberty and Harmony Pits at Golden Reward). The proposed project will not be affected by SDCL 45-6B-96, which allows extension of up to 200 acres of surface-mining disturbed land for each active Large-Scale Mine Permit. As shown in Table 3-1, Wharf has maintained six active mine permits and can expand up to 1,200 additional acres of newly disturbed land. The reclaimed acres are also available to be applied to the expansion limit.

Table 3-1. Active Mining Permits Issued to Wharf and Golden Reward

Permit	Permit No.	Action	Effective Date	Expiration Date	Comments
State Mine Permit	356	Permit Issued	December 7, 1982	None	Issued to Tiaga Gold
State Mine Permit	434	Permit Issued	March 21, 1986	None	
State Mine Permit	435	Permit Issued	March 21, 1986	None	
State Mine Permit	450	Permit Issued	June 30, 1988	None	Issued to Golden Reward
State Mine Permit	464	Permit Issued	June 18, 1998	None	Clinton Expansion Area
State Mine Permit	476	Permit Issued	January 19, 2012	None	Green Mountain/Golden Reward Expansion Area
Mining License	90–400	License Issued	August 17, 1992	May 3, 2011	Foley Gravel Permit

4.0 DEFINING IF THE LAND IS ECOLOGICALLY FRAGILE

This chapter addresses potential temporary land-use impacts associated with the proposed mine expansion operation with respect to SDCL 45-6B-33.3.

> *(1) The land is so ecologically fragile that, once it is adversely affected, it could not return to its former ecological role in the reasonably foreseeable future.*

The land within the proposed Boston Expansion area is not ecologically fragile, unique, or pristine. The vegetative habitat and ecology of the area is similar to adjacent areas at Wharf and the north-central Black Hills; much of the land has been previously disturbed by logging or other activities. Primary disturbances to the land via the proposed mining expansion will noticeably alter the landscape during operations. However, landscape changes will not destabilize attributes of the considered resources to the point that the land could not return to its former ecological role in the reasonably foreseeable future. Areas of Wharf's existing operations that have already undergone reclamation activities were successfully restored to woodland grazing, which is evidence that the land is capable of returning to its former ecological role. Postmining land use for the Boston Expansion area will be a combination of rangeland/woodland grazing and recreation, and the ecological role of the area is not predicted to be permanently adversely affected.

> *(2) The land has such a strong influence on the total ecosystem of which it is a part that even temporary effects felt by it could precipitate a system-wide ecological reaction of unpredictable scope or dimension.*

Current information indicates that expansion of mining operations proposed by Wharf will not affect or cause an influence strong enough to impact the total ecosystem and will not precipitate a systemwide reaction of unpredictable scope or dimension. The ecology of the proposed expansion area is similar to that of the north-central Black Hills and Wharf's existing mine operation. Wharf has been mining in Lawrence County since 1974 (more than 45 years), and no systemwide ecological reaction has been documented as a result of its operations.

Impacts on sensitive plant and wildlife species in the expansion area will be minimal. The field surveys in 2021 found only one sensitive vegetation species or species of local concern within the Boston Expansion area. One population of *Vaccinium membranaceum* (mountain huckleberry) is located within the baseline study area [BKS Environmental Associates, Inc., 2021]. The population consisted of approximately 10 individual plants and was found on the western border of the proposed Boston Expansion area in SE ¼ NE ¼, Section 3, T4N, R 2E, as shown on Figure 4-1. Additional summary information about the vegetation surveys is provided in Section 5.7.1 and Appendix B. The final baseline vegetation reports are being prepared and will be provided to SD DANR as part of the Large-Scale Mine Permit application.

During the summer 2021 baseline wildlife survey, seven wildlife species were observed, with only the broad-winged hawk (*Buteo platypterus*) designated as a rare species by the South Dakota Natural Heritage Program (SDNHP). No state or federally listed Threatened and Endangered (T&E) species were

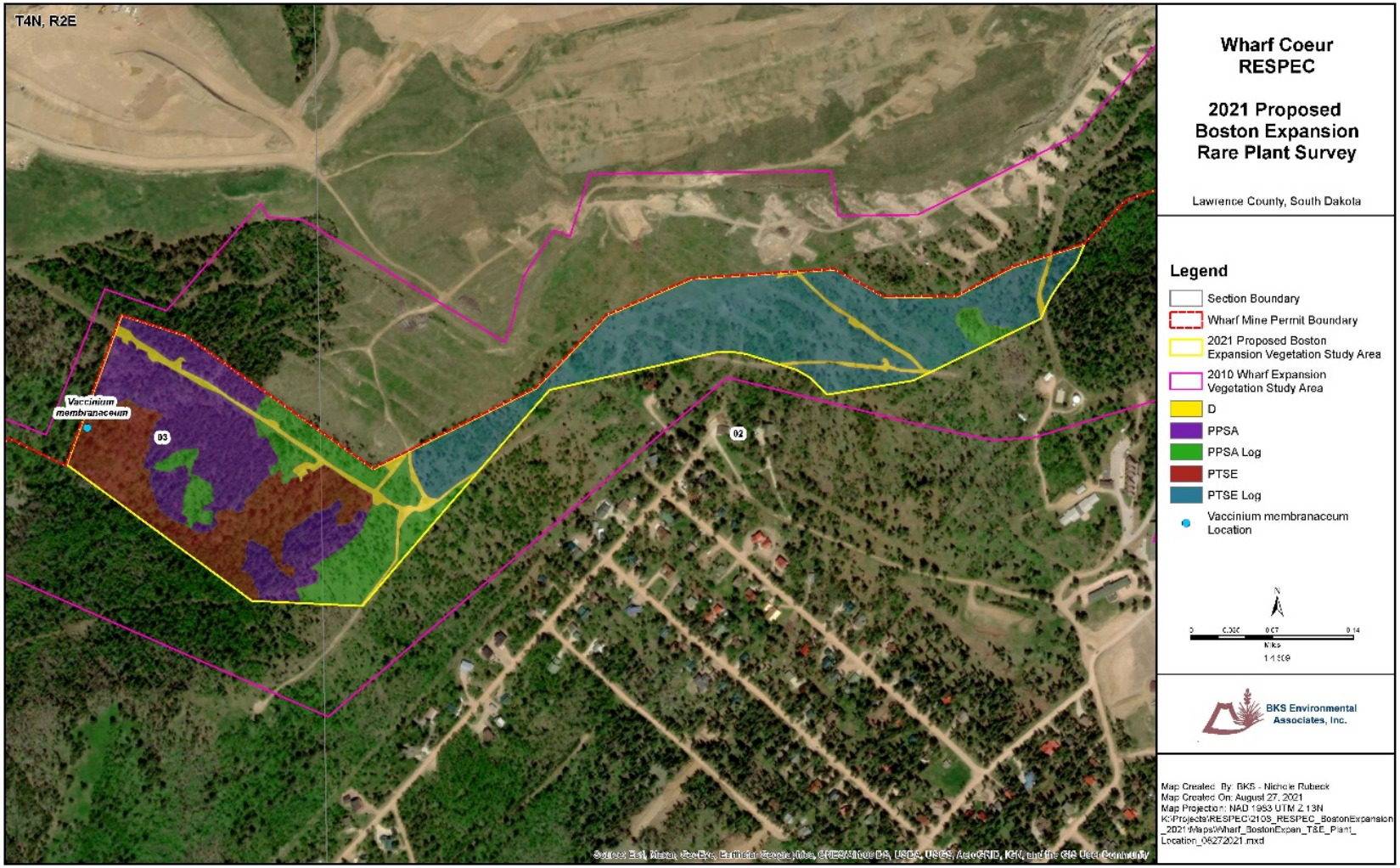

Figure 4-1. Location of Sensitive Plant Species [BKS Environmental Associates, Inc., 2021].

observed during the baseline wildlife survey. Annual wildlife monitoring, which includes raptor nest surveys, has been conducted at the Wharf and Golden Reward Mines for almost 40 years. Numerous raptor nest sites have been identified in the area during current and historical investigations. In the 2021 baseline investigation, only one broad-winged hawk was observed in the Boston Expansion area and did not appear to be actively nesting. No active raptor nests were observed within the proposed Boston Expansion area or 0.5-mile buffer. No other raptor nests (current or historical) exist within the proposed disturbance area and, therefore, no nests will be physically disturbed by proposed mining operations. All of the raptor species documented within or near the Boston Expansion area during 2021 and previous years are known to regularly nest elsewhere in the immediate vicinity or throughout the region. Additional information about wildlife surveys is provided in Section 5.7.3. The most recent wildlife reports will be included as a part of the Large-Scale Mine Permit application.

5.0 ASSESSMENTS OF SCENIC, HISTORIC, ARCHAEOLOGICAL, TOPOGRAPHIC, GEOLOGIC, ETHNOLOGIC, SCIENTIFIC, CULTURAL, OR RECREATIONAL SIGNIFICANCE

5.1 SCENIC

The land within the proposed permit boundary is similar to the surrounding land. The predominant land use is evergreen forest with the remaining area consisting of minor amounts of shrubland, grassland, and mixed forest. The area encompassing the project site is dominantly ponderosa pine-covered slopes. Although the characteristics of this area provide aesthetic appeal, they are similar to surrounding lands and are not unique to the area.

In the past, mining activities at Wharf have been north of the Portland Ridge, which provided some topographical and vegetative screen. The proposed Boston Expansion will push back into the ridgeline and allow for minor increased visibility from public areas. Compared to existing mining disturbance, visual impacts of the expansion will be low. The Boston Expansion area may be slightly visible from Perkins Road but will not be visible from Highway 34 or Interstate 90. The residence areas consist of the Barefoot Condominium area and Lost Camp area, both of which are close to the existing Wharf operation and the Boston Expansion. However, the Boston Expansion should not be visible from the housing development because topography and vegetation currently provide visual screening. However, visual screening measures will not be feasible for all of the views of the Boston Expansion area.

A visual resources assessment has been conducted to illustrate the current, maximum disturbance, and post-reclamation view of the landscape at several vantage points. These visual images will be included with the Large-Scale Mine Permit application.

5.2 HISTORIC

Considerable cultural resources research was conducted in the vicinity of the Wharf Mine in association with historic and existing mining activities. The majority of historical items are generally related to historical mining activities, railroad transportation, and community development. A summary of previous investigations as well as new surveys is provided in the following sections.

5.2.1 PREVIOUS INVESTIGATIONS

Cultural resources research was conducted in the vicinity of the Wharf and Golden Reward Mines in association with historic mining activities since the 1980s. The following brief historic overview of the area is provided by Luoma and Lowe [2010]:

> *The discovery of gold in the Black Hills during the 1874 reconnaissance by the Custer expedition heralded the beginning of Euroamerican settlement in the Black Hills of South Dakota – settlement based exclusively on the search for gold and the profitable commercial enterprises that supported the subsequent mining operations. The town of Portland developed a few years later in 1880 near Terry Peak in the northern Black Hills, resulting in the Bald Mountain Mining District. The community expanded with the mining*

operations, and a second town, Trojan, developed approximately 0.5 mil (0.8 km) south. Trojan was named for the re-organized gold mining company that played a prominent role in the area during the early twentieth century. The two towns appear to be inexplicably linked, sharing the same school, while the working populace was employed in several nearby mines. The distinction and identity of each townsite seems to correlate to two distinct periods of mining activity; Portland, from the inception of the Portland Company and its mill, which closed in the late 1890s; and Trojan, following the creation of the Trojan Mining Company in 1911 (Lowe and Schneider, 1996). Currently, both towns are extinct. The Bald Mountain Mining District including this project area is replete with old mining claims and mineral exploration activities.

The Trojan Townsite [39LA0376] once served as a residence for mine workers and their families. The area was abandoned around 1959 after the Bald Mountain Mining Company closed [TRC Mariah Associates, 1996]. Numerous archaeological studies have been performed at the site since 1973. One of the last surveys was conducted by TRC Mariah Associates in 1996, and a cultural resource clearance was granted by the State Archaeological Research Center (SARC) that same year. SARC conducted site updates in 2010 and 2016. As a result of historic mining activities, only small remnants of the foundations remain at the Trojan Townsite.

A preliminary list of previously recorded archaeological sites and historic structures located within the Boston Expansion area or approximate disturbance area is located in Table 5-1. Additional previously recorded sites within proximity of the expansion area are listed by Quality Services Inc. [Scott, 2021] and are included in Appendix C.

Table 5-1. Previously Recorded Archaeological Sites and Historic Structures Within the Boston Expansion Area

Site No.	Site Type	Cultural Affiliation	NRHP Status
Trojan Townsite 39LA0376	Townsite	Euroamerican	Eligible
39LA0475	Mine; artifact scatter	Euroamerican	Not Eligible

NRHP = National Register of Historic Places.

5.2.2 CURRENT INVESTIGATIONS

Boston Expansion areas that were not previously surveyed, as well as those sites already identified, were included in the Level III resource evaluations conducted by Quality Services, Inc. [Scott, 2021]. A preliminary records search at SARC in Rapid City, South Dakota, was conducted in April 2021.

Two cultural resource surveys were conducted within the Boston Expansion area during 2021. The first survey was in support of Wharf's Exploration Notice of Intent where exploration drilling would occur within the Boston Expansion area, and the second survey was within remaining areas of the Boston Expansion area that had not been previously surveyed. These surveys entailed pedestrian surveys of areas identified by SARC as needing inventory, which included additional inventory and site evaluation of the Trojan Townsite.

The first field inventory in May 2021 included 15 acres consisting of two parcels within the Boston Expansion area and portions of the Trojan Townsite (39LA0376). During the 2021 revisit, the remaining northern and southern portions of the Trojan Townsite were visited. Because of the age and nature of artifacts found, this portion of Site 39LA0376 contributes to the site's NRHP status. The northern portion is outside the Boston Expansion area and will not be impacted by the proposed project. The southern portion of the Trojan Townsite is located within the Boston Expansion area but was designated as noncontributing.

A newly recorded site was identified (39LA1728). This site consists of two small mine shafts within a trench. No artifacts were observed within the vicinity, and the shafts are not unique to this area and lack distinction. Therefore, Quality Services, Inc. recommended the site as not eligible for the NRHP.

A total of 5.8 acres in two separate tracts were evaluated in the second survey (June 2021). The majority of this area had been previously disturbed by mining, staging, and/or clearing. A single prospecting pit was found but was not recorded as a site per SARC requirements.

Finds from recent survey activity are consistent with the surveys that have been done near the mine for the past 30 years. Overall, a determination of no historic properties affected was recommended for the project. The final reports for the inventories were submitted to SARC and are included in electronic format as Appendix C for SD DANR.

5.3 ARCHAEOLOGIC

Archaeology was previously discussed in Section 5.2 titled*Historic* .

5.4 TOPOGRAPHIC

The proposed Boston Expansion area lies along the southern edge of the existing Wharf Mine, which is located in the north-central portion of the Black Hills uplift in western South Dakota. The area topography is mountainous within a forested ridge system. Land elevation of the Boston Expansion area ranges from 6,320 feet to 6,560 feet above mean sea level. The topography of the surrounding area is characterized by moderate to steep-sloping hills intersected by narrow drainages. Terry Peak, at an elevation of 7,064 feet, lies immediately south and southeast of the proposed project. The topography of the Boston Expansion area does not have significant features and is similar to the topography of the north-central Black Hills.

5.5 GEOLOGIC

The Wharf Mine and proposed expansion area are located in the north-central portion of the Black Hills uplift in western South Dakota. The geology consists of Precambrian metamorphic rocks overlain by sediments of the Cambrian Deadwood Formation within the expansion area. These rocks have been intruded by Tertiary-age igneous dikes and sills. Mineralization in the expansion area is primarily within the Deadwood Formation but also in and along the Tertiary intrusions.

The Precambrian Ellison Formation underlies the entire project area. The formation consists of interbedded quartzites and phyllites that are strongly folded and foliated. Foliation dips near vertically and strikes approximately north-south. Precambrian units that underlie most of the Wharf Expansion area are not conducive for hosting large-scale disseminated deposits such as those found in the overlying Paleozoic sediments and Tertiary intrusive.

The Cambrian Deadwood Formation unconformably overlies the Precambrian and consists of quartz and limestone conglomerate, sandstone, quartzite, siltstone, shale, and limestone. Locally, a pebble conglomerate is present at the basal unconformity. The Deadwood Formation is informally divided into the lower, middle, and upper members based on stratigraphy and preference for hosting mineralization. Within the expansion area, the dominant ore hosts are the lower and upper members.

All of the rock units within the expansion area have been intruded by Tertiary-age igneous dikes and sills. The compositions of these igneous bodies include monzonite porphyry, phonolite, and trachyte. These intrusions and the fluids associated with them are responsible for hydrothermal gold deposits in the mining district. With the exception of the gold mineralization in the mining district, the area is not considered to be geologically unique because similar rock outcrops and subsurface geology occur throughout the entire northern Black Hills.

Geochemical analysis of the affected rock units is being conducted on samples collected during the exploration phase of this project. Geochemical analysis includes Acid-Base Accounting, Meteoric Water Mobility Testing, whole-rock analysis, humidity cells, and nitrates for samples collected within the Boston Expansion area. Numerous samples have been collected, although final laboratory results are pending. Based on results from historical geochemical analysis of similar rock, the potential for acid rock drainage is minimal. Wharf does not plan to mine acid-generating material, and existing mitigation plans will be followed. Results of the geochemical analysis will be included in the Large-Scale Mine Permit application.

5.6 ETHNOLOGIC

Ethnology was previously discussed in Section 5.2 titled *Historic*.

5.7 SCIENTIFIC

The following sections summarize the results of environmental baseline studies conducted by Wharf and its consultants. The environmental baseline studies found that the Boston Expansion area is not ecologically fragile, and disturbance from mining activities can be restored and returned to its pre-mining ecological role. The permit area does not have a strong ecological influence on the total ecosystem; therefore, any disturbances during mining activities are not expected to cause systemwide ecological reactions (see Chapter 4.0).

5.7.1 VEGETATION

Two major vegetation communities are located within the project area: *Pinus ponderosa* (ponderosa pine)–*Symphocicarpus albus* (common snowberry) and *Pinus ponderosa* (ponderosa pine)–*Populus tremuloides* (quaking aspen) series. The ponderosa pine–common snowberry communities are dominated by ponderosa pine, common snowberry, and quaking aspen. The ponderosa pine–quaking

aspen communities are dominated by quaking aspen and ponderosa pine. Both vegetation community types had areas that are predominantly undisturbed and areas that are predominantly disturbed by logging or other activities. Flora on the site is adapted to withstand a wide range of temperature, humidity, sunlight, and wind conditions and are similar to those observed throughout the north-central Black Hills area.

The state of South Dakota has only one federally listed threatened plant species, the *Platanthera praeclara* (Western Prairie Fringed Orchid). The results of the field surveys in 2021 found no individuals of the Western Prairie Fringed Orchid within or adjacent to the Boston Expansion area. Additionally, no potential habitat for the Western Prairie Fringed Orchid was found within or adjacent to Wharf and the Boston Expansion area. The results of the field surveys in 2021 found one vegetation species within the Boston Expansion area that is listed as a sensitive species by the SDNHP. This sensitive species is *Vaccinium membranaceum* (thinleaf huckleberry). The population consisted of approximately 10 individual plants and was on the western border of the proposed Boston Expansion in SE ¼ NE ¼, Section 3, T4N, R 2E, as shown on Figure 4-1. Mountain huckleberry occurs throughout the area as seen within the Lost Camp subdivision and identified during the 2010 survey within or near the 2010 Expansion [BKS Environmental Associates, Inc., 2010]. The complete Boston Expansion area vegetation report is still being prepared and will be included with the Large-Scale Mine Permit application; however, a summary letter of the 2021 sensitive plant species is provided in Appendix B.

5.7.2 SOILS

The baseline soils survey of the Boston Expansion area was completed in 2010 as part of Wharf's Green Mountain Expansion, and 600.50 acres were included in the 2010 soil mapping. The 50 acres of the Boston Expansion area are a subset of the larger 2010 soils map. Baseline soils inventories for the 2010 area consisted of refining the current Natural Resources Conservation Service mapping for Lawrence County, South Dakota.

Soils in the Boston Expansion area are typical for soils formed under a mixed coniferous and deciduous forest that occur on the mountainous hillslopes of the Black Hills. Parent material includes colluvium, residuum, and alluvium. Soil map units for the Boston Expansion area are similar to those identified during the 2010 evaluation. Soils were classified taxonomically as Typic Palecryolls, Haplic Glossudalfs, and Pachic Hapludolls. All of the soils have at least some suitable topsoil and/or subsoil except for rock outcrops and rubbleland. The soils habitat on the proposed permit area is typical of the surrounding region, and no special, exceptional, critical, unique, or unusual features are present. The soil assessment will be included with the Large-Scale Mine Permit application.

5.7.3 WILDLIFE

As part of the SD DANR Large-Scale Mine Permit Application process, a baseline wildlife study was required for the proposed Boston Expansion project [ICF, 2021a]. Annual wildlife monitoring has been conducted at the Wharf and Golden Reward Mines since 1982 and by ICF since 1994. A baseline wildlife study for the Green Mountain and Golden Reward project was conducted by ICF in 2010. The proposed Boston Expansion area is located entirely within the study areas of the annual wildlife monitoring and the 2010 baseline wildlife study. Because of this overlap, the only specific wildlife surveys required for the Boston Expansion baseline wildlife study were those for bat habitat and nesting raptors

[ICF, 2021a]. These surveys were conducted in May, June, and September 2021 and followed the *Baseline Wildlife Plan for Coeur Wharf 2021 Proposed Boston Expansion* [ICF, 2021b]. The study area consisted of the proposed 50-acre Boston Expansion disturbance area and a 0.5-mile buffer for raptor nest surveys. In addition to the bat habitat and raptor nest surveys, incidental observations of all of the other wildlife species (e.g., mammals and songbirds) were recorded and combined with the historic data to create a comprehensive species list for the area [ICF, 2021a].

In 2021, five habitat features with potential for bats were found within the proposed Boston Expansion area, though no bats were observed at the time [ICF, 2021a]. These features included rock outcrops, collapsed mine adits, and a tree snag. A nocturnal acoustic bat survey was conducted from September 7 to 13, 2021, and a hibernacula survey will be conducted in October 2021. Results of those surveys will be provided to SD Game, Fish and Parks and SD DANR upon completion and as part of the Large-Scale Mine Permit application. In a bat survey conducted in 2010, calls were noted for six bat species but no evidence of collective roosting was observed, and the underground features were mitigated before disturbance [ICF, 2010].

No active raptor nests were observed within the proposed Boston Expansion area or 0.5-mile buffer during the baseline study in May and June 2021. Several historic raptor nests have been observed within the study area during previous surveys, but all of these nests are either inactive or have been destroyed by natural causes over time [ICF, 2020; 2021a]. One individual raptor, a broad-winged hawk (*Buteo platypterus*), was observed in the western portion of the proposed Boston Expansion area during the baseline study but did not appear to be actively nesting [ICF, 2021a]. Because of the lack of active nests within the proposed Boston Expansion area and the abundance of suitable nesting habitat adjacent to the area, the proposed Boston Expansion is unlikely to affect any nesting raptors.

Seven wildlife species were observed during the 2021 baseline wildlife survey, including yellow-bellied marmot (*Marmota flaviventris*), white-tailed deer (*Odocoileus virginianis*), turkey vulture (*Cathartes aura*), broad-winged hawk, black-capped chickadee (*Parus atricapillus*), yellow warbler (*Setophaga petechia*), and boreal chorus frog (*Pseudacris triseriata*) [ICF, 2021a]. Of these observed species, only the broad-winged hawk is tracked by the SDNHP as a rare species [SDNHP, 2018]. During previous surveys, 5 species of bats and 12 species of raptors, as well as several mammals, songbirds, owls, and waterfowl, have been observed [ICF, 2021a]. No state or federally listed T&E species were observed during the baseline wildlife survey. Other wildlife species with the potential to occur in the area include mammals such as deer, rabbits, and various rodents; waterfowl such as ducks and geese; raptors such as hawks and eagles; and various songbirds.

In summary, no active raptor nests were found within the proposed Boston Expansion area of the Wharf Mine during the 2021 baseline wildlife survey. Seven wildlife species were observed during the survey, and only the broad-winged hawk is designated by the SDNHP as a rare species. Ongoing bat studies are being performed in fall 2021 and, if necessary, mitigation will be coordinated with SD DANR and SD Game, Fish, and Parks. Wildlife use within the proposed expansion area appears to be limited, and suitable habitat for most species occurs immediately adjacent to the area. No state or federally listed T&E species were observed in the expansion area, and expansion activities are unlikely to affect these species. The last five wildlife reports will be included with the Large-Scale Mine Permit application.

5.7.4 AQUATIC

Annual aquatic species and habitat surveys have been conducted since the early 1990s on streams that flow through or have drainages within the Wharf and Golden Reward Mines as required in their National Pollution Discharge Elimination System Permit [GEI Consultants, Inc., 2021]. The 2020 study evaluated habitat, fish, benthic macroinvertebrates, and periphyton in Annie Creek, Ross Valley, Lost Camp Gulch, Deadwood Creek, False Bottom Creek, McKinley Gulch, Cleopatra Creek, Fantail Creek, Nevada Gulch, Stewart Gulch, Reno Creek, and Labrador Gulch, as shown in Figure 5-1 [GEI Consultants, Inc., 2021]. All of the surveys were conducted in August 2020 and followed the methodology of the 2018 *Aquatic Biological Sampling and Analysis Plan for Streams in the Vicinity of the Wharf Mine, Lawrence County, South Dakota* [GEI Consultants, Inc., 2018]. Not all of the streams involved in Wharf's aquatic monitoring program have drainage areas within the Boston Expansion area. No aquatic sites are located within the Boston Expansion area, although several sites (i.e., Annie Creek, Ross Valley, and Lost Camp Gulch) may be affected because they are downstream of the existing mine and proposed Boston Expansion area; only sites in these drainages are considered applicable to the Boston Expansion as discussed below.

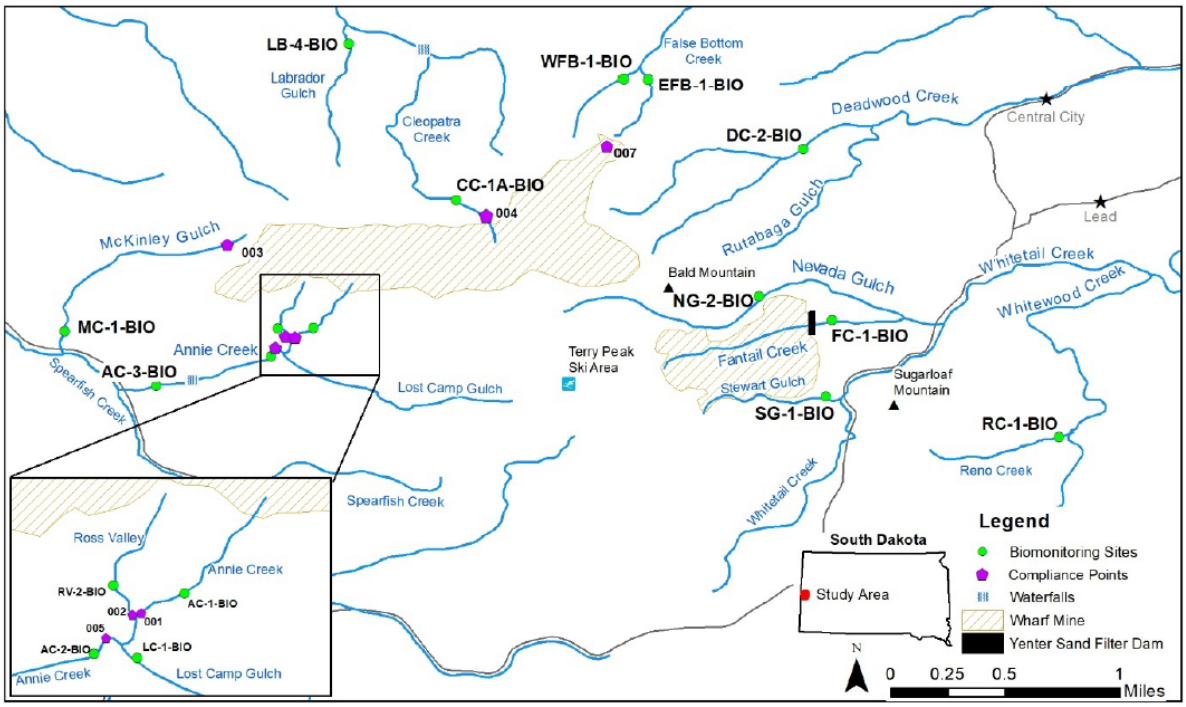

Figure 5-1. Aquatic Biological Monitoring Sites on Streams Near Wharf [GEI Consultants, Inc., 2021].

Habitat types observed in 2020 in Annie Creek, Ross Valley, and Lost Camp Gulch were similar to previous sampling events with some sites experiencing an increase in downed vegetation from a July 2020 tornado. Each site contained a diversity of habitat and substrate types, with more fine sediments found in Ross Valley and lower Annie Creek as well as larger substrate types found in Lost Camp Gulch and upper Annie Creek. These fine sediments are believed to be from the nearby Annie Creek Road and are not believed to be the result of mining activities. Overall, habitat quality was determined to be high at each site [GEI Consultants, Inc., 2021].

No fish have been observed at the uppermost Annie Creek site since sampling began in 2006, which is likely caused by natural barriers to fish passage (i.e., waterfalls). Historically, mountain suckers (*Catostomus platyrhychus*) were present at the middle Annie Creek site, but no fish have been collected since 2010 after an accidental ammonia and cyanide release from the Wharf Mine in 1995, followed by an accidental release of high-biological oxygen demand (BOD) water from the Wharf Mine in 2007, which was subsequently cleaned up in 2008. Mountain suckers are not a species of concern in South Dakota but are listed as a rare species by the SDNHP [2018]. The lower Annie Creek site was not sampled in 2020 because of heavy deadfall from a July 8, 2020, tornado; however, brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*) have been consistently observed at this location since 1992. Brown trout densities increased and brook trout densities decreased in recent years. Because of low flows, fish have never been observed at the Ross Valley or Lost Camp Gulch sample sites [GEI Consultants, Inc., 2021].

Macroinvertebrate population metrics in upper and middle Annie Creek have generally improved in recent years following improvements in habitat and water quality after the high-BOD water cleanup in 2008. Most metrics, including species richness, composition, tolerance, trophic habitat, and life history, had values ranging from moderate to excellent in 2020. The lower Annie Creek site was not sampled in 2020, but macroinvertebrate population metrics have generally declined in recent years. The reason for this decline is unknown but seems to be isolated to the lower sampling site on Annie Creek and is not believed to be caused by mining activities. Macroinvertebrate metrics in Ross Valley ranged from moderate to excellent in 2020 and have largely remained consistent over time. Macroinvertebrate metrics in Lost Camp Gulch were generally favorable in 2020 but vary widely from year to year because of variable and often very low flows in the summer months [GEI Consultants, Inc., 2021]. No state-listed sensitive, threatened, or rare aquatic macroinvertebrates have been sampled in streams near the Wharf Mine.

Periphyton population metrics in the upper and middle Annie Creek sites were generally favorable in 2020. The upper site generally had higher metric values than the middle site, but both sites meet the threshold for overall diversity and appear to support healthy populations. The Annie Creek sampling sites have shown very few changes in periphyton populations over time. Periphyton population metrics at the Ross Valley and Lost Camp Gulch sites were favorable in 2020 and have shown few changes over time, although the Lost Camp Gulch site does show signs of sedimentation from the nearby dirt road impacting periphyton assemblages [GEI Consultants, Inc., 2021].

Overall, aquatic monitoring in 2020 on streams near the Wharf Mine and proposed expansion area indicates healthy fish, benthic macroinvertebrate, and periphyton communities. The absence of fish in some streams is related to low flows, and sedimentation from nearby roads has led to decreased macroinvertebrate and periphyton population metrics in some streams. However, the 2020 aquatic report concludes that mining activities at the Wharf Mine did not directly impact aquatic resources in the study streams [GEI Consultants, Inc., 2021].

GEI Consultants, Inc. conducted field investigations in August 2021; however, laboratory results are not yet available. The full report will be provided to SD DANR by April 15, 2022, per the SD DANR established deadline. The last five aquatic resources reports will be included with the Large-Scale Mine Permit application.

5.7.5 GROUNDWATER

The aquifers in the Wharf area are similar to those throughout the central Black Hills and are not special, exceptional, critical, or unique resources. The area is underlain by two principal aquifers: the Deadwood Formation and the Precambrian Aquifer. These formations receive recharge where they crop out.

No water supply wells are located within the Boston Expansion area, and the majority of active wells in the nearby regions are owned by Wharf or the Black Hills Chairlift Company. General water uses are related to housing development, mining, and snowmaking. Recent drilling programs within the Boston Expansion area indicate that significant water is not present at the depths projected for surface mining [Sarratt, 2021].

Water quality and water level monitoring programs have been in place at Wharf since 1985 and at Golden Reward since 1987. At the Wharf Mine, 55 groundwater monitoring wells, as shown in Figure 5-2, are being sampled for water quality and water level, and two additional wells are monitored for water level only. At the Golden Reward Mine, 21 wells are part of the ongoing monitoring, as shown in Figure 5-3. Of these existing wells, three wells (i.e., Monitoring Well- [MW-] 19, MW-33, and MW-66) are considered baseline wells that may be representative of groundwater for the expansion area. These sites are listed in Table 5-2.

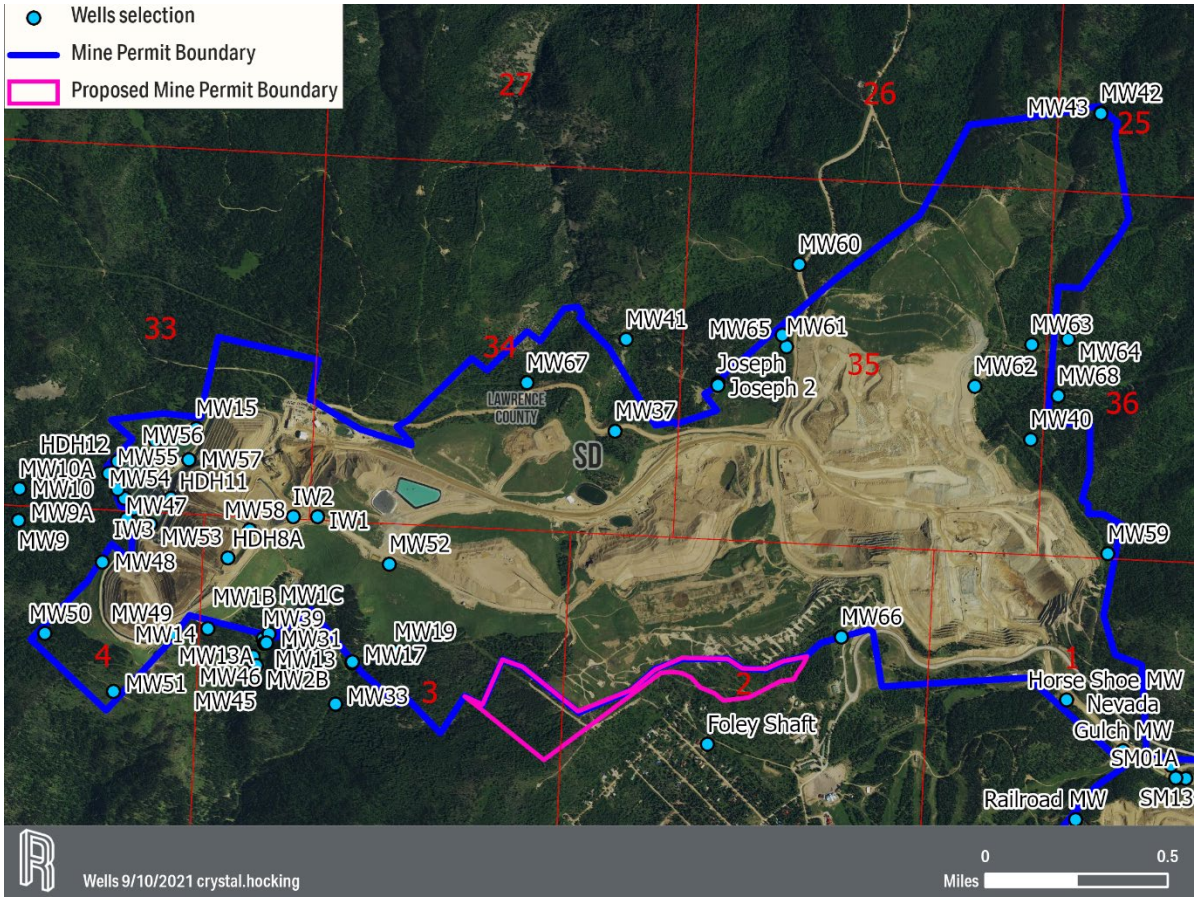

Figure 5-2. Existing Groundwater Monitoring Sites Near Wharf.

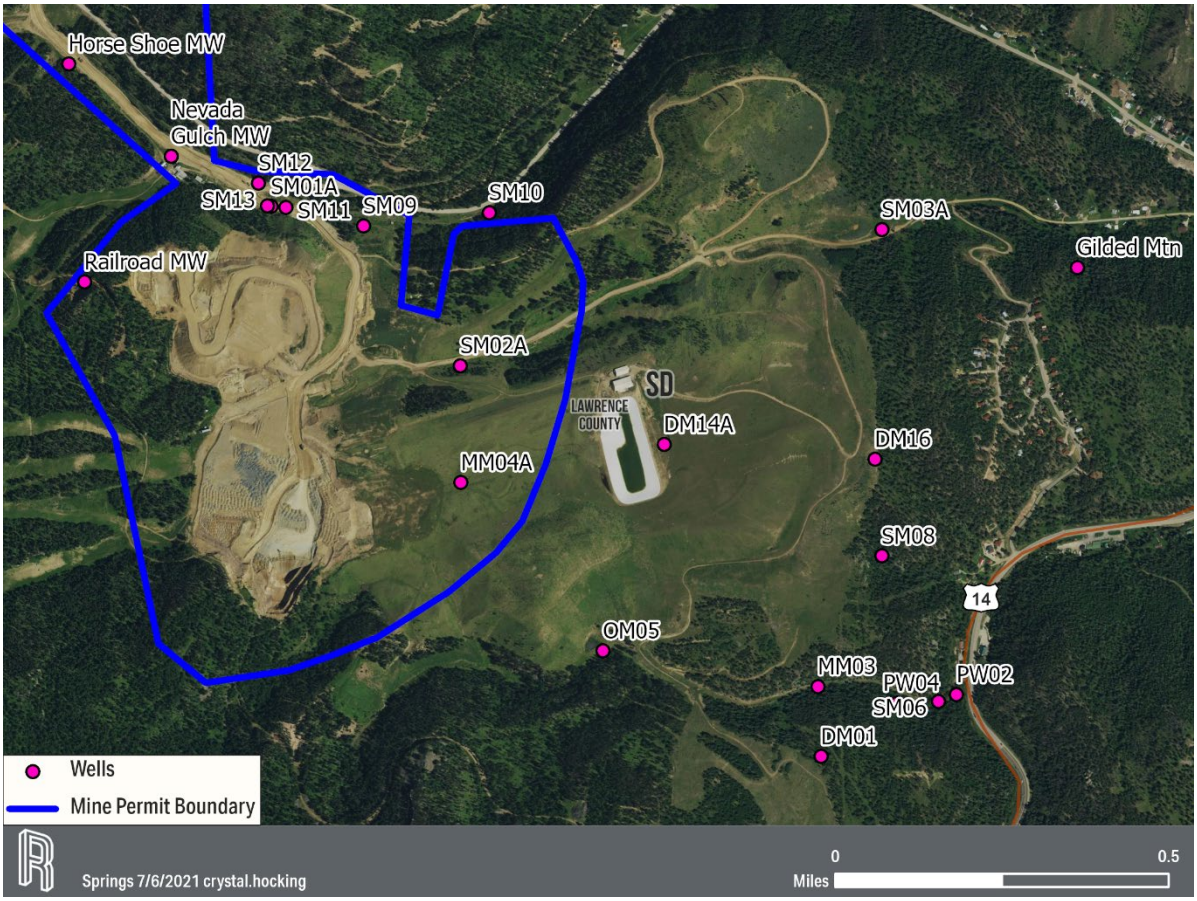

Figure 5-3. Existing Groundwater Monitoring Sites Near Golden Reward.

Table 5-2. Groundwater Monitoring Sites at the Boston Expansion Area

Site	Purpose	Description	Casing Elevation (feet)	Ground Elevation (feet)	Well Depth (feet)	Screen Interval (feet)	Legal Location
MW-19	Existing Wharf sampling site	Well in Annie Creek drainage inside Wharf Mine Permit Area	5,904.04	5,902.30	270	250–270	Sec. 3, T4N, R2E
MW-33	Existing Wharf sampling site	Well in Annie Creek drainage downstream of Wharf Mine	5,732.60	5,730.10	120	80–230	Sec. 3, T4N, R2E
MW-66	Existing Wharf sampling site	Well 200 yards southeast of current open pit	6,456.11	—	420	360–420	Sec. 2, T4N, R2E

The groundwater quality results at the three baseline sampling sites are similar to those from other sampling sites and are representative for mineralized groundwater in the region; the groundwater does not display any special characteristics. Most dissolved metals concentrations are generally at or below the detection limit. All of the nitrate detections in MW-33 and MW-66 over the last 5 years are less than 1 milligrams per liter (mg/L), and nitrate concentrations above 10 mg/L have been observed in MW-19 in the last 5 years. The results of the chemical analyses and statistics for sampled wells will be included with the Large-Scale Mine Permit application.

Impacts would be minimal to groundwater hydrology, water quality, and local water supply wells as a result of mining in the Boston Expansion area, primarily because the drilling programs did not indicate the presence of significant water at depths of the proposed mining. Hydrology will be similar because minimal to no inflow is anticipated and recharge to the pit will be available to local aquifers. Impacts on groundwater quality will include an increase in nitrate concentrations below the Boston Expansion area because of blasting and rock disposal. These impacts may be similar to groundwater impacts in nearby mined and backfilled areas, although impacts of the expansion will be small in comparison with the already permitted mine. No water supply wells exist within or immediately adjacent to the expansion area that would be impacted by the expansion. Potential impacts are anticipated to be similar to those experienced in previously mined areas of the Wharf and Golden Reward Mines. No special, exceptional, critical, or unique aspects of the groundwater are present within the expansion area.

5.7.6 SURFACE WATER

The Boston Expansion area occurs within the middle Spearfish Creek subwatershed and includes Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek drainages. The Lost Camp Gulch tributary drains into Annie Creek that drains into Spearfish Creek, which drains into the Redwater Creek and enters the Belle Fourche River. The Nevada Gulch Creek drains into Whitetail Creek, which drains into Whitewood Creek south of Lead, South Dakota.

Annie Creek is a perennial stream that flows southwest into Spearfish Creek. Annie Creek has one baseline sampling site (Annie Creek at U.S. Geological Survey [USGS]) located approximately 1.9 miles southwest of the Boston Expansion area and near the USGS 06430800 gage station. Lost Camp Gulch is an ephemeral stream that flows northwest to its confluence with Annie Creek. Lost Camp Gulch has one surface-water monitoring site (Lost Camp) located approximately 1.9 miles southwest of the Boston Expansion area and near the USGS 06430800 gage station. Nevada Gulch Creek flows east of the Boston Expansion area to its confluence with Whitetail Creek. Nevada Gulch Creek is an ephemeral stream with one surface-water monitoring site (SS-20).

The existing Wharf surface-water monitoring programs were evaluated to determine which sites were applicable to the Boston Expansion area. Three existing surface-water monitoring sites (i.e., Lost Camp, Annie Creek at USGS, and SS-20) were chosen as baseline monitoring sites based on proximity to the Boston Expansion area and SD DANR recommendations. In addition to the Wharf monitoring sites, Monitoring Site 46MN31 (Annie Creek near Elmore), which was sampled by the SD DANR, was evaluated. These monitoring sites are listed in Table 5-3 and Figure 5-4.

Table 5-3. Existing Surface-Water Monitoring Sites Applicable to the Boston Expansion Area

Site	Drainage	Frequency	Parameter List
Annie Creek at USGS	Annie Creek	4 Times per Year	1
46MN31	Annie Creek	4 Times per Year	4
Lost Camp	Lost Camp	4 Times per Year	3
SS-20	Nevada Gulch Creek	4 Times per Year	2

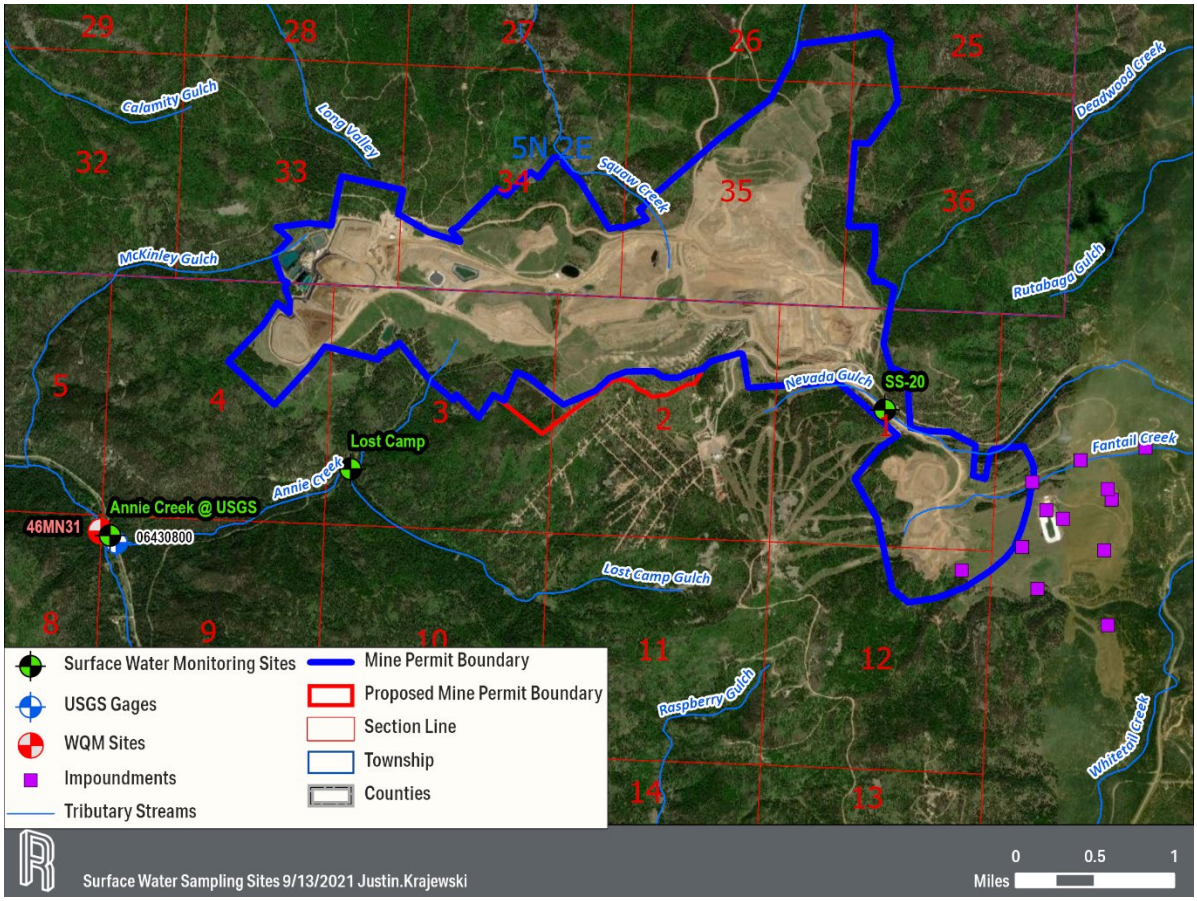

Figure 5-4. Location of Surface-Water Sampling Sites at the Wharf Mine Applicable to the Expansion Area.

The last 5 years of data for these sites and the 46MN31 site were evaluated. The water quality results at the four baseline surface-water sampling sites are generally typical for surface-water quality in the region. An analysis of the field parameters compared to the South Dakota state criteria showed that none of the collected data exceeded the criteria for the cold-water marginal fish life propagation use. All of the samples were below the SD DANR daily maximum nitrate criteria and below the Environmental Protection Agency's (EPA) freshwater-recommended limit for arsenic over the last 5 years. All of the samples were below the EPA-recommended criteria for Weak Acid Dissociable cyanide, selenium, and zinc over the last 5 years.

No springs or seeps are located within the Boston Expansion area. At the request of the SD DANR, Wharf conducted a field inventory for springs in May 2021 that involved walking up the Lost Camp drainage from its confluence with Annie Creek to search for a source of water. A small spring, Lost Camp Headwaters, was identified. The site was sampled in May 2021 and has been dry since that time.

Proposed mine disturbance is not expected to impact the overall surface-water flow or water quality in these drainages. Precipitation will be captured by the pit area and available for recharge and flows in these drainages are typically minimal. The results of the chemical analyses and statistics for relevant surface-water monitoring sites will be included with the Large-Scale Mine Permit application.

5.7.7 METEOROLOGY

Meteorological data used for this study were obtained from the Wharf meteorological station, Lead meteorological station, and North American Land Data Assimilation System. Meteorological data were evaluated from January 1, 2015, through December 31, 2020. The 6-year average historical temperature for the Lead station is 46.4 degrees Fahrenheit (°F).

On-site temperature and precipitation data were also available from Wharf's on-site meteorological station. From 2015 to 2020, the average precipitation accumulation was 2.5 inches per month. Annual precipitation at the mine during that same time period ranged from 23.2 to 37.0 inches. Snowfall data were obtained from the Lead meteorological station 5.0 miles east of the Boston Expansion area. An average of 127 inches of snowfall per year was observed.

Wind-speed and wind-gust data were based on gridded meteorological data from the North American Land Data Assimilation System. The yearly average wind speed from 2015 through 2020 was 9.9 miles per hour. July was the calmest month, and December and January were the windiest months. Most winds are predominantly from the northwest. The meteorological report will be included with the Large-Scale Mine Permit application.

5.7.8 SOUND

To evaluate current sound conditions as work progresses along the Portland Ridgeline and Flossie Pit, Wharf installed two automated, remote sound meters in April 2021. These meters are located at the Terry Peak Ski area overflow parking lot and south of a nearby residence. Beginning on April 20, 2021, data have been collected at 5-minute-average intervals. Wharf intends to extend continuous sound monitoring in the short term.

RESPEC performed an independent sound-monitoring study in July 2021. Six sites were monitored for an approximate 10-minute period. All of the sound-level measurements were made using the handheld portable instrument. The overall range in sound measurements collected by RESPEC ranged from 32.6 to 86.9 decibels (dB). The maximum sound levels were brief, momentary highs and related to traffic in almost every instance. LA_{eq} values ranged from 39.4 to 61.5 dB, which are equivalent to the sound levels found in a typical living room to a busy office setting. Much of the noise in 2021 is attributed to all-terrain vehicles (ATVs) and vehicle traffic. Other observed sounds were related to wind, wildlife, aircraft, thunder, construction, and mining activities. The only verified mine activities were recorded at a single site and included a blast (as well as pre- and post-blast sirens) and trucks. RESPEC's baseline sound study will be included with the Large-Scale Mine Permit application.

5.8 CULTURAL

Culture was previously discussed in Section 5.2 titled *Historic*.

5.9 RECREATIONAL

Outdoor recreation opportunities near the Wharf Mine and proposed Boston Expansion area include hiking and biking trails, hunting, ATV use, snowmobiling, skiing, camping, and a myriad of other

activities. Such activities, however, are not permitted on the property within the currently permitted mining boundary and would not be allowed on land considered under this expansion. No land area exists within this expansion permit that is presently accessible to the public.

Nearby major recreation areas include Black Hills National Forest, Spearfish Canyon, and Terry Peak. Commercial recreation in the area is limited primarily to Terry Peak Ski area, which is south of the proposed Boston Expansion area. Terry Peak is unique to the area in that it is one of two local ski areas and plays a role in winter recreation opportunities and the region's economy. For this reason, the potential for adverse impacts was a concern in the past. An investigation into the impact of mining activity on skiing was prepared during the 1997 Clinton Expansion permit application [Hammer, Siler, George Associates, 1996]. Although data are insufficient to support a systematic assessment of effects, trends in winter recreational use have continued to increase. The last 30 years confirm that ski recreation and nearby gold mining operations can coexist, and the visual impact of mining activity does not interfere with skiers' participation in the sport.

The proposed Boston Expansion will not likely impact winter recreation activities. The visual impacts of mining will become greater as mining occurs and the elevation of the Portland Ridgeline is reduced. Actual disturbance will not affect recreational use, and the amount of snowfall is known to have a greater impact on the number of skiers.

A complete socioeconomic study was prepared for the Boston Expansion area [Madden, 2021]. The report will be included with the Large-Scale Mine Permit application and includes additional details about the socioeconomic impacts that might result from expanded mining operations.

6.0 SUMMARY AND CONCLUSIONS

Environmental and cultural resources studies were performed in accordance with SD DANR regulations. With this application submittal to the SD DANR, Wharf intends to assist the State of South Dakota in determining the presence of special, exceptional, critical, or unique lands.

The following conclusions resulted from these studies:

- No significant cultural resources were identified. Although a portion of the Trojan Townsite occurs within the Boston Expansion area, the southern portion of the site (located in Section 2, T 4N, R2E and within the Boston Expansion area) was designated as noncontributing.
- No threatened or endangered plants or animal species exist within the Boston Expansion area.
- One sensitive plant species, mountain huckleberry, was identified within the west side of the expansion.
- No raptor nests were discovered within the Boston Expansion area. The broad-winged hawk, a SDNHP rare species, was observed.
- No special, exceptional, critical, or unique features exist in the Boston Expansion area.

7.0 REFERENCES

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TRC Mariah Associates, 1996. *Boom and Bust in the Bald Mountain District: History of the Trojan Townsite and Associated Mining Properties, Lawrence County, South Dakota*, prepared by Mariah Associates, Inc., Laramie, WY, for Wharf Resources (USA), Inc., Lead, SD.

APPENDIX A

SURFACE OWNERS AND WHARF OWNERSHIP

APPENDIX A1: SURFACE OWNERS WITHIN 500 FEET OF THE PROPOSED SURFACE-MINING DISTURBED LAND

PAUL GREGORY AKROP
11012 Moose Trail
Lead, SD 57754

Lot W-1, formerly known as Lot W, a subdivision of the Whale Lode, M.S. 1139 and Last Chance Lode, M.S. 1205, as shown on Plat Document Number 2004-4531, located in the NW/4, Section 2, T4N, R2E, B.H.M., Lawrence County, South Dakota.

ROSS A. AND AMBER A. DETERMAN
P.O. Box 193
Mitchell, SD 57301

Lily of the West Lode, M.S. 1139, located in Section 2, T4N, R3E, B.H.M., Lawrence County, South Dakota, excluding any portion in conflict with Lots 3, 4, and 5, Block 6, Tract A of Lost Camp Valley Acreage, a subdivision of a portion of M.S. 1139, as shown in Plat Book 2, page 92.

TERRY VALLEY-TROJAN WATER PROJECT DISTRICT
P.O. Box 515
Lead, SD 57754

Lot 1 Revised of Lot A, formerly Lot 1 of Lot A of the Clarence Lode, M.S. 2021, located in the SW/4NE/4, Section 2, T4N, R2E, B.H.M., Lawrence County, South Dakota, as shown on Plat Document Number 2005-3472.

WESTERN COMMUNICATIONS, INC.
3106 Campbell Street
Rapid City, SD 57701

Lot A, subdivision of the May Queen Lode, M.S. 1040, located in Section 2, T4N, R2E, B.H.M., Lawrence County, South Dakota, as shown in Plat Book 7, Page 30, B.H.M., and Bristol Fraction, M.S. 915, located in Section 2, T4N, R2E, B.H.M., Lawrence County, South Dakota.

APPENDIX A2: WHARF OWNERSHIP WITHIN THE BOSTON EXPANSION AREA AND 500-FOOT BUFFER

Gault No. 1, Gault No. 4, Gault No. 5, and Gault No. 6 patented lode claims, M.S. 1427, located in Section 3, T4N, R2E, B.H.M.

Apex, Star, Golden, and Argentine patented lode mining claim, M.S. 1341, located in Section 3, T4N, R2E, B.H.M.

Copperhead and Flossie patented lode mining claims, M.S. 1668, located in Sections 2 and 3, T4N, R2E, B.H.M.

Revenue Fraction No. 1 and Revenue Fraction No. 2, M.S. 1286, patented lode mining claims, located in Section 2, T4N, R2E, B.H.M.

Lot 1A and Lot 2A of Area B revised, a subdivision of M.S. 1205 and M.S. 1341, as shown on Plat 2004-5431, located in Section 2, T4N, R2E, B.H.M.

Lot 1 of the Vulcan Lode patented lode mining claim, M.S. 1404, as shown on Plat Book 6 page 86, located in Section 2, T4N, R2E, B.H.M.

Rudolph, Costello, and Dolphin patented lode mining claims, M.S. 1189, located in Section 2, T4N, R2E, B.H.M.

Forest Queen patented lode mining claim, M.S. 1139, located in Section 2, T4N, R2E, B.H.M.

Foran patented lode mining claim, M.S. 1768, located in Section 2, T4N, R2E, B.H.M.

Providence, Boston, Ashland, Norman patented lode mining claims, located in Section 2, T4N, R2E, B.H.M.

Lot A, a subdivision of the Clarence patented lode mining claim, M.S. 2021, as shown on Plat Book 7 page 4, located in Section 2, T4N, R2E, B.H.M.

Mark Twain patented lode mining claim, M.S. 378, excluding Lot U, located in Section 2, T4N, R2E, B.H.M.

Ofer Fraction and Reindeer patented lode mining claims, M.S. 945, located in Section 2, T4N, R2E, B.H.M.

Lots 2, 3, 4, and 7, located in Section 2, T4N, R2E, B.H.M.

Lot 5, located in Section 3, T4N, R2E, B.H.M.

APPENDIX B

SENSITIVE PLANT SPECIES

August 30, 2021

Amy Allen
Coeur Wharf
10928 Wharf Road
Lead, SD 57754

Subject: Wharf Boston Expansion – Rare Plant Species

Dear Ms. Allen:

BKS Environmental Associates, Inc. (BKS) conducted a baseline vegetation study in 2021 in support of the State of South Dakota Department of Agriculture and Natural Resources (SD DANR) requirements for mine permitting of the proposed Coeur Wharf Boston Expansion. Information on critical riparian zones, mountain meadows, wetlands, and U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered (T&E) species was required as part of this baseline vegetation study by SDCL 46-6B-7(3), SDCL 45-6B-92(3), and the Endangered Species Act. SD DANR and South Dakota Game, Fish, and Parks (SD GF&P) also require information regarding South Dakota Natural Heritage Program Rare Plants of South Dakota as part of this baseline vegetation study.

A baseline vegetation study conducted by BKS in 2010 as part of permitting the Wharf Expansion Area included the proposed Boston Expansion. Based on the 2010 and 2021 baseline vegetation studies, riparian zones, mountain meadows, and wetlands are not present within the proposed Boston Expansion. Baseline vegetation studies in 2010 and 2021 found no individuals of USFWS T&E species listed for South Dakota: Leedy's Roseroot (*Rhodiola integrifolia* spp. *leddyi*) and Western Prairie Fringed Orchid (*Platanthera praeclara*). Additionally, no potential habitat for these species was present within the proposed Boston Expansion. The USFWS Information, Planning, and Consultation (IPaC) System supports this finding and indicates no USFWS T&E species for Lawrence County, South Dakota.

The South Dakota Natural Heritage Program Rare Plants of South Dakota list was reviewed prior to the 2021 baseline vegetation study. The 2021 baseline vegetation study found one S2 species: *Vaccinium membranaceum*. BKS received verification of this identification through a collected specimen submitted to Bob Dorn, author of Vascular Plants of Wyoming. One populations of *V. membranaceum* was found on the western border of the proposed Boston Expansion in the SE ¼ NE ¼, Section 3, Township 4 North, Range 2 East. A map illustrating this location is attached (Map 1). This population was located within the Quaking Aspen Series (PTSE) vegetation community type on a relatively steep south-facing slope. A photograph of the transect on which the population was observed is attached (Figure 1). Quaking aspen (*Populus tremuloides*) and ponderosa pine (*Pinus ponderosa*) were the dominant overstory vegetation. Multiple small shrubs and forbs dominated the understory and included grouse whortleberry (*V. scoparium*),

kinnikinnick (*Arctostaphylos uva-ursi*), and shinyleaf spirea (*Spiraea lucida*). Approximately 10 individuals were observed within this population.

A complete report documenting these findings will be provided for the SD DANR mine permitting process for the proposed Coeur Wharf Boston Expansion. Additionally, a report of this population will be submitted to the SD GF&P and the Natural Heritage Program through the Rare Plant Report Card system. If you have any questions or comments, please do not hesitate to contact BKS at 307-686-0800 or dgardner@bksenvironmental.com.

Sincerely,

Dawn Gardner

Dawn Gardner
Sr. Vegetation Ecologist
BKS Environmental Associates, Inc.

cc. Crystal Hocking, RESPEC

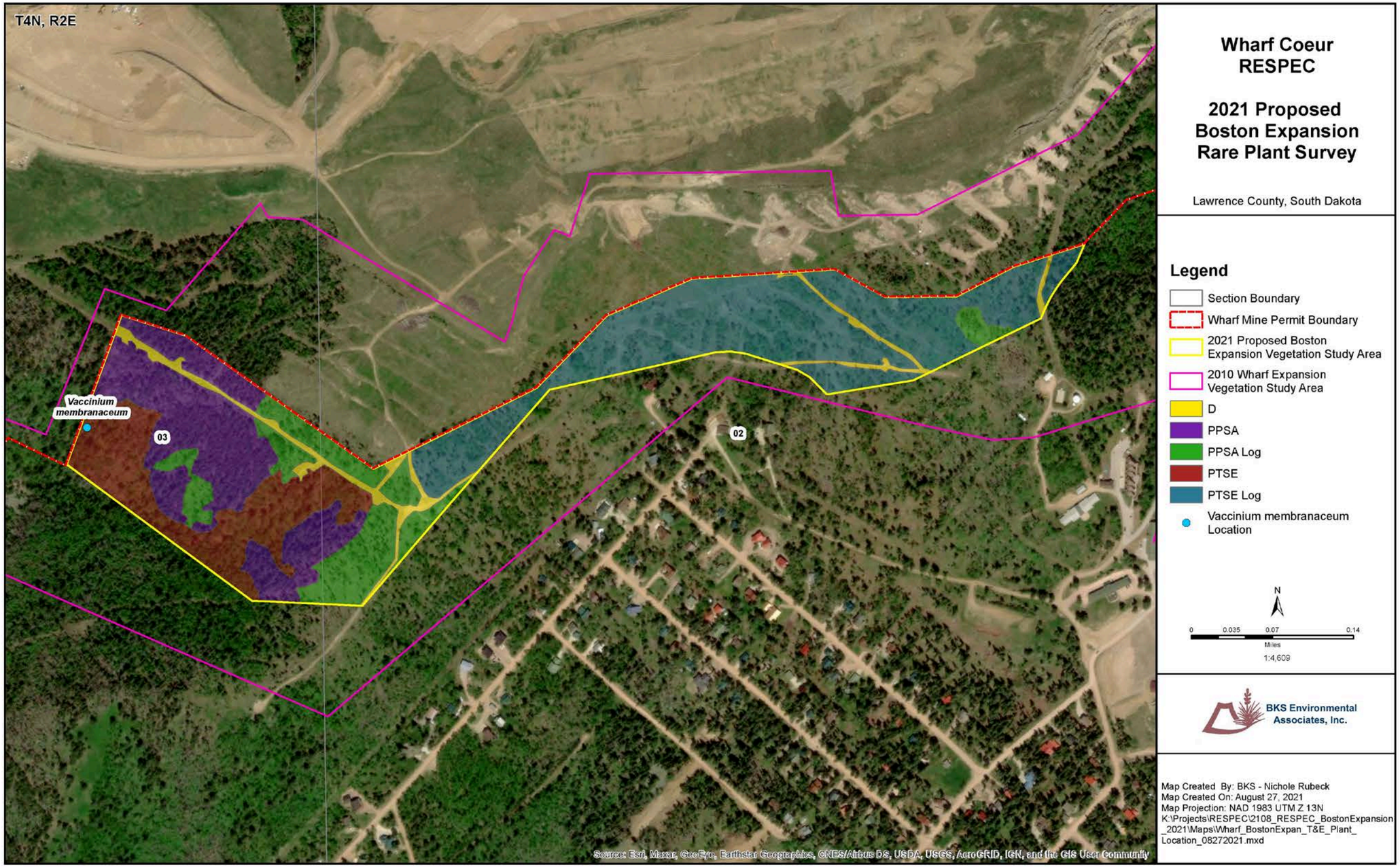
T4N, R2E
Vaccinium membranaceum
03
02
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Wharf Coeur
RESPEC
2021 Proposed Boston Expansion Rare Plant Survey
Lawrence County, South Dakota
Legend
Section Boundary
Wharf Mine Permit Boundary
2021 Proposed Boston Expansion Vegetation Study Area
2010 Wharf Expansion Vegetation Study Area
D
PPSA
PPSA Log
PTSE
PTSE Log
Vaccinium membranaceum Location
N
0 0.035 0.07 0.14
Miles
1:4,609
BKS Environmental Associates, Inc.
Map Created By: BKS - Nichole Rubeck
Map Created On: August 27, 2021
Map Projection: NAD 1983 UTM Z 13N
K:\Projects\RESPEC\2108_RESPEC_BostonExpansion_2021\Maps\Wharf_BostonExpan_T&E_Plant_Location_08272021.mxd

Figure 1: Photograph of transect on which *V. membranaceum* was observed.

APPENDIX C
CULTURAL RESOURCES