Draft Environmental Impact Statement for the Husky 1 North Dry Ridge Phosphate Mine

Governor's Office of Energy and Minerals

DOI-BLM-ID-I000-2021-0001-EIS

MISSION STATEMENT

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USDI Bureau of Land Management
Idaho Falls District
http://www.id.blm.gov

October 13, 2021

Dear Reader:

This is to notify you that the draft Environmental Impact Statement (DEIS) for the proposed Husky 1 North Dry Ridge Phosphate Mine and Reclamation Plan is available for your review and comment. The DEIS was prepared under the National Environmental Policy Act (NEPA) and analyzes impacts to the human environment from an open pit phosphate mine in Southeast Idaho that has been proposed by Itafos Conda LLC (Itafos). The Environmental Protection Agency (EPA) will publish a Notice of Availability (NOA) in the *Federal Register* on October 22, 2021.

The DEIS reviews a range of management options to address environmental and social issues associated with the proposed mine that were identified by the public, native tribes, and agencies during an earlier scoping period. The DEIS was prepared by the Bureau of Land Management (BLM), Idaho Falls District (lead agency); and the U.S. Forest Service, Caribou-Targhee National Forest (USFS, joint lead agency); with cooperation from the Idaho Department of Environmental Quality, Idaho Governor's Office of Energy and Mineral Resources, Idaho Department of Lands, and the U.S. Army Corps of Engineers.

Itafos' proposed project is located approximately 16 miles northeast of Soda Springs, Idaho and includes: 1) development of three federal mineral leases they currently hold for mining and reclamation of an open pit phosphate mine; 2) modification (enlargement) of an existing lease; 3) construction of a truck-to-rail ore transfer facility. The proposed mine is a surface mine like Itafos' existing Rasmussen Valley Mine which is located three miles to the north. Operations at the new (proposed) mine are planned to begin in time to allow for a smooth transition and continued ore production. As the Rasmussen Valley Mine becomes depleted, the new mine will ramp up production.

A digital copy of the DEIS and supporting documents can be obtained from either the BLM or USFS project websites. These are: BLM Land Use Planning and NEPA Register website at https://go.usa.gov/x7HSJ and the Caribou-Targhee National Forest Land Management Projects website at https://www.fs.usda.gov/project/?project=37878.

Please note that the public review and comment period for the DEIS ends 45 days following the EPA's publication of the NOA in the *Federal Register*. The publication date of the NOA is the exclusive means for calculating the comment period for this analysis. Public comments concerning the adequacy and accuracy of this Draft EIS will be accepted until midnight, MST, December 6, 2021 (assuming the EPA publishes the NOA on October 22, 2021), and may be submitted in writing by either of the following methods:

- Web site: https://go.usa.gov/x7HSJ (case sensitive, "participate now" button)

- Mail: Husky 1 North Dry Ridge Phosphate Mine Draft EIS, c/o Tetra Tech, 2525 Palmer Street, Suite 2, Missoula, MT 59808 (Please reference "Husky 1 North Dry Ridge Phosphate Mine Draft EIS" on all correspondence).

The agency will hold a virtual public meeting to provide information and answer questions about the DEIS and the public comment process on November 8, 2021. Detailed information about how to participate in the virtual public meeting is available at: https://go.usa.gov/x7HSJ.

Note that any future agency decision concerning the portion of the proposed project related to USFS special use authorizations for off-lease activities is subject to the objection process pursuant to 36 CFR 218 Subparts A and B. Only those who provide comment during this comment period or who have previously submitted specific written comments on the project, either during scoping or other designated opportunity for public comment, will be eligible as objectors (36 CFR 218.5). BLM appeal procedures found in 43 CFR Part 4, Subpart E apply to the portion of any future BLM project decision related to the Federal mineral leases.

Comments, including names and street addresses of respondents, will be available for public review at https://go.usa.gov/x7HSJ and subject to disclosure under the Freedom of Information Act (FOIA). They will be published as part of the Final EIS and other related documents. Individual respondents may request confidentiality. If you wish to withhold your name and/or address from public review or disclosure under the FOIA, you must state this prominently at the beginning of your written comment. The BLM and USFS will honor such requests to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, are available for public inspection in their entirety.

All comments received during the public comment period will be fully considered and evaluated during preparation of the Final EIS. Questions can be directed to Wes Gilmer, BLM Project Manager, (208) 478-6369.

Sincerely,

Mary D'Aversa
District Manager
BLM Idaho Falls District

Mel Bolling
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Husky 1 North Dry Ridge Phosphate Mine

Draft Environmental Impact Statement

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Abstract

This Draft Environmental Impact Statement (DEIS) analyzes impacts expected from approving the Husky 1 North Dry Ridge (H1NDR) Mine and Reclamation Plan submitted by Itafos Conda, LLC to mine phosphate ore in Caribou County, Idaho, including modifying leases to add approximately 559 acres needed to achieve maximum ore recovery. The Proposed Action consists of developing two new open mine pits, construction of haul and access roads, water management features, permanently reroute a portion of Stewart Creek, closing the National Forest System Road 134 (Stewart Canyon Road) to public access, environmental protection measures, and reclamation. Ore would be hauled via truck to an existing railroad and then by rail to a processing plant in Soda Springs, Idaho. Mine overburden (waste rock) would be placed as backfill in the mined-out North Maybe Mine and South Maybe Canyon Mine pits, an overburden storage area, and then into mined areas of H1NDR as mining progresses. Overburden would be used as backfill in mined-out pits, graded, and then covered with growth media and revegetated. In total, the mining and the support facilities would cause disturbance of approximately 1,146 acres of National Forest. Approximately 255 acres of those are previously disturbed by historic mining activities on National Forest. The expected mine life would be 13 years, more or less, followed by an expected 2 years of reclamation. In addition to the No Action Alternative, which is to not approve the Mine and Reclamation Plan, an alternative is evaluated to install a cover with more flexible membrane liner over strategic areas of the pit backfill to reduce water percolation through the backfill, resulting in a reduction of contaminants leaching into groundwater and subsequently, surface water. Another alternative is considered to return Stewart Creek to its natural channel at reclamation. As the proposed action would only provide public access between Dry Valley and Diamond Valley via the Blackfoot River Road, the final alternative considered would provide motorized access between Dry Valley and Diamond Valley more directly through the lease areas.

Public Comments on the DEIS will be accepted for 45 days, beginning the day that the Environmental Protection Agency publishes a Notice of Availability in the Federal Register. Comments should be submitted as described in the preceding cover letter.

Summary

Introduction

Itafos Conda, LLC (Itafos) submitted a phosphate mine and reclamation plan (MRP) for the Husky 1-North Dry Ridge (H1NDR) project to the Bureau of Land Management (BLM) on April 13, 2020. The BLM reviewed the MRP to determine if it and other application materials complied with requirements in the Code of Federal Regulations (CFR) (43 CFR 3592.1) and were complete, and informed Itafos that additional information was needed. Itafos submitted a revised MRP on June 19, 2020.

The mine would be located about 16 miles (26 road miles) northeast of Soda Springs in Caribou County, Idaho on existing and proposed modifications to federal phosphate leases, mostly on federal lands within the Caribou National Forest. Leases issued under the Mineral Leasing Act of 1920 grant exclusive rights to mine and dispose of the federal phosphate deposit.

Most activities would occur on National Forest System (NFS) lands on federal phosphate leases, some would occur off-lease and require a recommendation from the Forest Service and issuance of several special use authorizations from the U.S. Forest Service (USFS) Caribou-Targhee National Forest. Therefore, the BLM and USFS are joint lead agencies for this EIS. The U.S. Army Corps of Engineers (USACE), the Idaho Department of Environmental Quality (IDEQ), the Idaho Department of Lands (IDL), and the Idaho Office of Energy and Mineral Resources are cooperating agencies.

Before the BLM and USFS approve the MRP, modify the lease(s), and issue special use authorizations, the BLM and USFS must comply with the National Environmental Policy Act (NEPA) by analyzing the environmental impacts of mining and reclamation operations along with reasonable alternatives. As H1NDR is likely to have significant impacts, an EIS is appropriate to document this analysis.

Preliminary groundwater fate and transport modeling indicated that the backfill cover in the MRP would not meet regulatory requirements for surface water. Itafos developed several alternative covers in response. The Proposed Action analyzed in this Environmental Impact Statement (EIS) is the June 19, 2020 version MRP with the Preferred Alternative Configuration cap and cover.

Location

Operations would occur on the Federal Mineral Leases IDI-8289 (NDR), IDI-05549 (H1), IDI-04 (Maybe Canyon), and IDI-0678 (Dry Valley Pit D). Itafos is also requesting modifications to phosphate lease boundaries for the H1 lease (559 acres). The project is in portions of Township 7 South, Range 44 East, Sections17, 20, 21, 28, 33, and 34; Township 8 South, Range 44 East, Sections 3, 4, 8, 10, 14, 15, 21, 22, 23, 24, and 25; and Township 8 South, Range 45 East, Sections 30, 31, and 32; Boise Meridian.

Purpose and Need for Action

Itafos has submitted a detailed mine and reclamation plan application (MRP) for developing existing mineral leases that were previously purchased from the United States at the H1NDR site. These leases grant exclusive rights to mine the federal phosphate deposits. The purpose of the joint federal undertaking is for BLM and Forest Service to evaluate and respond to the MRP application. The plan includes a proposal to enlarge (modify) the existing leases to utilize federal lands as needed to operate and/or recover incidental un-leased ore reserves that would not be economically recoverable in the future by a separate mining operation.

As the agency authorized to approve mine and reclamation plans for lease development, BLM's purpose is to identify and incorporate measures to promote orderly and efficient mining, encourage utilization of all known phosphate resources, promote practices that avoid, minimize or correct damage to the environment and hazards to public health and safety. As the surface management agency, the USFS purpose is to provide the BLM with recommendations for lease modifications, surface protection, and reclamation. USFS also evaluates special use authorization proposals for phosphate mining support facilities and activities that occur on NFS lands outside lease boundaries. The USACE has jurisdiction over Waters of the United States, including wetlands. The USACE will use the EIS to inform its decision under Section 404 of the Clean Water Act regarding an action alternative that may be selected by BLM.

The proponent's purpose is to exercise development rights by implementing an MRP that allows them to economically mine the deposit and meet established requirements that relate to operations, land management and environmental protection.

Decision to be Made

Itafos must acquire all permits mandated by law. The BLM is responsible for activities on leased lands and would make decisions regarding approval of the proposed MRP, proposed lease modification, and appropriate land uses on leased lands. The BLM will prepare and sign the Record of Decision and decide whether to:

- Approve the MRP as proposed or an alternative,
- Recommend the lease modifications,
- Approve modifications of current mine plans on Lease I-04 and Lease I-0678 to accommodate mining and facilities as proposed on those leases,
- Approve a permanent or temporary stream rerouting; and
- Approve a road closure, new road, or ATV trail for access from Dry Valley to Diamond Creek.

The USFS is responsible for off-lease operations on NFS lands, including whether and how to authorize these operations or an access route alternative providing continuous public access. USFS will decide whether to:

- Approve an amendment to Simplot's existing slurry pipeline special use authorizations,
- Approve an amendment to the 2003 Caribou National Forest Land and Resource Management Plan (2003 RFP) for relocation of the pipeline,
- Approve special use authorizations for off-lease facilities, and
- Approve any needed adjustments to grazing allotments due to grazing impacts in the mine area.

If the Alternative Road alignment is selected, additional decisions would include whether to:

- Approve a public road open to all motor vehicles or a 50-inch trail open to OHV or smaller traffic.

Public Scoping

Scoping

A notice of intent to prepare an EIS was published in the Federal Register on December 23, 2020 followed by a 30-day scoping period. A virtual public meeting was held on January 11 to provide information. A press release was posted on BLM's website announcing the scoping period and the virtual public meeting. Media outlets were included in the scoping mailing, and the project is on BLM's ePlanning and Forest Service's project websites. Written comments were accepted by mail, email, or hard copy. During the scoping period, approximately 1,000 documents were submitted in the form of letters or emails before the close of the 30-day scoping period on January 22, 2021.

BLM Land Use Plan Conformance

To be approved, the MRP must comply with agency regulations, policies, plans, and programs. The H1NDR mine must comply with applicable land use plan direction developed under the Federal Land Policy and Management Act. Although the mine is located within the NFS, BLM has authority for issuing federal phosphate leases and administering associated resource use and development. Because of this, those portions of the mine that would occur within federal phosphate leases must also meet the phosphate mining planning and development criteria set forth in the BLM Pocatello Field Office ARMP, as amended. For instance, the Objective ME-2.3 in the ARMP states that the BLM will "regulate mineral development activities to prevent or control sediment and the release of contaminants such as selenium and metals into the environment" and land uses on mineral leases. Other related ARMP direction includes:

- Action ME-1.2.3. Leasable mineral resources will be available for development according to related laws and regulations and at the discretion of the BLM after full coordination with the surface management agency.
- Action ME-1.2.4. Leasable minerals on the Caribou National Forest will be managed consistent with the Caribou National Forest Plan.
- Action ME-1.2.5. Reclamation requirements for mineral development operations will be developed consistent with surface management agencies' recommendations.

The Proposed Action and alternatives have been reviewed and are consistent with management direction in the ARMP. No amendments to the ARMP would be necessary.

Mining and reclamation practices would also meet BLM's requirements for mining operations and reclamation of federal mineral leases at 43 CFR 3592.1.

Revised Land and Resource Management Plan Conformance

The Revised Forest Plan is also applicable since the mine is located within this portion of the Caribou-Targhee National Forest and it is incorporated by reference by the BLM ARMP. Management of the National Forest is directed by the Caribou National Forest Revised Land and Resource Management Plan (2003 RFP), which applies to all NFS lands, and post-reclamation activities.

The 2003 RFP provides overall management direction for each resource and the prescriptions provide specific direction based on the resources and conditions within each prescription area.

A review of the standards and guidelines and the activities in the Proposed Action, No Action, and other action alternatives are consistent with the Forest-Wide and Management Prescription direction provided in the 2003 RFP. However, an amendment would be needed to re-route Simplot's slurry line through the mine area. The amendment would be to change the designation on the new route from Prescription 6.2b to 8.1b for 6 acres where the pipeline would be located, and to change 6 acres from Prescription 8.2b to 6.2b for the area from where the pipeline would be relocated.

Proposed Action

The Proposed Action includes modification of an existing lease, mining, reclamation, and a special use authorization, summarized below. The MRP is viewable in its entirety during the EIS review period online at https://go.usa.gov/x7HSJ. The Proposed Action reclamation cap and cover were modified from the MRP based on the *H1NDR Mine and Reclamation Plan Addendum*.

This modified Proposed Action is called the Proposed Action in the EIS.

Leases and Lease Modifications

Surface owners or management agencies of current leases are the Forest Service and Idaho Department of Fish and Game (IDFG). Portions of the H1 mining areas extend beyond the current lease boundaries. To maximize recovery of the phosphate resource as per 43 CFR 3590, Itafos is requesting modification(s) under 43 CFR 3510 to expand the existing lease boundaries (559 acres). **Table S-1** provides the legal description, surface owners, and lease holders of H1NDR mineral leases and lease modifications.

Table S-1. Legal Descriptions, Surface Management Agency, and Lease Holders of H1NDR Project Mineral Leases and Proposed Lease Modifications

Mineral Leases	Township, Range, Section	Subdivision	Surface/ Subsurface Owner
H1NDR Mineral Leases			
Lease IDI-0005549 Husky 1 (864.35 acres) Current Lessee Itafos	8S, 44E, 24	SE¼SW¼, SW¼SE¼	NFS/Federal
	8S, 44E, 25	NE¼, NE¼NW¼, NE¼SE¼	NFS/Federal
	8S, 45E, 30	SW¼NW¼, SW¼, SW¼SE¼	NFS/Federal
	8S, 45E, 31	NE¼, NE¼NW¼, N½SE¼	NFS/Federal
	8S, 45E, 32	NW¼SW¼	NFS/Federal
Lease IDI-008289 North Dry Ridge (640 acres) Current Lessee Itafos	7S, 44E, 17	SE¼SE¼	IDFG/Federal
	7S, 44E, 20	E½NE¼	NFS/Federal
	7S, 44E, 21	W½NW¼, SE¼NW¼, SW¼	NFS/Federal
	7S, 44E, 28	W½NE¼, E½NW¼, NE¼SW¼, NW¼SE¼	NFS/Federal
Lease IDI-04 Maybe Canyon Mine (1522.24 acres) Current Lessee Nu-West	8S, 44E, 3	NW¼NW¼, S½NW¼, SW¼, SW¼SE¼	NFS/Federal
	8S, 44E, 4	E½NE¼	NFS/Federal
	8S, 44E, 10	NE¼NW¼, W½NE¼, SE¼NE¼, SE¼	NFS/Federal
	8S, 44E, 14	W½NW¼, SE¼NW¼, E½SW¼, NW¼SW¼, W½SE¼	NFS/Federal
	8S, 44E, 15	E½NE¼	NFS/Federal
	7S, 44E, 28	SW¼SE¼	NFS/Federal
	7S, 44E, 33	E½SE¼, NW¼SE¼, NE¼	NFS/Federal

Mineral Leases	Township, Range, Section	Subdivision	Surface/ Subsurface Owner
	7S, 44E, 34	W½SW¼	NFS/Federal
Lease IDI-0678 Dry Valley Mine Pit D (440 acres) Current Lessee Nu-West	8S, 44E, 15	W½NW¼, SW¼	NFS/Federal
	8S, 44E, 21	NE¼, NE¼	NFS/Federal
	8S, 44E, 22	NW¼	NFS/Federal
Proposed Mineral Lease Modifications			
Modification Area 1 (359 acres)	8S, 44E, 14	SE¼SE¼	NFS/Federal
	8S, 44E, 23	NE¼NE¼, NW¼NE¼, SE¼NE¼	NFS/Federal
	8S, 44E, 24	NW¼NW¼, S½NW¼, N½SW¼	NFS/Federal
Modification 2 (40 acres)	8S, 45E, 30	SE¼SE¼	NFS/Federal
Modification 3 (40 acres)	8S, 45E, 30	NW¼SE¼	NFS/Federal
Modification 4 (40 acres)	8S, 45E, 31	SE¼NW¼	NFS/Federal
Modification 5* (80 acres)	8S, 45E, 32	W½NW¼	NFS/Federal

Source: BLM Case Recordation Serial Register Page https://reports.blm.gov/reports/LR2000/ and (Itafos, 2020a, pp. Table 6-1)

Notes: S = South, E = East, W = West, and N = North

* Modification 5 in the MRP was eliminated due to acquisition of leasing rights instead of a modification. Modification 6 in the MRP is now called Modification 5 in the EIS.

Disturbance Summary

The approximate acres of new disturbance in H1NDR are provided in **Table S-2.** A buffer zone around the pits is provided to accommodate other mine facilities, as well as potential changes to pit design including highwall laybacks that may be necessary due to unstable rock that could be encountered during mining. Mining-associated impacts within the lease boundaries would occur within the Operational Zone, which includes re-disturbance of 148 acres previously disturbed at the Maybe Canyon Mine. Approximately 126 acres would be disturbed on the lease modification areas.

Mine facilities include growth media stockpiles, temporary and permanent overburden (waste rock) storage areas (OSA), water management features, dust suppression and water supply wells with water fill stands. Existing offices and shop facilities at the nearby Dry Valley Mine on private lands would be used. The Dry Valley yard area including the fuel storage tanks, an equipment parking/hot start line, and a lay-down yard would be used. The tipple (train loading) area includes an ore stockpile, train loading facility, and haul road ramp near the Dry Valley Mine Pit D, on Federal Phosphate Lease IDI-0678.

Table S-2. Mine Surface Disturbance

Mine Component	NFS Acres	Private Acres	Total Acres
H1NDR New Surface Disturbance			
H1 Operational Zone for	126	0	126
NDR Operational Zone	38	0	38
H1 Mine Pits	355	0	355
NDR Mine Pit	138	0	138
H1 Historical South Maybe Canyon Mine Pits*	77	0	77

Mine Component	NFS Acres	Private Acres	Total Acres
NDR Historical North Maybe Canyon Mine Pits*	71	0	71
Permanent OSA*	55	0	55
Temporary OSA	49	0	49
H1 Water Management Ponds, Sediment Control Ponds, Runoff Containment Ponds and Ditches	36	0	36
NDR Water Management Ponds, Sediment Control Ponds, Runoff Containment Ponds and Ditches	15	0	15
H1 Growth Media Stockpile	8	0	8
NDR Growth Media Stockpile	4	0	4
Stream Realignment	20	0	20
H1 Haul Roads*	32	0	32
NDR Haul Roads*	31	16	47
Ore Stockpile and Tipple Area*	61	0	61
H1 Ready Line	2	0	2
NDR Ready Line	9	0	9
Simplot Slurry Line Re-route	3	0	3
Total	1,130	16	1,146

Source: (Itafos, 2020a)
Notes: Rounding may cause numbers to total differently than the table.
* Previously disturbed areas

Ore Removal, Backfill, and Overburden Storage

Two primary areas would be mined: H1 and NDR. H1 would have a series of adjacent pits and occupy portions of the Maybe Canyon Mine lease (IDI-04), Husky 1 lease (IDI-05549), and Husky 1 lease modifications. NDR has one open pit on a portion of the lease (IDI-8289).

Mining would include 30 feet of benches for every 90 feet of depth. Mining would occur year-round, up to 24 hours per day, with overlapping shifts, for about 13 years. The mining sequence would mine H1 and NDR consecutively. Ore production may fluctuate over time, depending on technical factors and market conditions, increasing or decreasing the mine life.

Ore would be hauled by truck to the tipple. From there the ore would be hauled by existing rail to the existing Conda Plant in Soda Springs. Overburden would be ripped or blasted, excavated, and hauled to a temporary or permanent OSA or back fill location. The train loading facility (tipple) and ore stockpiles would be constructed south of the first (lower) switchback of the North Maybe Mine haul road (NFS Road 134). The proposed tipple area is east of the existing rail line and within the eastern portion of the Dry Valley Mine Pit D Lease. A haul road ramp would be constructed from the switchback to the tipple.

The entire tipple area would be lined as shown on the figures and maps. The 60 mils high density polyethylene (HDPE) liner would be placed over a minimum of 6 inches of 3/8-inch minus material. At least 2 feet of limestone would be placed on top of the HDPE liner to provide a visual indicator showing the bottom of stockpiled ore and the tipple pad, thereby protecting the liner during operations. Water management would be in accordance with the Storm Water Pollution Prevention Plan (SWPPP)

and runoff would be managed as contact water. To accommodate railcar loading requirements, the public access road would be safely relocated around and away from the tipple area.

The pits would be sequenced through several phases, outlined in **Table S-3.** As ore is mined from H1, overburden would be placed as backfill in existing pits and newly mined pits except in Phases 4 and 5. During these phases, approximately five million cubic yards would be placed in a permanent external overburden storage area (OSA).

Table S-3. Open Pit Mine Sequence

Phase	Production Years	Pit(s) Mined	Backfill Destination
H1			
1	1 through 3	H1-N	South Maybe Canyon Mine-N, South Maybe Canyon Mine-S
2	2 through 4	H1-N	South Maybe Canyon Mine-N, H1-N
3	3 through 5	H1-N	H1-N
4	4 through 6	H1-N, H1-X, H1-L	H1-N, H1-X, H1-X OSA, H1-L
5	5 through 7	H1-L	H1-L
6	6 through 8	H1-L, H1-E	Temp OSA, H1-L, H1-E
7	7 through 9	H1-E, H1-S	Temp OSA, H1-E, H1-S
8	8 through 10	H1-S	Temp OSA, H1-S
9	9 through 11	H1-S	Temp OSA, H1-S
NDR			
10	10 through 12	NDR	North Maybe Mine, NDR
11	11 through 13	NDR	NDR
12	12 through 13	NDR	NDR

Source: (Itafos, 2020a, pp. pp. 4-3, 4-4, 5-1, 5-2, 5-4, and 5-6).

A temporary external OSA would hold approximately 12.6 million cubic yards until room is available in the H1-E pit and H1-S pit.

NDR would be mined in 3 phases over approximately 3 years. Overburden would be placed in the existing North Maybe Mine pit, then into the NDR pit as room is available. Backfilled overburden would be compacted to reduce settlement and restrict air and water movement to reduce the risk of constituents of potential concern (COPCs) leaching. Backfill would be shaped to maximum slopes of three horizontal to one vertical (3H:1V) for covering and final reclamation.

One permanent OSA would be needed to store approximately 5 million cubic yards of backfill and serve as a buttress on the west band of the Maybe Creek realignment. Water infiltrating through the permanent OSA would drain into the H1-N pit.

Stream Realignment for Overburden Handling

Portions of Maybe Creek and Stewart Creek (2,557 feet of Stewart Creek and 7,757 feet of Maybe Creek) would be realigned adjacent to backfilled pits or re-established over backfilled pits around the H1-N pit, H1-X pits, and the H1-X Overburden Stockpile Area. Following final reclamation, a portion of the drainage would remain permanently realigned across the backfill. Limestone would be placed along the boundary of the H1-X OSA to serve as a buttress for the realigned drainage. The realigned channels would be designed to convey the stream flow that would result from the 100-year, 24-hour storm event plus a 6-inch freeboard. The realigned channel would incorporate an impervious liner

(60 mils HDPE) and other engineering controls to limit infiltration of the flow into the underlying fill. The OSA would provide a buttress for the Maybe Creek realignment to increase stability.

Backfill Cover

To limit infiltration into the overburden and limit the volume of leachate generated, various covers would be placed on the mine backfill. Itafos refined the original cover proposed in the MRP and provided a summary in a memo *H1NDR Mine and Reclamation Plan Addendum* (Itafos, 2020d), which is available on the BLM's ePlanning website. The addendum was to document changes to the MRP because of comments from the BLM, USFS, and IDEQ prior to public scoping. For reclamation, the type of cover to be used over backfill would depending on the location **(Table S-4)**.

The permanent OSA would be covered with a low-permeability clay cover, with a minimum 12 inches of chert/limestone then growth media.

Table S-4. Acres of Cover Materials in the Proposed Action

Location	Earthen Store and Release	Low Permeability Clay	Flexible Membrane	Lateral Drain	Total Acres
NDR Pit 1	28	-	-	-	28
NDR Pit 2	16	8	-	-	24
NDR Pit 3	26	56	-	-	82
North Maybe Mine Pit	-	71	-	-	71
South Maybe Canyon Mine Pit 1	-	55	-	-	55
South Maybe Canyon Mine Pit 2	-	-	-	22	22
H1-N	80	7			87
H1-X, Permanent OSA	5	56			61
H1-L Pit 1	46				46
H1 L Pit 2	29	-	-	-	29
H1 L Pit 3	-	31	-	-	31
H1 L Pit 4	-	-	22	-	22
H1 East Pit	53	12	-	-	65
H1 South Pit	55	26	-	-	81
Total	338	322	22	22	704

Source: (Itafos, 2020d, pp. 5, Table 1)
* Previously disturbed area

Water management

Approximately 3,030 feet of Stewart Creek crosses an area to be mined. This section of the stream would be relocated uphill into a constructed channel).

Water that accumulates in the pits would be managed per a SWPPP[1] and the Surface Water Management Plan, which is Appendix D in the MRP.

[1] The SWPPP would be developed Idaho Pollutant Discharge Elimination System IDAPA 58.01.25. https://www.deq.idaho.gov/water-quality/ipdes/ approved by the IDEQ.

- Lined ponds would be placed in native soils that are downgradient from backfill areas containing seleniferous materials and sized to control the volume of runoff produced by either the 10-year, 24-hour storm event plus the average calculated weekly snowmelt volume, or the 100-year, 24-hour storm event, whichever is larger.
- Unlined stormwater ponds would be sized to control the volume of runoff produced by the 2-year, 24-hour storm event with an emergency spillway that would safely discharge the peak flow from the 25-year, 24-hour storm event.
- Diversion ditches energy dissipators, outlet protection, and culverts associated with ditches that are expected to have a lifespan between 2 and 25 years or across multiple mining phases would be designed to control stormwater runoff produced by the 50-year, 24-hour storm event.
- Long-term drainage channels and associated structures would be designed to control stormwater runoff produced by the 100-year, 24-hour storm event.

Contact water, including drainage from haul roads, would be managed for zero discharge of the mine site to any surface waters. Runoff would be collected in basins with an impervious liner. Contact-water collected in basins would be disposed of through evaporation, dust suppression in zero release areas, or moved to areas of un-reclaimed backfill for infiltration.

Non-contact water would also be managed under the SWPPP. Runoff would be intercepted and diverted around disturbed areas through diversion ditches. Non-contact runoff water would enter basins to collect sediment then slowly released through spillways.

The small amount of perched groundwater that may be encountered would drain into the pit and be managed as contact water. If necessary, water would be moved to areas of un-reclaimed backfill for infiltration, used as dust suppression in zero release areas, or placed in the contact water basins. All drainage features would be designed to prevent erosion.

No long-term water treatment is anticipated after reclamation is complete. Stewart Creek would remain in the realigned channel.

Service and Haul Roads

The existing historical Maybe Canyon haul roads would be improved to a width of 80 feet. A new haul road ramp would be constructed from the first (lower) switchback of the Maybe Canyon haul road to the tipple. Haul road totals 7.2 miles with 3.2 miles of new construction and 4.0 miles of existing road. Using NFS Road 134 to haul ore would require closing the road to the public during mining until reclamation is complete, approximately 15 years.

Due to the steep, narrow topography and the pit sequence, mining the H1 Lease area would require three temporary staging areas. One staging area is required for the NDR Lease mining area. This staging area would require construction of a 50-foot-wide access road. The other staging areas would be developed in the existing disturbance/backfill footprint as the mine progresses south.

Relocation of Simplot Slurry Line

An active phosphate ore slurry pipeline crosses one of the off-lease areas proposed for mining. An agreement with the pipeline owner has been made on a relocation site of the pipeline before mining occurs in that area. Re-routing the pipeline would disturb approximately 3 acres (the other 3 acres of

disturbance for the reroute is already disturbed by the former North Maybe Mine) and require an amendment to the 2003 RFP and an amendment to special use authorization SSC51.

Environment Protection Measures and Best Management Practices

A broad array of measures has been included to minimize or eliminate environmental impacts and to meet BLM ARMP and Caribou National Forest 2003 RFP.

Alternatives

In addition to the No Action Alternative, action alternatives were developed to address the significant issues identified.

Alternative Cover

This alternative was developed to reduce potential impacts, from the Proposed Action, to Surface water and groundwater. Based on a preliminary analysis, Itafos would reconfigure placement of overburden and re-arrange and optimize the placement of the four types of covers. The reconfiguration would reduce the area needing a cover from 706 to 614 acres. In addition, based on the agency groundwater model, the most effective cover design would be deployed where it would decrease impacts to the greatest degree. The area of flexible liner cover would increase from 22 to 315 acres. This alternative would increase the acreage of unreclaimed highwall from 19 to 99 acres. Overall, the alternative would meet the following performance criteria:

- Prevent contact of surface water runoff with run-of-mine overburden.
- Prevent water infiltrating through the cover system and contacting run-of-mine overburden from subsequently expressing at the ground surface as a result of elevated pit backfill water levels.
- Prevent subsurface transport of COPCs in downgradient groundwater from resulting in additional loading to 303(d) listed surface waters or concentrations exceeding surface water quality standards in non-303(d) listed waters.
- Limit impacts to groundwater and the extent of impacted groundwater beyond the mining area so that there is no injury to current or projected future beneficial uses of groundwater.

Construction materials may change slightly, but all performance criteria would be met. Acres of each type of cover that would be applied to each pit

Alternative Stream Routing

To reduce long-term and permanent impacts to Stewart Creek, an alternative is considered that temporarily reroutes Stewart Creek into an open channel uphill from its current location during operations and then returns it permanently to its natural channel except where it would cross the backfill area. Where the stream crosses the backfill, the channel would be lined to minimize water contacting the backfill cover. This alternative would not create additional disturbance beyond the Proposed Action.

Alternative Access

This alternative was developed to address the significant issue of the loss of public access caused by the mine's use of the existing NSF Road 134 for a haul road. The alternative includes a 12-foot wide new road from Diamond Creek, following the Simplot Slurry Pipeline Right-of-Way then heading north on the east side of Dry Ridge then through the Maybe Mine area, crossing Dry Ridge where the

road would cross NFS Road 354 then down the west side near Maybe Creek and tying with the Dry Valley Road. The Alternative Road would be 7.6 miles of which 5.8 miles would be new construction and 1.8 miles would be constructed adjacent to the existing slurry line corridor. The new route would entail 6.1 miles of new road construction between Dry Valley and Diamond Creek, and approximately 1.5 miles of new disturbance adjacent to the slurry line from Diamond Creek to where the new road would begin. Approximately 18 acres of new disturbance and 4 acres of previously disturbed areas would be included in the road construction area for the road. NFS Roads 134, 193, and 194 would be obliterated in disturbance footprint (mining area).

An option for this road would use the same alignment but constructed a 50-inch-wide all-terrain vehicle (ATV) trail (ATV Options). Instead of constructing new road adjacent to the slurry line road, the ATV trail would be the slurry line right-of-way. Gates would be installed at two locations where larger vehicle access would end and a small parking area would be developed near each gate. The gates would restrict access of the trail to ATVs and pedestrians/equestrian only (but would retain access for maintenance vehicles, when needed). This option would result in an overall disturbance area of approximately 3 acres of new construction and 2 acres of previously disturbed area. the ATV trail would become a permanent public route on the Caribou Travel Plan.

Either of the options for this alternative would establish motorized access through the mined area between Dry Valley and Diamond Creek during mining and would remain permanently. Either of the options could be added to either the Proposed Action or the Alternative Cover.

Table S-5 summarizes and compares the impacts on the resources based on the issues and indicators analyzed.

Table S-5. Comparison of Environmental Impacts by Alternative

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
Groundwater				
Groundwater Quality - Trace metals, including selenium, leaching into groundwater	Preliminary groundwater modeling shows potential for COPCs to enter aquifer systems and discharging to seeps and surface water bodies.	Preliminary groundwater modeling shows that the Alternative Cover reduces COPC transport to underlying aquifers and percolation sufficiently to prevent shallow groundwater discharges from affecting seeps and surface water bodies.	There is no predicted effect on groundwater quality.	Reroute would be lined where it crosses the fill, there is little potential for water to infiltrate through the fill and contribute concentrations of COPCs to groundwater. There is no predicted effect on groundwater quality.
New mining operations effect on the timing and effectiveness of the CERCLA remediation	No impacts to the investigation schedule are anticipated. Preliminary groundwater modeling shows that the percolation of water into the backfill would be reduced, limiting future impacts from the Maybe Mine site backfill.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Surface Water				
Reduction in surface water flows of streams, seeps, creeks or impacts to water rights downstream from the drawdown of groundwater.	Preliminary groundwater flow modeling shows no adverse impacts to surface water baseflows in streams.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Qualitative assessment to downstream surface water rights.	No downstream impacts to water rights.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Groundwater discharging contaminants to surface water	Minor loading of selenium and other COPCs 40 years after closure in the headwaters of South Stewart Creek, East Mill Creek, and Maybe Creek. No detectible	Impacts to surface water quality would be reduced from the Proposed Action, negligible or eliminated.	Same as the Proposed Action.	Same as the Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	impacts to water quality would be expected in Diamond Creek or the Blackfoot River.			
Soil erosion causing sedimentation	Negligible due to BMPs. Closure of NFS Road 134 could reduce sedimentation to Stewart Creek in the mine area.	Same as the Proposed Action.	Reduced or eliminated sedimentation impacts from the current NFS Road 134 by eliminating close proximity to the creek.	Same as Proposed Action.
Wetlands, Non-wetland waters, and Riparian Vegetation				
Acres of wetlands permanently lost	0.17	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Linear feet of streams (non-wetland waters) impacted and riparian vegetation permanently lost	4,862 linear feet of perennial stream; 7,996 linear feet of intermittent stream. permanent loss of riparian vegetation 13,851 linear feet of ephemeral channel segments with no riparian vegetation lost.	Same as the Proposed Action.	166 linear feet of additional disturbance over Proposed Action.	4,443 feet of new channel to reroute Stewart Creek during mine operations (Operational Realignment). Reclamation would return the alignment of Stewart Creek to its original location as a channel 4,705 in length. Effects similar to the Proposed Action but the channel locations differ.
Stormwater runoff to contact wetlands and streams	Minimal degradation of wetlands and riparian habitat from erosion and sedimentation due to design features, BMPs	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Fish and Amphibians				
Miles of fish-bearing streams and fishless streams, number of ponds, acres of other amphibian	0 miles of fish-bearing streams 2.1 miles of fishless streams; 1.5 miles of Maybe Creek	Same as Proposed Action.	Same as Proposed action	Same as Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
habitat (forests), acres of wetlands.	and 0.5 mile of upper Stewart Creek (sections of Maybe creek occupied by tiger salamanders) 2 ponds permanently removed (one occupied by breeding tiger salamanders) 822 acres of forested habitat permanently removed (tiger salamander habitat) 0.17 acre of wetlands permanently removed (mitigated off site)			
Reduction in the quantity of water in streams, and ponds	Effects to fish habitat downstream from changes to base flow in streams would be negligible. Amphibian habitat could be reduced by the loss of water volume at the seeps.	The reduction in volumes discharge from seeps to surface water would have a negligible effect on the volume of water in fish-bearing streams	Same as Proposed Action.	Same as Proposed Action.
Alteration of surface water quality to a degree that fish and amphibians would be affected, including in the Blackfoot River	Negligible increase in sedimentation with implementation of BMPs and EPMs in Surface Water Management Plan. Discharge to the headwaters of Stewart Creek, East Mill Creek, and Maybe Creek would contain selenium concentrations exceeding the IDAPA water column criteria (3.1 µg/L), but effects would be negligible downstream. Increase in selenium loading in streams above baseline conditions is expected to result in a negligible, long-term toxicity impact to aquatic	Impacts to surface water quality would be reduced compared to the Proposed Action and would be negligible. Effects to aquatic life would be negligible.	Same as the Proposed Action with the following exception: Closing NFS Road 134 would improve water quality in downstream fish and amphibian habitat in the long term because sedimentation in Stewart Creek from the current road would be reduced once the road is reclaimed.	Same as Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	life.			
Sensitive fish Yellowstone cutthroat trout or their habitat	May impact individuals or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species	No impact to individuals. Not likely to contribute to a trend toward federal listing or cause a loss of viability to the population or species.	Same as Proposed Action.	Same as Proposed Action.
Vegetation				
Acres by type of vegetation impacted by disturbance	890 acres of vegetation. 822 forested acres. Less than 20% of the total forested acres in these watersheds.	Same as Proposed Action	42 acres of vegetation in addition to vegetation removed under the Proposed Action.	14 acres of vegetation in addition to vegetation removed under the Proposed Action.
Suitable timber acres designated in the 2003 RFP	294 acres of suitable timberlands resulting in a 0.35% reduction in forest wide suitable timber acres and allowable sale quantity.	Same as Proposed Action	30 acres of suitable timberlands	Same as Proposed Action
Acres of change by vegetation type and forest community structure change following reclamation	822 acres of forest permanently changed to grassland/shrubland (72% of the analysis area). 285 previously disturbed acres would be converted to a grassland or grassland/shrubland mix, an improvement over existing condition.	Same as Proposed Action.	30 acres of forested vegetation type permanently changed to grassland/shrubland in addition to the proposed action (75% of the analysis area). Acres of previously disturbed acres converted to a grassland or grassland/shrubland mix would be the same as the proposed action.	Effects on forested vegetation would be similar to those of the Proposed Action. The additional acres of forested type removed would not result in a detectible difference from effects under the Proposed Action.
Acres of old-growth forest removed, and long-term change in old-growth characteristics	2.4 acres of Stand D would result in the stand no longer meeting the R4 definition of the minimum area to be identified as old growth (10 acres).The impact to old-growth is considered minor,	Same as Proposed Action	Effects on forest stand structure and old-growth forest would be similar to those of the Proposed Action. The additional acres of forested type removed would not result	Effects on forest stand structure and old-growth forest would be similar to those of the Proposed Action. The additional acres of forested type removed would not result

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	though the extent of the Douglas-fir stand would be reduced, but the entire stand would not be removed.		in a detectible difference from effects under the Proposed Action.	in a detectible difference from effects under the Proposed Action.
Acres that would susceptible to the invasion or spread of noxious weeds and timeframe for a higher risk of invasion or spread and effects on native plant communities.	All areas of disturbance would be susceptible to weed invasion and spread. The potential for spread and invasion would be minimized with proposed control efforts through reclamation.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Wildlife, Including TES				
Wildlife habitat that would be lost or permanently altered, including loss of mature forest habitat	890 acres of wildlife habitat removed, 98% would be reclaimed to the existing use of wildlife habitat. Species that use grasslands and grass-shrub mix may benefit from the additional habitat that would exist post-reclamation. Some pit walls would remain and may be beneficial if it is suitable roosting habitat for bats and nesting habitat for cliff-nesting birds. 822 acres of mature forest habitat would be permanently lost (2% of the analysis area) and therefore would permanently reduce the number and diversity of forest wildlife species that can inhabit the analysis area.	Habitat types removed and reclaimed would be similar under the Alternative Cover, but with 80 additional acres of pit highwalls left exposed. Additional highwalls could provide more habitat for species that use cliff habitat (certain raptor and bat species). The acres of habitat reclaimed would be reduced to 614 acres compared to 706 acres in the Proposed Action. Effects to wildlife from changes to habitat would be the similar to the Proposed Action.	42 acres of wildlife habitat, including coniferous forest, aspen forest, mixed aspen-forest, mountain brush, and grass/forb permanently removed in addition to proposed action. Construction of the 6.2 miles of the new Alternative Road would permanently shift this disturbance to a different location as the old road (portions of NFS Road 134) would be removed by mining.	14 acres of habitat (coniferous forest and mixed aspen-conifer forest) in addition to the Proposed Action would be temporarily removed. The post-reclamation condition of wildlife habitat and riparian function would be the same as that expected under the Proposed Action. However, the stream restoration would occur at a different location (i.e., back to Stewart Creek's original location) compared to the Proposed Action.
Risk of wildlife experiencing selenium toxicity, due to reclaimed vegetation selenium uptake	Wildlife exposure to selenium in overburden or fugitive dust during mining would be limited through use of BMPs.	Surface water would not be contaminated by selenium because discharge of contaminated	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
or selenium contamination of wildlife water sources	The risk of selenium toxicity in wildlife foraging in reclaimed areas would be negligible because an agency-approved seed mix (low selenium accumulating and shallow rooted species) would be used and vegetation monitoring would ensure selenium concentrations are below BLM performance standards. The greatest potential for wildlife selenium exposure is from water sources. Selenium levels in wildlife could increase above current levels but are not expected to have measurable effects to survival or reproduction.	groundwater from seeps around the pits would be reduced to negligible amounts (within the measure of error in the groundwater flow model) and therefore selenium concentrations released into streams would be none to negligible (below the limits of detection), and never above IDEQ aquatic life criteria. The risk of wildlife selenium toxicity would be negligible.		
Threatened and Endangered .	May impact individual Canada lynx but not populations or critical habitat.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Sensitive Species	May impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Mule deer and elk that would be affected by habitat loss or alteration and from mining noise/disturbance/human activities	1.48 acres of Prescription 2.7.2(d) areas (Elk and Deer Winter Range) disturbed. Given that reclamation would return some shrub habitat over the long term, mining noise/disturbance would be temporary, and substantial areas of aspen and mountain shrub would remain intact on	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	the west slopes of Dry Ridge, the effect would be moderate and localized to Dry Ridge. Given that mule deer numbers in GMU 76 are currently declining, adding additional impacts from H1NDR would have a moderate adverse effect to the overall mule deer population. The elk numbers are stable to increasing and therefore more resilient but given the level and long-term nature of the impact, H1NDR would have a moderate adverse effect on the elk population in game management unit 76.			
Migratory birds that would be affected by habitat loss or alteration, and mining noise/disturbance/human activities	Overall, due to minor effects from disturbance and selenium, measures to reduce the likelihood of mortality, and the permanent removal of mature forest habitat in a small area, the Proposed Action would have a moderate effect on birds.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Soils				
Acres of soil disturbed	1,145	Same as the Proposed Action.	1,191	1,150
Potential for trace elements to be mobilized from stockpiles to contaminate on-site or adjacent soil resources	Soil trace element total concentrations would be unaffected by soil handling operations. Trace element mobility would also be unaffected as the existing near-surface soil is currently	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	subjected to the same atmospheric weathering processes as the resulting growth media placed for reclamation. Excavation would not cause a change in the oxidation state of trace element-containing minerals and subsequent increases in trace element mobility.			
Soil available to meet reclamation requirements	Soil available is sufficient to meet reclamation requirements.	Same as the Proposed Action.	Same as Proposed Action with an additional 145,023 cubic yards of soil available for salvage from areas of soil mapped within the alternative road alignment.	Same as Proposed Action with an additional 8,357 cubic yards of soil available for salvage from areas of soil mapped within the alternative operational stream realignment.
Grazing				
Acres of change in capable and suitable rangeland	Kendall Canyon 101 acres lost short-term 187 acres gained long-term Maybe Canyon 109 acres lost short-term 304 acres gained long-term Stewart Canyon 105 acres lost short-term 221 acres gained long-term Dry Valley 167 acres lost short-term 3 acres gained long-term	Kendall Canyon 101 acres lost short-term 166 acres gained long-term Maybe Canyon Same as Proposed Action Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 134 acres lost short-term 279 acres gained long-term Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 113 acres lost short-term 306 acres gained long-term Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action
Estimate short-term and long-term reduction in animal unit months (AUMs)	Kendall Canyon 47 AUM reduction short-term and 90 AUM increase long-term. Maybe Canyon 48 AUM reduction short-term	Kendall Canyon 47 AUM reduction short-term and 80 AUM increase long-term. Maybe Canyon Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 59 AUM reduction short-term and 139 AUM increase long-term	Kendall Canyon Same as Proposed Action Maybe Canyon 49 AUM reduction short-term and 151 AUM increase long-term

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	and 150 AUM increase long-term. Stewart Canyon 48 AUM reduction short-term and 108 AUM increase long-term. Dry Valley 84 AUM reduction short-term and 1 AUM reduction long-term.	Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Stewart Canyon 48 AUM reduction short-term and 107 AUM increase long-term Dry Valley Same as Proposed Action	Stewart Canyon 48 AUM reduction short-term and 107 AUM increase long-term Dry Valley Same as Proposed Action
Areas where the mining activities split an allotment or reduce movement to feed or water.	Kendall Canyon allotment split from north to south. The west side of the allotment would be accessible to grazing with prior authorization to cross mine areas granted by Itafos. Ample access to feed and water on each side. Maybe Canyon allotment from northwest to southeast. Lower Maybe Pond and Schmid Ridge Trough range improvements would be lost to livestock. Very little access to water sources on the west side and ample access to water sources on the east side, ample access to feed during mining and reclamation. The Stewart Canyon allotment would not be completely bisected by the disturbance; therefore, livestock rotation may not be as difficult as for Maybe Canyon and Kendall Canyon.	Same as proposed action.	Although the alternative road would permanently split the Maybe Canyon allotment, it would allow uninhibited access to the eastern portion of the allotment and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Although a small portion of the alternative road would permanently occupy the Stewart Canyon allotment, it would allow uninhibited access to the allotment and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action.	The operational realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use within the Maybe Canyon allotment during the construction of the operational stream bed. During construction of the alternative reclamation realignment, livestock would have access to the Stewart Creek operational realignment. The alternative reclamation realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use within the Stewart Canyon Allotment during the construction of the reclaimed stream bed. Itafos would supply a supplemental water

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	Ample access to feed and water Dry Valley Unit 12 split from east to west. Tipple site would isolate the northern most portion of Unit 12 and a small portion of Unit 11 east of the proposed Dry Valley Road Realignment, this area would likely become unusable during the life of the Proposed Action. With the unit split, livestock would have very little access to water sources on the north end and ample access to water sources on the southern side. Livestock would still have ample access to feed during mining and reclamation.			source to livestock if access to surface water sources is inhibited. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action.
Recreation Changes in acreage available for dispersed (both motorized and non-motorized) recreation activities particularly hunting.	Acres available to the public for dispersed non-motorized recreation including hunting and winter motorized recreation (snowmobiling) would decrease by 1,130 acres. There would be no change in developed recreation acreage. NDR lease extends onto the Blackfoot River Wildlife Management Area, no portion of the mine footprint would.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Access Acres of public lands	1,130	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
closed to public use during mining and reclamation.				
Miles of primary access roads (NFS Road 134) closed to public use by mining and reclamation activities (short-term).	5	Same as the Proposed Action.	Same as Proposed Action except 6.1 miles of new road constructed. ATV trail option would allow small vehicles, not large.	Same as the Proposed Action.
Changes in the number of miles of NFS roads and trails open to motorized travel.	NFS miles of roads and trails open to motorized travel would not change. 1.2 miles of ATV Trail #138 would be closed during mining in the area and then reopened.	Same as Proposed Action	NFS road miles would increase by 1.1 miles, except for the 50-inch ATV trail option which would result in no change to NFS road mileage and an increase in motorized trail mileage of 6.1 miles.	Same as Proposed Action
Inventoried Roadless Area				
Acres of disturbance including roads and other infrastructure within a designated inventoried roadless area	Approximately 19 acres including 18 acres for a permanent overburden stockpile would be used within the Dry Ridge Inventoried Roadless Area (IRA).	Same as the proposed action.	Same as the proposed action.	Same as the proposed action.
Tribal Treaty Rights and Interests				
The Shoshone-Bannock Tribes' ability to access unoccupied lands of the United States where they may exercise treaty-reserved rights in accordance with the terms of the Fort Bridger Treaty of 1868.	Short-term, temporary loss of access during active mine years. Permanent long-term loss of 124 acres (unreclaimed highwall and partially reclaimed haul roads) after reclamation. Minor impacts to tribal access of unoccupied lands.	Same as Same as Proposed Action.	Short-term alternative road construction would guarantee there would be no loss of access for tribal members to exercise their treaty rights to hunt, fish, and gather resources within unoccupied lands outside the mine area. Long-term same as Proposed Action.	Same as Proposed Action.
Acres of unoccupied lands available or unavailable during mining activities and the Tribes' ability to access				

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
these acres Effects on fisheries, water, grazing rights, vegetation, wildlife, and cultural resources that important to the Tribes and those effects on traditional practices. Changes in the quality and quantity of valued resources on unoccupied public land including:				
Water and fish	No impacts	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
grazing rights, vegetation, and wildlife	Grazing rights would not be affected. Increased acres of grassland and shrubland after reclamation and no permanent impacts to plants and animals. Alternatively, the loss of 822 acres of forest types represents a major impact on plants and animals in forested environment.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
cultural resources	No impact on significant cultural resources.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
effect of these changes on the Tribes	No Traditional Cultural Properties have been identified; therefore, no project impacts would occur.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Social and Economic Conditions				
Number of employees and wages, short-term and long-term	237 miners	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Federal payments	$3.6 million in annual royalty payments	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

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Appendices

Acronyms

µg/l	microgram per liter
AIZ	Aquatic Influence Zone
ARMP	Approved Resource Management Plan
ATV	all-terrain vehicle
AUM	Animal Unit Month
BLM	Bureau of Land Management
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Contaminants of Potential Concern
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPM	Environmental Protection Measure
GIS	Geographic Information System
H1NDR	Husky 1 North Dry Ridge
HUC	Hydrologic Unit Code
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
2003 RFP	2003 Revised Forest Plan (Revised Land and Resource Management Plan)
MCL	maximum contaminant level
mg/l	milligram per liter
MRP	Mine and Reclamation Plan
NEPA	National Environmental Policy Act
NFS	National Forest System
OSA	overburden storage area (temporary or permanent)
SWPPP	Storm Water Pollution Prevention Plan
U.S.C.	United States Code
USACE	US Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service

Chapter 1
Purpose and Need

1.1 Introduction

Itafos Conda, LLC (Itafos) submitted a phosphate mine and reclamation plan (MRP) for the Husky 1-North Dry Ridge (H1NDR) project to the Bureau of Land Management (BLM) on April 13, 2020. The BLM reviewed the MRP to determine if it and other application materials complied with requirements in the Code of Federal Regulations (CFR) (43 CFR 3592.1) and were complete, and informed Itafos that information was needed. Itafos submitted a revised MRP on June 19, 2020 (Itafos, 2020a).

The mine would be located about 16 miles (26 road miles) northeast of Soda Springs in Caribou County, Idaho on existing and proposed modifications to federal phosphate leases (**Figure 1**), mostly on federal lands within the Caribou National Forest. Leases issued under the Mineral Leasing Act of 1920 grant exclusive rights to mine and dispose of the federal phosphate deposit.

Most activities would occur on National Forest System (NFS) lands on federal phosphate leases. BLM is required to coordinate these actions with the USFS. Some activities would occur off-lease and require issuance of several special use authorizations from the U.S. Forest Service (USFS) Caribou-Targhee National Forest. Therefore, the BLM and USFS are joint lead agencies for this EIS. The U.S. Army Corps of Engineers (USACE), the Idaho Department of Environmental Quality (IDEQ), the Idaho Department of Lands (IDL), and the Idaho Office of Energy and Mineral Resources are cooperating agencies.

Before the BLM and USFS approve the MRP, modify the lease(s), and issue special use authorizations, the BLM and USFS must comply with the National Environmental Policy Act (NEPA) by analyzing the environmental impacts of mining and reclamation operations along with reasonable alternatives. As H1NDR is likely to have significant impacts, an EIS is appropriate to document this analysis.

Preliminary groundwater fate and transport modeling indicated that the backfill cover in the MRP would not meet regulatory requirements for surface water. Itafos developed several alternative covers in response. The Proposed Action analyzed in this Environmental Impact Statement (EIS) is the June 19, 2020 version MRP with the Preferred Alternative Configuration cap and cover (Itafos, 2020c).

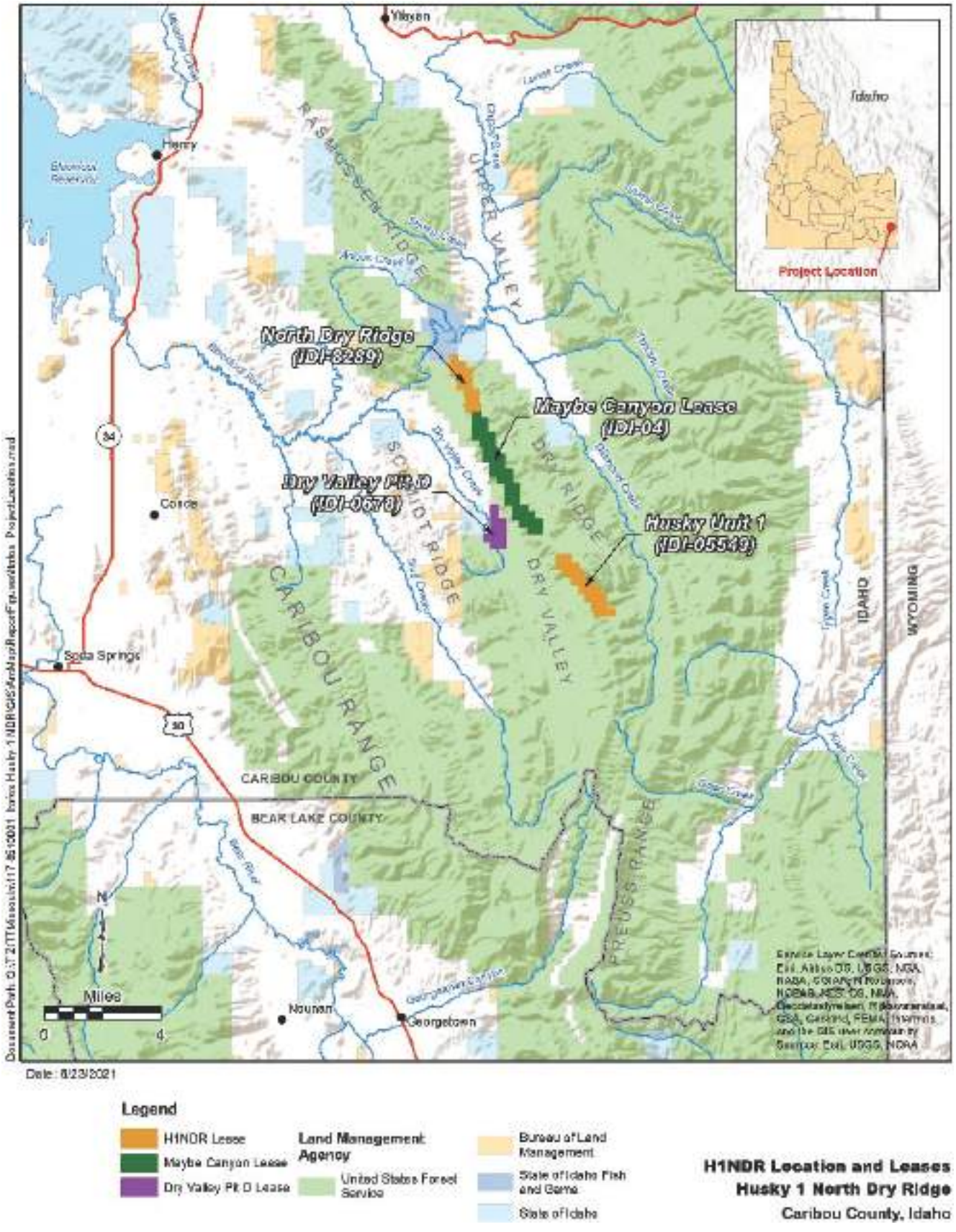
1.2 Location

Operations would occur on the Federal Mineral Leases IDI-8289 (NDR), IDI-05549 (H1), IDI-04 (Maybe Canyon), and IDI-0678 (Dry Valley Pit D) (**Figure 1**). Itafos is also requesting modifications to phosphate lease boundaries for the H1 lease (559 acres). The project is in portions of Township 7 South, Range 44 East, Sections17, 20, 21, 28, 33, and 34; Township 8 South, Range 44 East, Sections 3, 4, 8, 10, 14, 15, 21, 22, 23, 24, and 25; and Township 8 South, Range 45 East, Sections 30, 31, and 32; Boise Meridian.

1.3 Purpose and Need for Action

Itafos has submitted a detailed mine and reclamation plan application (MRP) for developing existing mineral leases that were previously purchased from the United States at the H1NDR site. These leases grant exclusive rights to mine the federal phosphate deposits. The purpose of the joint federal undertaking is for BLM and Forest Service to evaluate and respond to the MRP application. The plan

Figure 1. H1NDR Location and Federal Phosphate Leases



includes a proposal to enlarge (modify) the existing leases to utilize federal lands as needed to operate and/or recover incidental un-leased ore reserves that would not be economically recoverable in the future by a separate mining operation.

As the agency authorized to approve mine and reclamation plans for lease development, BLM's purpose is to identify and incorporate measures to promote orderly and efficient mining, encourage utilization of all known phosphate resources, promote practices that avoid, minimize or correct damage to the environment and hazards to public health and safety. As the surface management agency, the USFS purpose is to provide the BLM with recommendations for lease modifications, surface protection, and reclamation. USFS also evaluates special use authorization proposals for phosphate mining support facilities and activities that occur on NFS lands outside lease boundaries. The USACE has jurisdiction over Waters of the United States, including wetlands. The USACE will use the EIS to inform its decision under Section 404 of the Clean Water Act regarding an action alternative that may be selected by BLM.

The proponent's purpose is to exercise development rights by implementing an MRP that allows them to economically mine the deposit and meet established requirements that relate to operations, land management and environmental protection.

1.4 Decision to be Made

Itafos must acquire all permits mandated by law. The BLM is responsible for activities on leased lands and would make decisions regarding approval of the proposed MRP, proposed lease modification, and appropriate land uses on leased lands. The BLM will prepare and sign the Record of Decision and decide whether to:

- Approve the MRP as proposed or an alternative,
- Recommend the lease modifications,
- Approve modifications of current mine plans on Lease I-04 and Lease I-0678 to accommodate mining and facilities as proposed on those leases,
- Approve a permanent or temporary stream rerouting, and
- Approve a road closure, new road, or ATV trail for access from Dry Valley to Diamond Creek.

The USFS is responsible for off-lease operations on NFS lands, including whether and how to authorize these operations or an access route alternative providing continuous public access. USFS will decide whether to:

- Approve an amendment to Simplot's existing slurry pipeline special use authorizations (see **Table 2**),
- Approve an amendment to the 2003 Caribou National Forest Land and Resource Management Plan (2003 RFP) for relocation of the pipeline,
- Approve special use authorizations for off-lease facilities, and
- Approve any needed adjustments to grazing allotments due to grazing impacts in the mine area.

If the Alternative Road alignment is selected, additional decisions would include whether to:

- Approve a public road open to all motor vehicles or a 50-inch trail open to OHV or smaller traffic.

1.4.1 Federal Permits, Licenses, and Other Authorizations

Approval of the MRP is one of several approvals and permits required before mining operations begin**.** **Table 1 i**dentifies those known to be needed at the time this EIS was published.

Table 1. Anticipated Permits and Authorizations Needed

Permit/Authorization	Authority	Agency
MRP approval or approval of modified MRP	43 CFR 3590.2(a), 3592.1(a)	BLM
	36 CFR 228.5	USFS
Lease Modification/Fringe Lease	43 CFR 3510	BLM
Record of Decision	42 U.S.C. 4321 et seq.; 40 CFR 1505	BLM and USFS
Special Use Authorizations[1]	36 CFR 251	USFS
High Explosives Permit	18 U.S.C. 40; 27 CFR 555	Bureau of Alcohol, Tobacco, and Firearms
Point of Compliance under the Idaho Groundwater Quality Rule	IDAPA 58.01.11.401	IDEQ
Water Quality Certification (Clean Water Act, Section 401)	IDAPA 39-101 et seq.; Idaho Code Parts 39-3601 et seq.	IDEQ
Water Rights	Idaho Code Parts 42-201 et seq.; IDAPA 37.03.08, Water Appropriation Rules and 37.03.11 Conjunctive Management of Surface and Ground Water.	Idaho Department of Water Resources
Multi-Sector General Permit for storm water discharges, National Pollutant Discharge Elimination System	Clean Water Act (Title 33 U.S.C. 1251 et seq.)	IDEQ
Section 404 Clean Water Act Permit	Clean Water Act (Title 33 U.S.C. 1344, Section 404(b)(1)).	USACE
Stream Channel Alteration Permit	IDAPA 42-3801	Idaho Department of Water Resources
Air Quality Permit to Construct	IDAPA 58.01.01	IDEQ
Reclamation Plan approval and modification of approved Reclamation Plan and state mineral lease	IDAPA 20.03.02.010, 20.03.02.120, and 20.03.02.140	IDL
Conditional Use Permit for facilities within an approved land use	Caribou County Zoning Ordinance, Chapter 13	Caribou County
Use of the county roads	County Road Permit	Caribou County

1 See Table 2.

Special Use Authorizations will be needed for activities that are located on NFS lands outside of the lease boundary. Authorizations for new and existing haul roads, stormwater ponds, growth media stockpiles, and a readyline are shown in (**Table 2**).

Table 2. New Special Use Authorizations Requested

Description	Type	Acres	Linear Feet/ Corridor Width	Legal Description
NDR Growth Media Stockpile	Non-linear Feature	6	n/a	SE 1/4, SW 1/4, Section 28, Township 7S, Range 44E NE 1/4, NW 1/4, Section 33, Township 7S, Range 44E
NDR Ready Line	Non-linear Feature	10	n/a	NE 1/4, NW 1/4, Section 33, Township 7S, Range 44E
NDR Haul Road	Linear Feature	5	2053 feet/ 100 feet	W 1/2, NE 1/4, Section 4, Township 8S, Range 44E SE 1/4, SW 1/4, Section 28, Township 7S, Range 44E
Main Haul Road to Tipple	Linear Feature	29	12,220 feet/ 100 feet	S 1/2, NW 1/4, Section 10, Township 8S, Range 44E SW 1/4, Section 10, Township 8S, Range 44E E 1/2, NW 1/4, Section 15, Township 8S, Range 44E
H1 Haul Road	Linear Feature	1	587feet/ 100 feet	NW 1/4, NE 1/4, Section 15, Township 8S, Range 44E
Tipple Rail Line	Linear Feature	0.2	79 feet/ 72 feet	SW 1/4, SE 1/4, NW ¼, Section 15, Township 8S, Range 44E
Total		51.2		

1.5 Public Scoping

1.5.1 Scoping

A notice of intent to prepare an EIS was published in the Federal Register (Federal Register, 2020) on December 23, 2020 followed by a 30-day scoping period. A virtual public meeting was held on January 11 to provide information. A press release was posted on BLM's website announcing the scoping period and the virtual public meeting. Media outlets were included in the scoping mailing, and the project is on BLM's ePlanning and Forest Service's project websites. Written comments were accepted by mail, email, or hard copy. The virtual public meeting was attended by 32 people in addition to 8 presenters (Tetra Tech, Inc., 2021a). During the scoping period, approximately 1,000 documents were submitted in the form of letters or emails before the close of the 30-day scoping period on January 22, 2021.

1.6 BLM Land Use Plan Conformance

To be approved, the MRP must comply with agency regulations, policies, plans, and programs. The H1NDR mine must comply with applicable land use plan direction developed under the Federal Land Policy and Management Act. Although the mine is located within the NFS, BLM has authority for issuing federal phosphate leases and administering associated resource use and development. Because of this, those portions of the mine that would occur within federal phosphate leases must also meet the phosphate mining planning and development criteria set forth in the BLM Pocatello Field Office ARMP (BLM, 2012), as amended. For instance, the Objective ME-2.3 in the ARMP states that the BLM will "regulate mineral development activities to prevent or control sediment and the release of contaminants such as selenium and metals into the environment" and land uses on mineral leases.

Other related ARMP direction includes:

- Action ME-1.2.3. Leasable mineral resources will be available for development according to related laws and regulations and at the discretion of the BLM after full coordination with the surface management agency.
- Action ME-1.2.4. Leasable minerals on the Caribou National Forest will be managed consistent with the Caribou National Forest Plan.
- Action ME-1.2.5. Reclamation requirements for mineral development operations will be developed consistent with surface management agencies' recommendations.
- Action ME-2.3.8. To meet reclamation vegetation release criteria, Itafos may need to modify their caps to prevent vegetation uptake of selenium.

The Proposed Action and alternatives have been reviewed and are consistent with management direction in the ARMP. No amendments to the ARMP would be necessary.

Mining and reclamation practices would also meet BLM's requirements for mining operations and reclamation of federal mineral leases at 43 CFR 3592.1.

1.7 Revised Land and Resource Management Plan Conformance

The Revised Forest Plan is also applicable since the mine is located within this portion of the Caribou-Targhee National Forest and it is incorporated by reference by the BLM ARMP. Management of the National Forest is directed by the Caribou National Forest Revised Land and Resource Management Plan (2003 RFP) (USFS, 2003a), which applies to all NFS lands, and post-reclamation activities. The 2003 RFP allocated NFS lands into prescription areas. Prescriptions that apply to H1NDR are:

- Prescription 2.7.2(d) – (1.5 acres – haul road) Elk and Deer Winter Range
- Prescription 2.8.3 – (57 acres) Aquatic Influence Zone (AIZ)
- Prescription 5.2 (b) – (530 acres) Forest Vegetation Management places emphasis on scheduled wood-fiber production, timber growth, and yield while maintaining or restoring forested ecosystem processes and functions to more closely resemble historical ranges of variability with consideration for long-term forest resilience.
- Prescription 6.2 (b) – (313 acres) Rangeland Vegetation Management emphasizes the maintenance of healthy rangelands for livestock and to support favorable watershed conditions. This prescription focuses on sustainable resource conditions.
- Prescription 8.1(b) – (17.5 acres) Concentrated Development, Utility Corridor, which is occupied by the Simplot slurry line. Drilling would not take place in this utility corridor.
- Prescription 8.2.2 (g) – (269 acres) Phosphate Mine Areas

The 2003 RFP provides overall management direction for each resource and the prescriptions provide specific direction based on the resources and conditions within each prescription area.

A review of the standards and guidelines and the activities in the Proposed Action, No Action, and other action alternatives, described in **Chapter 2** are consistent with the Forest-Wide and Management Prescription direction provided in the 2003 RFP (Tetra Tech, Inc., 2021b). However, an amendment

would be needed to re-route Simplot's slurry line through the mine area. The amendment would be to change the designation on the new route from Prescription 6.2b to 8.1b for 6 acres where the pipeline would be located, and to change 6 acres from Prescription 8.2b to 6.2b for the area from where the pipeline would be relocated. The impacts of this amendment are discussed as part of the environmental consequences for the alternatives in each resource section in Chapter 3.

Chapter 2
Alternatives

2.1 Introduction

This chapter describes and compares alternatives considered in detail and alternatives considered but not studied in detail, along with a brief rationale.

2.2 Proposed Action

The Proposed Action includes modification of an existing lease, mining, reclamation, and a special use authorization, summarized below. The MRP is viewable in its entirety during the EIS review period online at https://go.usa.gov/x7HSJ. The Proposed Action reclamation cap and cover were modified from the MRP based on the *H1NDR Mine and Reclamation Plan Addendum* (Itafos, 2020d). "Cap" refers to material placed over the top of overburden but does not include a layer of growth media for revegetation. "Cover" refers to growth media placed over a cap or other area as a substrate to support revegetation as part of reclamation.

This modified Proposed Action is called the Proposed Action in the EIS.

The Proposed Action has been developed over several years. Agrium, doing business as Nu-West Industries, Inc., originally proposed the H1NDR Mine in 2010. After the baseline data collection was largely complete, a corporate decision was made to terminate the project in December 2015. Itafos acquired Agrium's mining operations and processing facilities. Nu-West retained the phosphate leases in the area that had already been mined, including the Maybe Canyon and Dry Valley Mine–South Extension leases. Itafos re-initiated the baseline studies including the geochemistry testing and developed a new MRP, which was submitted to BLM in 2020 (Itafos, 2020a). Additional details on the cover were also submitted (Itafos, 2020b). The agencies had developed a groundwater fate and transport model to assist with evaluating impacts on groundwater and surface water (Tetra Tech, Inc., 2021c), which indicated that the original cover would allow too much water to infiltrate into the mine pits, predicting impacts to surface water. A modified cover was designed and submitted (Itafos, 2020c). This modified Proposed Action cover design comprised a combination of four types of covers (to control overall costs to be used in specific areas, to achieve specific design criteria set to ensure compliance with clean water requirements. Proposed Action backfill cover components are discussed in Section 2.2.4.

2.2.1 Leases and Lease Modifications

Surface owners or management agencies of current leases are the Forest Service and Idaho Department of Fish and Game (IDFG). Portions of the H1 mining areas extend beyond the current lease boundaries **(Table 3** and **Figure 2**). To maximize recovery of the phosphate resource, Itafos is requesting modification(s) to expand the existing lease boundaries (559 acres). **Table 3** provides the legal description, surface owners, and lease holders of H1NDR mineral leases and lease modifications.

Table 3. Legal Descriptions, Surface Management Agency, and Lease Holders of H1NDR Project Mineral Leases and Proposed Lease Modifications

Mineral Leases	Township, Range, Section	Subdivision	Surface/ Subsurface Owner
H1NDR Mineral Leases			
Lease IDI-0005549 Husky 1 (864.35 acres) Current Lessee Itafos	8S, 44E, 24	SE¼SW¼, SW¼SE¼	NFS/Federal
	8S, 44E, 25	NE¼, NE¼NW¼, NE¼SE¼	NFS/Federal
	8S, 45E, 30	SW¼NW¼, SW¼, SW¼SE¼	NFS/Federal
	8S, 45E, 31	NE¼, NE¼NW¼, N½SE¼	NFS/Federal
	8S, 45E, 32	NW¼SW¼	NFS/Federal
Lease IDI-008289 North Dry Ridge (640 acres) Current Lessee Itafos	7S, 44E, 17	SE¼SE¼	IDFG/Federal
	7S, 44E, 20	E½NE¼	NFS/Federal
	7S, 44E, 21	W½NW¼, SE¼NW¼, SW¼	NFS/Federal
	7S, 44E, 28	W½NE¼, E½NW¼, NE¼SW¼, NW¼SE¼	NFS/Federal
Lease IDI-04 Maybe Canyon Mine (1522.24 acres) Current Lessee Nu-West**	8S, 44E, 3	NW¼NW¼, S½NW¼, SW¼, SW¼SE¼	NFS/Federal
	8S, 44E, 4	E½NE¼	NFS/Federal
	8S, 44E, 10	NE¼NW¼, W½NE¼, SE¼NE¼, SE¼	NFS/Federal
	8S, 44E, 14	W½NW¼, SE¼NW¼, E½SW¼, NW¼SW¼, W½SE¼	NFS/Federal
	8S, 44E, 15	E½NE¼	NFS/Federal
	7S, 44E, 28	SW¼SE¼	NFS/Federal
	7S, 44E, 33	E½SE¼, NW¼SE¼, NE¼	NFS/Federal
	7S, 44E, 34	W½SW¼	NFS/Federal
Lease IDI-0678 Dry Valley Mine Pit D (440 acres) Current Lessee Nu-West**	8S, 44E, 15	W½NW¼, SW¼	NFS/Federal
	8S, 44E, 21	NE¼, NE¼	NFS/Federal
	8S, 44E, 22	NW¼	NFS/Federal
Proposed Mineral Lease Modifications			
Modification Area 1 (359 acres)	8S, 44E, 14	SE¼SE¼	NFS/Federal
	8S, 44E, 23	NE¼NE¼, NW¼NE¼, SE¼NE¼	NFS/Federal
	8S, 44E, 24	NW¼NW¼, S½NW¼, N½SW¼	NFS/Federal
Modification 2 (40 acres)	8S, 45E, 30	SE¼SE¼	NFS/Federal
Modification 3 (40 acres)	8S, 45E, 30	NW¼SE¼	NFS/Federal
Modification 4 (40 acres)	8S, 45E, 31	SE¼NW¼	NFS/Federal
Modification 5* (80 acres)	8S, 45E, 32	W½NW¼	NFS/Federal

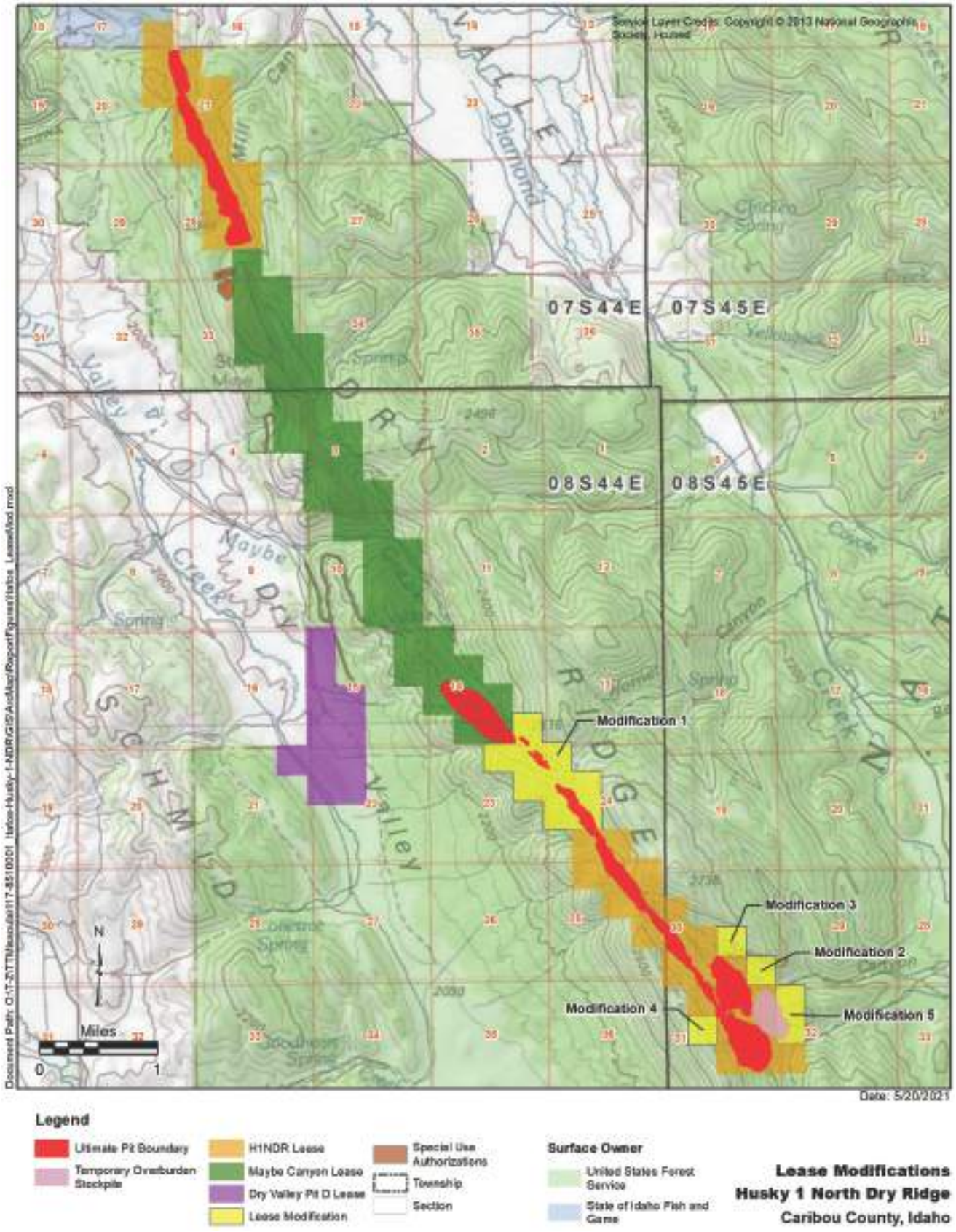
Source: BLM Case Recordation Serial Register Page https://reports.blm.gov/reports/LR2000/ and (Itafos, 2020a, pp. Table 6-1)

Notes: S = South, E = East, W = West, and N = North

* Modification 5 in the MRP was eliminated due to acquisition of leasing rights instead of a modification. Modification 6 in the MRP is now called Modification 5 in the EIS.

** Current lease holders will need to submit a revised mine and reclamation plan in accordance with the H1NDR Record of Decision.

Figure 2. Lease Modifications



2.2.2 Disturbance Summary

The approximate acres of new disturbance in H1NDR are provided in **Table 4** and depicted in Figure 3. A buffer zone around the pits is provided to accommodate other mine facilities, as well as potential changes to pit design including highwall laybacks that may be necessary due to unstable rock that could be encountered during mining. Mining-associated impacts within the lease boundaries would occur within the Operational Zone. **Table 4** includes re-disturbance of 148 acres previously disturbed at the Maybe Canyon Mine. About 126 acres would be disturbed on the lease modification areas.

Table 4. Mine Surface Disturbance

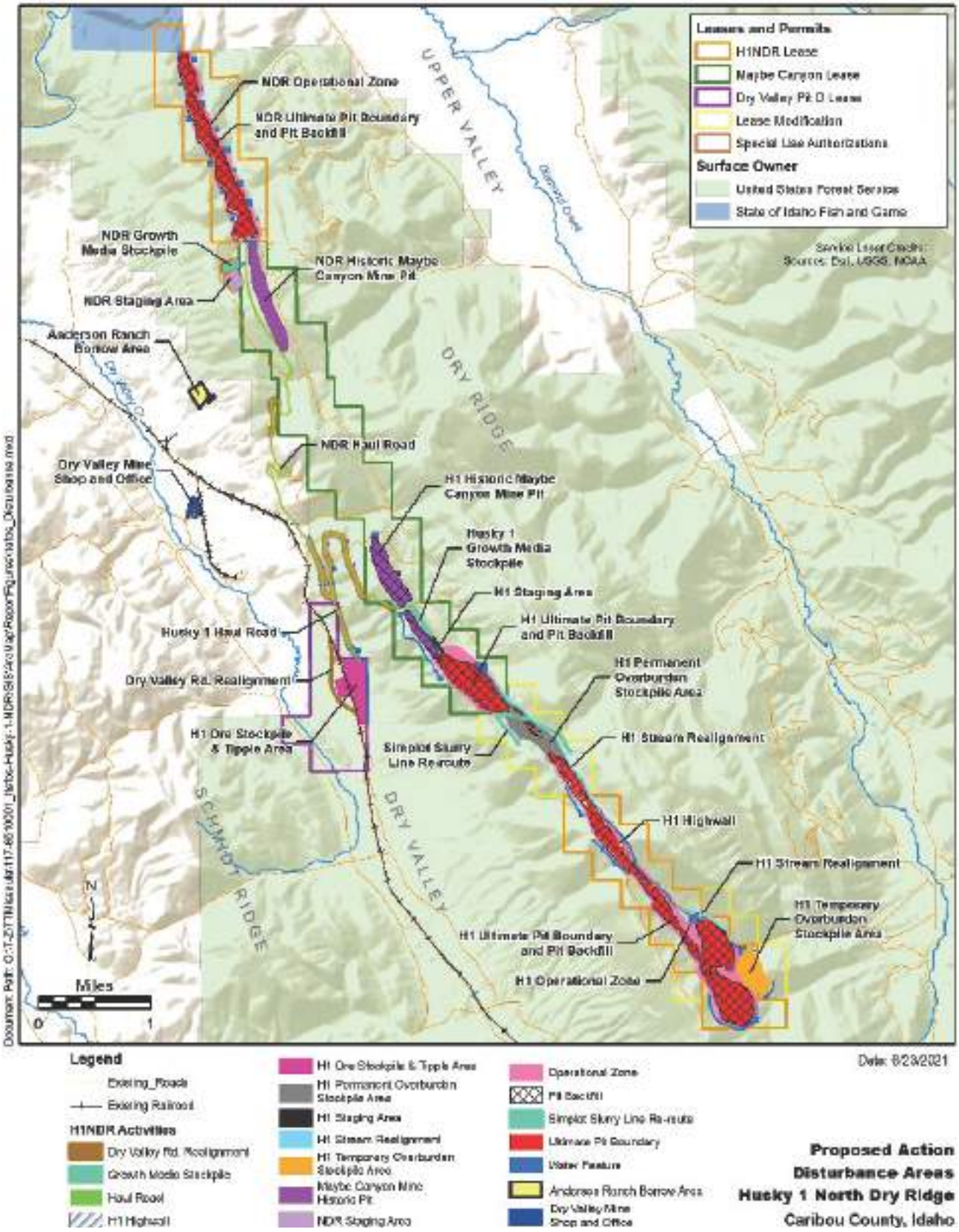
Mine Component	NFS Acres	Private Acres	Total Acres
H1NDR New Surface Disturbance			
H1 Operational Zone for	126	0	126
NDR Operational Zone	38	0	38
H1 Mine Pits	355	0	355
NDR Mine Pit	138	0	138
H1 Historical South Maybe Canyon Mine Pits*	77	0	77
NDR Historical North Maybe Canyon Mine Pits*	71	0	71
Permanent OSA*	55	0	55
Temporary OSA	49	0	49
H1 Water Management Ponds, Sediment Control Ponds, Runoff Containment Ponds and Ditches	36	0	36
NDR Water Management Ponds, Sediment Control Ponds, Runoff Containment Ponds and Ditches	15	0	15
H1 Growth Media Stockpile	8	0	8
NDR Growth Media Stockpile	4	0	4
Stream Realignment	20	0	20
H1 Haul Roads*	32	0	32
NDR Haul Roads*	31	16	47
Ore Stockpile and Tipple Area*	61	0	61
H1 Ready Line	2	0	2
NDR Ready Line	9	0	9
Simplot Slurry Line Re-route	3	0	3
Total	1,130	16	1,146

Source: (Itafos, 2020a)

* Previously disturbed areas

Mine facilities include growth media stockpiles, temporary and permanent overburden (waste rock) storage areas (OSA), water management features, dust suppression and water supply wells with water fill stands. Existing offices and shop facilities at the nearby Dry Valley Mine on private lands would be used. The Dry Valley yard would be used including the fuel storage tanks, an equipment parking/hot start line, and a lay-down yard. The tipple (train loading) area includes an ore stockpile, train loading facility, and haul road ramp near the Dry Valley Mine Pit D, on Federal Phosphate Lease IDI-0678.

Figure 3. Proposed Action Disturbance Areas



2.2.3 Ore Removal, Backfill, and Overburden Storage

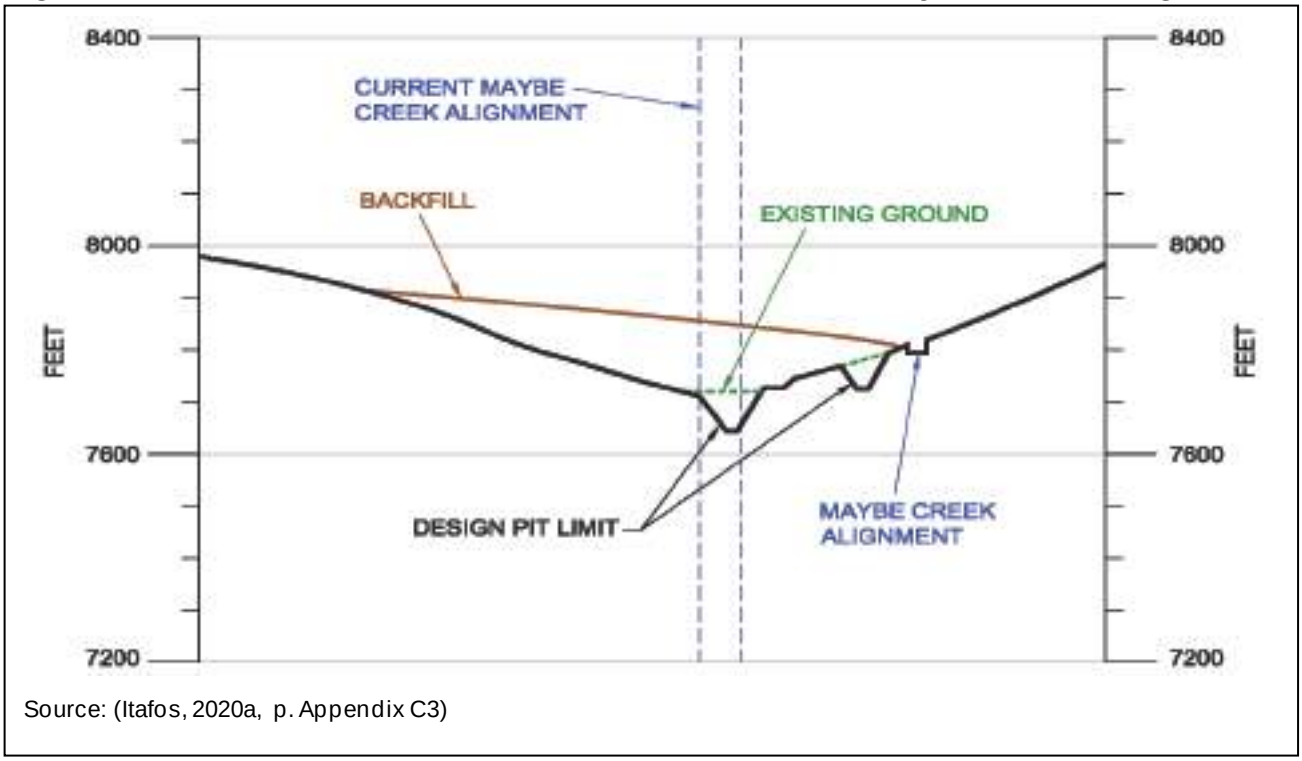
Two primary areas would be mined: H1 and NDR. H1 would have a series of adjacent pits and occupy portions of the Maybe Canyon Mine lease (IDI-04), Husky 1 lease (IDI-05549), and Husky 1 lease modifications. NDR has one open pit on a portion of the lease (IDI-8289).

Mining would include 30 feet of benches for every 90 feet of depth. Mining would occur year-round, up to 24 hours per day, with overlapping shifts, for about 13 years. The mining sequence would mine H1 and NDR consecutively. Ore production may fluctuate over time, depending on technical factors and market conditions, increasing or decreasing the mine life.

The ore to be removed is estimated and would not be known for certain until mining is complete. The total material that is removed every month would be calculated by modeling and mine planning software based on baseline topography compared to post-mining topography. One ton will be estimated using an ore density of 1.6875 tons per loose cubic yard, which has been verified from recent mining operations, including from the Dry Valley Mine. Actual value of the ore mined will be gained from calibrated scales at the mine tipple.

Ore would be hauled by truck to the tipple. From there the ore would be hauled by existing rail to the existing Conda Plant in Soda Springs. Overburden would be ripped or blasted, excavated and hauled to a temporary or permanent OSA (see cross-section **Figure 4**) or back fill location. The train loading facility (tipple) and ore stockpiles would be constructed south of the first (lower) switchback of the North Maybe Mine haul road (NFS Road 134). The proposed tipple area is east of the existing rail line and within the eastern portion of the Dry Valley Mine Pit D Lease. A haul road ramp would be constructed from the switchback to the tipple.

Figure 4. Cross-Section of Permanent OSA in Relation to Maybe Creek Realignment



Source: (Itafos, 2020a, p. Appendix C3)

The entire tipple area would be lined as shown on the figures and maps. The 60 mils high density polyethylene (HDPE) liner would be placed over a minimum of 6 inches of 3/8-inch minus material. At least 2 feet of limestone would be placed on top of the HDPE liner to provide a visual indicator showing the bottom of stockpiled ore and the tipple pad, thereby protecting the liner during operations. Water management would be in accordance with the Storm Water Pollution Prevention Plan (SWPPP) and runoff would be managed as contact water. To accommodate railcar loading requirements, the public access road would be safely relocated around and away from the tipple area.

The pits would be sequenced through several phases, outlined in **Table 5** and **Figure 5**. As ore is mined from H1, overburden would be placed as backfill in existing pits and newly mined pits except in Phases 4 and 5. During these phases, approximately five million cubic yards would be placed in a permanent external overburden storage area (OSA).

Table 5. Open Pit Mine Sequence

Phase	Production Years	Pit(s) Mined	Backfill Destination	Ore Removed (wet tons)[1]
H1				
1	1 through 3	H1-N	South Maybe Canyon Mine-N, South Maybe Canyon Mine-S	2,314,990
2	2 through 4	H1-N	South Maybe Canyon Mine-N, H1-N	2,420,998
3	3 through 5	H1-N	H1-N	2,379,884
4	4 through 6	H1-N, H1-X, H1-L	H1-N, H1-X, H1-X OSA, H1-L	2,429,292
5	5 through 7	H1-L	H1-L	2,412,919
6	6 through 8	H1-L, H1-E	Temp OSA, H1-L, H1-E	2,354,187
7	7 through 9	H1-E, H1-S	Temp OSA, H1-E, H1-S	2,357,813
8	8 through 10	H1-S	Temp OSA, H1-S	2,348,210
9	9 through 11	H1-S	Temp OSA, H1-S	2,330,949
NDR				
10	10 through 12	NDR	North Maybe Mine, NDR	2,458,649
11	11 through 13	NDR	NDR	2,320,380
12	12 through 13	NDR	NDR	1,372,880
Total				27,5012,071

Source: (Itafos, 2020a, pp. 4-3, 4-4, 5-1, 5-2, 5-4, and 5-6).

1 These are estimated tons and do not establish a regulatory minimum or maximum that would result in the need for a change in the MRP is the volume was exceeded or not met.

A temporary external OSA would hold approximately 12.6 million cubic yards until room is available in the H1-E pit and H1-S pit.

NDR would be mined in 3 phases over approximately 3 years. Overburden would be placed in the existing North Maybe Mine pit, then into the NDR pit as room is available. Backfilled overburden would be compacted to reduce settlement and restrict air and water movement to reduce the risk of constituents of potential concern (COPCs) leaching. Backfill would be shaped to maximum slopes of three horizontal to one vertical (3H:1V) for covering and final reclamation.

One permanent OSA would be needed to store approximately 5 million cubic yards of backfill and serve as a buttress on the west band of the Maybe Creek realignment. Water infiltrating through the permanent OSA would drain into the H1-N pit (**Figure 6)**.

Figure 5. Open Pit Mine Sequence

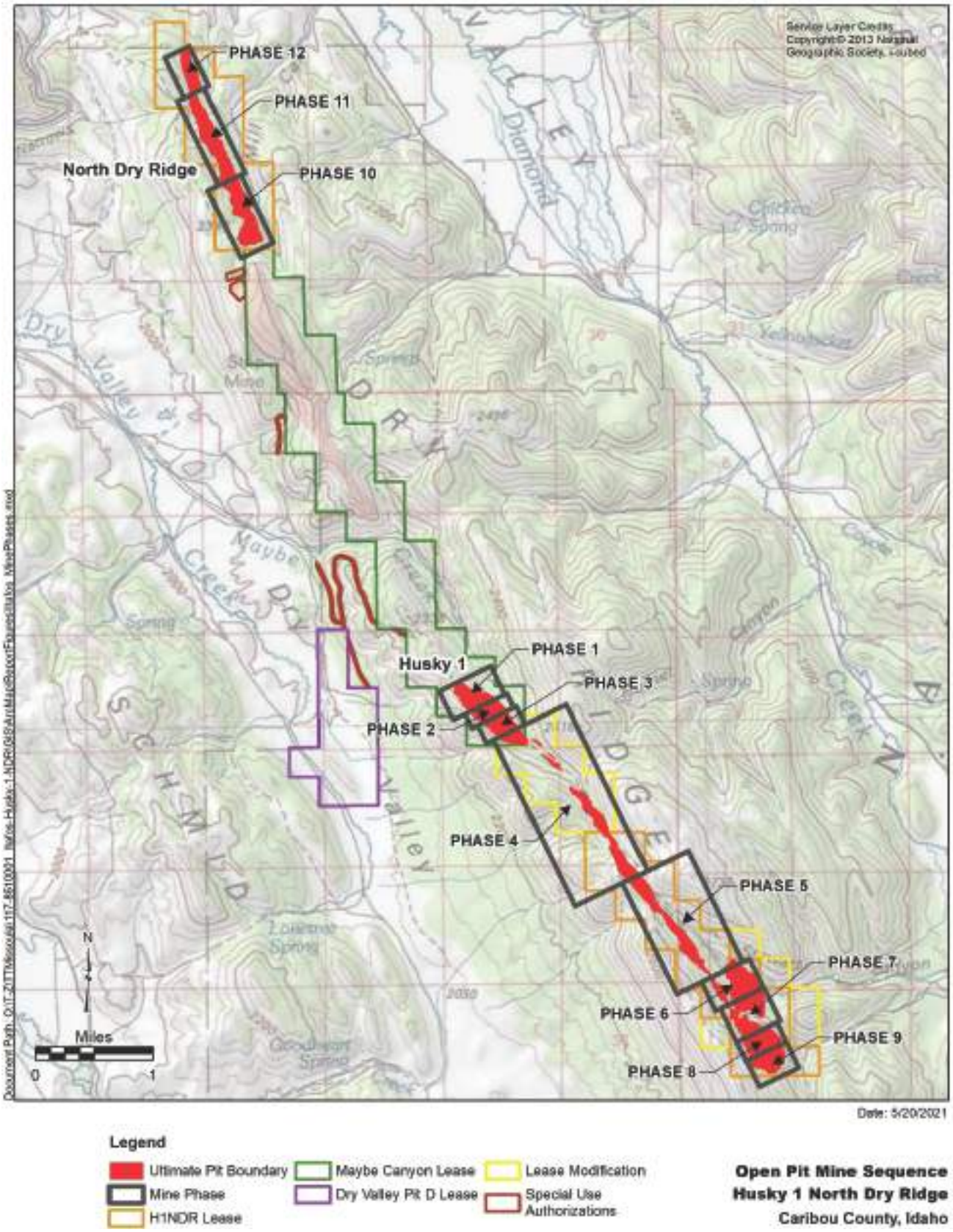
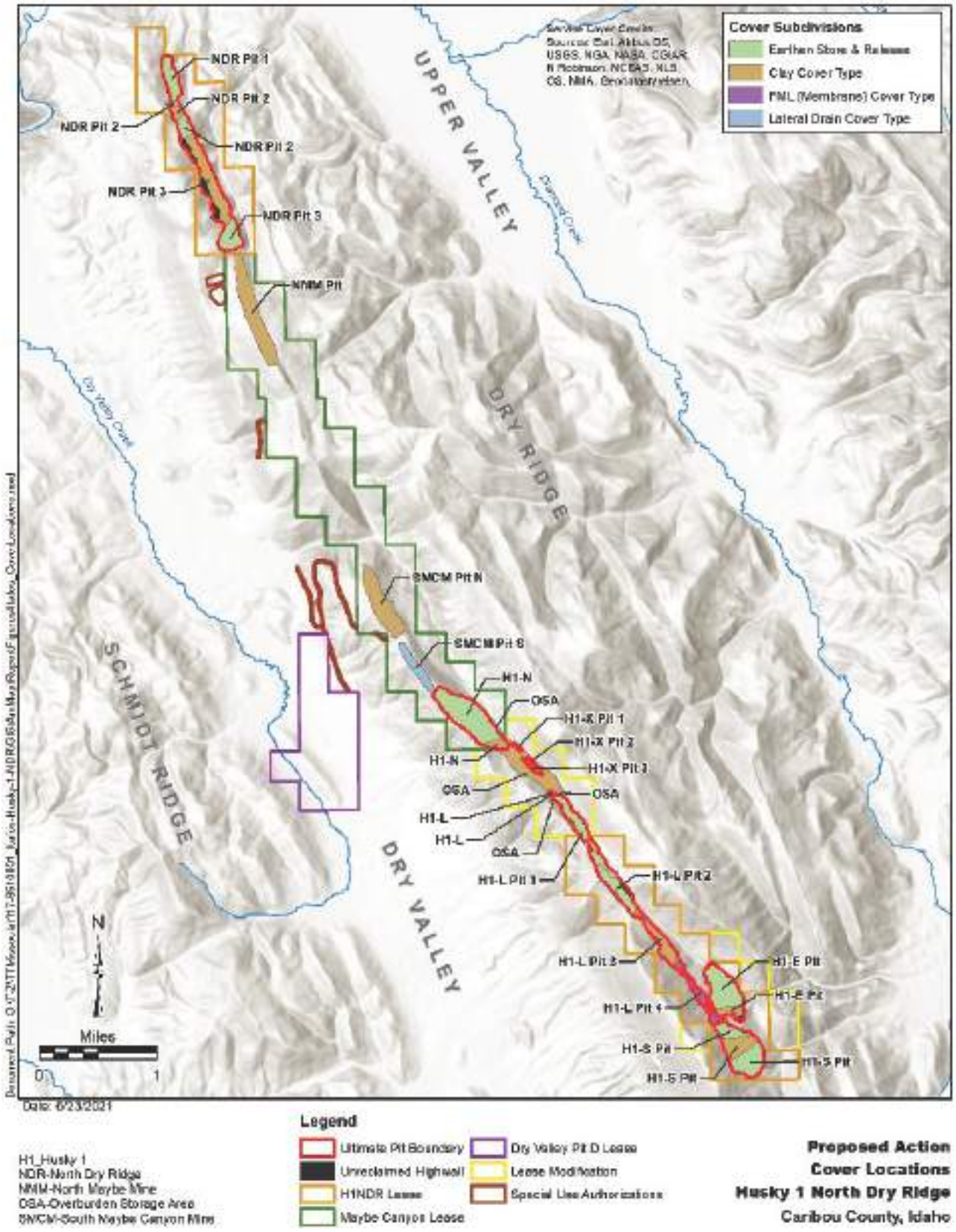


Figure 6. Proposed Action Cover Locations



Backfilling approximately 5,000 lineal feet or 71 acres of the historic North Maybe Mine and approximately 6,500 lineal feet or 77 acres the historic South Maybe Canyon Mine of open pit and exposed highwall from that have remained open for almost 30 years, would be stabilized, then capped and covered, and revegetated.

2.2.3.1 Stream Realignment for Overburden Handling

Approximately 2,557 feet of Stewart Creek and 7,757 feet of Maybe Creek would be realigned adjacent to backfilled pits or re-established over backfilled pits around the H1-N pit, H1-X pits, and the H1-X Overburden Stockpile Area (**Figure 6**). Following final reclamation, a portion of the drainage would remain permanently realigned across the backfill. Limestone would be placed along the boundary of the H1-X OSA to serve as a buttress for the drainage. Conceptual channel designs for the realignments are provided in the MRP in Section 4.6 and in the Water Management Plan (Appendix D of the MRP). The realigned channels would be designed to convey the stream flow from a 100-year, 24-hour storm event plus a 6-inch freeboard. The realigned channel would have an impervious liner (60 mils HDPE) and other engineering controls to limit infiltration into the underlying fill. The OSA would provide a buttress for the Maybe Creek realignment to increase stability.

2.2.4 Backfill Cover

To limit infiltration into the overburden and the volume of leachate generated and to ensure that vegetation does not take up selenium and minimize risks to wildlife or livestock, various covers would be placed on the mine backfill. Itafos refined the original cover proposed in the MRP and provided a summary in a memo *H1NDR Mine and Reclamation Plan Addendum* (Itafos, 2020d). The addendum documented changes to the MRP from BLM, USFS, and IDEQ comments prior to public scoping. For reclamation, the type of cover used over backfill would depend on the location **(Table 6** and **Figure 6**). The configuration of the caps used in the cover was to cost-effectively reduce infiltration to meet water quality standards. Combined they would include an earthen store-and-release cover, a low-permeability clay cover, a flexible membrane liner (60 mils HDPE) cover; and a lateral drain cover.

The permanent OSA would be covered with a low-permeability clay cover, with a minimum 12 inches of chert/limestone then growth media. Each configuration is described below.

Table 6. Acres of Cover Materials in the Proposed Action

Location	Earthen Store and Release	Low Permeability Clay	Flexible Membrane	Lateral Drain	Total Acres
NDR Pit 1	28	-	-	-	28
NDR Pit 2	16	8	-	-	24
NDR Pit 3	26	56	-	-	82
North Maybe Mine Pit	-	71	-	-	71
South Maybe Canyon Mine Pit 1	-	55	-	-	55
South Maybe Canyon Mine Pit 2	-	-	-	22	22
H1-N	80	7			87
H1-X, Permanent OSA	5	56			61
H1-L Pit 1	46				46
H1 L Pit 2	29	-	-	-	29
H1 L Pit 3	-	31	-	-	31
H1 L Pit 4	-	-	22	-	22

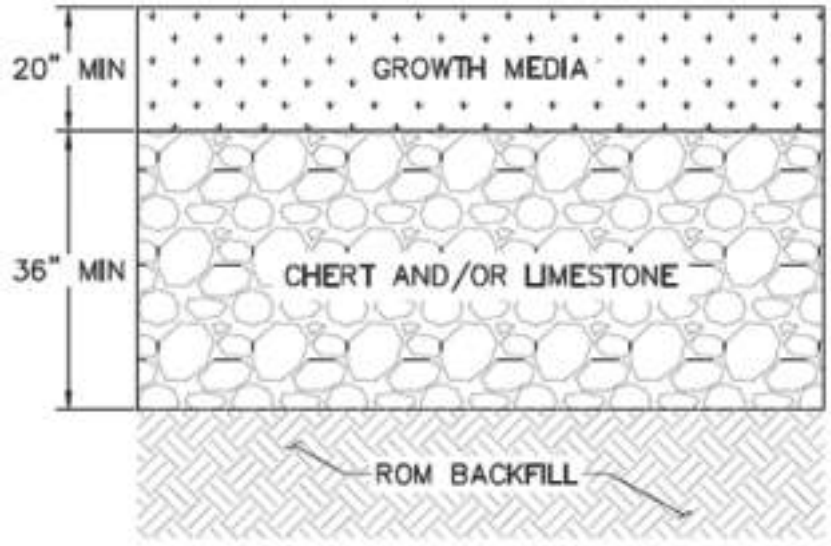
Location	Earthen Store and Release	Low Permeability Clay	Flexible Membrane	Lateral Drain	Total Acres
H1 East Pit	53	12	-	-	65
H1 South Pit	55	26	-	-	81
Total	338	322	22	22	704

Source: (Itafos, 2020d, pp. 5, Table 1)
* Previously disturbed area

2.2.4.1 Earthen Store-and-Release Cover

The earthen store-and-release soil cap and cover over the backfill would consist of a minimum of 36 inches of chert and limestone, covered by growth media (**Figure 7**). The earthen cover is designed to store infiltrated rainwater and snowmelt then release it to the atmosphere through evapotranspiration. The Rex Chert/limestone layer is used as a capillary break that impedes upward movement of water from the backfill by retaining moisture in the finer material for vegetation and promotes evapotranspiration, thus reducing infiltration of precipitation into underlying overburden. Rex Chert and limestone leach the least amount of COPCs and are most likely to be exposed to leaching conditions with direct impact to surface water.

Figure 7. Store-and-Release Cover Configuration

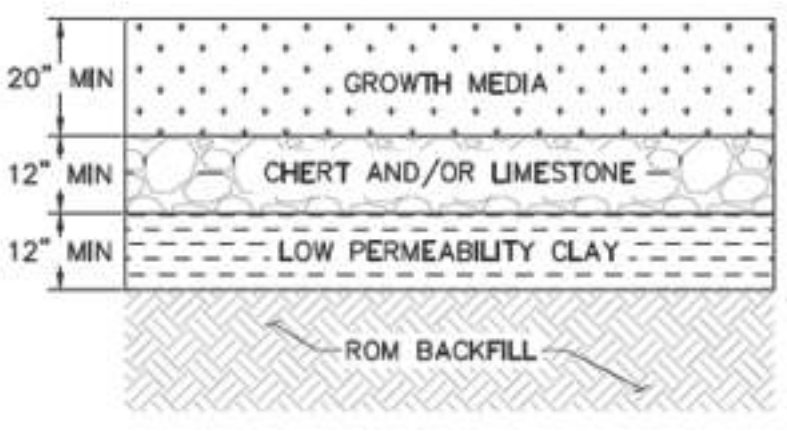


Source: (Arcadis, 2021a, p. 2/4 Figured 1).

2.2.4.2 Low-Permeability Clay Cover

Infiltration would be reduced in some areas with a layer of low-permeability clay. This cover would have 12 inches of low-permeability clay on top of the backfill, cover the clay with at least 12 inches of chert/limestone, and cover that with growth media (**Figure 8**). Clay would be obtained from the Anderson Ranch (**Figure 3. Proposed Action Disturbance Areas**). Low-permeability clay materials are clays with an average permeability of less than or equal to 1x10-69 centimeters per second (cm/sec) and may be used as a barrier layer to limit net percolation by hydraulic 10 resistance. These materials may also be used in combination with other potential cover materials to 11 reduce the overall net percolation of a cover area.

Figure 8. Low-Permeability Clay Cover Configuration

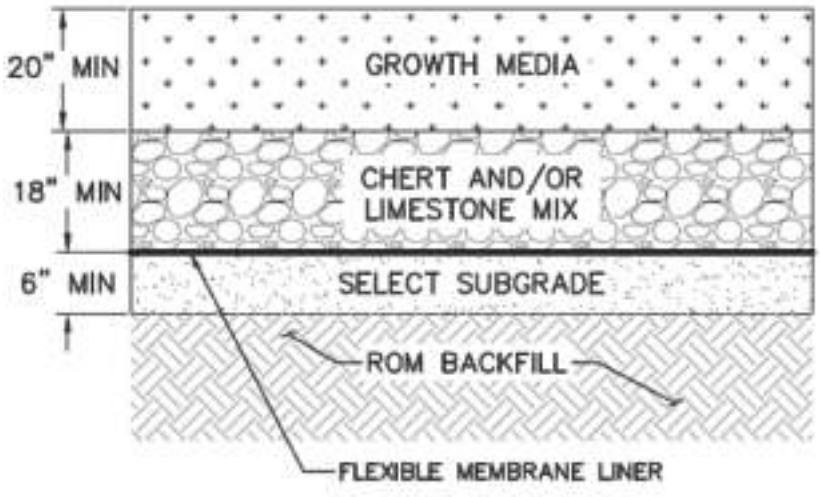


Source: (Arcadis, 2021a, p. 2/4 Figured 2).

2.2.4.3 Flexible Membrane Liner

This cover, including the flexible membrane (60 mils HDPE), is designed to greatly reduce infiltrated rainwater and snowmelt into and through the backfill with 6 inches of a select subgrade, covered with a flexible membrane line (plastic) then growth media and chert/limestone (**Figure 9**) (while the MRP indicated 12 inches of growth media, an environmental protection measure has been included in Section 2.2.9 increasing the depth to a minimum 20 inches). The growth media would support revegetation efforts.

Figure 9. Cap and Cover with Flexible Membrane Liner

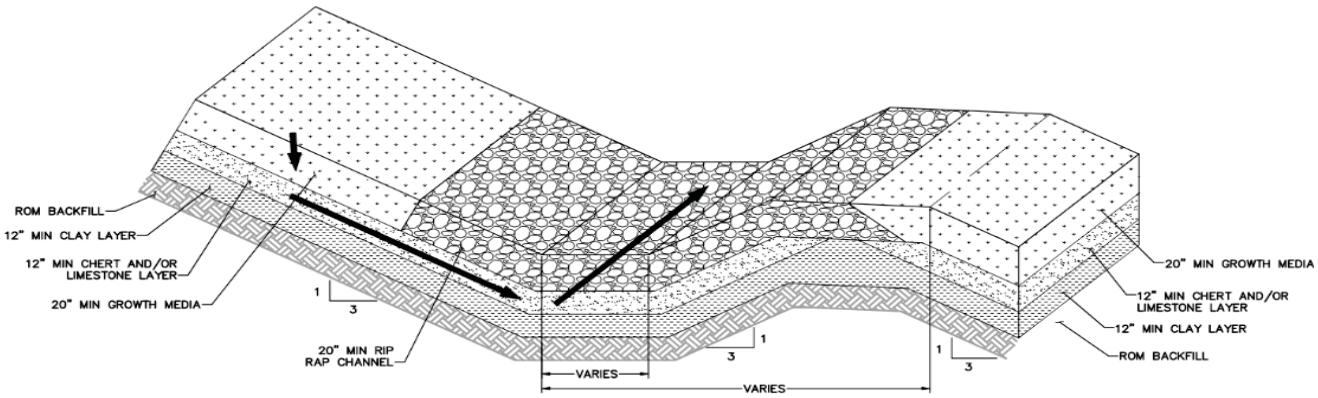


Source: (Arcadis, 2021a, p. 3/4 Figured 3)

2.2.4.4 Lateral Drain Cover

A layer would be constructed to intercept water percolating through the growth media and divert it off the backfill with a minimum 12-inch clay layer on top of the backfill, covered with a minimum 12-inch of chert/limestone, covered with growth media. The backfill would be graded to create perpendicular 10-foot wide riprap bench every 150 feet of slope that would drain the water (**Figure 10**). The down drains would be constructed of riprap.

Figure 10. Lateral Drain Cover



Source: (Itafos, 2020c, pp. 16 Figure 4-5) (Arcadis, 2021a, p. 4/4 Figured 4).

2.2.5 Water Management System

Approximately 3,030 feet of Stewart Creek crosses an area to be mined. This section of the stream would be relocated uphill into a constructed channel (**Figure 14**).

Water that accumulates in the pits would be managed per a SWPPP[2] and the Surface Water Management Plan, which is Appendix D in the MRP.

- Lined ponds would be placed in native soils that are downgradient from backfill areas containing seleniferous materials and sized to control the volume of runoff produced by either the 10-year, 24-hour storm event plus the average calculated weekly snowmelt volume, or the 100-year, 24-hour storm event, whichever is larger.
- Unlined stormwater ponds would be sized to control the volume of runoff produced by the 2-year, 24-hour storm event with an emergency spillway that would safely discharge the peak flow from the 25-year, 24-hour storm event.
- Diversion ditches energy dissipators, outlet protection, and culverts associated with ditches that are expected to have a lifespan between 2 and 25 years or across multiple mining phases would be designed to control stormwater runoff produced by the 50-year, 24-hour storm event.
- Long-term drainage channels and associated structures would be designed to control stormwater runoff produced by the 100-year, 24-hour storm event.

"Contact-water" is precipitation that has contact with mine surface disturbance such as waste rock with a higher potential for containing constituents of potential concern (COPCs) that could leach into water. Contact water, including drainage from haul roads, would be managed for zero discharge of the mine site to any surface waters. Runoff would be collected in basins with an impervious liner. Contact-water collected in basins would be disposed of through evaporation, dust suppression in zero release areas, or moved to areas of un-reclaimed backfill for infiltration.

[2] The SWPPP would be developed Idaho Pollutant Discharge Elimination System IDAPA 58.01.25. https://www.deq.idaho.gov/water-quality/ipdes/ approved by the IDEQ.

Non-contact water would also be managed under the SWPPP. Runoff would be intercepted and diverted around disturbed areas through diversion ditches. Non-contact runoff water would enter basins to collect sediment then slowly released through spillways.

The small amount of perched groundwater that may be encountered would drain into the pit and be managed as contact water. If necessary, water would be moved to areas of un-reclaimed backfill for infiltration, used as dust suppression in zero release areas, or placed in the contact water basins. All drainage features would be designed to prevent erosion.

No long-term water treatment is anticipated after reclamation is complete. Stewart Creek would remain in the realigned channel.

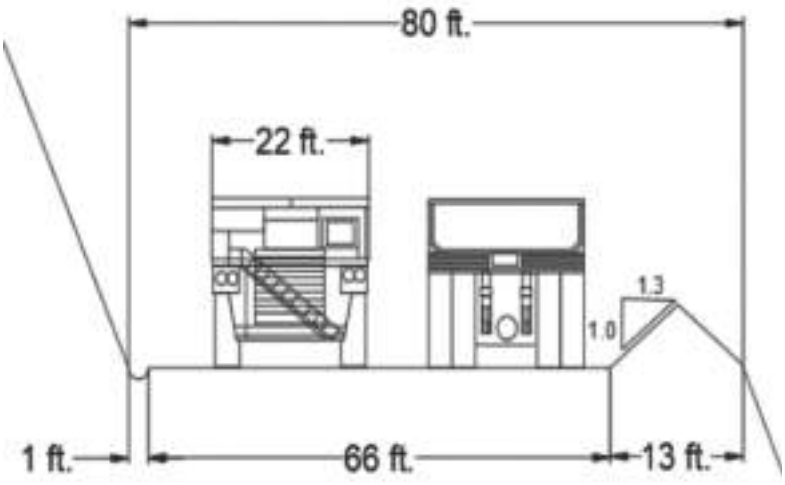
2.2.6 Relocation of Simplot Slurry Line

An active phosphate ore slurry pipeline crosses one of the off-lease areas proposed for mining. An agreement with the pipeline owner has been made on a relocation site of the pipeline before mining occurs in that area. The proposed pipeline relocation is shown on **Figure 3** as the Simplot Slurry Line Re-route. Re-routing the pipeline would disturb approximately 3 acres (the other 3 acres of disturbance for the reroute is already disturbed by the former North Maybe Mine) and require an amendment to the 2003 RFP as described in Section 1.7 and an amendment to special use authorization SSC51.

2.2.7 Service and Haul Roads

The existing historical Maybe Canyon haul roads would be improved to a width of 80 feet (**Figure 11**). A new haul road ramp would be constructed from the first (lower) switchback of the Maybe Canyon haul road to the tipple (**Figure 12**). Nu-West Industries owns the existing historical Maybe Canyon Haul Roads and are partially under a Special Use Authorization. Haul road totals 7.2 miles with 3.2 miles of new construction and 4.0 miles of existing road. Using NFS Road 134 to haul ore would require closing the road to the public during mining until reclamation is complete, approximately 15 years.

Figure 11. Example of a Double-Lane Design Haul Road



Source: (Itafos, 2020a, pp. 4-6 Figure 4-1)

Dry Staging areas would be constructed as places for miners to meet, receive operational instruction, and discuss safety items as needed. Facilities such as mobile office trailers may be fitted with

shower(s) and have restrooms. The staging area would also have a "ready line" or temporary equipment storage.

Due to the steep, narrow topography and the pit sequence, mining the H1 Lease area would require three temporary staging areas. One staging area is required for the NDR Lease mining area. This staging area would require construction of a 50-foot-wide access road (**Figure 11**). The other staging areas would be developed in the existing disturbance/backfill footprint as the mine progresses south.

2.2.8 Valley Mine Facilities, Tipple Area, and Ore Haulage

The existing Dry Valley shop/office facilities would be used as the main base and for production engineering, geology, maintenance, and management staff. The Dry Valley yard area would be used for fuel storage tanks, an equipment parking/hot start line, and a lay-down yard (**Figure 12**).

The tipple area is east of the existing rail line and within the eastern portion of the Dry Valley Mine Pit D Lease. A haul road ramp would be constructed from the switchback to the tipple on NFS. The entire tipple area would be lined to prevent impacts to water quality and fenced to restrict public and livestock access. Water management would be in accordance with the SWPPP and runoff would be managed as contact water. To accommodate railcar loading requirements, the public access road would be safely relocated around and away from the tipple area.

2.2.9 Environmental Protection Measures and Best Management Practices

Itafos has committed to implementing environmental protection measures (EPMs) and Best Management Practices (BMPs) to ensure responsible mining operations and reduce adverse environmental impacts. Key components of the EPMs are described in the MRP and additional BMPs would be included in the Point of Compliance application.

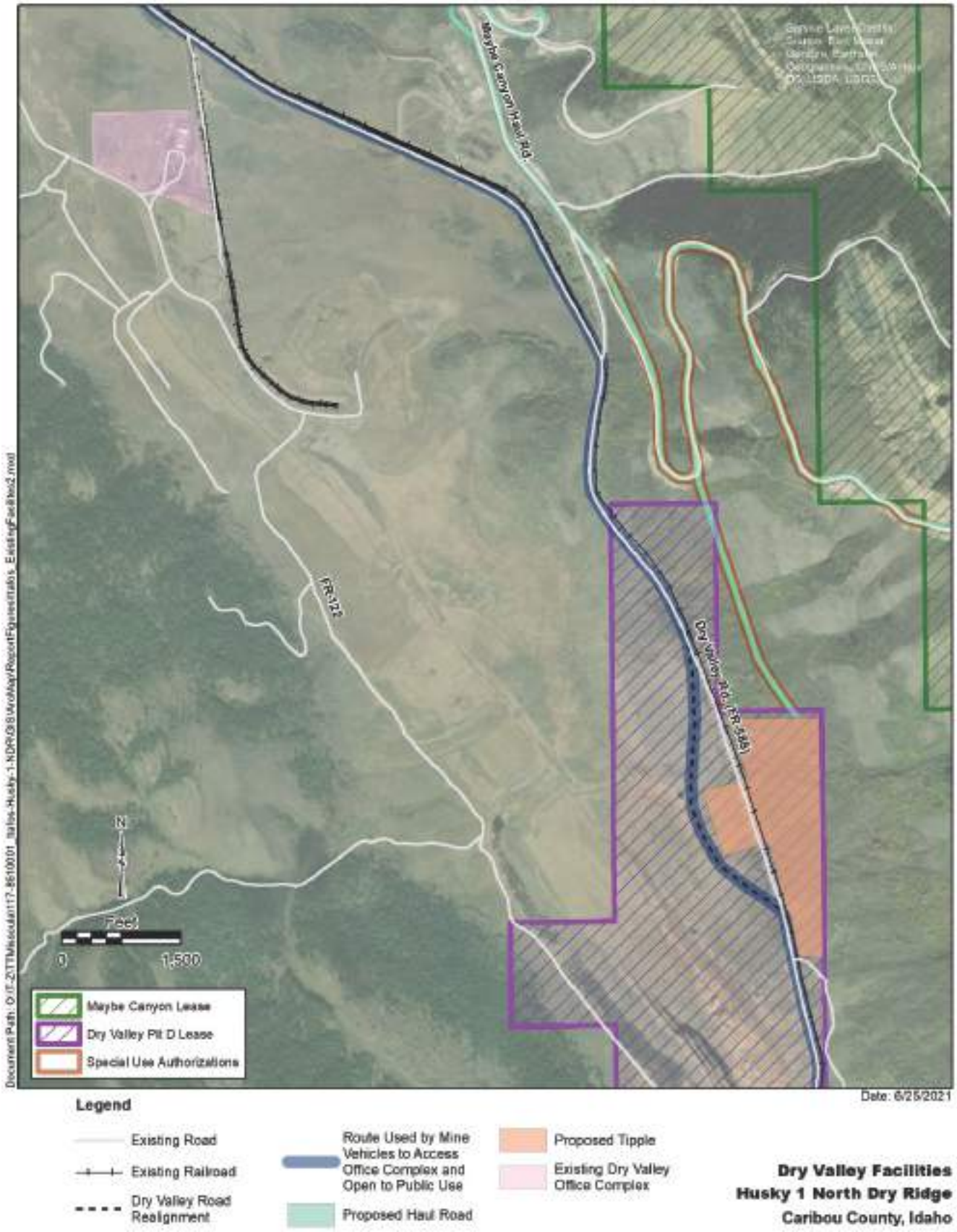
2.2.9.1 Air Quality

- Up to three wells would be constructed and used to supply water for spraying haul roads, access roads, and other areas for dust suppression. An estimated 80,000 and 200,000 gallons of water would be used per day through the months of April to November, depending on the haul road length required to transport ore or overburden for a given phase of mining and environmental conditions.
- Contact water may also be used for dust suppression in areas such as within the pit, haul roads, ore stockpiles, or staging areas. Contact water used for dust suppression would only be used within zero discharge areas according to the site's SWPPP.
- Watering and chemically sealing the roads with magnesium chloride as necessary during the dry season to control dust emissions on the roads.

2.2.9.2 Cultural and Historical Resources

- If any unidentified cultural resources are discovered during the mining process or associated activities, or during an agency mine inspection, operations in the immediate area of the discovery would be halted. The discovery would be reported to the BLM or USFS, and the BLM or Forest

Figure 12. Dry Valley Facilities



Service or its authorized representatives would document and evaluate the discovery. If necessary, a treatment plan be developed and implemented.

2.2.9.3 Livestock Grazing

- To limit the potential for vegetation to take up selenium and minimize risks to livestock, various covers would be placed on the mine backfill.
- Itafos would place a fence around the tipple area to restrict public and livestock access.
- Approximately 0.17 acres of wetland habitat removed as part of the proposed mine would be restored off-site.
- Itafos will relocate or replace existing livestock water improvements as identified in the Grazing Permit(s) Annual Operating Instructions (AOI) that are damaged or destroyed by mining activities.
- Additional mitigation for disruption to grazing patterns or access to water will be discussed between Itafos and the USFS when those impacts are more imminent. Additional mitigation for impacts to grazing could include, but not be limited to:
    - Updating the AOI(s) to provide for clockwise grazing;
    - Coordination between Itafos, USFS, and permit holder for controlled migration over mine site;
    - Itafos provisioning of temporary water to specific locations during operations; and/or
    - Updating the Grazing Permit(s) to suspend grazing on either the east or west side of the mine during operations.

2.2.9.4 Surface Water and Wetlands

- Geologic materials at the site have been extensively chemically tested. It has been determined that chert and limestone materials obtained on-site that are proposed to be utilized to construct geologic drains, roads, stream crossings, mine caps, and other features will not leach contaminants detrimental to water quality.
- The MRP Surface Water Management Plan (Itafos, 2020a, pp. D-1 Appendix D) is designed for controlling surface water runoff and minimizing erosion, sedimentation and would be employed to minimize adverse effects on water quality.
- The SWPPP (Section 2.2.9.6) would prevent habitat degradation of adjacent and downstream wetlands and non-wetland waters and would prevent the potential for plant uptake of COPCs. Additional measures are in place to minimize the potential of bioaccumulation.
- Surface water would be managed to effectively segregate “contact water” from “noncontact water,” with the goal of preventing discharge of “contact water.” The following water would be classified as contact water:
    - Surface water that contacts waste that, based on both historical data and the site- specific geochemistry program, has a higher potential of containing leachable COPCs (MRP Section 5.2.2), most notably selenium;
    - Water that mixes with water identified above;

  - Water that has collected in the pit;
  - Water collected from the running surfaces of haul roads. The following water would be classified as noncontact water;
  - Surface water that contacts only waste with a historically lower potential of containing leachable COPCs (MRP Section 5.2.2); and
  - Run-on water diverted around mining disturbances.
- Groundwater is not anticipated to be encountered in sufficient quantity to require special handling. Small perched aquifers may be encountered during mining. These would be allowed to drain to the pit and would be managed as contact water.
- Sedimentation to wetlands and non-wetland waters from access and haul road construction would be minimized by proper placement of culverts to maintain connectivity between streams and wetlands at stream crossings and minimize erosion and sedimentation. The culvert design would meet peak discharge requirements based on the size of a storm event and duration of culvert installation. Roads would meet guidelines established in the 2003 RFP, as described in MRP Section 4.1.4, and Section 5.2.7, to design roads to the intended use while emphasizing protection of water quality; prioritizing maintenance; and avoiding construction on unstable slopes and highly erosive soils, where practicable.
- The locations of culverts that would remain, or new culverts that would be installed, would be dependent upon final road grading and adjacent contouring (to be completed during final reclamation) of the reclaimed surface. BMPs would be used to address soil erosion at culvert removal sites until vegetation is established.
- Upon reclamation, all road culverts on roads not needed for future access would be removed and the natural drainage patterns re-established.
- Erosion prevention BMPs such as seeding soil stockpiles and implementing run-on and run-off control measures would minimize loss of stockpiled soil and replaced growth media through erosion.
- Ditches would be constructed in sequence with the mining phases to minimize runon into the pit and excessive precipitation contact with exposed shales. It is not feasible to capture and divert all off-site stormwater runoff utilizing diversion ditches, which would require that runoff at certain locations be permitted to drain to adjacent pits. Appendix D describes the detailed design criteria of these structures.

2.2.9.5 Stormwater Pollution Prevention Plan

- Surface water management would consist of managing water based on its potential for transporting COPCs. Specific control measures and BMPs to minimize impacts on water quality would be included in the project SWPPP, developed in accordance with the Idaho Pollutant Discharge Elimination System.
- Degradation of wetlands and riparian habitat from erosion and sedimentation during construction and operations, or from stormwater runoff contacting wetlands and streams, would be minimized through design features, BMPs, adherence to 2003 RFP Standards, and implementation of a site-specific SWPPP. Itafos would prepare a SWPPP in accordance with applicable state regulations.

The SWPPP would identify all potential sources of pollutants that could be transported to surface waters during precipitation events. In addition, the SWPPP would outline control measures and BMPs to be used to prevent or reduce the discharge of pollutants in stormwater.

- As part of the SWPPP, Itafos would comply with several requirements for storm event-related surface water monitoring established by the United States Environmental Protection Agency (USEPA) and the IDEQ. The overarching goal of the various monitoring requirements is to demonstrate that episodic stormwater runoff from the site does not degrade surface water quality. A conceptual approach to stormwater management is provided in MRP Appendix D; however, the comprehensive SWPPP would be contingent upon the final approval of the MRP and would be updated and approved throughout the mine life to accommodate the changing mining operations.

2.2.9.6 Spill Prevention, Control, and Countermeasure Plan

- Itafos would prepare a Spill Prevention, Control and Countermeasures (SPCC) Plan in accordance with applicable regulations. An SPCC Plan would be implemented to meet the requirements in 40 CFR 112 before placement of the petroleum products on site and would be reviewed every 3 years by the Spill Prevention Coordinator or other qualified personnel. As required by the regulation, all amendments to this SPCC Plan would be reviewed by a Professional Engineer. The engineer would certify that the SPCC Plan has been prepared in accordance with good engineering practices and meets applicable standards.

2.2.9.7 Groundwater

- Any wells/core holes to be used for groundwater monitoring will comply with IDAPA 37.03.09 Well Construction Standards Rules.
- Constituents mobilized from backfill areas and other mining features during precipitation events have the potential to enter groundwater systems through infiltration. Of specific concern at phosphate mines in southeastern Idaho is the introduction of selenium to the groundwater system. Itafos would protect groundwater resources by selectively handling and placing all selenium waste[3] directly to pit backfills and using BMPs designed to control runoff of sediments from mining features.
- Materials higher in selenium would be directly backfilled to previously mined-out phases or to historically mined pits. These materials would be used for backfill in the lower portions of the mined-out pit where practicable and capped and covered. MRP Section 4.1.8 describes each of these cap and cover systems in detail and are summarized in EIS Section 2.2.4.
- Before capping, the backfill areas would be graded to reduce runon and infiltration, while revegetation would encourage evapotranspiration of precipitation. Proper placement and cap/cover of the material with selenium would reduce, to the extent possible, precipitation infiltration into the backfill storage areas and subsequent mobilization of selenium to groundwater.

[3] The MRP refers to this material as seleniferous waste or SeW. This is waste with a higher potential of containing leachable selenium and includes the non-ore portions of the Phosphoria Formation (center waste shales, footwall and hanging wall muds, and ore partings). See section 5.2.2 of the MRP for more information.

- During mining, water can pool in the bottom of the pit even when diversion ditches are used to divert surface runoff away from the pit walls. Some runoff would be allowed to drain into the pit to be managed as contact water. Other sources of pit water include direct rainfall, snow melt, and groundwater exfiltration. Groundwater exfiltration is not expected beyond the occasional interception of a perched aquifer.
- As surface runoff accumulates in active pits, it may be necessary to pump the water away from the active pits to facilitate safe mining operations. Pit water would be managed as contact water. Therefore, pit water would be pumped or moved by a water truck to areas of un-reclaimed active backfill within the pit area for infiltration, utilized for dust suppression within zero-release areas in accordance with the SWPPP, or delivered to lined contact water basins with available capacity. Where possible, contact water basins are proposed at various locations to collect and retain stormwater runoff and pit water, as applicable, for zero release.
- Itafos would design and implement BMPs for erosion, sedimentation, and selenium control to limit runoff from mining components and potential infiltration. Sediment control could include, but not be limited to, the use of erosion mats, straw wattles, brush barriers, silt fences, diversion ditches, and sedimentation ponds (MRP Section 5.5.1).
- Itafos would conduct mining in accordance with Section 39-120, Idaho Code (Ground Water Quality Rule). Itafos may request set points of compliance from the IDEQ before mining operations per IDAPA 58.01.11.401. The set points of compliance requested would be determined as planning proceeds and baseline data are collected.

2.2.9.8 Noxious Weeds

- Noxious weeds would be continuously managed throughout mining. A noxious weed control program would be instituted throughout mining operations, during site closure, and would continue until agreement with the agencies that site closure is complete. The noxious weed control program would be designed and implemented according to the requirements of the Idaho State Department of Agriculture and the 2003 RFP. With implementation of these proposed control measures, the potential for spread and invasion would be minimized.

2.2.9.9 Wildlife

- The proposed use of synthetic and/or thick geologic mine caps topped with growth media will ensure that roots of reclamation vegetation cannot access selenium or other contaminants contained in the run-of-mine waste rock and create a bioaccumulation hazard to foraging wildlife, livestock, or Treaty rights use of vegetative materials.
- No take of nesting migratory birds would occur because a nest clearance survey (to include general/songbird surveys and raptor-specific surveys) would be conducted 7 to 10 days prior to initiating timber removal or other ground clearing during the migratory bird breeding season to identify active nests.
- The mine disturbance area has been reduced where feasible through placement of haul roads on previously disturbed areas.
- Reclamation would establish native vegetation suitable to wildlife habitat over approximately 98 percent of the total disturbance (1,180 acres) disturbed by mining operations. The historic North

Maybe Mine and South Maybe Canyon Mine open pits would also be backfilled and reclaimed to provide up to approximately 148 acres of additional wildlife habitat.

2.2.9.10 Fire Prevention

- Fire prevention would be accomplished by an active safety training program that includes safe work practices. All mining equipment is fitted with appropriately sized fire extinguishers or automatic fire suppression systems. All light trucks and support vehicles are equipped with fire extinguishers as well. Small wildfires may be extinguished using a dust suppression water truck and/or track-mounted equipment. However, mine personnel and public safety would be considered the highest priority. Local land management agencies and county authorities would be immediately notified in the event of a wildfire on or near the mine site.

2.2.9.11 Fuel Storage Area and Containment

- Fuel would be stored at the existing Dry Valley shop and distributed directly to equipment or by fuel trucks that comply with relevant federal and state regulations. The total fuel storage capacity may be as much as 40,000 gallons. Fuel would be stored in multiple aboveground storage tanks. Barriers have been constructed under and around fuel tanks to meet applicable requirements for secondary containment of petroleum products. The Dry Valley fuel storage area would be maintained according to relevant federal and state regulations and the H1NDR SPCC Plan.

2.2.9.12 Growth Media

- Growth media would be applied at a minimum 20 inches.
- When direct placement of salvaged growth media is not practical, it would be salvaged and stockpiled until used in reclamation. Stockpiles on historical backfill areas would be constructed on 2 feet of limestone as a base to prevent contamination. Stockpiles on native ground would be placed directly on native ground after clearing and grubbing. Growth media would be stored in the fewest stockpiles as efficient.

2.2.9.13 Stability

- The bottoms of the open pits would not exceed 12% grade, where reasonable. Steeper grades may occur due to localized discontinuity of the deposits, which are interpreted as faults.
- On the footwall side of the deposit, the slope is parallel to the dip of the strata where it is shallow. In steeper portions, the overall slope uses a maximum of 48 degrees for a face angle and 30-foot-wide catch benches for each 90 feet of pit depth.
- Hanging wall slopes in the Rex Chert would have a 48-degree face angle with 20-foot-wide catch benches for every 80 feet of depth.
- A slope stability study would be completed to determine more accurate slope design parameters. Localized conditions within the pit may require additional layback of the pit walls for safety.

2.2.9.14 Access and Haul Road Design

- All access and haul roads outside the pits are designed to minimize surface and natural resource impacts and to ensure maximum efficiency and safety in truck haulage. Road design features include the following:

- Road locations would minimize wetland and riparian area disturbance.
- Where practical, haul roads would be placed within the pit boundaries to reduce the disturbance footprint of mining operations.
- Road cut slopes would be designed with a 1:1 or 45-degree angle.
- Road fill slopes would be designed at a repose angle of approximately 36 degrees.
- Road surfaces would be graded to minimize standing water.
- If necessary, large fill or cut slopes may be hydro-mulched, seeded, or otherwise stabilized to prevent excessive soil erosion from runoff.
- Growth media would be salvaged from the proposed road areas in accordance with Section 4.1.10 and Section 5.6.9 of the MRP.
- BMPs such as sediment control fencing, straw waddles, and erosion mats, would be used as needed to minimize impacts around haul roads.

- Haul roads are sized to an 80-foot travel width, which includes a 10-foot safety berm. As most of the roads would be on steep terrain, haul roads would generally need only one berm on the outside shoulder. The minimal road widths are a result of the steep terrain as well as efforts to minimize impacts. The improvements to the existing roads would rehabilitate and widen the road to a total width of 80 feet by removing cut slope ravel, removing oversized water control ditches, and reconditioning berms as needed.
- All roads would be constructed with a cut-fill, full cut, and/or full fill method. Any fill construction would use selective materials with side berms where necessary for safety.

2.2.9.15 Culverts

- Surface water runoff would be conveyed under the access and haul roads through culverts. Culverts are considered long-term or permanent structures; therefore, they were designed to convey the peak discharge from a design storm event selected based on the anticipated life of the culvert installation (Table 7).

Table 7. Design Storm Criteria for Peak Flow Conveyance

Anticipated Life of Structure	Design Storm Event1
Less than 2 years, or approximately one phase of mining	10-year, 24-hour
2 to 25 years, or multiple mining phases	50-year, 24-hour
Long-term or permanent	100-year, 24-hour

Source: (Itafos, 2020a, pp. Table 4-5)
Note:
1 Appendix D includes maps showing the proposed culvert locations, a description of the conceptual design, and tabulated hydraulic design parameters.

2.2.9.16 Blasting

- Blasting would be conducted consistent with the requirements of Mine Safety and Health Administration, the Bureau of Alcohol, Tobacco, Firearms, and Explosives, and the Department of Homeland Security. Blasting would be performed with a mixture of ammonium nitrate-fuel oil, blasting emulsions, or other standard blasting agents placed in drilled blast holes.

- Before blasting, inspection of the blasting area, warning sirens, personnel cleared, blast warnings broadcast by two-way radio, and guards posted on all roads would occur to ensure control of access to the blasting area.

2.2.9.17 Measures to Meet Forest Service 2003 RFP Requirements

The USFS has reviewed the MRP against the requirements in the 2003 RFP (USFS, 2003a), and included additional EPMs to meet standards and guidelines. These measures would be included in the approval decision:

- Construct wildlife structures at reclamation such as slash piles, rock piles, and logs per (Prescription 8.2.2(6) Phosphate Mine Areas).
- Interim reclamation shall be conducted according to a plan submitted at the time the Forest Service is notified of a temporary shutdown (Forest-Wide guidance, Drastically Disturbed Lands standards (6)).
- Reclamation vegetation shall be monitored for bio-accumulation of hazardous substances prior to release for multiple use management (Forest-Wide guidance, Drastically Disturbed Lands standards (7)).
- Loss of available surface water sources for uses such as wildlife or grazing, due to mining operations shall be replaced or mitigated by the mine operator. This includes the loss of water quality sufficient to maintain post-mining uses (Forest-Wide guidance, Drastically Disturbed Lands standards (9)).
- Selection of plant species for establishment should reflect the surrounding ecosystem and post remedial land use. Plant materials used should be adapted to the climate of the site. Consideration and preference should be given to promoting natural succession, native plant species, and structural diversity (Forest-Wide guidance, Drastically Disturbed Lands guidelines (2)).
- Prescribe reclamation plant species known to reduce the risk of bioaccumulation of hazardous substances, if such risk is present (Forest-Wide guidance, Drastically Disturbed Lands guidelines (3)).
- In reclaimed areas, vegetation should include species that meet wildlife habitat needs. Wildlife structures (slash piles, logs, rock piles) using native vegetation and materials are designed to provide cover for wildlife movements in created openings (Forest-Wide guidance, Drastically Disturbed Lands guidelines (7)).
- Culverts (permanent and temporary) should be sized so that the probability of flow exceedance is fifty percent or less during the time the culvert is expected to be in place (Prescription 2.8.3 (AIZ) Roads and Trails Guidelines (1)).
- Avoid placing ditch relief culverts where they may discharge onto erodible slopes or directly into streams (Prescription 2.8.3 (AIZ)Roads and Trails Guidelines (2)).
- Where feasible, install cross-drainage above stream crossings to prevent ditch sediments from entering streams (Prescription 2.8.3 (AIZ) Roads and Trails Guidelines (3)).
- New or reconstructed roads and trails should cross the AIZ riparian areas as perpendicular as possible (Prescription 2.8.3 (AIZ) Roads and Trails Guidelines (4)).

- Design and install drainage crossings to reduce the chances of turning stream flows down the road prism in case of a blocked or overflowing culvert (Prescription 2.8.3 (AIZ) Roads and Trails Guidelines (5)).
- Road drainage patterns should avoid disruption of natural hydrologic flow paths (Prescription 2.8.3 (AIZ)Roads and Trails Guidelines (6)).
- These [Phosphate Mine] areas may be opened to grazing after meeting the restoration criteria identified in the mine reclamation plan (Prescription 8.2.2(g) Phosphate Mine Areas Livestock Grazing Guideline (1)).

2.2.9.18 Measures to Meet BLM Policy Requirements

Instruction Memorandum 2021-038

On July 21, 2021, BLM issued Instruction Memorandum 2021-038[4] rescinding the previous Instruction Memorandum 2019-018 on compensatory mitigation due to inconsistency with recently issued Executive Order 13990 and Secretary's Order 3398 and indicated that the BLM would be establishing policies that align with the orders. The memorandum further stated that NEPA documents in the final stages of review on that date, such as this draft EIS, may be modified but not to delay publication.

In anticipation of the likely future direction to include options for compensatory mitigation before the final EIS is released and records of decisions signed, BLM is including an outline of a conceptual compensatory plan submitted by Itafos in **Appendix A**, which is based on the impacts stated in Chapter 3. Based on the final selected alternative and after consideration of public comment and consultations, details will be added to the compensatory mitigation plan.

Depending on the policy in force at the time the BLM decision is signed, the mitigation plan may become a condition of approval.

BLM ARMP

The BLM has reviewed the MRP against the requirements in the ARMP (BLM, 2012). In addition to EPMs and BMPs specified in the MRP, measures included to meet 2003 RFP standards and guidelines above are consistent with the BLM ARMP (management actions ME 1.2.4, ME-1.2.5 and ME-2.6.3).

The analysis and interdisciplinary team discussions indicated the need for the following EPM:

- If intact vertebrate fossils are exposed during mining activities, the locations would be recorded and, if possible, the fossil may be tentatively identified. Notification would be provided to the BLM and USFS.
- Backfill caps to eliminate the threat of selenium bioaccumulation in reclamation vegetation.
- Geochemical testing of backfill and cover materials to demonstrate material used for cap and drain construction won't result in leaching of selenium or uptake into reclamation vegetation.
- All soils must be salvaged and utilized for reclamation. It has been demonstrated that these natural soils will not cause any bioaccumulation of selenium into vegetation.

[4] https://www.blm.gov/policy/im-2021-038.

2.2.10 Reclamation

The H1NDR disturbance footprint will be 98 percent reclaimed. The remaining 2 percent will consist of exposed pit walls as limited portions of the pits are partially backfilled and certain haul roads that will be partially reclaimed to a much smaller final width to allow for access and maintenance.

Reclamation of mine pit areas would be concurrent with mining. Reclamation of other areas of the H1NDR Mine site are scheduled to be completed within 2 years after cessation of mining. Reclamation is designed to restore the site to beneficial post-mining multiple land uses, protect the environment, and reclaim disturbed areas to conditions compatible with the surrounding landscape. This section summarizes the reclamation plan included in Sections 5.6 of the MRP.

Reclamation practices are designed to meet the objectives set by 43 CFR 3592.1, the BLM's ARMP, USFS's 2003 RFP, and Idaho's Reclamation Plan Title 47, Chapter 15 – Idaho Code. The reclamation plan is intended to stabilize (protect from erosion) disturbed areas and to meet the final multiple land use goals of wildlife habitat, and grazing.

Reclaimed areas over backfill would be covered with at least 20 inches of growth media. The proposed reclamation seed mix (**Table 8**) consists of native grasses, forbs, and shrubs similar to the existing plant communities and will provide benefit to wildlife and livestock.

Table 8. Revegetation Seed Mixes

Scientific Name	Common Name	Native Status	Pounds per Acre	Percentage of Seed Mix
Grasses				
Agrostis gigantea	Redtop bentgrass	Native	2	4
Bromus marginatus	Mountain brome	Native	4	9
Calamagrostis canadensis	Bluejoint grass	Native	4	9
Calamagrostis rubescens	Pine reedgrass	Native	2	4
Elymus cinereus	Great Basin wildrye	Native	3	7
Elymus glaucus	Big bluegrass	Native	5	11
Elymus spicatus	Bluebunch wheatgrass	Native	3	7
Elymus trachycaulus	Slender wheatgrass	Native	4	9
Festuca idahoensis	Idaho fescue	Native	2	4
Koeleria macrantha	June grass	Native	1	2
Phleum pratense	Timothy	Non-native	1	2
Pseudoroegneria spicata	Bluebunch wheatgrass	Native	4	9
Stipa [Nassella]viridula	Green needlegrass	Native	2	4
Thinopyrum intermedium	Intermediate wheatgrass	Non-native	1	2
Triticale sp.	Sterile annual rye (Quick Guard)	Non-native	1	2
Forbs				
Achillea millefolium	White yarrow	Native	1	2
Balsamorhiza sagittata	Arrowleaf balsamroot	Native	1	2
Linum lewisii	Lewis blue flax	Native	1	2
Shrubs and Subshrubs				
Symphoricarpos oreophilus	Mountain snowberry	Native	1	2
Dasiphora fruticosa	Cinquefoil	Native	1	2

Scientific Name	Common Name	Native Status	Pounds per Acre	Percentage of Seed Mix
Purshia tridentata	Bitterbrush	Native	1	2
Total			**45**	**100[a]**

Source: (Itafos, 2020a, pp. 5-15, Table 5-7)
[1] Sum of percentage of seed mix accounts for rounding.

2.2.11 Financial Assurance

The BLM, Forest Service, and the IDL would determine reclamation performance bond amounts required by the Idaho Surface Mining Act (Idaho Code Title 47, Chapter 15), 43 CFR 3504.50 and 36 CFR 251.56(e). Itafos would post reclamation performance bonds or other instruments (financial assurance) prior to any surface disturbance. Per 43 CFR 3504.71 and in accordance with the BLM actual-cost reclamation bonding policy, Bond Requirement for Phosphate Mining Operations, September 10, 2013, that prescribes the procedures for ensuring that an accurate actual-cost reclamation bond is in effect for phosphate mines in Idaho. The performance bond is to assure that reclamation obligations are met, the project site is reclaimed, and resources are not adversely affected. A BLM production royalty bond for mining phosphate ore from the federal lease is also required.

The bond amount would be calculated based on the alternative(s) selection when a final MRP is approved and requirements have been identified and would be adjusted as needed due to operational changes or as projected reclamation costs change. Because the bond amount is calculated based on the alternative selected in the Record of Decision and proscribed by statute and existing agency policy it is not in this EIS. The bond would provide adequate funding to complete reclamation, pre- and post-closure maintenance, and monitoring until affected areas are determined to meet reclamation goals consistent with the Record of Decision and existing rules, regulations, and standards by the IDL, BLM, and Forest Service (for areas disturbance permitted by special use authorizations under). The performance bond and information forming its basis would be available for public inspection.

2.3 Alternatives Development

BLM conducted public and internal scoping to identify concerns and issues best resolved by considering alternatives. These alternatives, and the reasons they were proposed are discussed below. Additionally, the No Action Alternative is evaluated as an alternative in the EIS.

2.4 Reasonable Alternatives to the Proposed Action

2.4.1 Significant Issues and Preliminary Alternative Suggestions

BLM, Forest Service, Army Corps of Engineers, and IDEQ reviewed the issues and potential impacts from the project and their knowledge of previous phosphate mining projects in southeastern Idaho to develop a list of preliminary issues. The public scoping was completed on January 22, 2021. The EIS team reviewed the comments from public scoping and supplemented the preliminary issues to develop the final set of issues. For the purposes of this EIS, “significant issues” were the issues that drive alternative development. They cannot be resolved through design or analysis. Other issues are addressed through the EIS analysis or measures that can be applied to all the action alternatives.

2.4.1.1 The significant issues

- Degradation of groundwater and surface water quality that does not meet state standards caused by backfilling the open pits with overburden after mining, and the subsequent infiltration of rainwater and snowmelt through the backfill cover after reclamation. Additionally, permanently realigning Stewart Creek may not be consistent with 2003 RFP requirements in AIZs.
- Interruption of access (1) to Tribes for excising treaty rights, (2) to the public for recreation and (3) to herd managers for grazing operations caused by the mine's planned usage of currently existing forest roads for ore hauling, the requirement to impair public access into the mine area for safety, and mining that would remove access roads or sever access to trails.

2.4.2 No Action Alternative

The MRP and Special Use Authorizations would not be approved. Federal mineral leases would not be modified. The 2003 RFP would not be amended. No mining and ore recovery would occur. No 404 Permit would be issued or mitigation completed.

The future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup would continue, final reclamation of the North Maybe Mine and South Maybe Canyon Mine would take place following CERCLA. The existing Conda Plant may or may not remain open depending on if Itafos elected to purchase phosphate rock from another source.

Selecting this alternative does not mean the ore would never be mined, just that it would not be mined with this plan. Another plan could be submitted at any time.

2.4.3 Alternative Cover

This alternative was developed to reduce potential impacts, from the Proposed Action, to Surface water and groundwater. Based on a preliminary analysis, Itafos would reconfigure placement of overburden and re-arrange and optimize the placement of the four types of cover described in Section 2.2.4. The reconfiguration would reduce the area needing a cover from 706 to 614 acres. In addition, based on the agency groundwater model, the most effective cover design would be deployed where it would decrease impacts to the greatest degree. The area of flexible liner cover would increase from 22 to 315 acres. This alternative would increase the acreage of unreclaimed highwall from 19 to 99 acres. Overall, the alternative would meet the following performance criteria:

- Prevent contact of surface water runoff with run-of-mine overburden.
- Prevent water infiltrating through the cover system and contacting run-of-mine overburden from subsequently expressing at the ground surface because of elevated pit backfill water levels.
- Prevent subsurface transport of COPCs in downgradient groundwater from resulting in additional loading to 303(d) listed surface waters or concentrations exceeding surface water quality standards in non-303(d) listed waters.
- Limit impacts to groundwater and the extent of impacted groundwater beyond the mining area so that there is no injury to current or projected future beneficial uses of groundwater.

Construction materials may change slightly from those described in Section 2.2.4, but all performance criteria would be met.Acres of each type of cover that would be applied to each pit are shown on **Figure 13** and in **Table 9**. Differences in acres by location are shown in **Table 10.**

Figure 13. Alternative Cover

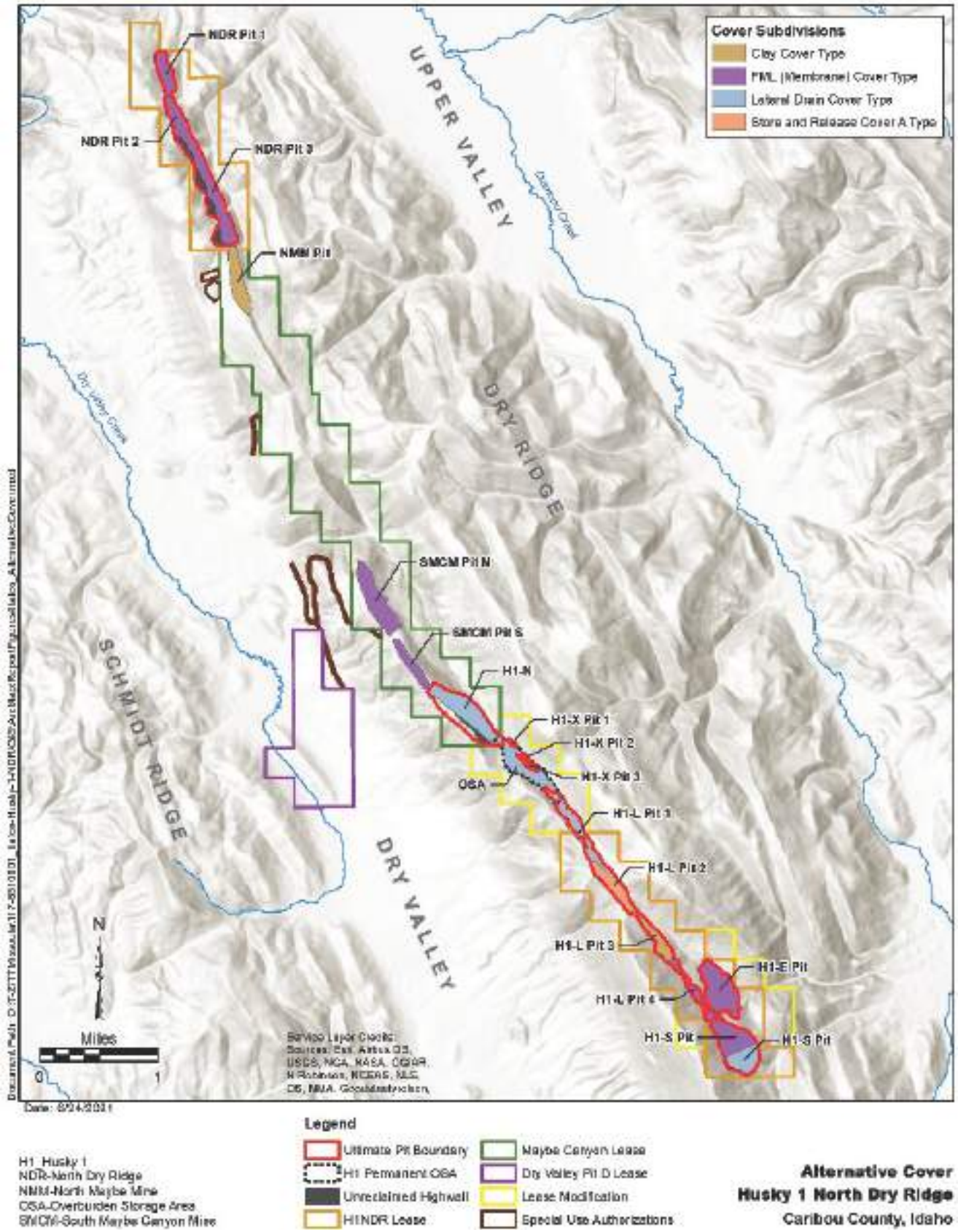


Table 9. Acres of Cover Materials in the Alternative Cover

Pit	Earthen Cover	Low-Permeability Clay	Flexible Membrane Liner	Lateral Drain	Total Acres
NDR Pit 1	--	--	26	--	26
NDR Pit 2	--	--	22	--	22
NDR Pit 3	--	--	61	--	61
North Maybe Mine Pit	--	37	--	--	37
South Maybe Canyon Mine Pit 1	--	--	57	--	57
South Maybe Canyon Mine Pit 2	--	--	23		23
H1-N,	--	--	--	61	61
H1-X (1, 2, 3), Permanent OSA,				63	63
H1-L Pit 1	--	--	--	41	41
H1-L Pit 2	30	--	--	--	30
H1-L Pit 3	--	29	--	--	29
H1-L Pit 4	--	--	18	--	18
H1-E Pit	--	--	64	--	64
H1-S Pit	--	--	43.5	31.5	75
Total	30	66	315	197	607

Source: (Anderson, 2021, p. 5/8 Table 3)

All other components of the Proposed Action would be the same (leases, water management, roads, Dry Valley facilities, EPMs and BMPs, reclamation, and financial assurance on this cover) as described in Section 2.2.This alternative would also modify the backfill placement, but not the total amount of backfill to be managed. Approximately 2.9 million more cubic yards would be placed in the OSA than the Proposed Action, which increases the size of the OSA from 55 to 77 acres. Overall, the Alternative Cover has 92 fewer acres needing cover due to backfill placement.

Table 10. Proposed Action Cover Acres Compared to Alternative Cover Acres

Location	Proposed Action	Alternative Cover	Difference
NDR Pit 1	27	26	-1
NDR Pit 2	24	22	-2
NDR Pit 3	82	61	-21
North Maybe Mine Pit	71	37	-34
South Maybe Canyon Mine Pit 1	55	57	+2
South Maybe Canyon Mine Pit 2	22	23	+1
H1-N	89	61	-28
H1-X, Permanent OSA	61	63	+2
H1-L Pit 1	46	41	-5
H1 L Pit 2	29	30	+1
H1 L Pit 3	31	29	-2
H1 L Pit 4	22	-18	-4
H1 East Pit	65	64	-1
H1 South Pit	81	75	-6
Total	705	607	-98

Source: (Itafos, 2020d, pp. 5, Table 1; Anderson, 2021, pp. 5/8, Table 3)

Performance of the cover to meet design criteria would be monitored at the Points of Compliance established by IDEQ (Section 2.2.9). The potential to meet these design criteria are evaluated with a robust, predictive groundwater model to assess the effect of the cover alternatives to ground water over time. (Tetra Tech, Inc., 2021d).

2.4.4 Alternative Stream Routing

To reduce long-term and permanent impacts to Stewart Creek, an alternative is considered that temporarily reroutes Stewart Creek into an open channel uphill from its current location during operations and then returns it permanently to its natural channel except where it would cross the backfill area. Where the stream crosses the backfill, the channel would be lined to minimize water contacting the backfill cover. This alternative would not create additional disturbance beyond the Proposed Action. The locations of the Alternative Stream Routing and the Proposed Action stream reroute are shown on **Figure 14**.

2.4.4.1 Reclamation of the Alternative Stream Routing

The operational reroute would be reclaimed by returning the channel to its natural slope and revegetating with a seed mix. approved by Forest Service to meet the objectives of reclamation, which are low potential for uptake of COPCS, wildlife habitat, livestock grazing, native plant emphasis, accommodate gathering needs of native people, and soil and site stabilization (erosion control). The approved seed mix vary by site depending on environmental conditions, aspect, and reclamation objectives.

2.5 Alternatives to Address the Loss of Recreation Access

2.5.1 Alternative Access

This alternative was developed to address the significant issue of the loss of public access caused by the mine's use of the existing NSF Road 134 for a haul road (Section 2.4.1.1). The alternative includes a 12-foot-wide new road from Diamond Creek, following the Simplot Slurry Pipeline Right-of-Way then heading north on the east side of Dry Ridge then through the Maybe Mine area, crossing Dry Ridge where the road would cross NFS Road 354 then down the west side near Maybe Creek and tying with the Dry Valley Road, as shown on **Figure 15**. The Alternative Road would be 7.6 miles of which 5.8 miles would be new construction and 1.8 miles would be constructed adjacent to the existing slurry line corridor. The new route would entail 6.1 miles of new road construction between Dry Valley and Diamond Creek, and approximately 1.5 miles of new disturbance adjacent to the slurry line from Diamond Creek to where the new road would begin. Approximately 18 acres of new disturbance and 4 acres of previously disturbed areas would be included in the road construction area for the road. NFS Roads 134, 193, and 194 would be obliterated in disturbance footprint (mining area).

An option for this road would use the same alignment but constructed a 50-inch-wide all-terrain vehicle (ATV) trail (ATV Options). Instead of constructing new road adjacent to the slurry line road, the ATV trail would be the slurry line right-of-way. Gates would be installed at two locations where larger vehicle access would end and a small parking area would be developed near each gate. The gates would restrict access of the trail to ATVs and pedestrians/equestrian only (but would retain access for maintenance vehicles, when needed). This option would result in an overall disturbance area of approximately 3 acres of new construction and 2 acres of previously disturbed area (Arcadis, 2021b). the ATV trail would become a permanent public route on the Caribou Travel Plan.

Figure 14. Stewart Creek Realignment (Proposed Action and Alternative Stream Routing Alternatives)

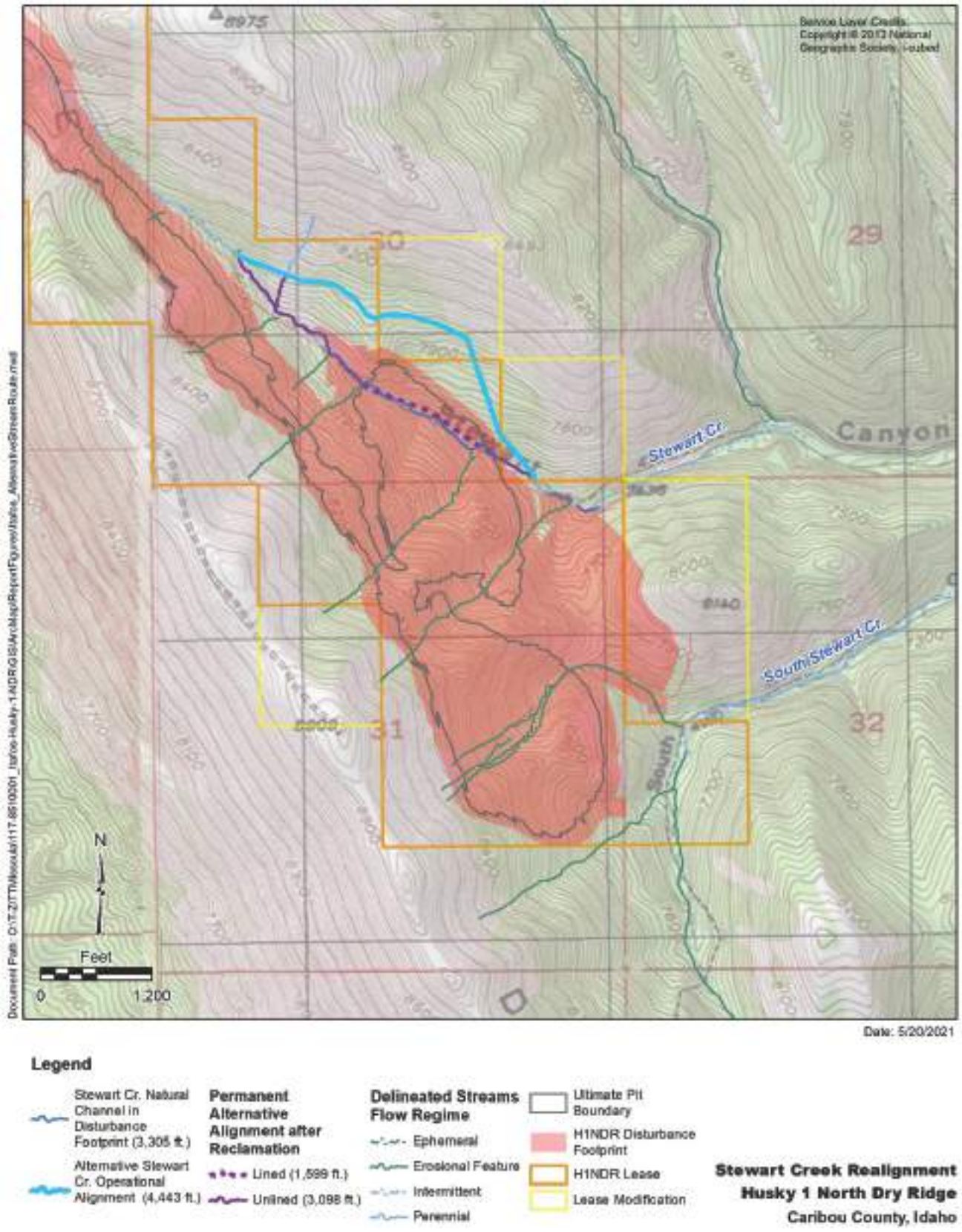
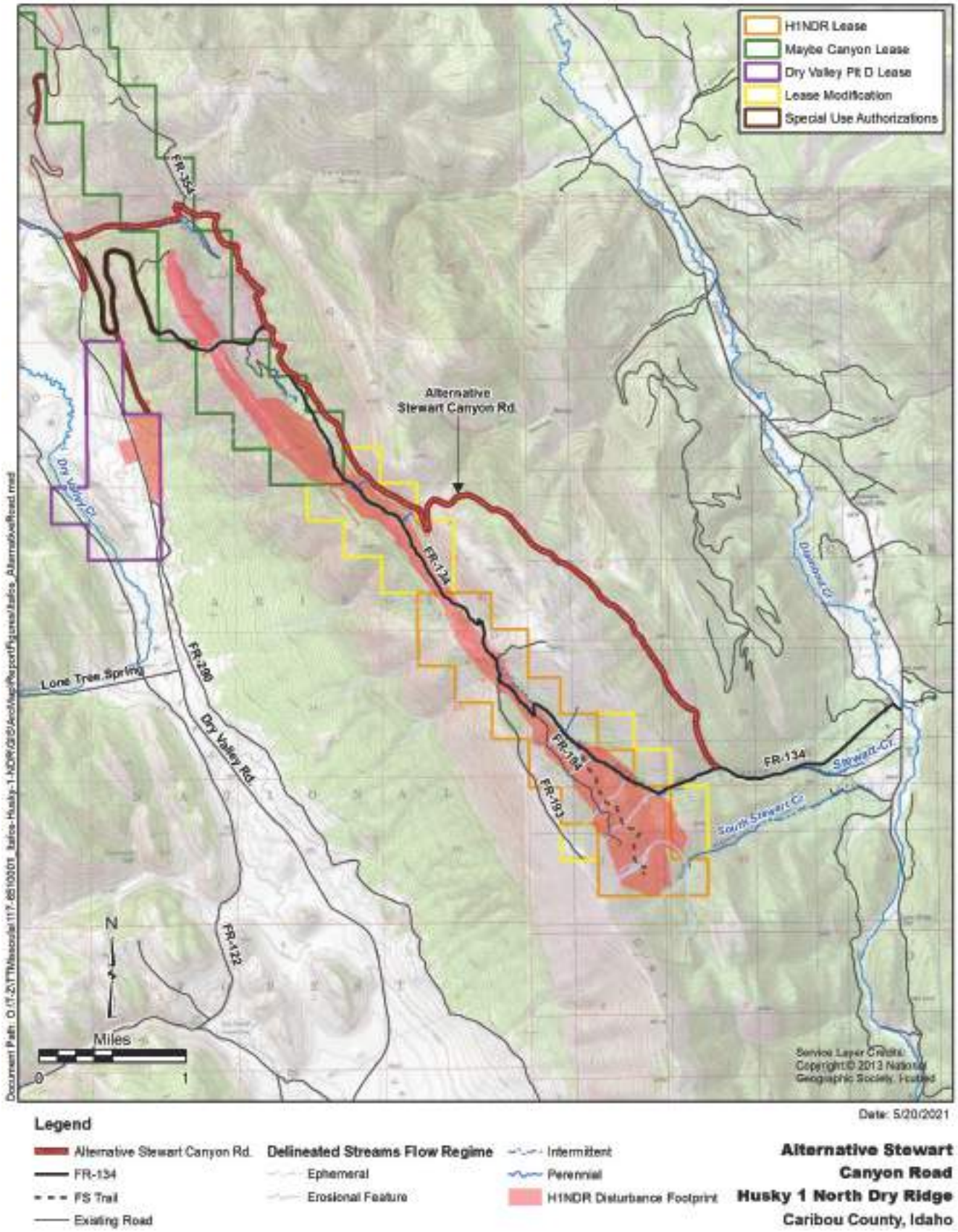


Figure 15. Alternative Road



Either of the options for this alternative would establish motorized access through the mined area between Dry Valley and Diamond Creek during mining and would remain permanently. Either of the options could be added to either the Proposed Action or the Alternative Cover.

2.6 Alternatives Considered but Not Studied in Detail

BLM and Forest Service considered public comments and potential project effects when determining what alternatives should be evaluated in this EIS. Some alternatives were suggested during scoping, but after a preliminary evaluation of their effects or benefits, it was determined that the alternatives suggested did not need to be considered in detail.

This section describes how the alternatives not studied in detail differ from the Proposed Action, the reasons for considering the alternatives, and then provides the rationale for why the alternatives were not considered in detail.

In general, alternatives to the Proposed Action may be eliminated from detailed analysis if (BLM NEPA Handbook H-1790-1):

- It is ineffective (it would not respond to the purpose and need).
- It is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology; this does not require cost-benefit analysis or speculation about an applicant's costs and profits).
- Its implementation is remote or speculative.
- It is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan).
- It is substantially similar in design to an alternative that is analyzed.
- It would have substantially similar effects to an alternative that is analyzed.

In general, alternatives to the Proposed Action that are considered in detail should:

- Address an issue raised or the need to meet a standard, rule, management plan, or policy;
- Reduce or eliminate one or more impacts that could result from the Proposed Action;
- Be technically and economically feasible; and
- Be effective and adequately respond to the purpose and need (Section 1.3).

2.6.1 Cover Systems

2.6.1.1 Total Store-and-Release Cover

In their original MRP, Itafos included an earthen store-and-release soil cap and cover described in Section 2.2.4. This alternative was not analyzed in detail because preliminary baseline water modeling results indicated that surface water quality would be adversely affected. The model indicated that the backfilled pit would fill with water, which would eventually overtop the pit and create seeps that would allow poor quality pit water into the surface water. As the nearby streams are 303(d) listed, no measurable discharge is allowed.

2.6.1.2 Alternative 1 Cap and Cover System

Based on groundwater model assumptions and analysis methods, Itafos proposed a cap and cover system that was designed to demonstrate that an alternative could be developed that would meet Idaho water quality standards (no measurable loading of selenium to either Maybe Creek or Stewart Creek). This cover system is similar to the Total Store and Release Cover (Section 2.6.1.1). The thicker chert and/or Limestone layer would provide additional protection for vegetation but would not appreciably reduce impacts on surface or groundwater. It was not discussed in detail because potential impacts would be greater than the Proposed Action and Alternative cover. This alternative did not propose additional cover types, but rather, modified the locations and acreages of the cover types presented in the Proposed Action cover. Alternative 1 included approximately 348 acres of flexible membrane liner.

2.6.2 Mining Location Alternatives

2.6.2.1 No lease modifications

Lease modifications are not guaranteed. They are a discretionary BLM decision. This alternative would not include the proposed lease modifications and reduce surface disturbance by 126 acres.

This alternative was dismissed from detailed analysis for several reasons. The Action Alternatives include the lease modifications and meets all applicable requirements relevant to lease modification. Impacts on surface resources are compliant with land use direction and reclamation of surface disturbance is predicted to meet post mining land uses. Potential water quality impacts on Maybe Creek would be minimized by the backfill design. Since the project with the lease modification meets applicable requirements, there is no environmental reason to consider this alternative further.

Without the lease modifications the H1 pit mining and backfill would not occur and the permanent and temporary OSAs would need to be located elsewhere on lease. If not recovered with this mine plan, the phosphate resource would likely be rendered un-recoverable, due mostly to its small size and lack of enough remaining ore to support an independent mine. Given BLM's policy to consider resource recovery along with safety and other competing land uses, since the additional recovery does not affect compliance, the reduced recovery would unnecessarily bypass the recoverable phosphate resource, create negative economic impacts, and could lead to other areas being opened to phosphate mining sooner (Arcadis, 2021c).

Without the proposed lease modifications, H1NDR would not be feasible. Economically, the project would not be feasible for the proponent without the proposed ore recovery. Approximately 60% of 21.6 million tons of the recoverable ore in H1 the pits are from the lease modification (see **Table 5**). Practically, the project would not be feasible without the space provided for backfill by the nearby pits and on-lease area within the proposed lease modification. Essentially, the southern portion of H1 would not be feasible to mine because there is no place else to store overburden on the leases (the permanent and temporary OSAs need approximately 105 acres, see **Table 4**).

2.6.2.2 Expand Mining to Include All Reserves in Blackfoot River Wildlife Management Area

A portion of the NDR lease (IDI-8289) extends into the Blackfoot River Wildlife Management Area. The BLM considered an alternative that would maximize phosphate recovery. Once the NDR lease is mined as described in the MRP and reclaimed, the ore within the wildlife management would be

permanently severed and likely never recovered, which is a loss of revenue to the taxpayers from royalties:

- Important habitat and resources in the wildlife management area would be adversely affected,
- Mining this area would increase the disturbance by 15 acres,
- The structural geology at the north end of the NDR Lease indicates that mining the ore in the wildlife management area would not be economically feasible to the proponent, as indicated by exploration drilling (Arcadis, 2021d), and
- A pit extension into this area "only added a few days' worth of ore" (Arcadis, 2021d).

This alternative was not considered in detail because it is not economically feasible and would have greater impacts than the other alternatives considered.

2.6.2.3 Avoid Mining Below the Water Table

This alternative was suggested by the Tribes and others to prevent contamination of groundwater by not mining below the Wells aquifer water table and installing liners in any areas subject to percolation.

No mining is proposed below the water table. A separate alternative is not considered in detail because it is the proposed action.

2.6.2.4 Eliminate Mining on the Maybe Canyon Lease

This alternative was suggested because groundwater and surface water quality has been adversely affected by past mining of the Maybe Canyon Lease in the North Maybe Mine and South Maybe Canyon Mine. The past mines are now in remediation under the CERCLA. H1NDR would recover additional ore from the Maybe Canyon Lease that remains after previous mining activity. Previous mining at the South Maybe Canyon Mine mined only a portion of the pit for the highest-grade ore at the lowest cost, which resulted in a shallow pit and phosphate ore left behind. Reentering the existing pit footprint would recover an estimated 7.3 million wet net tons of the remaining phosphate resource with no new surface impacts. Recovering the ore remaining within the Maybe Canyon Lease would maximize ore recovery and would improve the economic viability of H1NDR. Approximately 7.33 million wet net tons of phosphate ore on the Maybe Canyon Lease would be bypassed if the Maybe Canyon Lease is not mined. Analysis of the Proposed Action and the Cover Alternative indicate that the ore can be recovered from the Maybe Canyon Lease while maintaining compliance with regulatory requirements.

This alternative was not considered in detail because it does not meet the purpose and need.

2.6.3 Backfilling Alternatives

2.6.3.1 Eliminate the Permanent Overburden Storage Area

This alternative is dismissed from further analysis because the OSA provides some benefits for stream reconstruction and there are no water quality or recreation or grazing access impacts from the OSA. This alternative would not provide any reduced impacts over the proposed action or other action alternatives. The eastern boundary of the permanent OSA would serve as a limestone buttress for the Maybe Creek realignment to reduce COPC concentrations.

2.6.3.2 Place high-selenium waste "high and dry" below an impermeable cover

This alternative, suggested in public scoping, is not considered in detail because the proposed action would not place waste high in selenium below the water table. All waste rock in the action alternatives will be above the water table. The effectiveness of the cover is evaluated, and another alternative is studied in detail that reduces infiltration to maintain surface and groundwater quality, eliminating the need to consider an alternative with an impermeable cover.

2.6.4 Reduce Resource Impacts

2.6.4.1 Avoid significant impacts on historic and traditional cultural properties

An alternative to avoid significant impacts on historic or traditional cultural properties is not considered in detail because cultural surveys that were completed identified no historical properties. The tribe has not disclosed any traditional cultural properties that may be affected. An EPM was included to manage unanticipated discoveries, which would result in no significant impact.

2.6.4.2 Avoid Roadless Area Impacts

Approximately 19 acres, including 18 acres for a permanent OSA, would be used within the Dry Ridge Inventoried Roadless Area. This alternative would be similar to the 'No Lease Modifications" alternative and is not considered in detail for the same reasons. Any temporary road access to this area from the mine would be permanently obliterated by reclamation activities.

2.6.4.3 Avoid Discharges to Waters of the U.S.

An alternative was suggested to avoid discharges to waters of the U.S. for compliance with the Clean Water Act section 404(b)(1) Guidelines.

A separate alternative is not considered because the proposed action and other action alternative incorporates avoiding and minimizing impacts to the extent practicable.

2.6.4.4 Implement Road and Grazing Closures, Fence Removals, Noise Limits, Stream Restoration

Alternatives were suggested to include road and trail closures to attain a scientifically defensible density per square mile, grazing allotment closures, fence removals, and setting noise limits on vehicles, and limit or close winter use. The suggestion was made to provide lynx, wolverine, and other far-ranging species (elk, deer) to migrate and have security cover during all seasons and protect goshawk and native plant communities.

This alternative is dismissed because it does not meet the purpose and need and is outside the scope of a project-specific analysis. This alternative is suitable for a 2003 RFP revision or amendment.

2.6.4.5 Avoid Climate Change Impacts

An alternative suggested eliminating phosphate mining, logging and "vegetation management", livestock grazing impacts on forest stands, understory conditions and aspen recruitment, and the impact that climate change and livestock grazing have on overall forest resiliency.

This alternative is dismissed because it does not meet the purpose and need and is outside the scope of a project-specific analysis. This alternative is suitable for a 2003 RFP revision or amendment.

2.6.4.6 Use a Conveyor for Ore Transportation instead of Constructing a Haul Road

Construction of the haul road would eliminate public access on NFS Road 134 to National Forest Lands from Dry Valley to Dry Ridge and eliminate a direct route to Diamond Valley. The suggestion was made that instead of the haul road a conveyor system could be used to transport ore to the tipple, leaving NFS Road 134 open to the public.

There are two scenarios that a conveyor system could be implemented to replace the Haul Road and subsequent interference with public access to NFS Road 134:

- Build a conveyor that transports ore from the north end of H1 to the tipple and utilize haul trucks to transport ore from the pit to this stationary location.
- Continually progress the conveyor with phased pit mining on H1.

Option A is a 'final mile' alternative. Haul trucks would still be utilized to transport the ore for most of the distance, i.e. from the active pit to the north end of the H1 site. The conveyor would be utilized to transport the ore final distance to the tipple.

The only location that the beginning of the conveyor could be built in this Option would be on the South Maybe Canyon Mine Pit S backfill. To create such a backfilled area Phase 1 would have to be mined first (**Table 5**). This would mean that as ore is removed from Phase 1 the Proposed Action haul road would still have to be built to transport ore before the conveyor could be built. Option A would still require the closure of NFS Road 134 and therefore does not fulfill the need for the alternative.

Option B would continually relocate the feed point of the conveyor as mining progressed south along strike. The only initial location that the beginning of the conveyor could be built in this Option would again be on the South Maybe Canyon Mine Pit S backfill. To create such a backfilled area Phase 1 would have to be mined first (**Table 5**). This would mean that as ore is removed from Phase 1 the Proposed Action haul road would still have to be built to transport ore before the conveyor could be built. Option B would still require the closure of NFS Road 134 and therefore does not fulfill the need for the alternative. This is not a viable alternative given the site topography, short mine life, and low conveyor utilization (Arcadis, 2021h).

For these reasons, a conveyor to replace the proposed haul road would not be technically or economically practical.

2.7 Agency Preferred Alternative

The BLM has identified the Alternative Cover, including the lease modifications and modifications of current mine plans on Lease I-04 and Lease I-0678, along with the Alternative Stream Routing (temporary stream routing) as its preferred alternative. The Forest Service has identified the Alternative Cover with its Special Use Authorizations for off-lease activities (see **Table 2**) including relocating the Simplot slurry pipeline and associated amendment to the 2003 RFP. The USFS preferred alternative will also include adjustments to the grazing allotments. The USFS has not identified a preferred alternative for public access (either the Proposed Action to close NFS Road 134 during mining, establish an alternative open road from Stewart Creek, or establish an ATV trail).

2.8 Comparison of Alternatives

Table 11 shows the key differences between key features of alternatives studied in detail. **Table 12** compares the key impacts that distinguish the differences between alternatives. Explanations of the effects and analysis methods used to arrive at the effects are disclosed in Chapter 3, along with some other effects that are noted, but don't differentiate between alternatives.

Table 11. Comparison of Alternative Features

	Proposed Action	Alternative Cover	Road Reroute[2]	Stream Reroute
Total Acres Disturbed	1,146	1,146	42	NA
Backfill Cover				
Earthen Store and Release (acres)	338	30		
Low permeability Clay (acres)	324	66		
Flexible Membrane Liner (acres)	22	315		
Lateral Drain (acres)	22	197		
Total Acres Covered (acres)	706	608		
Disturbed Area Acres covered[1]	725	713	Road 42, ATV Trail 14	
Highwall Area[1]	19	99		
Highwall Linear Distance (Feet)[1]	7,430	15,960		
Existing Disturbed Area Reclaimed[1]	148	114		
Miles of Rerouted Stewart Creek Road	0	0	7.6 miles	0
Feet of Temporary stream route	0	0	0	4,443
Feet of Permanent Relocation of Stewart Creek	4,597	4,597	0	0
Million Tons of Ore removed				
• NDR	6.2	6.2	6.2	6.2
• H1	21.3	21.3	21.3	21.3
Total	27.5	27.5	27.5	27.5

Sources: (Itafos, 2020a; Itafos, 2020c)
1 (Anderson, 2021b)
2 (Arcadis, 2021b)

2.8.1 Summary Comparison of Environmental Impacts

Table 12 shows the differences in effects between alternatives. For more explanation on how these effects were determined and what they mean, please see Chapter 3. Some effects noted in Chapter 3 are not included here because they don't distinguish between alternatives and were included for disclosure purposes only. The No Action Alternative would have no effects on any of the resources analyzed except Social and Economic Conditions, so it is not included in the table.

In summary, the No Action Alternative would reduce the employment, income, revenue, and contributions to the community from Itafos, their operations, and their employees approximately 15 years earlier than any of the action alternatives. These changes would occur with any alternative after mining H1NDR is complete if other ore reserves are not found and mined and the mining and production facilities end and close.

Table 12. Comparison of Environmental Impacts by Alternative

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
Groundwater				
• Groundwater Quality - Trace metals, including selenium, leaching into groundwater	Preliminary groundwater modeling shows potential for COPCs to enter aquifer systems and discharging to seeps and surface water bodies.	Preliminary groundwater modeling shows that the Alternative Cover reduces COPC transport to underlying aquifers and percolation sufficiently to prevent shallow groundwater discharges from affecting seeps and surface water bodies.	There is no predicted effect on groundwater quality.	Reroute would be lined where it crosses the fill, there is little potential for water to infiltrate through the fill and contribute concentrations of COPCs to groundwater. There is no predicted effect on groundwater quality.
• New mining operations effect on the timing and effectiveness of the CERCLA remediation	No impacts to the investigation schedule are anticipated. Preliminary groundwater modeling shows that the percolation of water into the backfill would be reduced, limiting future impacts from the Maybe Mine site backfill.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Surface Water				
• Reduction in surface water flows of streams, seeps, creeks or impacts to water rights downstream from the drawdown of groundwater.	Preliminary groundwater flow modeling shows no adverse impacts to surface water baseflows in streams.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Qualitative assessment to downstream surface water rights.	No downstream impacts to water rights.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Groundwater discharging contaminants to surface water	Minor loading of selenium and other COPCs 40 years after closure in the headwaters of South Stewart Creek, East Mill	Impacts to surface water quality would be reduced from the Proposed Action, negligible or eliminated.	Same as the Proposed Action.	Same as the Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	Creek, and Maybe Creek. No detectible impacts to water quality would be expected in Diamond Creek or the Blackfoot River.			
• Soil erosion causing sedimentation	Negligible due to BMPs. Closure of NFS Road 134 could reduce sedimentation to Stewart Creek in the mine area.	Same as the Proposed Action.	Reduced or eliminated sedimentation impacts from the current NFS Road 134 by eliminating close proximity to the creek.	Same as Proposed Action.
Wetlands, Non-wetland waters, and Riparian Vegetation				
• Acres of wetlands permanently lost	0.17	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Linear feet of streams (non-wetland waters) impacted and riparian vegetation permanently lost	4,862 linear feet of perennial stream; 7,996 linear feet of intermittent stream. permanent loss of riparian vegetation 13,851 linear feet of ephemeral channel segments with no riparian vegetation lost.	Same as the Proposed Action.	166 linear feet of additional disturbance over Proposed Action.	4,443 feet of new channel to reroute Stewart Creek during mine operations (Operational Realignment). Reclamation would return the alignment of Stewart Creek to its original location as a channel 4,705 in length. Effects similar to the Proposed Action but the channel locations differ.
• Stormwater runoff to contact wetlands and streams	Minimal degradation of wetlands and riparian habitat from erosion and sedimentation due to design features, BMPs	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Fish and Amphibians				
• Miles of fish-bearing streams and fishless streams, number of ponds, acres of other	0 miles of fish-bearing streams 2.1 miles of fishless streams; 1.5 miles of Maybe Creek and 0.5 mile of upper Stewart Creek	Same as Proposed Action.	Same as Proposed action	Same as Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
amphibian habitat (forests), acres of wetlands.	(sections of Maybe creek occupied by tiger salamanders) 2 ponds permanently removed (one occupied by breeding tiger salamanders) 822 acres of forested habitat permanently removed (tiger salamander habitat) 0.17 acre of wetlands permanently removed (mitigated off site)			
• Reduction in the quantity of water in streams, and ponds	Effects to fish habitat downstream from changes to base flow in streams would be negligible. Amphibian habitat could be reduced by the loss of water volume at the seeps.	The reduction in volumes discharge from seeps to surface water would have a negligible effect on the volume of water in fish-bearing streams	Same as Proposed Action.	Same as Proposed Action.
• Alteration of surface water quality to a degree that fish and amphibians would be affected, including in the Blackfoot River	Negligible increase in sedimentation with implementation of BMPs and EPMs in Surface Water Management Plan. Discharge to the headwaters of Stewart Creek, East Mill Creek, and Maybe Creek would contain selenium concentrations exceeding the IDAPA water column criteria (3.1 µg/L), but effects would be negligible downstream. Increase in selenium loading in streams above baseline conditions is expected to result in a negligible, long-term toxicity impact to aquatic life.	Impacts to surface water quality would be reduced compared to the Proposed Action and would be negligible. Effects to aquatic life would be negligible.	Same as the Proposed Action with the following exception: Closing NFS Road 134 would improve water quality in downstream fish and amphibian habitat in the long term because sedimentation in Stewart Creek from the current road would be reduced once the road is reclaimed.	Same as Proposed Action.
Sensitive fish				
• Yellowstone cutthroat trout or their habitat	May impact individuals or their habitat but would not likely	No impact to individuals. Not likely to contribute	Same as Proposed Action.	Same as Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	contribute to a trend toward federal listing or cause a loss of viability to the population or species	to a trend toward federal listing or cause a loss of viability to the population or species.		
Vegetation				
• Acres by type of vegetation impacted by disturbance	890 acres of vegetation. 822 forested acres. Less than 20% of the total forested acres in these watersheds.	Same as Proposed Action	42 acres of vegetation in addition to vegetation removed under the Proposed Action.	14 acres of vegetation in addition to vegetation removed under the Proposed Action.
• Suitable timber acres designated in the 2003 RFP	294 acres of suitable timberlands resulting in a 0.35% reduction in forest wide suitable timber acres and allowable sale quantity.	Same as Proposed Action	30 acres of suitable timberlands	Same as Proposed Action
• Acres of change by vegetation type and forest community structure change following reclamation	822 acres of forest permanently changed to grassland/shrubland (72% of the analysis area). 285 previously disturbed acres would be converted to a grassland or grassland/shrubland mix, an improvement over existing condition.	Same as Proposed Action.	30 acres of forested vegetation type permanently changed to grassland/shrubland in addition to the proposed action (75% of the analysis area). Acres of previously disturbed acres converted to a grassland or grassland/shrubland mix would be the same as the proposed action.	Effects on forested vegetation would be similar to those of the Proposed Action. The additional acres of forested type removed would not result in a detectible difference from effects under the Proposed Action.
• Acres of old-growth forest removed, and long-term change in old-growth characteristics	2.4 acres of Stand D would result in the stand no longer meeting the R4 definition of the minimum area to be identified as old growth (10 acres). The impact to old-growth is considered minor, though the extent of the Douglas-fir stand would be reduced, but the entire stand would not be removed.	Same as Proposed Action	Effects on forest stand structure and old-growth forest would be similar to those of the Proposed Action. The additional acres of forested type removed would not result in a detectible difference from effects under the Proposed Action.	Effects on forest stand structure and old-growth forest would be similar to those of the Proposed Action. The additional acres of forested type removed would not result in a detectible difference from effects under the Proposed Action.
• Acres that would	All areas of disturbance would	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
susceptible to the invasion or spread of noxious weeds and timeframe for a higher risk of invasion or spread and effects on native plant communities.	be susceptible to weed invasion and spread. The potential for spread and invasion would be minimized with proposed control efforts through reclamation.			
Wildlife, Including TES				
• Wildlife habitat that would be lost or permanently altered, including loss of mature forest habitat	890 acres of wildlife habitat removed, 98% would be reclaimed to the existing use of wildlife habitat. Species that use grasslands and grass-shrub mix may benefit from the additional habitat that would exist post-reclamation. Some pit walls would remain and may be beneficial if it is suitable roosting habitat for bats and nesting habitat for cliff-nesting birds. 822 acres of mature forest habitat would be permanently lost (2% of the analysis area) and therefore would permanently reduce the number and diversity of forest wildlife species that can inhabit the analysis area.	Habitat types removed and reclaimed would be similar under the Alternative Cover, but with 80 additional acres of pit highwalls left exposed. Additional highwalls could provide more habitat for species that use cliff habitat (certain raptor and bat species). The acres of habitat reclaimed would be reduced to 614 acres compared to 706 acres in the Proposed Action. Effects to wildlife from changes to habitat would be the similar to the Proposed Action.	42 acres of wildlife habitat, including coniferous forest, aspen forest, mixed aspen-forest, mountain brush, and grass/forb permanently removed in addition to proposed action. Construction of the 6.2 miles of the new Alternative Road would permanently shift this disturbance to a different location as the old road (portions of NFS Road 134) would be removed by mining.	14 acres of habitat (coniferous forest and mixed aspen-conifer forest) in addition to the Proposed Action would be temporarily removed. The post-reclamation condition of wildlife habitat and riparian function would be the same as that expected under the Proposed Action. However, the stream restoration would occur at a different location (i.e., back to Stewart Creek's original location) compared to the Proposed Action.
• Risk of wildlife experiencing selenium toxicity, due to reclaimed vegetation selenium uptake or selenium contamination of wildlife water sources	Wildlife exposure to selenium in overburden or fugitive dust during mining would be limited through use of BMPs. The risk of selenium toxicity in wildlife foraging in reclaimed areas would be negligible because an agency-approved seed mix (low selenium	Surface water would not be contaminated by selenium because discharge of contaminated groundwater from seeps around the pits would be reduced to negligible amounts (within the measure of error in the	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	accumulating and shallow rooted species) would be used and vegetation monitoring would ensure selenium concentrations are below BLM performance standards. The greatest potential for wildlife selenium exposure is from water sources. Selenium levels in wildlife could increase above current levels but are not expected to have measurable effects to survival or reproduction.	groundwater flow model) and therefore selenium concentrations released into streams would be none to negligible (below the limits of detection), and never above IDEQ aquatic life criteria. The risk of wildlife selenium toxicity would be negligible.		
• Threatened and Endangered .	May impact individual Canada lynx but not populations or critical habitat.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
• Sensitive Species	May impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
• Mule deer and elk that would be affected by habitat loss or alteration and from mining noise/disturbance/human activities	1.48 acres of Prescription 2.7.2(d) areas (Elk and Deer Winter Range) disturbed. Given that reclamation would return some shrub habitat over the long term, mining noise/disturbance would be temporary, and substantial areas of aspen and mountain shrub would remain intact on the west slopes of Dry Ridge, the effect would be moderate and localized to Dry Ridge. Given that mule deer numbers in GMU 76 are currently declining, adding additional impacts from H1NDR	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	would have a moderate adverse effect to the overall mule deer population. The elk numbers are stable to increasing and therefore more resilient but given the level and long-term nature of the impact, H1NDR would have a moderate adverse effect on the elk population in game management unit 76.			
• Migratory birds that would be affected by habitat loss or alteration, and mining noise/disturbance/human activities	Overall, due to minor effects from disturbance and selenium, measures to reduce the likelihood of mortality, and the permanent removal of mature forest habitat in a small area, the Proposed Action would have a moderate effect on birds.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Soils				
• Acres of soil disturbed	1,145	Same as the Proposed Action.	1,191	1,150
• Potential for trace elements to be mobilized from stockpiles to contaminate on-site or adjacent soil resources	Soil trace element total concentrations would be unaffected by soil handling operations. Trace element mobility would also be unaffected as the existing near-surface soil is currently subjected to the same atmospheric weathering processes as the resulting growth media placed for reclamation. Excavation would not cause a change in the oxidation state of trace element-containing minerals and subsequent increases in trace element mobility.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
• Soil available to meet reclamation requirements	Soil available is sufficient to meet reclamation requirements.	Same as the Proposed Action.	Same as Proposed Action with an additional 145,023 cubic yards of soil available for salvage from areas of soil mapped within the alternative road alignment.	Same as Proposed Action with an additional 8,357 cubic yards of soil available for salvage from areas of soil mapped within the alternative operational stream realignment.
Grazing				
• Acres of change in capable and suitable rangeland	Kendall Canyon 101 acres lost short-term 187 acres gained long-term Maybe Canyon 109 acres lost short-term 304 acres gained long-term Stewart Canyon 105 acres lost short-term 221 acres gained long-term Dry Valley 167 acres lost short-term 3 acres gained long-term	Kendall Canyon 101 acres lost short-term 166 acres gained long-term Maybe Canyon Same as Proposed Action Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 134 acres lost short-term 279 acres gained long-term Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 113 acres lost short-term 306 acres gained long-term Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action
• Estimate short-term and long-term reduction in animal unit months (AUMs)	Kendall Canyon 47 AUM reduction short-term and 90 AUM increase long-term. Maybe Canyon 48 AUM reduction short-term and 150 AUM increase long-term. Stewart Canyon 48 AUM reduction short-term and 108 AUM increase long-term. Dry Valley 84 AUM reduction short-term and 1 AUM reduction long-term.	Kendall Canyon 47 AUM reduction short-term and 80 AUM increase long-term. Maybe Canyon Same as Proposed Action Stewart Canyon Same as Proposed Action Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 59 AUM reduction short-term and 139 AUM increase long-term Stewart Canyon 48 AUM reduction short-term and 107 AUM increase long-term Dry Valley Same as Proposed Action	Kendall Canyon Same as Proposed Action Maybe Canyon 49 AUM reduction short-term and 151 AUM increase long-term Stewart Canyon 48 AUM reduction short-term and 107 AUM increase long-term Dry Valley Same as Proposed Action
• Areas where the mining activities split	Kendall Canyon allotment split from north to south. The west	Same as proposed action.	Although the alternative road would permanently	The operational realignment of Stewart

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
an allotment or reduce movement to feed or water.	side of the allotment would be accessible to grazing with prior authorization to cross mine areas granted by Itafos. Ample access to feed and water on each side. Maybe Canyon allotment from northwest to southeast. Lower Maybe Pond and Schmid Ridge Trough range improvements would be lost to livestock. Very little access to water sources on the west side and ample access to water sources on the east side, ample access to feed during mining and reclamation. The Stewart Canyon allotment would not be completely bisected by the disturbance; therefore, livestock rotation may not be as difficult as for Maybe Canyon and Kendall Canyon. Ample access to feed and water Dry Valley Unit 12 split from east to west. Tipple site would isolate the northern most portion of Unit 12 and a small portion of Unit 11 east of the proposed Dry Valley Road Realignment, this area would likely become unusable during the life of the Proposed Action. With the unit split, livestock would have very little access to water sources on the north end and ample access to water sources on the southern side. Livestock would still have ample access to feed during mining and reclamation.		split the Maybe Canyon allotment, it would allow uninhibited access to the eastern portion of the allotment and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Although a small portion of the alternative road would permanently occupy the Stewart Canyon allotment, it would allow uninhibited access to the allotment and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action.	Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use within the Maybe Canyon allotment during the construction of the operational stream bed. During construction of the alternative reclamation realignment, livestock would have access to the Stewart Creek operational realignment. The alternative reclamation realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use within the Stewart Canyon Allotment during the construction of the reclaimed stream bed. Itafos would supply a supplemental water source to livestock if access to surface water sources is inhibited. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
Recreation				
• Changes in acreage available for dispersed (both motorized and non-motorized) recreation activities particularly hunting.	Acres available to the public for dispersed non-motorized recreation including hunting and winter motorized recreation (snowmobiling) would decrease by 1,130 acres. There would be no change in developed recreation acreage. NDR lease extends onto the Blackfoot River Wildlife Management Area, no portion of the mine footprint would.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Access				
• Acres of public lands closed to public use during mining and reclamation.	1,130	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
• Miles of primary access roads (NFS Road 134) closed to public use by mining and reclamation activities (short-term).	5	Same as the Proposed Action.	Same as Proposed Action except 6.1 miles of new road constructed. ATV trail option would allow small vehicles, not large.	Same as the Proposed Action.
• Changes in the number of miles of NFS roads and trails open to motorized travel.	NFS miles of roads and trails open to motorized travel would not change. 1.2 miles of ATV Trail #138 would be closed during mining in the area and then reopened.	Same as Proposed Action	NFS road miles would increase by 1.1 miles, except for the 50-inch ATV trail option which would result in no change to NFS road mileage and an increase in motorized trail mileage of 6.1 miles.	Same as Proposed Action
Inventoried Roadless Area				
Acres of disturbance including roads and other infrastructure within a	Approximately 19 acres including 18 acres for a permanent overburden stockpile	Same as the proposed action.	Same as the proposed action.	Same as the proposed action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
designated inventoried roadless area	would be used within the Dry Ridge Inventoried Roadless Area (IRA).			
Tribal Treaty Rights and Interests				
The Shoshone-Bannock Tribes' ability to access unoccupied lands of the United States where they may exercise treaty-reserved rights in accordance with the terms of the Fort Bridger Treaty of 1868.	Short-term, temporary loss of access during active mine years. Permanent long-term loss of 124 acres (unreclaimed highwall and partially reclaimed haul roads) after reclamation. Minor impacts to tribal access of unoccupied lands.	Same as Same as Proposed Action.	Short-term alternative road construction would guarantee there would be no loss of access for tribal members to exercise their treaty rights to hunt, fish, and gather resources within unoccupied lands outside the mine area. Long-term same as Proposed Action.	Same as Proposed Action.
• Acres of unoccupied lands available or unavailable during mining activities and the Tribes' ability to access these acres				
Effects on fisheries, water, grazing rights, vegetation, wildlife, and cultural resources that important to the Tribes and those effects on traditional practices.				
• Changes in the quality and quantity of valued resources on unoccupied public land including:				
• Water and fish	No impacts	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
• grazing rights, vegetation, and wildlife	Grazing rights would not be affected. Increased acres of grassland and shrubland after reclamation and no permanent	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Resource/Issue	Proposed Action	Alternate Cover	Access Road	Stream Realignment
	impacts to plants and animals. Alternatively, the loss of 822 acres of forest types represents a major impact on plants and animals in forested environment.			
• cultural resources	No impact on significant cultural resources.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
• effect of these changes on the Tribes	No Traditional Cultural Properties have been identified; therefore, no project impacts would occur.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Social and Economic Conditions				
• Number of employees and wages, short-term and long-term	237 miners	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
• Federal payments	$3.6 million in annual royalty payments	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

This chapter discusses the existing conditions of resource issues analyzed, the impacts on issues, and the analysis methods used to evaluate the impacts. Assumptions, definitions, and past, present, and reasonably foreseeable actions that were considered in the analysis of effects are described below.

The analysis of effects on resources assumes the EPMs and BMPs listed in Chapter 2 (Section 2.2.9) would be implemented.

Some resources were considered and evaluated but are not discussed in detail. These are discussed in Section 3.16 and include air quality, noise, scenery, cultural resources, threatened and endangered plants, sensitive plants and state ranked plants, threatened and endangered fish, threatened and endangered wildlife, sensitive wildlife (some species), paleontological resources, environmental justice, bioaccumulation in vegetation, and geologic hazards.

Itafos indicated that many of the H1NDR operations would be very similar to operations at the Rasmussen Valley Mine analyzed in the final EIS. Where appropriate (including the impacts from past, present, and reasonably foreseeable actions), the *Final Environmental Impact Statement Rasmussen Valley Mine* (BLM, USFS, USACE, IDEQ, 2016) is incorporated by reference. Information used is summarized where used and cited.

Geographic Information System (GIS) data was used to calculate impacts (miles, acres, etc.) and to map activities and indicate the location of impacts. GIS is generally developed using aerial photography, global position systems, or some other remote sensing. Boundaries and locations are rarely surveyed. Therefore, the GIS information is useful for displaying and calculating the comparative impacts but is not exact and minor differences in sizes and locations are likely to occur.

In some instances, impacts are characterized qualitatively. Where used, these terms are defined as:

- No Impact: No discernible or measurable impacts.
- Negligible Impact: Impacts in the lower limit of detection of an impact that could cause an insignificant change or stress to a resource or use.
- Minor Impact: Impacts that could be detectable but would be slight.
- Moderate: Impacts that could cause some change or stress to a resource, but the impact levels are not considered major.
- Major: Impacts that could cause significant depletion, change, or stress to resources or stress within the social, cultural, and economic realm.
- Short-term: Impacts occur during mining or reclamation, then cease.
- Long-term: Impacts extend beyond the mine life and reclamation activities.
- Permanent: Impacts would last into the foreseeable future, with no reasonably certain date for ending.
- Temporary: Less than 5 years after initial impacts.

3.2 Past, Present, and Reasonably Foreseeable Actions Considered

When considering the impacts, other actions that had or will have similar types of impacts on the issues analyzed within the analysis areas for the resource sections below were evaluated. Examples of these are modifications of vegetation types from previous mining and reclamation, or changes seen in water quality.

Past land management activities have occurred on BLM, NFS, state, and private lands for a century or more and have contributed to the current conditions described in the affected environment sections in this chapter. These activities include mining, timber management (harvesting, site preparation, planting, salvage, and thinning), weed treatment (herbicide application), prescribed burning (for wildland fuel management, habitat improvement, site preparation), fuel break construction, mechanical fuel treatment, farming and ranching (grazing), firewood gathering, and recreation. Some activities created trails, roads, railroads, fences, power lines, mine pits, and waste rock storage areas. More is known about more recent activities, which are shown in **Table 13** and where location information is available, are shown on **Figure 16**.

Reasonably foreseeable actions were identified as those activities which are approved and those activities that have been proposed (such as an application submitted or included on the schedule of proposed actions) but are not yet underway. These are also shown in **Table 13**. Past mining listed in **Table 13** that have contributed to CERCLA actions are discussed in Section 3.2.1.

Table 13. Past, Present, and Reasonably Foreseeable Actions

Activity/ Project Name	Period of Activity	Description
Mining – Past and Present		
Ballard Mine	1952-1969	635 acres[1]
Bear Lake Mine	1920-1921	0.1 acres[1]
Blackfoot Bridge Mine	2013-Present	420 acres
Champ Mine and Champ Extension	1982-1985	460 acres
Conda Mine and Trail Canyon Mine	1920-1984	1,572 acres
Diamond Gulch Mine	1960	32 acres[1]
Dry Valley Mine	1992-2014	1,082 acres
Enoch Valley Mine	1990-Present	645 acres
Georgetown Canyon Mine	1958-1964	251 acres[1]
Henry Mine	1969-1989	1,074 acres[1]
Home Canyon Mine	1916-1924	0.8 acres[1]
Lanes Creek Mine	1978-1989; 2014 to Present	256 acres[1]
Mountain Fuel Mine	1966-1967, 1985-1993	781 acres[1]
North and South Maybe Canyon Mine	1951-1995	1,028 acres[1]
Rasmussen Ridge Mine[2]	1991- 2020	858 acres[1]

Activity/ Project Name	Period of Activity	Description
Rattlesnake Canyon Mine	1920-1926	0.4 acres[1]
Smoky Canyon Mine	1982-Present	3,338 acres[1]
South Rasmussen Mine	2003-2015	390 acres[1]
Waterloo Mine	1907-1920, 1945-1960	196 acres[1]
Wooley Valley Mine	1955-1989	808 acres[1]
Rasmussen Valley Mine (Federal Lease I-05975)	2017 to 2024	An open pit phosphate mine with approximately 440 acres of planned disturbance for mining, backfilled pits, a haul road, and ancillary facilities, on private land, State of Idaho land, and public land administered by the BLM and Forest Service.
Caldwell Canyon and Trail Creek Exploration Plan Environmental Assessment	Completed	Exploration drilling to gather information about phosphate reserves on portions of two federal phosphate leases and three off lease areas. The Caldwell Canyon portion is complete. Trail Creek will resume into 2019.
Caldwell Canyon Mine	2019- present	Phosphate mining in open pits. 1,559 acres of disturbance. Backfilling new mine pits and part of an existing mine pit at Dry Valley Mine. New haul road, new rail loop.
Ballard Exploration and Lease	2019	Phosphate mining on previously disturbed Ballard Mine to recover ore and facilitate reclamation. No additional disturbed areas.
Dairy Syncline Mine (Federal Leases)	Ground disturbing activities approximately 2030-2060 when Smoky Canyon Mine depleted	Phosphate mining in open pits, beneficiation plant, tailings pond, and facilities on private land, State of Idaho land, and public land administered by the BLM and Forest Service. Approximately 2,767 acres would be disturbed.
East Smoky Panel Mine EIS (Federal I-26843, I-012890, and I-015259)	Ground disturbing activities approximately 2023-2036 (12 years)	Phosphate mine expansion plan and associated projects and infrastructure at the existing J.R. Simplot Company's Smoky Canyon Mine. 720 acres of new disturbance.
Other – Past and Present		
Flat Valley Road Stream Crossing Improvements on Lanes Creek and Brown Canyon Creek	2016	The project focused on upgrading two undersized and problematic road stream crossings on the Forest Service Flat Valley Road (FS107) to restore stream/riparian function and aquatic passage in Lanes Creek.
John Wood Forest Management Project EIS	2019	Forest vegetation management activities (mechanical timber harvest and pre-commercial thinning) and road work (temporary and permanent). Johnson and Wood canyon drainages.
Lanes Creek Recreational Trail Improvements	2015	Improved 1.8 miles on all-terrain vehicle Trail 088 and 2.5 miles on Trail 022 by relocating and adding drainage.
Lanes Creek Restoration	2015	Upper Lane Creek Restoration occurring on about 3 miles of stream on private lands.
Bayer Processing Plant in Soda Springs, Idaho	Past, Present, and Future	Operating phosphate processing plant and associated facilities including railroads.
Itafos Conda Plant	Past, Present, and	Operating phosphate processing plant and associated

Activity/ Project Name	Period of Activity	Description
	Future	facilities including railroads. Itafos holds several air permits from IDEQ, available on IDEQ's website https://www.deq.idaho.gov/permits/issued-permits-and-water-quality-certifications/.
Sheep Creek Restoration	2016	Sheep Creek Restoration occurring on about 1 mile of private lands.
South Soda Sheep Allotments Environmental Assessment	2018	Livestock grazing and permit re-administration for multiple allotments on the Soda Springs Ranger District. Legal Description – Township 7 South/Township 8 South, Range 45 East, multiple sections.
Hooper Springs Transmission Line	2019	A 138/115-kilovolt Hooper Springs Substation, 24 miles of double-circuit 115-kilovolt transmission line, a connection facility to connect the new line to Lower Valley Energy's transmission system, about 0.2 miles of single-circuit 138-kilovolt transmission line between the Hooper Springs Substation and PacifiCorp's existing Threemile Knoll Substation, and ancillary facilities such as access roads. 112 to 188 acres in affected.
Other – Reasonably Foreseeable		
Caribou-Targhee National Forest and Curlew National Grassland Integrated Weed Management Analysis	Final EIS in preparation	Update the existing weed management strategy using an Integrated Weed Management approach.
Lanes Creek Forest Management Project	2021 (in objection resolution)	Upper Lanes Creek watershed (170402070101). Treat 494 acres using (355 harvest and 139 tending) to address the need to restore and improve forested vegetation.

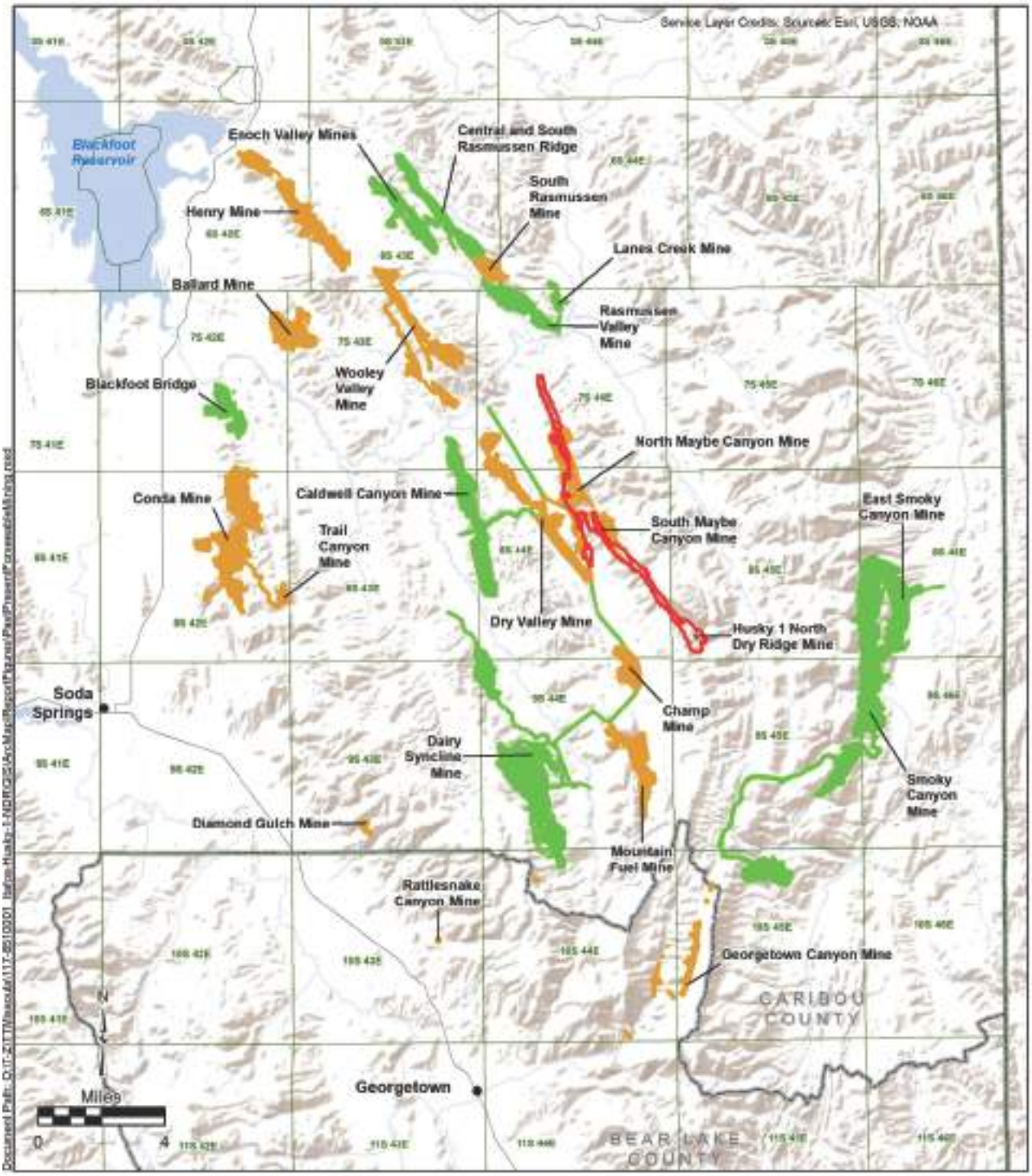
Notes:
1 Disturbed Areas (acres) (permitted or actual disturbance): Acreage does not account for current reclamation status of mine areas.
2 Consists of North Rasmussen Ridge, Central Rasmussen Ridge, and South Rasmussen Ridge mines.

3.2.1 CERCLA

Several mine sites in or near H1NDR produced contamination, of which clean-up is active and ongoing. The Maybe Canyon Mines are between the H1 and NDR pits.

The Maybe Canyon Mine is divided into North Maybe Mine and South Maybe Canyon Mine. North Maybe Mine and South Maybe Canyon Mine each disturbed approximately 600 acres (GAO, 2012). CERCLA actions began in 1997 for South Maybe Canyon Mine and in 2000 for North Maybe Mine. The lead agency for CERCLA at these mines is the USFS. The Maybe Canyon Mine is currently under response actions in which investigation, removal, and/or remedial actions have or are being completed. The Maybe Canyon Mines includes adit and pit, mine pits, waste dumps, ore stockpiles, a sediment catchment and stormwater pond, railroad line and associated facilities, and other disturbed mine land (USGS, 2001).

Figure 16. Past, Present, and Reasonably Foreseeable Actions



Selenium contamination from the South Maybe Canyon Mine was first discovered in 1996 in Maybe Creek water and pasture plants exposed to creek water after six pastured horses presented with selenosis. Selenium is the most widespread and concentrated contaminant of concern and is the main driver related to human health risks from surface water and sediment (USFS and Millennium Science & Engineering, Inc., 2011). Selenium and several other metals, such as cadmium chromium, nickel, vanadium, and zinc are concerns for ecological receptors - surface water, sediment, and vegetation.

The South Maybe Canyon Mine is an open pit phosphate mine storing approximately 30 million cubic yards of waste rock in the South Maybe Cross Valley Fill. The eastern side of the Cross Valley Fill includes a chert French drain, which allows storm water from the eastern slope and Maybe Creek to flow under the fill unimpeded. This water contains dissolved selenium leached from the waste rock (USFS and Millennium Science & Engineering, Inc., 2011) and other metals, are transported off site via Maybe Creek. Selenium was also detected in shallow alluvial groundwater wells in Maybe Canyon and Dry Valley. Vegetation covering the Cross Valley Fill also indicated an uptake of selenium above background concentrations (USFS and Millennium Science & Engineering, Inc., 2011).

Actions completed in November 2017 included installation of an engineered cover, which monitoring, inspection, and maintenance has shown to be effective (Arcadis, 2021e). Surface water selenium concentrations between 2016 and 2020 decreased between 88 and 97%. Other metals concentrations also decreased. Selenium concentrations in groundwater between 2016 and 2020 were reduce from 85% to 96%. Monitoring and data analysis will continue.

The East Mill Dump at the North Maybe Mine is a significant contributor to and the primary source of surface water and groundwater contamination. The 81-acre East Mill Dump is approximately 1,400 feet wide by 3,100 feet long. The East Mill Dump was constructed to maintain an original topographic divide between the northern and southern drainage slopes (Arcadis, 2021f). Approximately 58 acres on the north side of the East Mill Dump drain toward East Mill Creek, 11 acres on the south side drain toward North Fork Kendal Creek, and the remaining 11 acres form the top surface of the dump. Waste shale in the East Mill Dump releases selenium and other metals/metalloid contaminants through infiltration of precipitation. Selenium and other contaminants are present in surface soil, vegetation, surface water, sediment, and groundwater (Arcadis, 2021f). A remedial action plan is in draft and will be released for public comment in 2021. In addition, the areas of Each Mill Creek and Maybe Creek are also CERCLA actions and are known to contain potentially contaminated sediments. Of note, CERCLA uses different screening values than those presented in this EIS, which results in different screening value exceedances.

The H1NDR groundwater model domain includes active and inactive mines; Maybe Canyon Mine, Dry Valley Mine, and Champ Mine. Mines within Caribou County located outside the groundwater model domain include (from north to south): Henry Mine, Enoch Valley Mine, Rasmussen Ridge Mine, Wooley Valley Mine, Ballard Mine, Lanes Creek Mine, Conda/Woodall Mine, Trail Canyon Mine, Smokey Canyon Mine, Mountain Fuel Mine, Diamond Gulch Mine (USGS, 2001) (**Figure 16**). The Wooley Valley Mine complex is made up of three other mines, Mill Canyon Mine, Little Long Valley Mine, and Blackfoot Narrow Mine (Buck & Jones, 2002, p. Figure 1).

The Southeast Idaho Phosphate Mine Site Trustee Council (2015) stated remedial actions at many of these mines are being conducted, some of which are under the CERCLA remedial investigation/feasibility study process or other agreed upon similar remedial action activities. These efforts are being conducted by the mining companies with oversight primarily provided by IDEQ, USFS, and EPA. Other oversight agencies include BLM and the Shoshone-Bannock Tribes.

Established agreements include, but are not limited to, Administrative Order on Consent, Administrative Settlement Agreement/Order on Consent, or Unilateral Administrative Orders in effect for CERCLA remedial investigation/feasibility study work and other CERCLA response actions.

Table 14 summarizes the dates of known CERCLA actions through 2019. Mines that have established orders with one or more federal or state agency for removal actions, remedial actions under CERCLA or related remedial action agreements with IDEQ or IDL are listed.

IDEQ currently has not established a priority date for a Total Maximum Daily Load (TMDL) to address selenium in Maybe Creek but has elected to address these exceedances under the consent order which has been established for the CERCLA Remedial Investigation/Feasibility Study (IDEQ, 2020).

Table 14. Summary of CERCLA and Remedial Actions Near H1NDR

Mine and Mining Company	Agency Oversight	Removal & Remedial Action Status
Mines Under CERCLA Action Within Groundwater Model Domain		
North Maybe Mine (Inactive) NuWest	Forest Service, EPA, IDEQ	2000 – CERLCA Preliminary Assessment 2002 – Administrative Order of Consent 2004 – Removal action process initiated 2009 – Remedial Investigation/Feasibility Study underway, removal action initiated for sedimentation ponds[1] 2010 – Remedial action process initiated 2013 – Investigation on East Mill, Remedial Investigation/Feasibility Study[1] 2014 – Time critical removal action for Bear Lake Grazing Association property 2015-2016 – Remedial Investigation continued, screening Level Ecological risk Assessment[1] 2018 – Remedial Investigation/Feasibility Study underway[1] 2021 – Proposed plan is being drafted by the Forest Service
South Maybe Canyon Mine (Inactive) NuWest	Forest Service	1997 – CERCLA Preliminary Assessment 1998 – Administrative Order of Consent 1998 – Removal action process initiated 2007 – Site investigation report complete 2011 – Engineering Evaluation/Cost Analysis complete 2012 – Administrative Settlement Agreement and Order on Consent signed for Cross Valley Fill cap[1] 2013 – Remedial Investigation/Feasibility Study initiated 2014 – Cross Valley Fill cap design approved[1] 2015 – Cross Valley Fill cap construction[1] 2015 – 2018 – Remedial Investigation/Feasibility Study in progress[1] 2016 – Baseline ecological risk assessment began Upcoming – proposed plan
Champ Mine (Inactive) NuWest	Forest Service, IDEQ, the Tribes	2000 – CERCLA Preliminary Assessment 2012 – Administrative Settlement Agreement and Order on Consent signed[1] 2013 – 2015 – Remedial Investigation field work[1] 2015 – 2017 – Remedial Investigation/Feasibility Study[1] 2016 – Baseline risk assessment 2018 – Remedial Investigation/FS in progress and risk assessments are under agency review[1] Upcoming ROD

Mine and Mining Company	Agency Oversight	Removal & Remedial Action Status
Mines Under CERCLA Action Within Caribou County in General H1NDR Area		
Henry Mine (Inactive) P4/Monsanto	IDEQ, EPA, Forest Service	2003 – AOC & Removal action process initiated 2004 – 2009 Investigations conducted 2009 – Remedial action process initiated 2011 – Remedial Investigation/Feasibility Study work plan completed, treatability study initiated[1] 2016 – Remedial Investigation report[1] 2018 – Remedial Investigation/Feasibility Study and proposed plan for cleanup complete1 2019 – ROD anticipated
Enoch Valley Mine (Inactive) P4/Monsanto	IDEQ, EPA, Forest Service	2002 – CERCLA Preliminary Assessment 2003 – Administrative Order of Consent 2004 – 2009 Investigations conducted 2009 – Remedial action process initiated 2011 – Remedial Investigation/Feasibility Study work plan completed, treatability study initiated[1] 2017 – Remedial Investigation/Feasibility Study planned/underway[1] 2018 – Work on hold to gain progress on Henry and Ballard Mines[1] 2019 – ROD anticipated
Ballard Mine (Inactive) P4/Monsanto	IDEQ, EPA, Forest Service	2003 – AOC, removal action process initiated 2004 – 2009 Investigations conducted 2009 – Remedial action process initiated 2011 – Remedial Investigation/FS work plan completed, treatability study initiated[1] 2014 – Remedial Investigation report complete[1] 2015 – Supplemental soil data reported, partial FS prepared[1] 2016 – Proposed cleanup plan[1] 2017 – Remedial Investigation/Feasibility Study and proposed plan for cleanup complete[1] 2019 – Record of Decision anticipated
Conda/Woodall Mine (Inactive) Simplot	IDEQ, EPA, BLM	2008 – Administrative Order of Consent, CERLA Preliminary Assessment, Remedial Investigation/Feasibility Study 2011 – Engineering Evaluation/Cost Analysis complete, Time-critical removal action 2012 – Settlement Agreement/Consent Order, field-scale selenium pilot study completed[1] 2013 - 2014 – Draft Remedial Investigation[1] 2013 - 2015 – Non-time critical removal action of the Overburden Disposal Area[1] 2015 – 2016 – Risk Assessment[1] 2015 – Post Removal Action Site Control Plan[1] 2016 –Remedial Investigation complete[1] 2018 – Feasibility Study in progress; field-scale pilot treatability study completed[1] Upcoming – Proposed plan and ROD[1]
Smokey Canyon Mine (Active mine) Simplot	Forest Service, EPA, IDEQ	2000 – CERCLA Preliminary Assessment 2002 – AOC 2003 / 2013 – Removal action process initiated

Mine and Mining Company	Agency Oversight	Removal & Remedial Action Status
		2005 / 2013 – Site investigation report complete 2008 – Removal action to divert water from Pole Canyon Creek around Overburden Disposal Area[1] 2013 – Administrative settlement agreement 2014 – Overburden Disposal Area non-time critical removal action, Remedial Investigation completed[1] 2012 – Engineering Evaluation/Cost Analysis complete[1] 2007 / (2015) – Removal action complete 2009 – Remedial action process initiated 2015 – 2017 – Treatability studies to reduce selenium in surface water, risk assessments completed[1] 2018 – Pilot water treatment plan (Phase 2) constructed Upcoming – Feasibility Study, proposed plan[1]
Mountain Fuel Mine (Inactive mine) NuWest	Forest Service, IDEQ	2000 – CERLCA Preliminary Assessment 2012 – Administrative Settlement Agreement/Order of Consent 2013 – 2015 – Remedial Investigation field work initiated[1] 2015 – 2016 – Feasibility Study[1] 2016 – 2018 – Remedial Investigation in progress, risk assessments under agency review[1] Upcoming – FS, proposed plan, Record of Decision[1]
Rasmussen Ridge Mine (Active mine) NuWest	EPA, IDEQ, IDL	2002 – CERCLA Preliminary Assessment
Mines Undergoing Other Actions or Scheduled to for Remedial Investigation/Feasibility Study		
Wooley Valley Mine (Inactive) Rhodia Inc.	Forest Service, BLM	2000 – Preliminary Assessment
South and Central Rasmussen Ridge Mine (Active Mine) NuWest	EPA	2005 & 2006 – Notice of Violation: selenium discharge to two creeks 2013 – Consent Order: address groundwater/surface water impacts[1] 2015 and 2016 – Source characterization work and report1 2018 – Draft Remedial action plan submitted
South Rasmussen Mine P4/Monsanto	EPA IDEQ	2007 – Notice of Violation: selenium discharge from seep to a dump and creek 2012 – Consent Order signed, remedial action plan[1] 2014 – 2015 – Horseshoe Overburden Area source characterization and action plan 2016 – Investigation and monitoring, remedial construction[1] 2018 – Remedial and investigative work continued
Mines on State Land Scheduled for or that are Undergoing Other Remedial Actions		
Lanes Creek Mine (Inactive mine) Agrium / NuWest	IDL	2014 – Approved mine plan to open Lanes Creek Mine

Source: (Southeast Idaho Phosphate Mine Site Trustee Council, 2015), except where noted.

1 Information obtained from (EPA and Forest Service, 2012; 2014; 2016; IDEQ, EPA, and USFS, 2017; 2019)

2 (USGS, 2001b)( ) – Indicates estimated date

3.3 Geology and Minerals

3.3.1 Analysis Area and Methods

The geology and minerals are affected solely by the mining; therefore, the analysis area for geology and minerals is the leases and lease modifications and off-lease areas containing surface roads. The entire lease and lease modification areas are included to provide information to other resources near the site and to account for potential modifications to the pit boundaries during implementation. The issues for analyzing impacts on geology and minerals and the indicators that used to discuss them are shown in **Table 15**.

Table 15. Issues and Indicators for Geology and Minerals

Issue	Analysis Method
Million tons of ore to be removed.	Predications from Itafos in MRP.
Geochemical characteristics with potential to leach COPC.	Description of the methods and results of testing and how used in the fate and transport model based on geochemical investigation and source term calculations.

3.3.2 Affected Environment

3.3.2.1 Geologic Formations

Information for this section is summarized from the MRP. Information was obtained by Itafos and their predecessor Agrium through exploration drilling between 1969 and 2014. In all, 253 holes were drilled in NDR and 235 drill holes in H1.

Digital geologic models were developed using drilling data and, where drilling data were not available, from surface geology maps. Grades were assigned to the geologic formations and ore based on the drilling results to calculate the minable tonnages considering a recovery factor for each mineable unit based on historic mining. Mine overburden was also modeled to predict how much would be removed and how much would require selective handling.

Phosphate

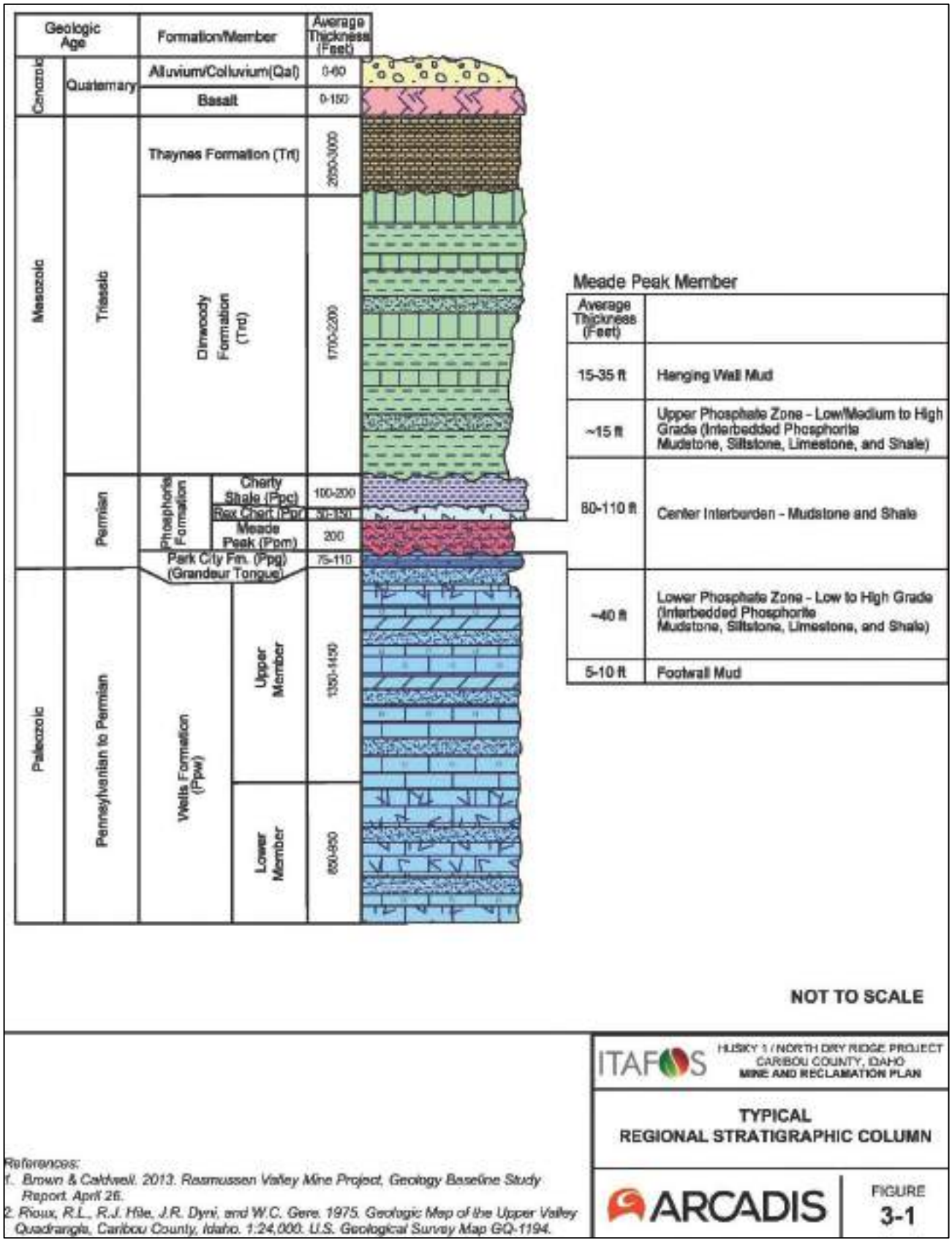
The Mineral Leasing Act, as amended, directs leasing of phosphate so it can be recovered and used to fulfill the regional and national demand. **Figure 17** is a graphical display of the regional stratigraphy and shows how the geologic formations generally relate to each other. Phosphate to be mined from the H1 and NDR pits is found in the Phosphoria Formation, which includes the Rex Chert Member and Meade Peak phosphatic shale. The phosphate mineralization is sedimentary, occurring in alternating phosphatic and weakly- to non-phosphatic shale, mudstone, carbonate, and chert beds. The thickness and geometry of the beds have been affected by variability during deposition and subsequently by faulting and folding.

Non-Phosphate Geologic Units

Units above the Phosphoria Formation constitute the overburden that would be removed, stored (temporarily or permanently), and backfilled into the pits. Non-phosphate-bearing geologic units occur above and below those that are phosphate-bearing. Above the Phosphoria Formation are the following:

- Alluvium/Colluvium – Unconsolidated sand, silt, and gravel in drainages and along hillsides.

Figure 17. Regional Stratigraphic Column



Source (Itafos, 2020a).

- Dinwoody Formation – Thin-bedded siltstone, shale, and interbedded limestone, where surface weathering forms dense, clayey soils. Outcrops occur on the eastern slope of Dry Ridge.
- Geologic layers below the Phosphoria Formation include the following:
    - Grandeur Tongue Member of the Park City Formation – Directly underlies the Phosphoria Formation and outcrops on the central-western portion of Dry Ridge
    - Wells Formation – The upper layer of the Wells Formation consists of sandy limestone, sandstone, dolomitic limestone, and interbedded limestone and dolomite. The lower layer consists of thin- and medium-bedded silty limestone with cherty nodules and flatten oolites and some interbedded sandstone. The Wells Formation outcrops along the western side of Dry Ridge. Areas below the Phosphoria Formation would not be disturbed but the Wells Formation typically hosts a regional groundwater aquifer that metals and COPCs may drain in to (Arcadis, 2020a).

Structurally, the geology is characterized by thrust faulting and folding into a series of northwest- to southeast-trending folds (i.e., anticlines and synclines). Bedrock forms the eastern limb of the Dry Valley Anticline and generally dips northeastward. The Meade Peak Member is overturned at the NDR lease and is overturned in the southern portion of the H1 lease with subsidiary folding and faulting in the southern portion of the H1 Lease.

The Maybe Canyon Lease lies between the NDR and H1 leases (**Figure 18**) and was previously mined between 1950 and 1993 as part of the North Maybe Mine and South Maybe Canyon Mine.

Geochemical Characteristics

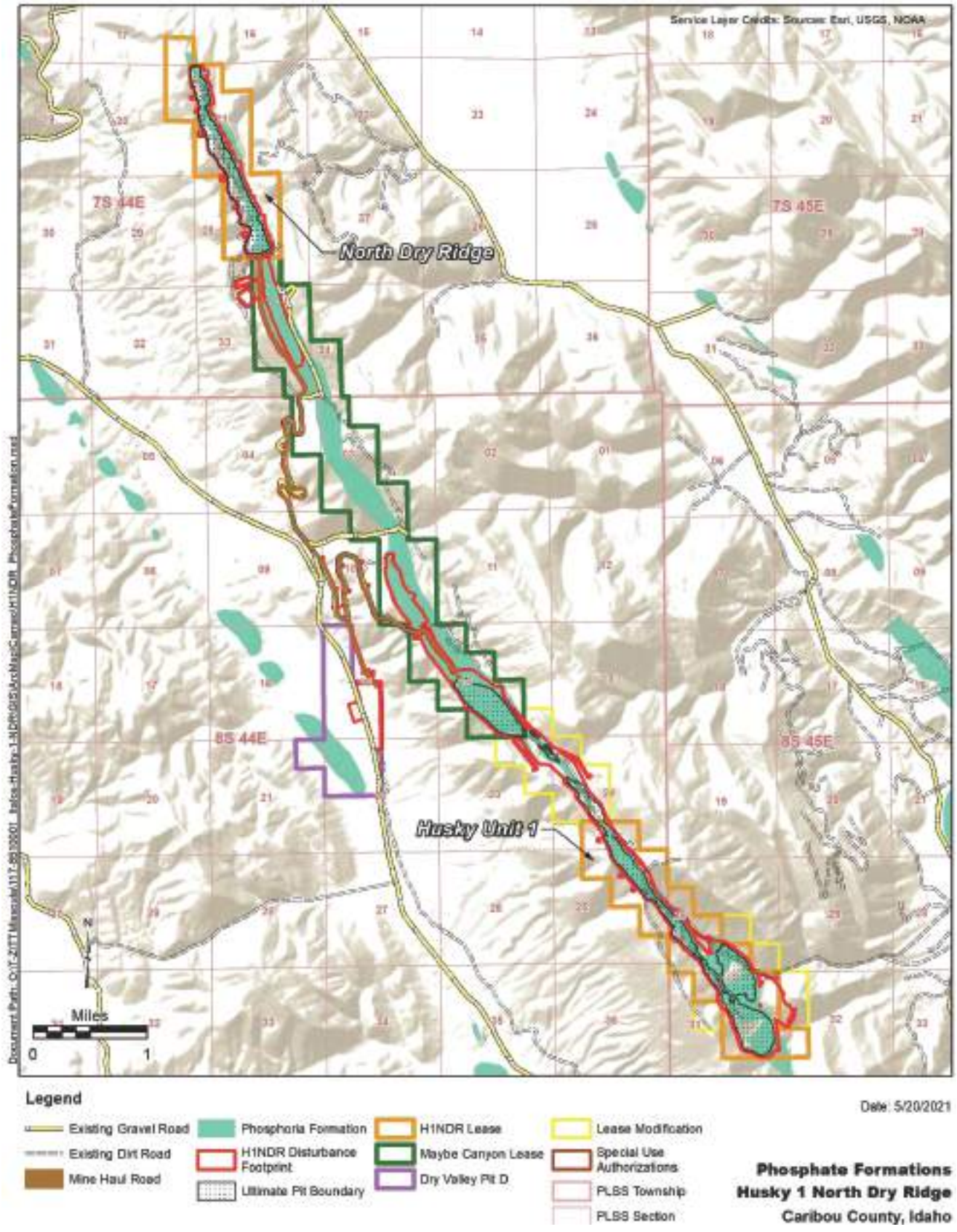
A baseline geochemical characterization was completed. Detailed discussions of the methods and conclusions can be found in the *Final Geochemical Baseline Characterization Study Report* (Arcadis, 2020a). The purpose of the study was to characterize the overburden materials to be mined, stored, and replaced as backfill; develop and evaluate cap and cover designs; identify materials that may leach COPCs into surface water and groundwater; and develop concentrations of contaminants to include in the groundwater fate and transport model.

The chemistry of groundwater aquifers is generally a calcium-bicarbonate water type with neutral to slightly alkaline pH. Shallow groundwater in the alluvium tends to be highly oxic with seasonal variation in pH and major ion concentrations.

Acid rock drainage is not a concern due to overall lack of sulfide mineralogy and the abundant neutralization potential of carbonate minerals in the limestone and other geologic units.

Historically, leaching from shale units exposed during mining following placement in external storage piles has resulted in the release of dissolved constituents via the dissolution of soluble minerals and organic matter (see Section 3.2.1). Selenium is of particular concern due to its high concentration in the shale, its leachability through dissolution reactions, and its limited attenuation downgradient of source zones under oxic conditions, which was confirmed through unsaturated H1NDR column testing (Arcadis, 2020a). Selenium concentrations are generally lower in low-oxygen environments and may be further attenuated by biological activity. Reduced selenium concentrations have been observed in deep zones of saturated backfilled pits and overburden storage areas where oxygen concentrations are low compared to more shallow zones.

Figure 18. Phosphoria Formation and Leases



Other metals and oxyanions released from the shale can be attenuated by various geochemical processes, including coprecipitation with iron and manganese. Adsorption of metals to carbonate minerals can be an important protective mechanism as seen in the underlying Wells Formation. Other constituents (most notably, cadmium) can be a concern in localized environments where insufficient geochemical attenuation has occurred. Dissolved metal and oxyanion (such as arsenic) concentrations can also be locally elevated where strongly reducing conditions are observed from either natural (e.g., wetland) or mining-related influence.

Geochemical evaluations indicated leachable metals from the Center Waste Shale, Hanging Wall Mud, Rex Chert, and limestone lithologies. The following COPCs were detected during geochemical testing described in the Geochemistry Baseline Study Report and Addendum (Arcadis, 2020a).

- Center Waste Shale/Hanging Wall Mud: antimony, arsenic, cadmium, iron, manganese, nickel, selenium, sulfate, thallium, total dissolved solids, uranium, zinc.
- Rex Chert: cadmium, manganese, nickel, selenium, sulfate, total dissolved solids, uranium, and zinc.
- Limestone: cadmium, nickel, selenium, thallium, and total dissolved solids.
- Lithologies without much potential to leach COPCs include the alluvium and Dinwoody.

Manganese was elevated above the groundwater quality reference standard and remained steady through the leaching cycles in leachates from all lithologies. The limestone unit does not typically exhibit leachable COPCs in concentrations exceeding water quality limits. The presence of leachable COPCs from limestone in H1NDR is believed to be primarily due to the collection of limestone samples in the transition zone between Footwall Mud and limestone lithologies based on X-ray fluorescence sampling (Tetra Tech, Inc., 2014a; Tetra Tech, Inc., 2019a).

3.3.3 Environmental Consequences

3.3.3.1 Proposed Action and Other Action Alternatives

Ore Removed

Phosphate is leased to fulfill the regional and national demand. Approximately 27.5 million wet tons of phosphate ore (21.3 million tons from H1 and 6.2 million tons from NDR) would be mined over approximately 13 years. The Proposed Action and Alternative Cover options would both mine the same amount of ore and waste rock and make the same volume of material available to potential leaching. Removal and use of the ore would deplete the deposit and would be an irretrievable (ore would not be replaced) and irreversible impact (ore will not regenerate). However, the leased phosphate resource would be used as intended, to fulfill regional and national demand for agricultural supplies. Backfilling of pits would likely eliminate opportunities for future ore recovery.

Ore measurement method described in Section 2.2.3 would ensure that an accurate volume is recorded to calculate the royalties owed by Itafos to the United States, and to adjust the ore density if necessary, as has been done in other mining projects.

Potential to Leach COPCs

It is anticipated that the pit backfill and OSA could be a source of potential leaching. Other activities such as the roads, moving the slurry pipeline, and the lined tipple area do not be sources of leached COPCs. Concentrations of contaminants expected to be leached out of the overburden were calculated

based on the geochemical testing program results (source terms) (Arcadis, 2020a). Source terms concentrations were calculated for each of the pit backfill/OSA locations, using the proportion of each lithology expected to be part of the overburden material (calculated as weighted averages of the COPC concentrations for each lithology). The source term concentrations used in the groundwater fate and transport modeling (Section 3.4) depended on the hydraulic residence time of a cycle of water within the total void space contained within the waste rock in each pit backfill/OSA (pore volume) (Arcadis, 2020b, pp. 15, Table 12). The concentrations were applied to the fate and transport model as pore volume concentrations for each pit backfill/OSA for the duration of the applicable residence time (8.9 to 20.9 years). The concentrations were reduced at the start of each pore volume timeframe until the last pore volume concentration was reached, which was used for the duration of the model simulation.

The calculation methods and results are described in detail in a memo *Source Term Results for the Husky 1/North Dry Ridge Mine Project* (Arcadis, 2020b). Source term concentrations are specified for total and dissolved selenium. The dissolved selenium source terms were used in the fate and transport model. The differences between total and dissolved source terms are small. The fate and transport model report (Tetra Tech, Inc., 2021c) explains in more detail how the source term was used. **Table 16** presents the selenium source terms calculated for each pit backfill area and pore volume and utilized in the fate and transport modeling.

Geochemical characteristics of the waste rock by each rock type are shown in **Appendix B** in **Table B-1** and **Table B-2**. Results of the calculations for unsaturated conditions are shown in **Table B-3**.

Table 16. Source Term Concentrations for each Pit Backfill and Pore Volume

Location	Pore Volumes (mg/L)					
	0.5-1	0.5-2	1	2	3	4
Total Selenium						
South Maybe Canyon Mine-south	1.73	0.0089	0.909	0.0065	0.0039	0.0039
South Maybe Canyon Mine -north	1.69	0.0088	0.884	0.0066	0.0045	0.0045
H1-N	2.08	0.0099	1.09	0.0072	0.0039	0.0037
H1-X	3.07	0.0131	1.61	0.0094	0.0056	0.0047
H1-L	2.85	0.0124	1.49	0.0105	0.0063	0.0051
H1-E	3.11	0.0127	1.62	0.0112	0.0066	0.0053
H1-S	3.16	0.0133	1.65	0.0109	0.0066	0.0052
North Maybe Mine	6.75	0.5966	3.84	0.0514	0.0281	0.0274
NDR	4.96	0.4206	2.78	0.0425	0.0249	0.0244
Dissolved Selenium						
South Maybe Canyon Mine-south	1.62	0.0082	0.8487	0.0089	0.0032	0.0029
South Maybe Canyon Mine -north	1.57	0.0081	0.8239	0.0087	0.0037	0.0035
H1-N	1.94	0.0092	1.0189	0.0099	0.0032	0.0027
H1-X	2.86	0.0119	1.5019	0.0132	0.0045	0.0037
H1-L	2.67	0.0113	1.398	0.0137	0.0052	0.0041
H1-E	2.91	0.0116	1.5244	0.0142	0.0056	0.0043
H1-S	2.95	0.0121	1.5459	0.0144	0.0054	0.0042
North Maybe Mine	7.14	0.5873	4.0429	0.0516	0.0228	0.0248
NDR	5.15	0.4062	2.8796	0.0429	0.0203	0.0224

The Alternative Stream Routing and Alternative Access would not affect geology and minerals.

3.3.3.2 No Action

Under the No Action Alternative, the phosphate resource would not be mined, provide resource to fulfill the regional and national demand. It would remain in the ground as a future resource. The mining benefits of phosphate recovery and increasing the nation's supply of available phosphate would not be realized.

No COPCs in overburden would be leached from backfill material.

3.4 Groundwater

3.4.1 Analysis Area and Analysis Methods

The groundwater analysis area is the groundwater model domain boundary, which was developed in the *2014 Final Groundwater Modeling Study Plan* (HydroGeo, 2014) and covers approximately 186 square miles including Dry Valley Creek and Diamond Creek drainages. It was defined so the impacts on groundwater are completely encompassed by the model boundary (HydroGeo, 2014; Tetra Tech, Inc., 2019b). **Figure 19** shows the groundwater model domain boundary and the groundwater wells.

Table 17 shows the issues for analyzing impacts on groundwater and the indicators to discuss them.

Table 17. Issues and Indicators for Groundwater

Issue	Analysis Method
Groundwater Quality - Trace metals, including selenium, leaching into groundwater	Groundwater model to predict the fate and transport of COPCs in the groundwater. The trace metals will be simulated using the leachate concentrations from the geochemical baseline study for the backfill.
New mining operations effect on the timing and effectiveness of the CERCLA remediation	Groundwater model to predict changes in flows caused by the placement of backfill and cover to predict the impacts from the COPCs on groundwater where groundwater discharges are already affected by the CERCLA site.

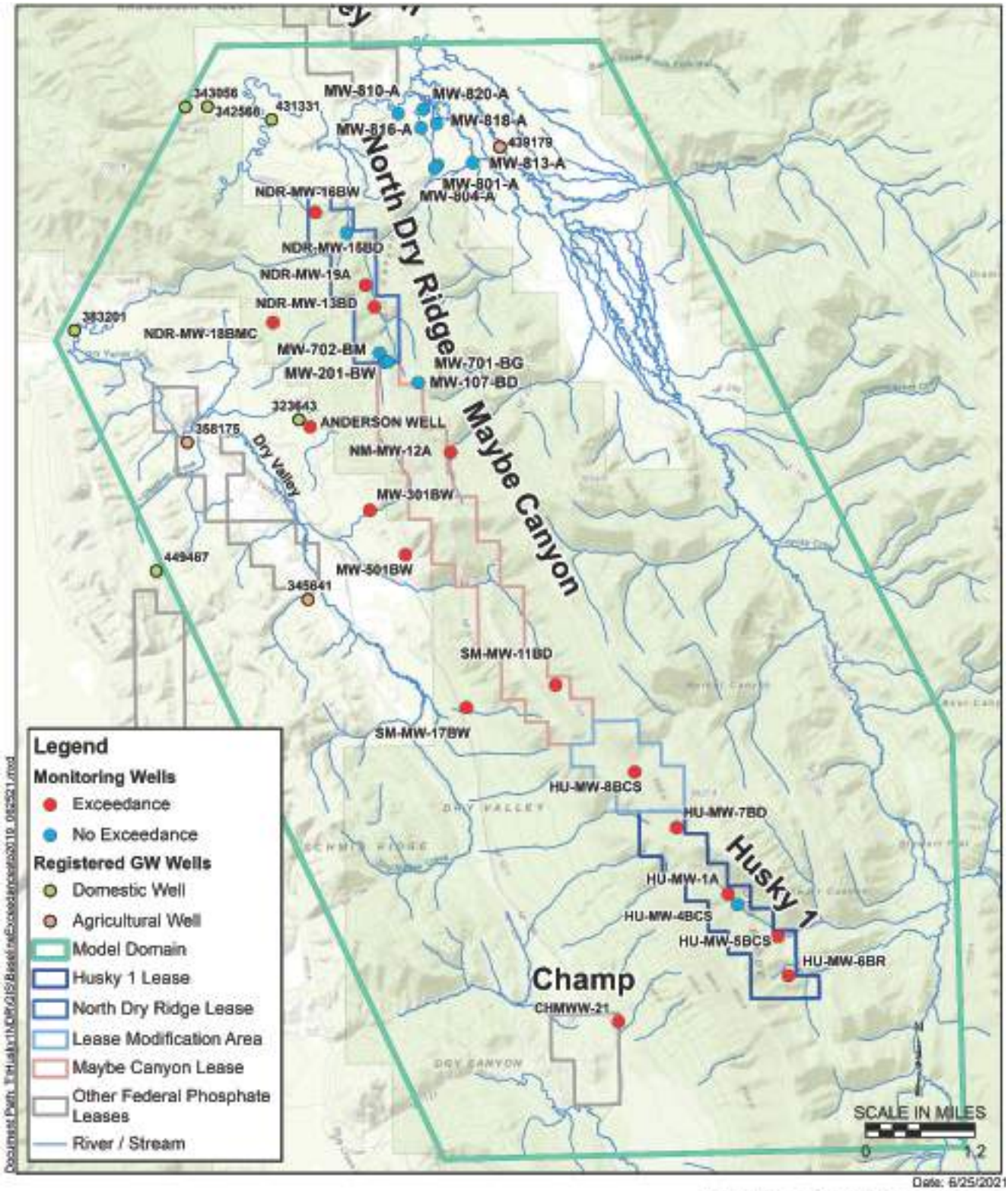
3.4.2 Affected Environment

Groundwater Quality

Baseline groundwater monitoring was conducted 2012 through 2019, and the results are reported in the *Final Groundwater Baseline Study Report* (Arcadis, 2020d). As part of the baseline groundwater monitoring, registered domestic and agricultural wells were searched (Idaho Department of Water Resources, 2020). Most of the wells are monitoring wells for H1NDR or nearby mines. Wells for domestic or agricultural use are shown on **Figure 19**. There are no municipal wells in the study area.

The baseline geochemistry study evaluated the potential for backfill materials to leach constituents into water (Arcadis, 2020a). COPCs along with the Idaho groundwater standard are shown in **Table 18**. One or more groundwater samples from monitoring wells showed elevated background concentrations that exceeded primary standards for total cadmium or selenium, and/or secondary standards for iron, manganese, and total dissolved solids. Some are due to the existence of impacted groundwater from nearby inactive, historic mines (see Section 3.2.1). Some areas have a naturally elevated background level of iron and manganese.

Figure 19. Analysis Area and COPC Exceedances in Wells



Date: 6/25/2021

Model Domain and Exceedances
Husky 1 North Dry Ridge
Caribou County, Idaho

Table 18. Applicable Groundwater Standards for each COPC

COPC	Groundwater Standard	Units	Source
Antimony	0.006	mg/L	Primary IDEQ
Arsenic	0.05	mg/L	Primary IDEQ
Cadmium	0.005	mg/L	Primary IDEQ
Copper	1.3	mg/L	Primary IDEQ
Iron	0.3	mg/L	Secondary IDEQ
Manganese	0.05	mg/L	Secondary IDEQ
Selenium	0.05	mg/L	Primary IDEQ
Sulfate	250	mg/L	Secondary IDEQ
Thallium	0.002	mg/L	Primary IDEQ
total dissolved solids	500	mg/L	Secondary IDEQ
Uranium	0.03	mg/L	EPA Drinking Water MCL[1]
Zinc	5	mg/L	Secondary IDEQ

Source: (Arcadis, 2020a)
Note: In the absence of IDEQ standard for Uranium, EPA drinking water standard was used.
1 MCL=maximum contaminant level

The most frequent exceedances were for iron, manganese, and selenium as total concentrations in unfiltered samples. **Figure 19** shows the locations of the wells with exceedances and generally indicates the extent of the current groundwater contamination. A summary listing all exceedances in monitoring wells is shown in **Table 19**.

Table 19. Monitoring Wells and Chemicals Above IDEQ Groundwater Quality Standards

Well	Sample Date Range	Chemical Name
Anderson Well	5/7/2013 through 7/22/2014	Iron, Manganese
CHMWW-21	9/24/2013 through 10/2/2019	Manganese
HU-MW-1A	10/2/2013 through 10/4/2019	Aluminum, Iron, Manganese
HU-MW-4BCS	7/16/2012 through 10/4/2019	No chemical above IDEQ groundwater standards
HU-MW-5BCS	10/9/2012 through 10/4/2019	Manganese, Iron
HU-MW-6BR	7/18/2013	Aluminum, Cadmium, Iron, Manganese
HU-MW-7BD	11/1/2013 through 10/3/2019	Iron
HU-MW-8BCS	9/22/2013 through 10/3/201916	Selenium, Iron, Manganese
MW-301-BW	5/15/2013 through 8/27/2019	Selenium
MW-501-BW	5/15/2013 through 8/26/2019	Aluminum, Iron
NDR-MW-13BD	8/4/2013 through 10/1/2019	Selenium
NDR-MW-14BD	10/11/2012 through 10/1/2019	Total Dissolved Solids, Iron
NDR-MW-15BD	10/22/2012	No chemical above IDEQ groundwater standards
NDR-MW-16BW	7/25/2013 through 10/2/2019	Antimony, Iron, Manganese
NDR-MW-18BMC	11/15/2013 through 10/5/2019	Iron, Manganese
NDR-MW-19A	6/4/2014 through 7/17/2019	Aluminum, Iron, Manganese
NM-MW-12A	6/4/2014 through 8/21/2019	Aluminum, Iron, Manganese
SM-MW-11BD	10/16/2013 through 10/3/2019	Iron, Manganese, Total Dissolved Solids, Sulfate
SM-MW-17BW	10/28/2013 through 10/2/2019	Iron

Source: (Arcadis, 2020d, pp. 62-95; Table 3-5 and Figure 4-3 (pp. 111))

An analysis of selenium exceedances showed one well within the NDR lease area that exceeded primary drinking water MCLs for multiple COPCs. A second monitoring well next to a tributary to Dry Valley Creek also displayed elevated selenium levels. A third well, within the H1 Lease Modification Area, exceeded selenium standards in 2013 and 2014, but more recent data does not indicate elevated levels. The groundwater model indicates the impacts from mining H1NDR but does not add in the naturally occurring, elevated levels or distribution of some COPCs.

CERCLA

Groundwater quality exceedances are from the North Maybe Mine and South Maybe Canyon Mine and specifically the South Maybe Cross Valley Fill and North Maybe Mine East Mill Dump (see Section 3.2.1). Moreover, CERCLA uses different screening levels than the H1NDR analysis, which results in different exceedances. Site investigations and monitoring has been and will be conducted to define the nature and extent of groundwater impacts from past mining activities, and the fate and transport of their COPCs to determine and implement remediation actions.

South Maybe Canyon Mine Facilities

Based on current understanding, the Cross Valley Fill directly affects Maybe Creek via surface discharge from the toe of the fill and affects the shallow alluvial groundwater system in the Maybe Creek drainage, down-gradient of the fill. It is uncertain, but possible, that impacted water from Maybe Creek re-infiltrates, also affecting groundwater west of Dry Ridge. Based on North Maybe Mine CERCLA trace element studies, isotope studies, and monitoring well data, any leachate currently being generated by the historic pits and their backfill is likely migrating downdip to the east at South Maybe Canyon Mine. Existing contaminant plumes likely exist in the shallow alluvial aquifer and down dip.

North Maybe Mine Facilities

Similar to the South Maybe Canyon Mine, the two primary existing and historic sources of contaminant release at the North Maybe Mine are the East Mill Dump and the partially backfilled pits. The East Mill Dump is known to release leachate directly into East Mill Creek and into the shallow alluvial groundwater system in the East Mill Creek drainage. It is not clear if or how much deeper groundwater is affected. The partially backfilled pits also contribute to the baseline groundwater impacts. Based on North Maybe Mine CERCLA trace element studies, isotope studies, and monitoring well data, any leachate currently being generated by the historic pits and their backfill is likely generally migrating downdip to the east. Existing contaminant plumes likely exist in the shallow alluvial aquifer and down dip.

3.4.3 Environmental Consequences

3.4.3.1 Model Uncertainty

The regional flow models used to simulate the groundwater system are limited due to the simplifications necessary to represent complex natural systems. Flow and transport model grid size and available data constrain the resolution and accuracy of the predictions. Estimations of approximate magnitudes and timing of groundwater system changes is possible with regional-scale predictive flow models. Small changes in water levels and stream flows are inherently difficult for a regional model to accurately simulate, but the predictions are useful for assessing the potential range of impacts and comparing alternatives.

Other factors affecting model uncertainty is representing an inherently fractured-bedrock system as a porous medium. In fractured systems, steep gradients, complex saturation profiles, and poorly connected fracture networks can be present, which are difficult to simulate accurately with a finite-difference, porous-medium model.

The models were constructed based on present-day conditions, but natural and anthropogenic changes should be expected over the simulation period. As predictive simulations extend further in time, the potential error from the predictions increases. These factors limit the precision and accuracy of the model. However, the results presented here represent the current best estimate of groundwater system changes. The uncertainty in these predictions was evaluated as part of a detailed sensitivity analysis (Tetra Tech, Inc., 2021c).

The groundwater model has been constructed with a modest amount of conservatism to better ensure that impacts are not under-predicted.

3.4.3.2 H1NDR Groundwater Interaction with Existing Conditions

A key consideration in this analysis is estimating how the H1NDR project impacts would interact with existing groundwater impacts from historic mining and facilities. The groundwater analysis predicts impacts from the proposed mining activities and alternatives after development and closure of the H1NDR mine. It considers and includes existing waste rock backfilled in the historically mined North Maybe Mine and South Maybe Canyon Mine pits as contributing to the future impacts. Like the H1NDR waste rock that would be generated, samples of the existing historic North Maybe Mine and South Maybe Canyon Mine backfill were collected, geochemically characterized, column tests conducted, and the results mathematically combined with the results from the H1NDR backfill columns to develop source terms for the fate and transport modeling. The net result is a H1NDR source term that represents the leachate that results from the H1NDR backfill when placed over or combined with the historic North Maybe Mine and South Maybe Canyon Mine backfill.

For simplicity and because a complete data set of current plumes and historic loading rates is not available, only new impacts from H1NDR were modeled, not existing conditions. However, this is not the actual condition and Sections 3.2 and 3.2.1 describe historic mining and the current status of CERCLA actions. Also, Section 3.4.2 describes existing groundwater quality and identifies locations where water quality has already been degraded by the historic mine facilities.

As described in detail in Sections 3.4.3.1 and 3.4.3.3, the proposed action and alternatives would create groundwater plumes of selenium and other contaminants that would generally migrate down-dip to the east, and upon reaching the regional aquifer they would dilute and migrate westward.

South Maybe Canyon Mine Facilities

H1NDR would not affect the Cross Valley Fill as a potential source of contaminants. The H1NDR backfill would be placed in the same South Maybe Canyon Mine pits currently generating some volume of leachate. The analysis of the H1NDR backfill placement indicates that it would affect both the shallow alluvial aquifer and would migrate down dip to the east until intersecting the regional aquifer. Because the predicted groundwater impacts from the mining activity generally migrate to the east, they would not comingle with shallow groundwater infiltrating from Maybe Creek water west of Dry Ridge. As described in Sections 3.5.3.1 and 3.5.3.3, groundwater would interact with Maybe Creek and the shallow alluvial system along Maybe Creek and add to the baseline conditions, although the Alternate Cover alternative would interact to a far lesser degree. The leachate generated from the

H1NDR backfill would follow the same flow paths as any existing baseline leachate or contaminant plumes. Thus, the H1NDR plumes would follow the existing plumes in time and would not interact in an additive manner. The predicted H1NDR plumes would replace the existing plumes but would not add to the existing plumes or create higher concentrations.

Site Improvements

As described in Section 3.2.1, CERCLA Remedial Actions at the Cross Valley Fill include construction of a synthetic cover system and surface water management control facilities. They have substantially reduced load and concentrations discharged to surface water and the shallow alluvial aquifer. Likewise, H1NDR includes backfill of the South Maybe Canyon Mine historic pits and construction of infiltration limiting cover systems. Although the project would add additional source material on top of existing backfill in the historic pits, the cover system would drastically reduce the generation of leachate compared to the existing conditions. The Proposed and Alternative Cover systems would be constructed over 77 or 80 acres, respectively, of currently unreclaimed pit surface. The cover system addresses the pathways of release considered in the CERCLA remediation process: uptake of contaminants by vegetation, releases of leachate to groundwater, and releases of leachate to surface water. Although all future decisions will be based on future monitoring results, the proposed cover construction could render future CERCLA actions at the historic pits unnecessary.

North Maybe Mine Facilities

H1NDR would not affect the East Mill Dump as a potential source of contaminants. The H1NDR backfill would be placed in the same North Maybe Mine pits currently generating some volume of leachate. The analysis of the H1NDR backfill placement indicates that it would affect both the shallow alluvial aquifer and would migrate down dip to the east until intersecting the regional aquifer. As described in Sections 3.5.3.1 and 3.5.3.3, groundwater would interact with the shallow alluvial system along East Mill Creek, with the Alternate Cover alternative would interact to a much lesser degree. The leachate from the H1NDR backfill would follow any existing contaminant plumes in time and would not interact in an additive manner. The H1NDR plumes would replace the existing plumes and would not add to the existing plumes to create higher concentrations. The backfill placed in the proposed North Dry Ridge Pit would generate a contaminant plume to the north and east of the pit. The northern extent of the H1NDR plume would be new and would not interact with any existing plumes. Since the groundwater migration is largely controlled by down-dip flow, the easterly portion of the H1NDR plume would be stratigraphically below any deeper plumes, if they exist, emanating from the East Mill Dump, and would mainly stay separated.

Site Improvements

As described in Section 3.2.1, the East Mill Dump is being investigated through CERCLA. A synthetic cover and water management system, similar to the system constructed on the Cross Valley Fill, is being reviewed and is likely to be constructed between 2023 - 2024. Like at the Cross Valley Fill, substantial reductions in concentrations and loading to East Mill Creek and the shallow alluvial aquifer are foreseeable. If there is a deeper plume under the East Mill Dump, the cover would likely reduce the size of that plume, as well. H1NDR includes backfill of one of the North Maybe Mine historic pits and construction of infiltration limiting covers. Although H1NDR would add additional source material on top of existing backfill in the historic pit, the cover system would drastically reduce the generation of leachate compared to the existing conditions. The Preferred Alternative cover system would be constructed over 71 acres of currently unreclaimed pit surface. The cover addresses the release

pathways considered in the CERCLA remediation: uptake of contaminants by vegetation, releases of leachate to groundwater, and releases of leachate to surface water. Although all future decisions will be based on future monitoring results, the cover construction could render future CERCLA actions at the northern portion of the North Maybe Mine open pits unnecessary.

3.4.3.3 Proposed Action

Groundwater Quality

Groundwater quality would not be affected by construction of surface facilities such as roads, moving the slurry pipeline, and other mine features. While the Proposed Action cover would limit the percolation of water into the backfill, selenium concentrations in groundwater quality downgradient and down dip of the mine in the vicinity of the pits would exceed 50 parts per billion drinking water MCL primarily within the Rex Chert member before migrating downward into lower stratigraphic units (e.g., Wells Formation) according to geologic structure, fractures, and faults present (Tetra Tech, Inc., 2021c) (**Figure 20**). Once COPCs migrate into the Wells Formation, plume direction changes toward the west following the hydraulic gradient in the regional aquifer. Due to this pathway, groundwater contamination in shallow aquifer systems is anticipated to be limited to within 1 mile of the mine pits. Groundwater modeling showed the potential for shallow groundwater to discharge to seeps or surface water and affect surface water quality (see Section 3.5.3.1). Manganese and sulfate plume migration shows similar shapes and extents as selenium in **Figure 20** and thus is not shown.

Groundwater modeling of COPCs indicates that the Proposed Action would result in COPCs in exceedance of primary and secondary drinking water MCLs (Tetra Tech, Inc., 2021c)of 50 parts per billion Groundwater impacts would primarily be restricted to the eastern side of the H1-S, NDR, and H1-N pits and would extend downdip following the geological structures in the pits. Limited migration of COPCs to surface water would occur in East Mill Creek, Maybe Creek, and Stewart Creek, but not the Blackfoot River, causing groundwater discharge that exceeds selenium aquatic standards (i.e., greater than 3.1 µg/L) into surface water in the immediate pit vicinity. Domestic and agricultural wells screened in the alluvium would not be affected by the H1NDR mine. Some additional groundwater contamination is expected to the north of the mine pits (Tetra Tech, Inc., 2021c). **Figure 21** and **Figure 22** presents the simulated extent of selenium transport in the Wells formation at the drinking water MCL of 0.05 mg/L under the Proposed Action simulation from north to south.

The extent of manganese transport with concentrations above the 0.05 mg/L standard is predicted to be hundreds of feet farther than selenium (**Figure 23** and **Figure 24**). Because the source area manganese concentrations are expected to exceed the groundwater standard through at least pore volume 4 and at higher concentrations than selenium at the end of pore volumes 1 through 4 except pore volume 1 (Section 3.3.3.1) for NDR and North Maybe Mine, the manganese plume was predicted to extend farther downgradient and downdip. See **Table 16** for pore volume by location.

The extent of sulfate transport above the 250 mg/L groundwater standard is predicted to be smaller in lateral extent than selenium or manganese (**Figure 25** and **Figure 26**).

A sensitivity analysis (Tetra Tech, Inc., 2021c) assessed the change in groundwater discharge peak selenium concentrations into Stewart Creek, Maybe Creek, and East Mill Creek from the Proposed Action (**Table 20**). The high and low infiltration rate simulations indicate what might happen if climate change modified the precipitation or if the cover did not perform as expected. The other factors indicate what would happen if assumptions and testing did not accurately characterize the conditions or the model did not accurately account for them.

Figure 20. Cross-Sections of Predicted Selenium Concentrations 40 Years after Mine Closure for Proposed Action

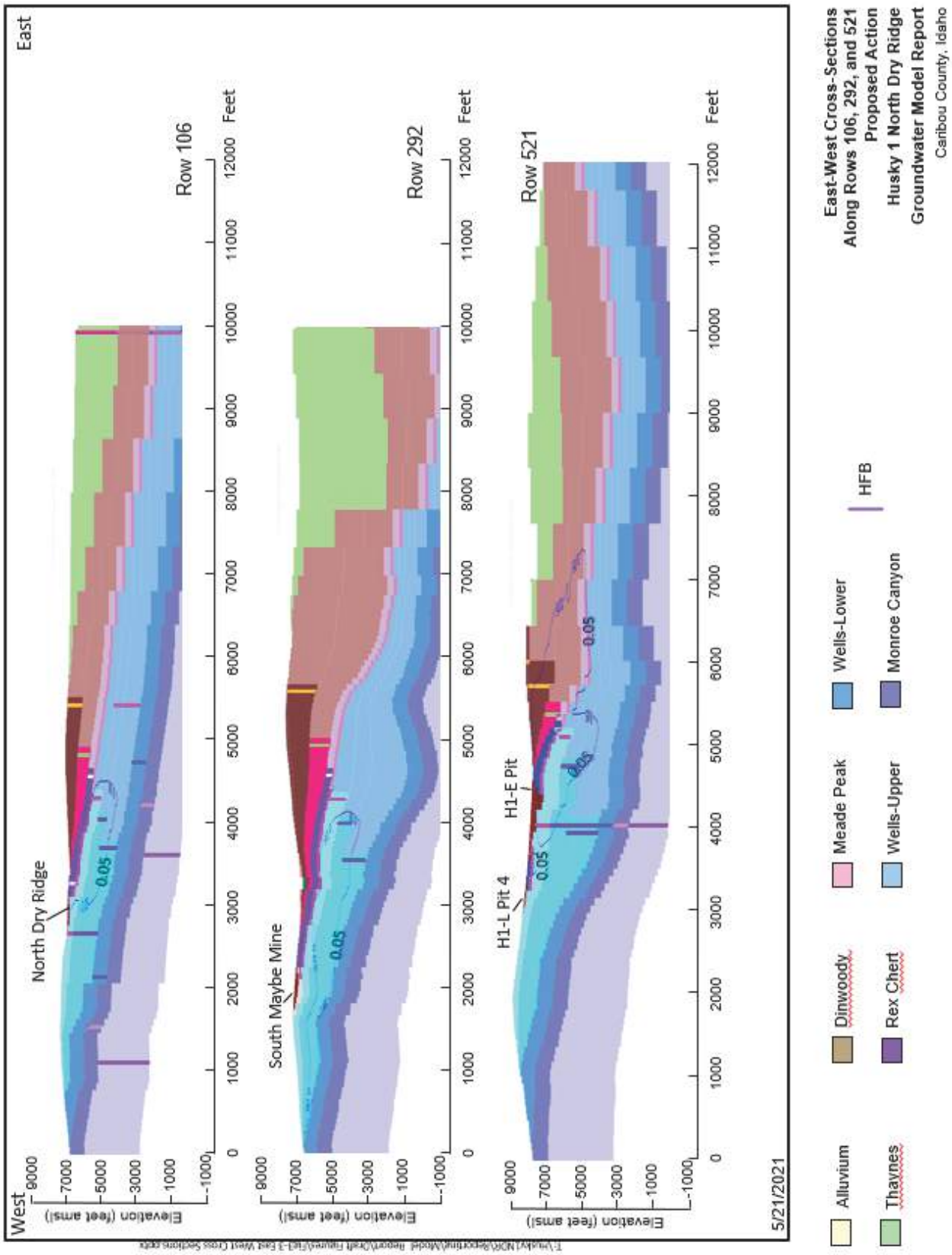


Table 20. Sensitivity Analysis on Groundwater Discharge Peak Selenium Concentrations for Proposed Action

Model Simulation	Sensitivity Tested	Stewart Creek (µg/L)	Maybe Creek (µg/L)	East Mill Creek (µg/L)
Base Case	NA	49	18	23
High Infiltration Rate	2 times the base case	67	35	52
Low Infiltration Rate	Half the base case	4.9	<0.1	1.0
High Hydraulic Conductivity	2 times the base case	37	4.3	17
Low Hydraulic Conductivity	Half the base case	47	19	31
High Effective Porosity	3.3 times the base case	48	18	23
Low Effective Porosity	1/3 the base case	48	18	23
Longitudinal Dispersivity	1½ the base case	48	17	22
Transverse Dispersivity	1½ the base case	48	17	22

As expected, higher backfill infiltration rates increase the groundwater selenium concentration entering these three creeks and vice versa for a lower backfill infiltration rate. A higher hydraulic conductivity of the weathered bedrock, Rex Chert, and Meade Peak, caused a reduction in groundwater discharge concentration entering these three creeks because as water mounds within the backfill, once it reaches the Rex Chert, more selenium is transported downgradient and downdip and the amount of mounding in the backfill is reduced. Changes in effective porosity and dispersivity had minimal effect.

Potential Conflicts with CERCLA Maybe Mine Project

Site investigations and monitoring to support CERCLA would continue as planned (see Section 3.2.1). The backfill and cover over the existing backfill in the North Maybe Mine and South Maybe Canyon Mine would reduce the amount of water that can percolate into the backfill. Percolation is expected to be reduced by 4% at North Maybe Mine and the northern portion of South Maybe Canyon Mine and reduced by more than 15% in the southern portion of South Maybe Canyon Mine (Arcadis, 2020b), which would reduce the contaminant loading from the CERCLA site compared to the No Action.

3.4.3.4 No Action

Groundwater Quality

There would be no impacts on groundwater quality from H1NDR because current conditions would not change.

Potential Conflicts with CERCLA Maybe Mine Project

Site investigations and monitoring would continue as planned (see Section 3.2.1). Impacts on groundwater quality and Maybe Creek from previous mining would continue to be remediated with no additional benefit from the added backfill and cover discussed in the Proposed Action.

3.4.3.5 Alternative Cover

Groundwater quality would not be affected by construction of surface facilities such as roads and other mine features. Many of the samples in the baseline investigation indicated current secondary or primary groundwater quality standards are not being met. Results of groundwater and contaminant fate and transport modeling indicate that the downgradient COPC concentrations would be reduced but would still exceed the groundwater standards in areas outside the immediate vicinity of the mine pits.

Figure 21. Proposed Action Predicted Extents of Selenium Plumes at 20-Year Intervals From NDR and North Maybe Mine

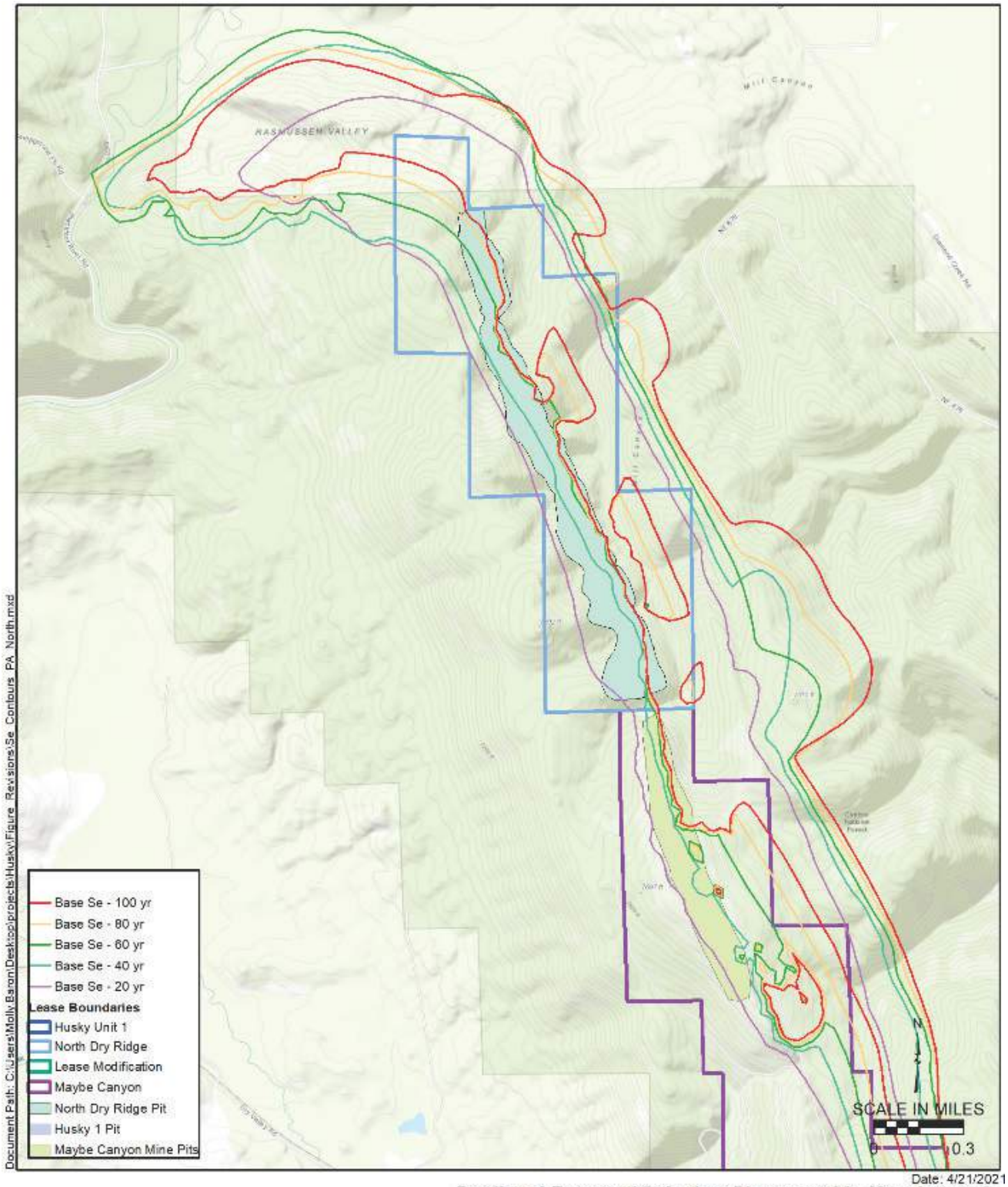


Figure 22. Proposed Action Predicted Extents of Selenium Plumes at 20-Year Intervals from South Maybe Canyon Mine and H1

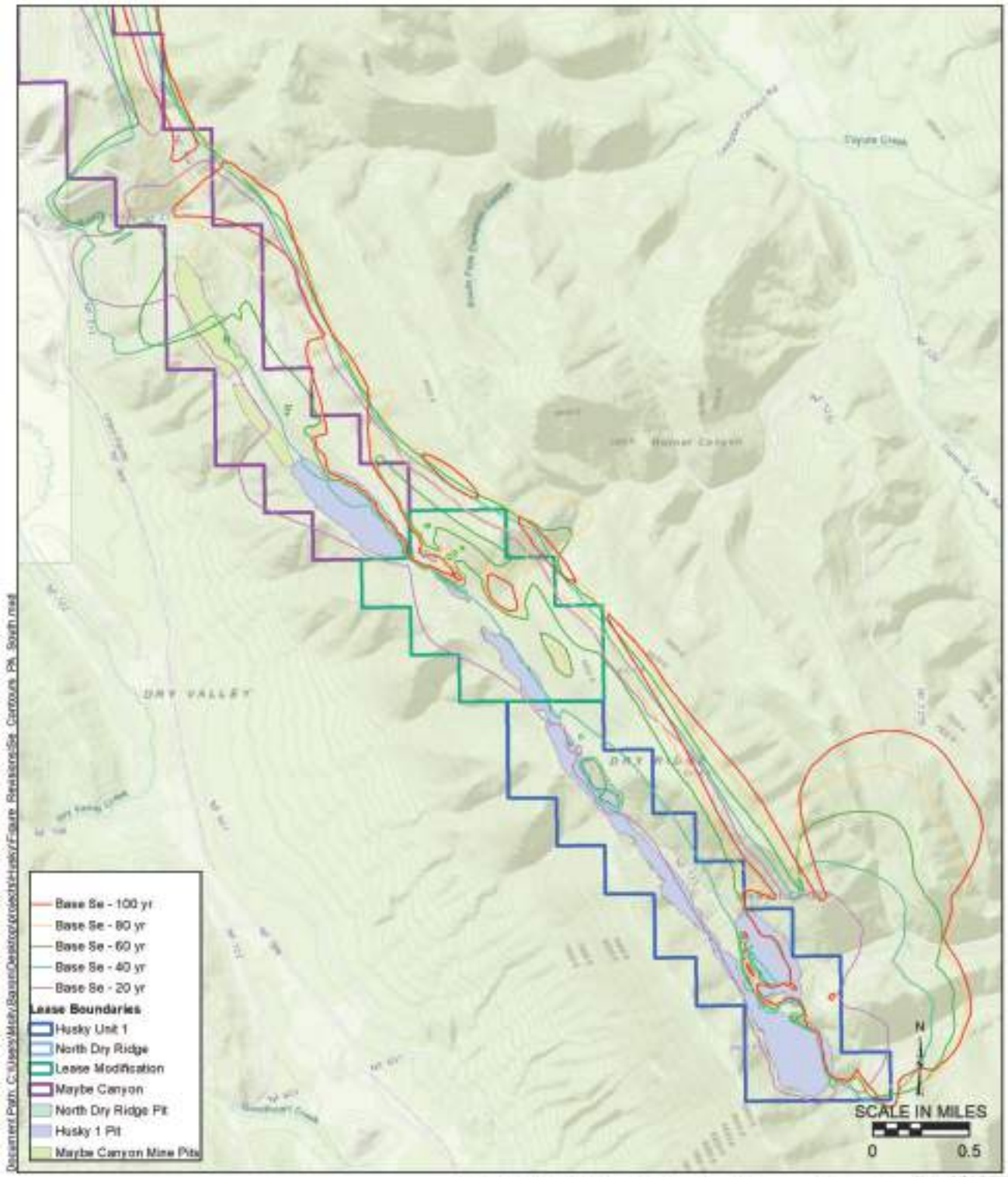


Figure 23. Proposed Action Predicted Extents of Manganese Plumes at 20-Year Intervals from NDR and North Maybe Mine

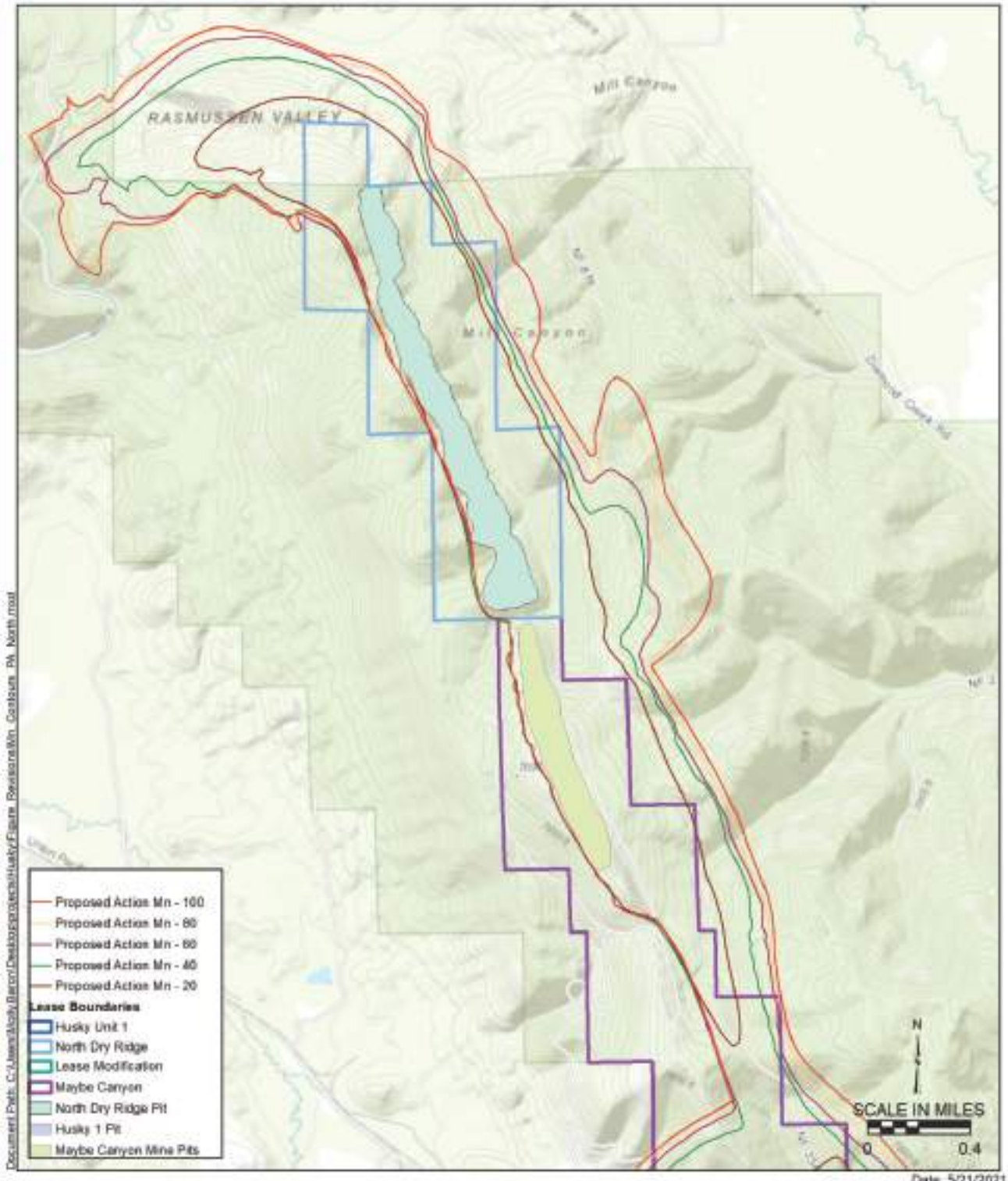


Figure 24. Proposed Action Predicted Extents of Manganese Plumes at 20-Year Intervals from South Maybe Canyon Mine and H1

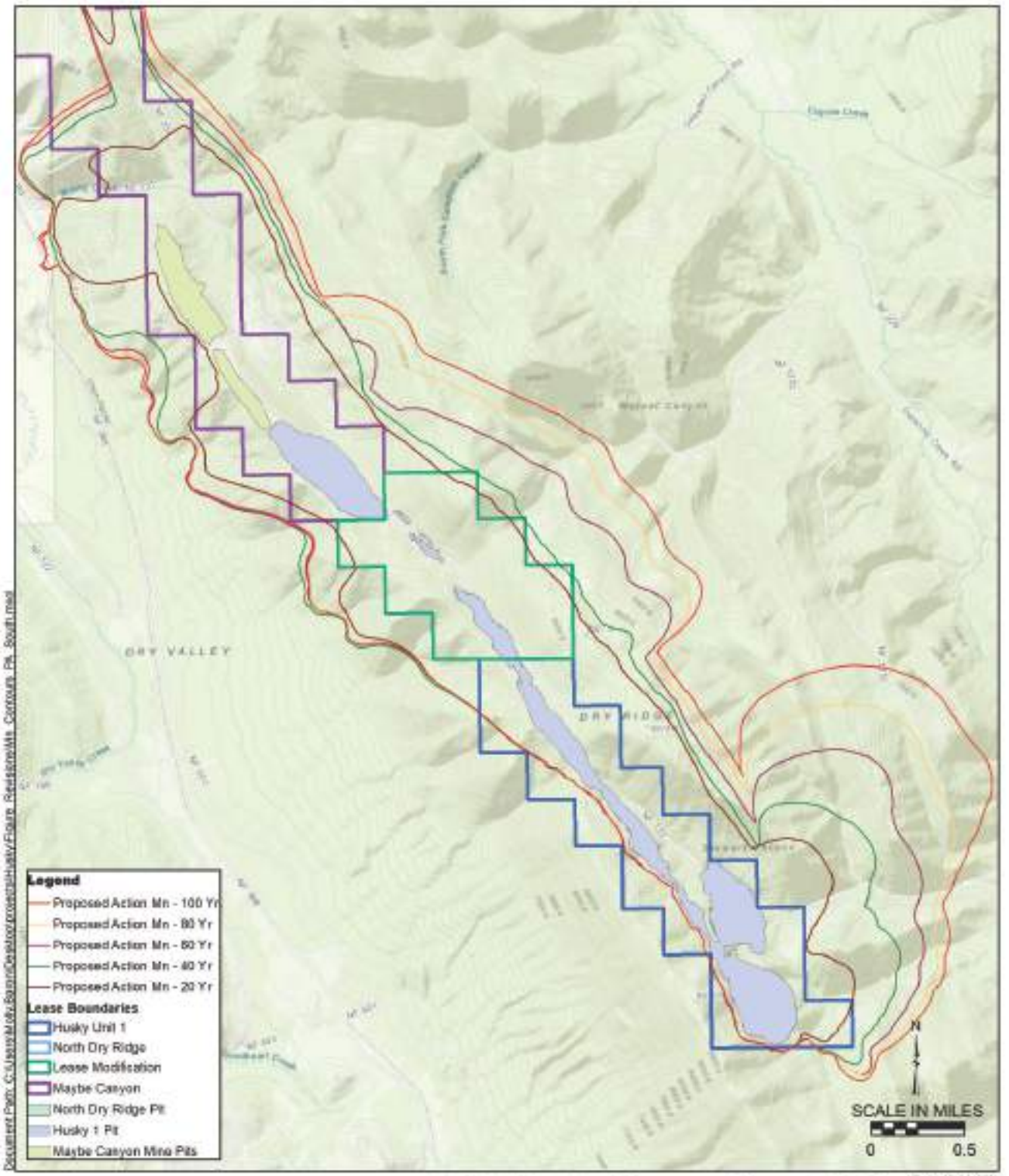


Figure 25. Proposed Action Predicted Extents of Sulfate Plumes at 20-Year Intervals from NDR and North Maybe Mine

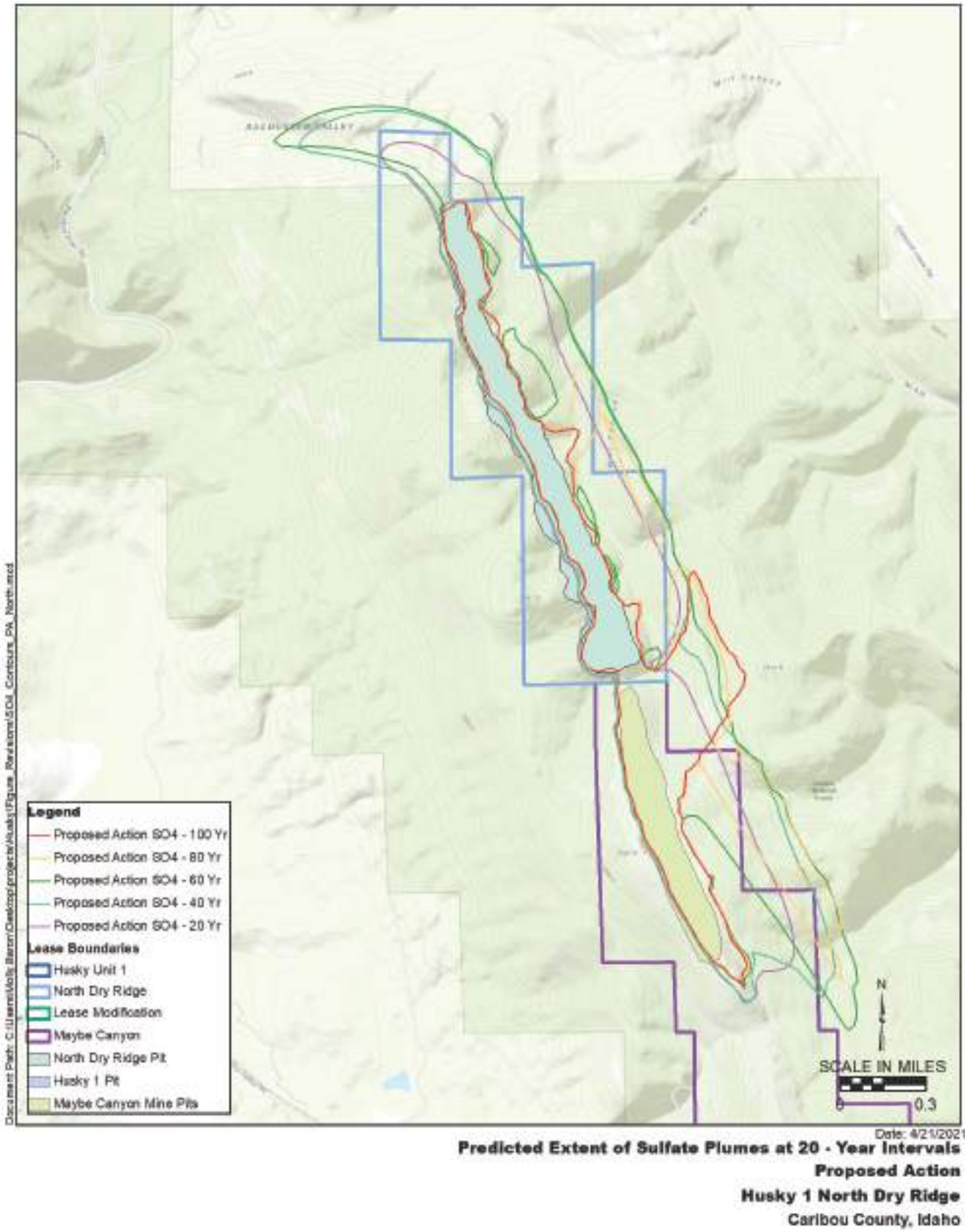
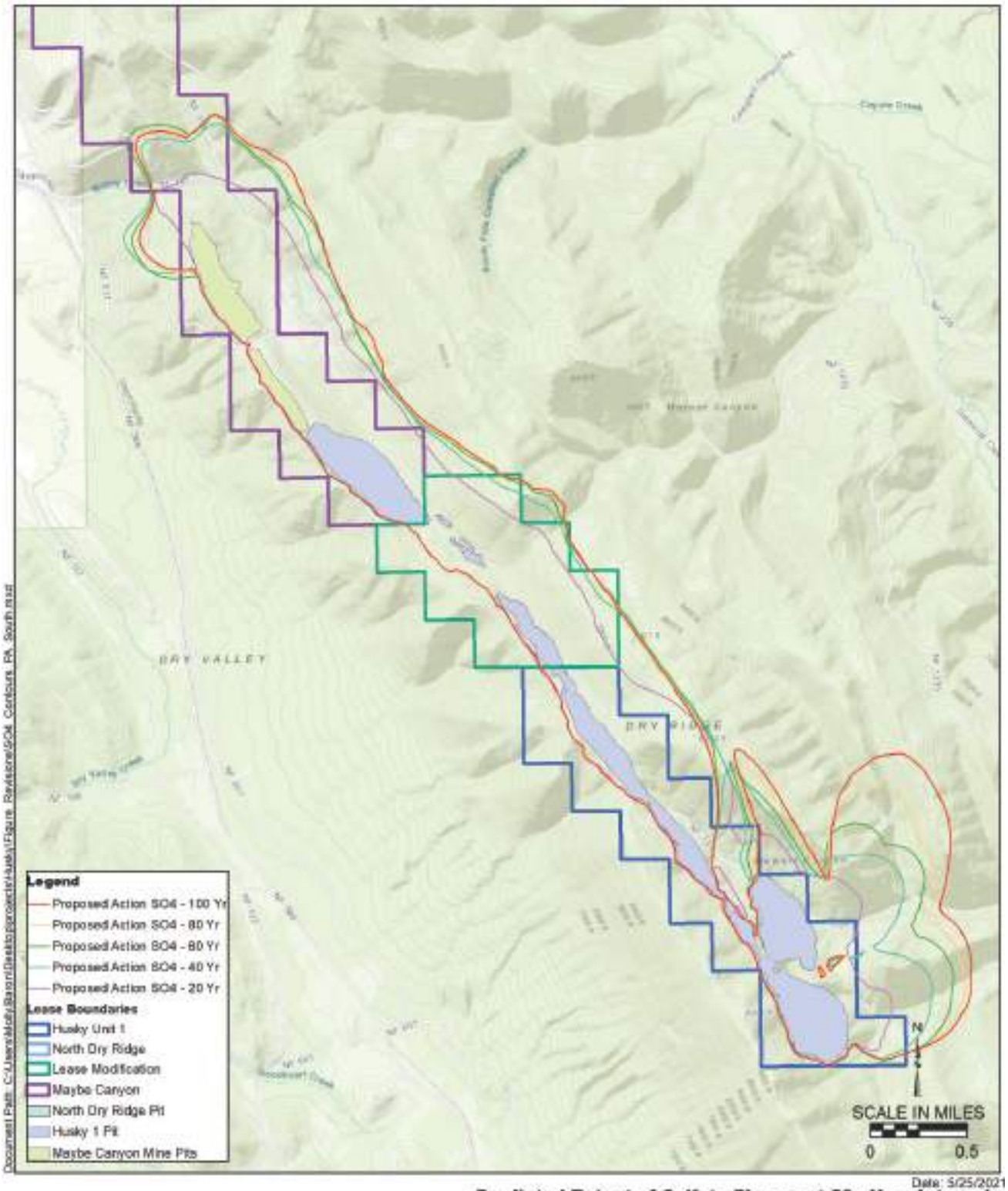


Figure 26. Proposed Action Predicted Extents of Sulfate Plumes at 20-Year Intervals from South Maybe Canyon Mine and H1



Groundwater Quality

Groundwater quality would be affected downgradient and down dip of the mine in the immediate vicinity of the pits, but the contamination extent would be more limited than the Proposed Action (**Table 21**). This reduction is due to the expected lower percolation from the flexible membrane liner and lateral drain cover compared to engineered soil covers. Groundwater modeling of selenium (Tetra Tech, Inc., 2021c) predicts that selenium concentrations above groundwater MCLs downgradient and downdip from H1-E and H1-S pits are reduced by approximately 40% in extent (**Table 21**). There would still be potential for shallow groundwater to discharge to seeps or surface water and affect surface water quality, but at a reduced concentration and flow rate compared to the Proposed Action.

Impacts on groundwater would be primarily restricted to the eastern side of the mine pit and would extend to depth following geological structures. Limited migration of COPCs to surface water would occur, causing minimal discharge to surface water that will not exceed 0.1 µg/L. Some additional groundwater contamination is expected north of the mine pits into the Wells Formation (Tetra Tech, Inc., 2021c). **Figure 27** through **Figure 32** present the simulated extent of transport under the Alternative Cover simulation.

Table 21. Comparison of Impacts Groundwater, Proposed Action, Alternative Cover

	Square Miles		Maximum Feet from Pit	
COPC	Proposed Action	Alternative Cover	Proposed Action	Alternative Cover
Selenium	4.06	2.62	6,950	4,300
Sulfate	4.47	2.75	5,600	3,250
Manganese	11.73	8.03	7,650	5,450

The Alternative Cover reduces plumes in the Wells Formation by at least 500 feet downgradient and downdip at most of the mine pits. The largest reduction in plume extent is downgradient and downdip from H1-E and H1-S Pits. At these locations, the addition of flexible membrane liners covers has reduced the height of the water level within the backfill enough to prevent COPC transport through the Lower Dinwoody near H1-S and H1-E.

Potential Conflicts with CERCLA Maybe Mine Project

Under the Alternative Cover, site investigations and monitoring would continue as planned. The cap and cover design of Alternative Cover is expected to reduce the percolation of water into the backfill by 4% in North Maybe Mine and by approximately 30% in South Maybe Canyon Mine. The reduction in percolating water into the backfill material is expected to reduce the contaminant loading from the CERCLA site compared to the No Action and Proposed Action.

3.4.3.6 Stream Routing

Conceptual channel designs for the Maybe Creek and Stewart Creek realignments (Itafos, 2020a) incorporate a 60 mils HDPE liner under a bedding layer and rip rap for stability. The engineered fill and liner would prevent or inhibit infiltration of surface water through the fill and contribute to contamination of groundwater. There would be no expected impacts to groundwater or water quality. The design life of the buried liner system would be 200 to 750 years (Peggs, 2003).

3.4.3.7 Alternative Access

The Alternative Road Access or the ATV Trail option would not affect groundwater.

Figure 27. Predicted Selenium Plumes at 20-year Intervals, Alternative Cover from NDR and North Maybe Mine

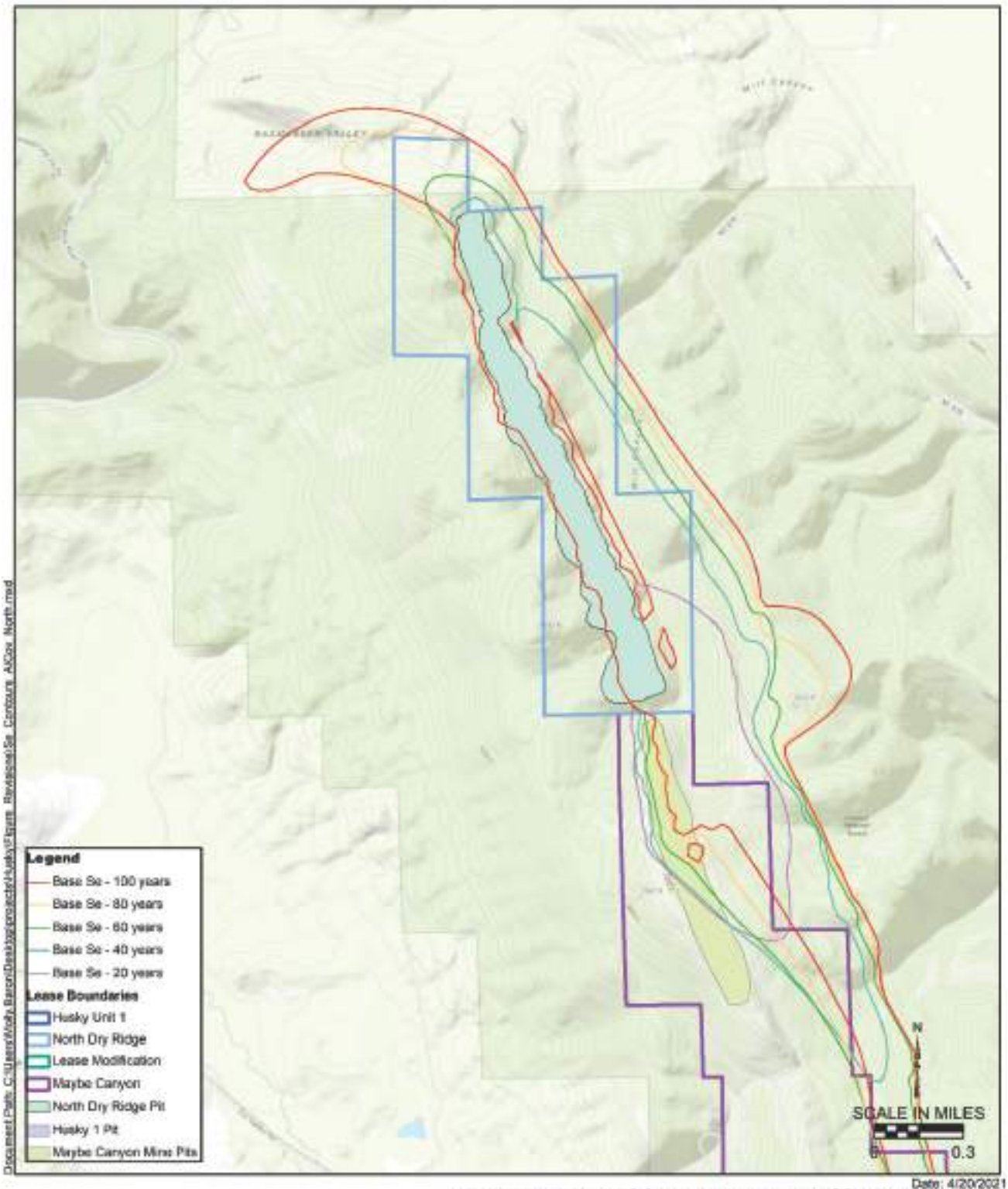


Figure 28. Alternative Cover Extent of Selenium Contamination at 20-Year Intervals from South Maybe Canyon Mine and H1

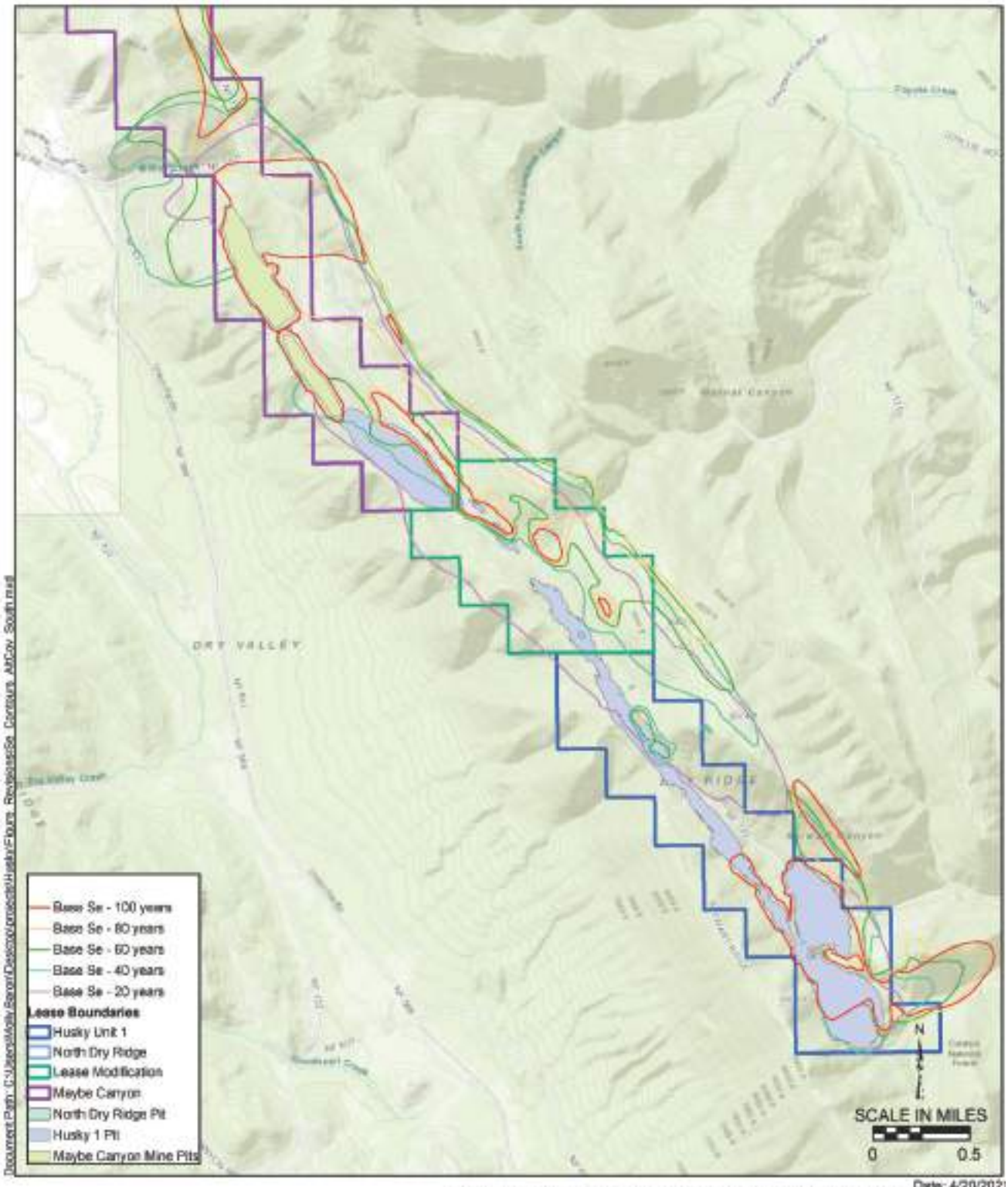


Figure 29. Predicted Manganese Plumes at 20-year Intervals, Alternative Cover from NDR and North Maybe Mine

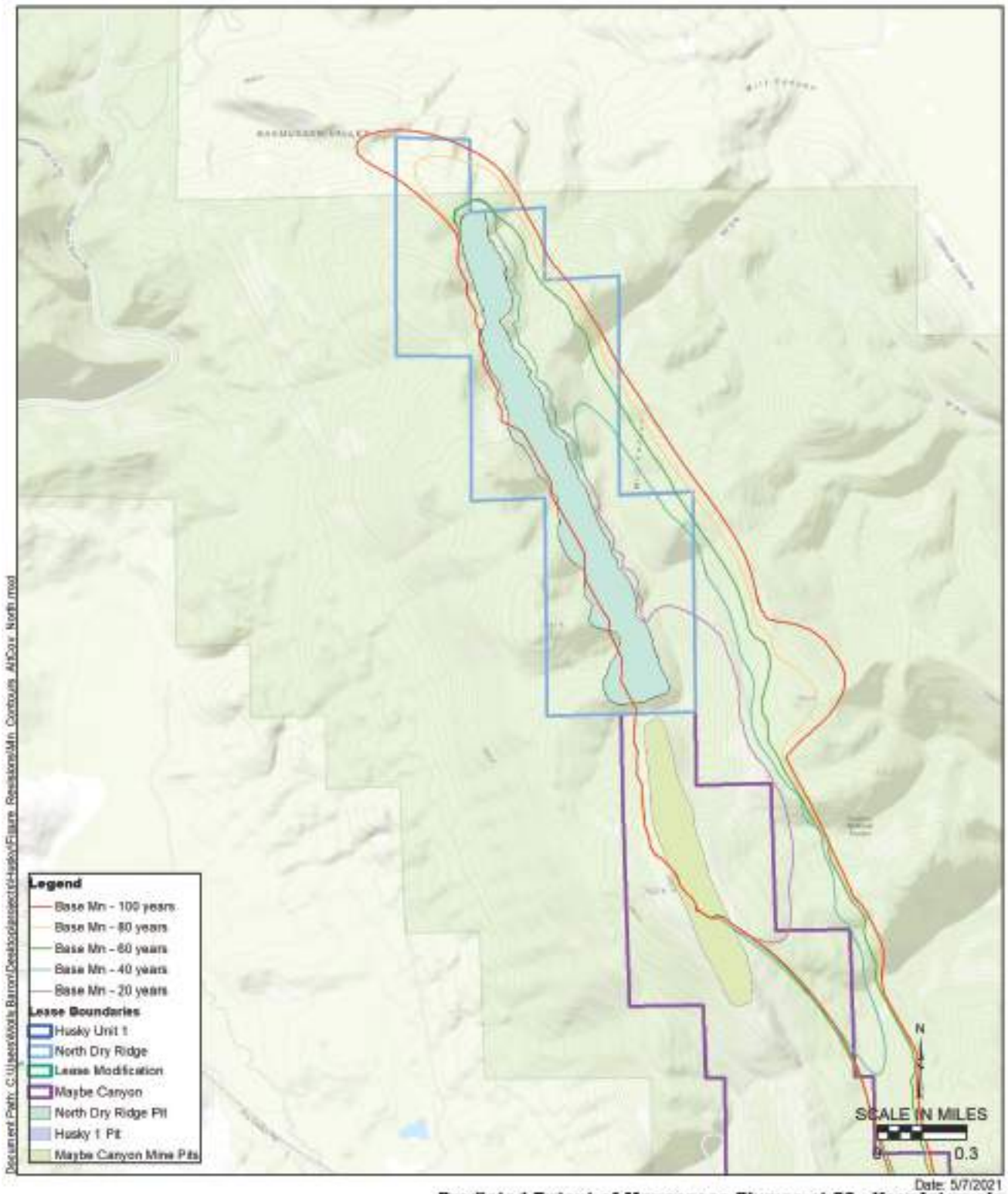


Figure 30. Alternative Cover Extent of Manganese Contamination at 20-Year Intervals from South Maybe Canyon Mine and H1

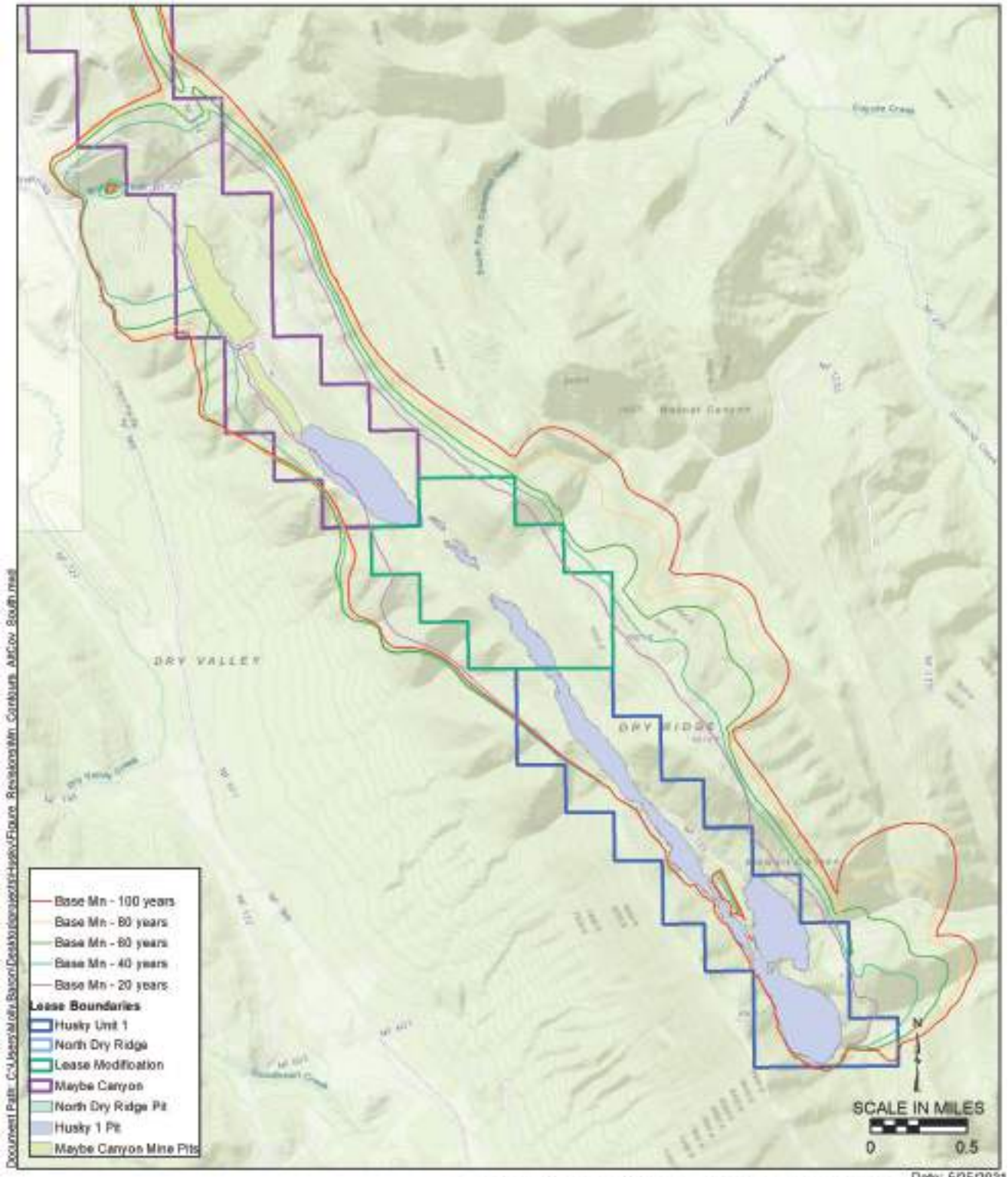


Figure 31**. Predicted Sulfate Plumes at 20-year Intervals, Alternative Cover from NDR and North Maybe Mine**

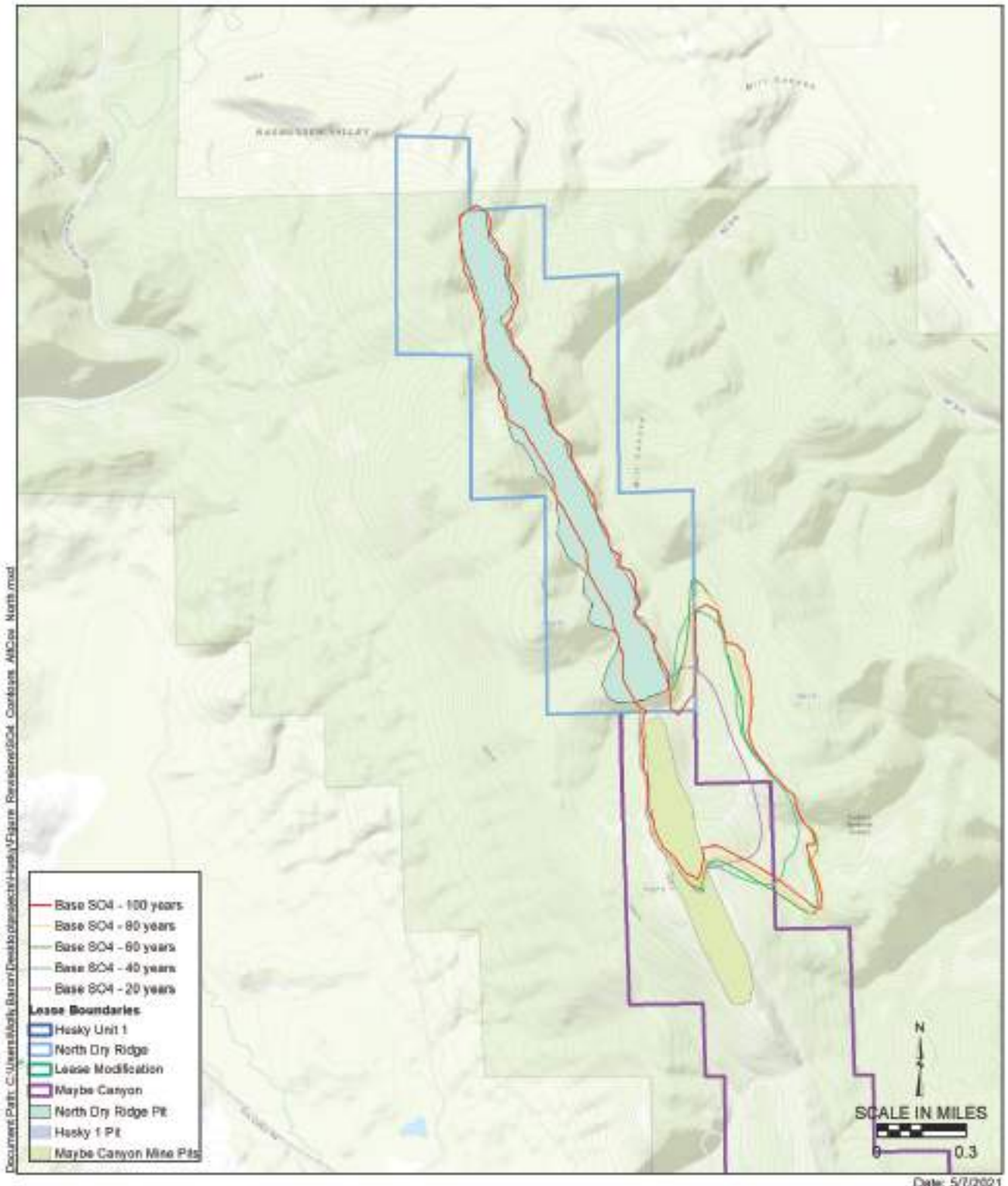
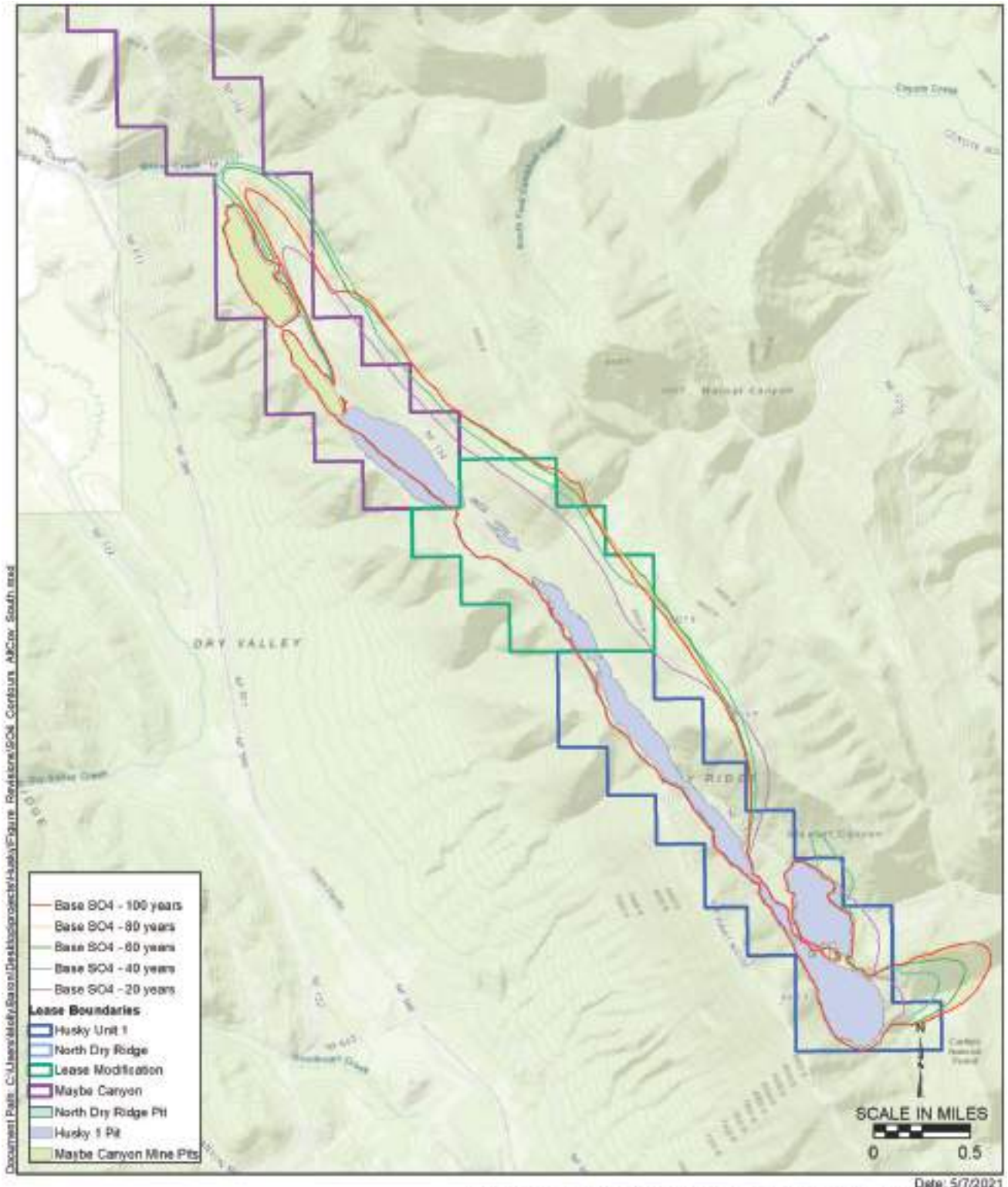


Figure 32. Alternative Cover Extent of Manganese Contamination at 20-Year Intervals from South Maybe Canyon Mine and H1



3.5 Surface Water

3.5.1 Analysis Area and Methods

The surface water study area includes watershed boundaries along the north-south topographic ridge known as Dry Ridge that is bounded by Diamond Creek to the east, Dry Valley Creek to the west, and the Blackfoot River to the north (**Figure 33**). H1NDR is in the Blackfoot River Subbasin upstream of the Blackfoot Reservoir, is approximately 1,270 square miles, and drains into the Snake River Basin. The issues for analyzing impacts on surface water and the indicators that will be used to discuss them are shown in **Table 22**.

Table 22. Issues for Analyzing Impacts on Surface Water

Issue	Analysis Method
Reduction in surface water flows of streams, seeps, creeks or impacts on water rights downstream from the drawdown of groundwater.	Results from groundwater pre-mining baseline analysis and groundwater modeling will be used to quantify impacts on quantity and flow of surface water features, including seeps creeks, and wetlands. Qualitative assessment to downstream surface water rights.
Surface water quality effects from discharged groundwater and contaminant trace elements, including selenium, compliance with water quality standards, and relocation of the Stewart Canyon Road.	Results from groundwater modeling used to assess impacts to surface water quality, including evaluation of trace metals and selenium from discharges of groundwater to surface water features, including seeps and wetlands, Quantitative and qualitative assessment of fate and transport of contaminates, including trace metals and selenium, to downstream creeks and rivers, including the Blackfoot river. Qualitative assessment of the Stewart Canyon Road now, and if relocated.
Sedimentation from soil erosion	Soil erosion from mining resulting in sedimentation of surface water bodies, and compliance with water quality standards.

3.5.2 Affected Environment

Surface Water Flow and Water Rights

The main drainages are described below with perennial, intermittent, and ephemeral determinations based on definitions specified by the Idaho water quality standards (IDAPA 58.01.02.010) and definitions established by the Corps of Engineers. The Blackfoot River, Diamond Creek, and Dry Valley Creek are characterized as low-gradient, wide valley streams; while all other drainages are relatively high-gradient channels surrounded by steep, mountainous slopes. The west flank of Dry Ridge is dominated by steep ephemeral drainages which rarely form a confluence with Dry Valley Creek (**Figure 34**).

Surface water baseline characterization sampling was conducted between 2011 and 2019 (Tetra Tech, Inc., 2014b; Arcadis, 2020c). The surface water monitoring network has historically included 252 locations with stations added and dropped based on data evaluation and study objectives. Stations were sampled for some or all the following parameters: flow (discharge), water quality, seep/spring surveys, sediment quality, and stream gain-loss determination. An overview of the 2011-2019 stream discharge measurements for prominent monitoring stations is provided in **Table 23**. Calculated discharge rates for sampling events and sampling locations are in the Surface Water Baseline Report (Arcadis, 2020c).

Figure 33. Surface Water, Wetlands, Riparian, and Wildlife Resources Study Area

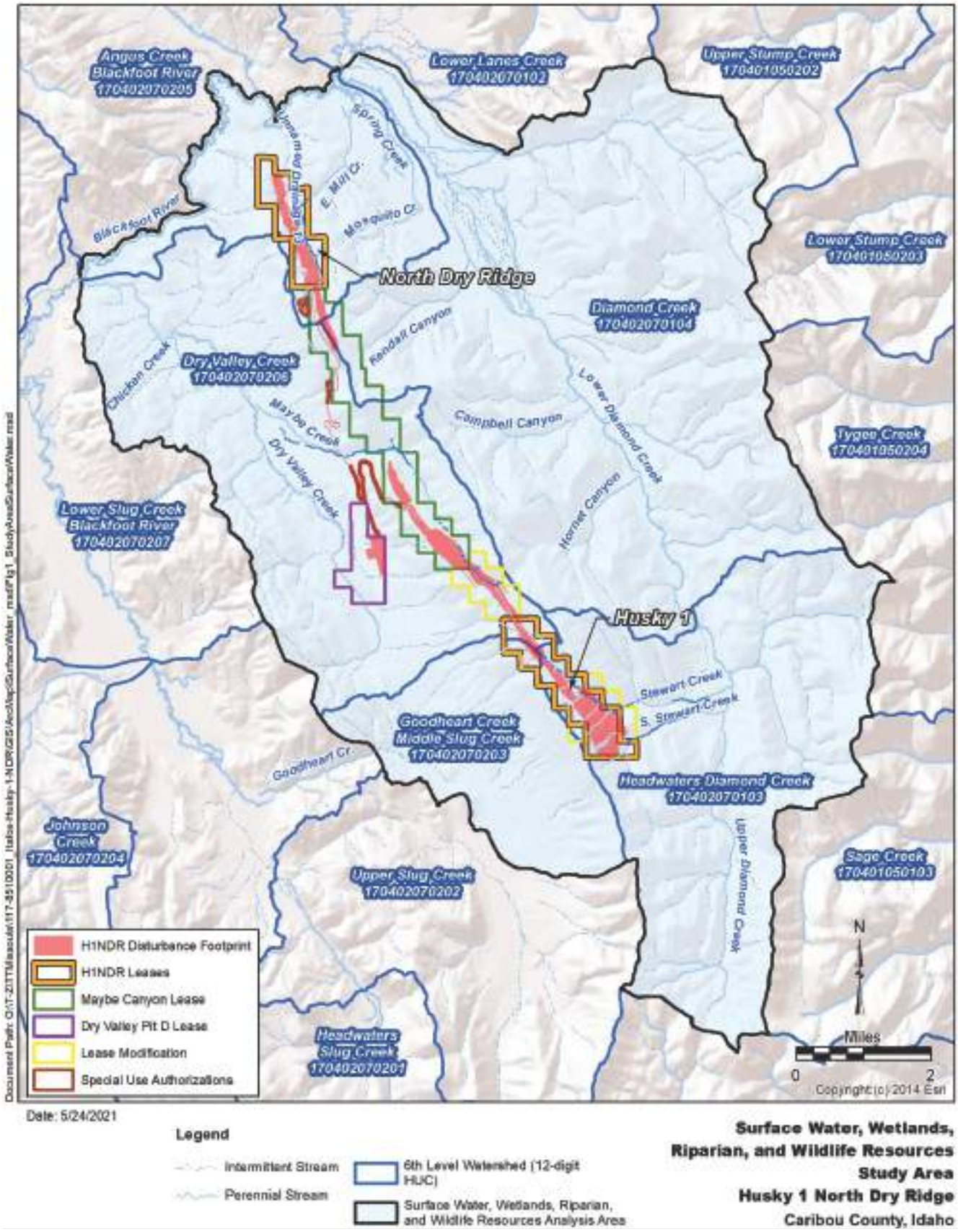


Figure 34. Stream Gain/Loss Baseline Conditions

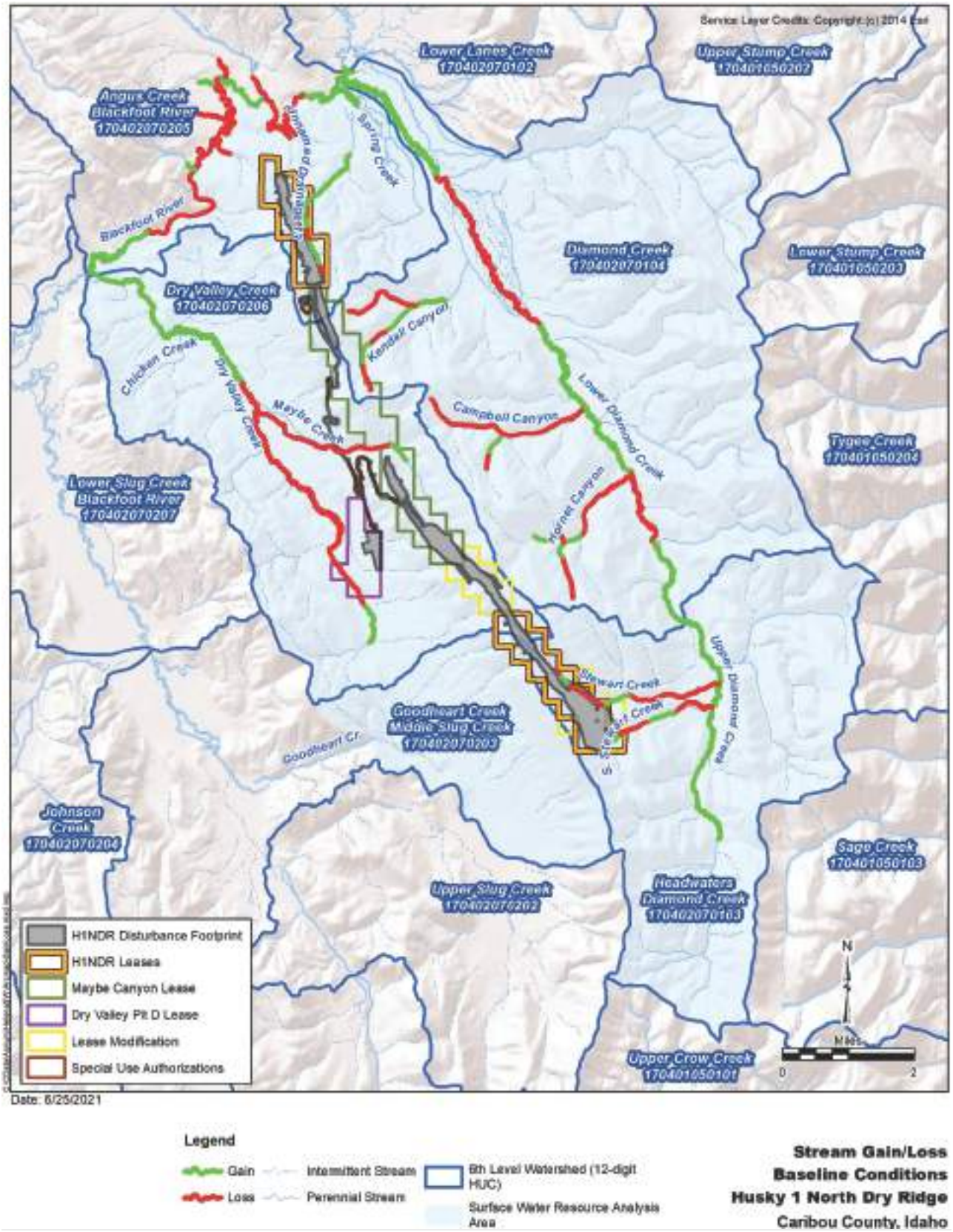


Table 23. Surface Water Flow Characteristics

Drainage	Classification	Flow
Blackfoot River	perennial	33 cubic feet per second (cfs) to 274 cfs (Station SW-BF4)
Dry Valley Creek	intermittent	0.05 cfs and 21 cfs (Station SW-DV2)
Maybe Creek	intermittent	dry to 5 cfs (Station SW-MB1)
Goodheart Creek	ephemeral stream upstream of the Champ Mine and intermittent immediately downstream of the Champ Mine.	0.004 cfs to 0.135 cfs (Station SW-SP2).
Diamond Creek	perennial	dry to 45 cfs (Station SW-DC3)
East Mill Creek	perennial	0.57 cfs to 6.9 cfs (Station IA8-07A)
Stewart Creek	intermittent above the lease boundary and perennial below the lease boundary	dry to 14 cfs (Station SW-SC1)
South Stewart Creek	intermittent with an ephemeral north branch and intermittent south branch in its upper reaches	dry to 1,7 cfs (SW-SSC1)

Source (Arcadis, 2020c).

Groundwater – Surface Water Interactions on Flow

The upper most ground water system potentially interacts with surface water and includes groundwater from alluvium and colluvium near the land surface and shallow bedrock above the low-permeability Meade Peak Member of the Phosphoria Formation (Tetra Tech, Inc., 2019b). During runoff in April and May, water infiltrates into the upper system and eventually discharges into seeps or gaining stream reaches (**Figure 34**).

Surface Water Rights

A January 2020 search of the Idaho Department of Water Resources general mapping tool (Idaho Department of Water Resources, 2020) for surface water rights found 163 water rights and documented points of diversion. Ownership and points of diversion for these water rights are presented in the *Final Surface Water Baseline Report Addendum* (Arcadis, 2020c).

Surface Water Quality

Idaho water quality standards are the basis for evaluating surface water quality (IDAPA 58.01.02). Only the Blackfoot River has designated beneficial uses (IDAPA 58.01.02), cold water aquatic life, salmonid spawning, primary/secondary recreation, and agricultural and domestic water supply. Other water bodies are undesignated but are required to be protected for beneficial uses including "all recreational use in and on the water and the protection and propagation of fish, and wildlife wherever attainable" by IDAPA 58.01.02 Section 101. If an undesignated surface water body is intermittent, the numeric criteria do apply during periods of "optimal" flow that are sufficient to support the uses for which the water body is designated.

The COPCs that may be released to water contacting overburden materials (antimony, arsenic, cadmium, copper, iron, manganese, nickel, selenium, sulfate, thallium, total dissolved solids, uranium, and zinc) and the water quality standards are shown in Table 24 for aquatic life and for human health. There are no applicable standards for iron, manganese, sulfate, thallium, total dissolved solids, or uranium (Arcadis, 2020a). The aquatic life standards for copper is calculated using the Biotic Ligand Model which calculates copper criteria using the ambient measured parameters of temperature, pH, dissolved organic carbon, calcium, magnesium, sodium, potassium, sulfate, sulfide, chloride, and

alkalinity (IDAPA 58.01.02.210). The aquatic life standards for cadmium and zinc are calculated using ambient stream sample hardness. The selected screening levels were based on the minimum value for protection of aquatic life or protection of human health for comparative purposes only,

Table 24. Water Quality Standards for COPCs

Analyte	Fraction	Units	Criteria for Aquatic Life[1]		Criteria for Human Health [2]	
			Criteria Maximum Concentration (Acute)	Criteria Continuous Concentration (Chronic)	Water & Fish	Fish Only
antimony	dissolved	µg/L	No Standard	No Standard	5.2	190
arsenic	dissolved	µg/L	340	150	10	10
cadmium	dissolved	µg/L	2.0	0.8	No Standard	No Standard
copper[3]	dissolved	µg/L	12.3	7.6	1,300	
iron	dissolved	µg/L	NS	NS	No Standard	No Standard
manganese	dissolved	µg/L	NS	NS	No Standard	No Standard
nickel	dissolved	µg/L	770	86	58	100
selenium[4]	dissolved	µg/L	see footnote	1.5 or 3.1	29	250
sulfate			No Standard	No Standard	No Standard	No Standard
thallium		µg/L	No Standard	No Standard	0.017	0.023
total dissolved solids	dissolved	mg/L	No Standard	No Standard	No Standard	No Standard
uranium			No Standard	No Standard	No Standard	No Standard
zinc	dissolved	µg/L	193	194	870	1,500

1 Values for cadmium, nickel, and zinc are for comparative purposes only and based on a hardness value of 180 mg/L measured as CaCO3

2 Criteria are based on consumption

3 Values are for comparative purposes only; based on the Biotic Ligand Model

4 Depends on lentic or lotic. Lentic (ponded) locations are screened against the 1.5 µg/L criterion. Lotic (flowing) locations are screened against the 3.1 µg/L criterion; there is no specific acute criterion for aquatic life; however, the aquatic life criterion is based chronic effects and is expected to adequately protect against acute effects.

Section 303(d) of the Clean Water Act requires states to identify streams and lakes that do not meet water quality standards. Listed 303(d) water bodies are presented in **Table 25** and on **Figure 35** (IDEQ, 2020). Several stream segments have been listed as impaired under Section 303(d) for sedimentation/siltation and temperature. For most of these segments, TMDLs have been developed to establish procedures and best management practices to bring these waters into attainment with standards and beneficial uses. Several segments have also been listed for selenium. TMDLs for most of these segments have not currently been developed by IDEQ or a specific schedule established.

A portion of NFS Road 134 closely follows Stewart Creek and contributes sediment loads to the creek through erosion and fugitive dust. As noted in **Table 25**, Stewart Canyon is listed under Section 303(d) for sedimentation and a TMDL has been established by IDEQ.

Table 25. 303(d) Listed Streams and Rivers

Water Body	Stream Miles	Impaired Not from Pollutant [1]	Impaired 303(d) Listed [2]	TMDL Established [3]	Listed Pollutant
Blackfoot River – HUC No. 17040207					
Blackfoot River - ID17040207SK010_05	20.72	No	Yes	No	selenium, dissolved oxygen
		No	Yes	Yes	sediment, temperature
Goodheart Creek - D17040207SK012_02b	7.55	No	Yes	No	selenium
		Yes	No	--	physical substrate
Maybe Creek – Source to Mouth - ID17040207SK014_02	5.23	No	Yes	No	selenium
		No	Yes	Yes	sediment
Dry Valley Creek - ID17040207SK013_02a	6.44	No	Yes	No	selenium
		Yes	No	--	physical substrate
Chicken Creek – Tributary to Dry Valley Creek - ID17040207SK013_02b	2.85	No	Yes	No	selenium
		No	Yes	Yes	sediment
Dry Valley Creek – Source to Mouth - ID17040207SK013_03	4.99	No	Yes	No	selenium
East Mill Creek - ID17040207SK015_02a	2.44	No	Yes	No	selenium
Stewart Canyon - ID17040207SK016_02f	2.99	No	Yes	Yes	sediment
Campbell Canyon - ID17040207SK016_02g	2.16	No	Yes	Yes	sediment
Diamond Creek – unnamed tributaries - ID17040207SK016_02	41.77	No	Yes	Yes	sediment
Upper Diamond Creek - ID17040207SK016_02a	4.43	No	Yes	No	temperature
Middle Diamond Creek - ID17040207SK016_03a	10.63	No	Yes	No	temperature
		No	Yes	Yes	sediment, e-coli
Lower Diamond Creek - ID17040207SK016_03	19.31	No	Yes	No	temperature
		No	Yes	Yes	sediment, e-coli

1 IDEQ 2020 Integrated Report Category 4c (Impaired by Other Pollution list)
2 IDEQ 2020 Integrated Report Category 5 (303d list). No TMDLs established.
3 IDEQ 2020 Integrated Report; Category 4a. Waters with established TMDL approved by EPA.
4 IDEQ Assessment Unit (AU) Code for the designated stream reach (IDEQ, 2020)

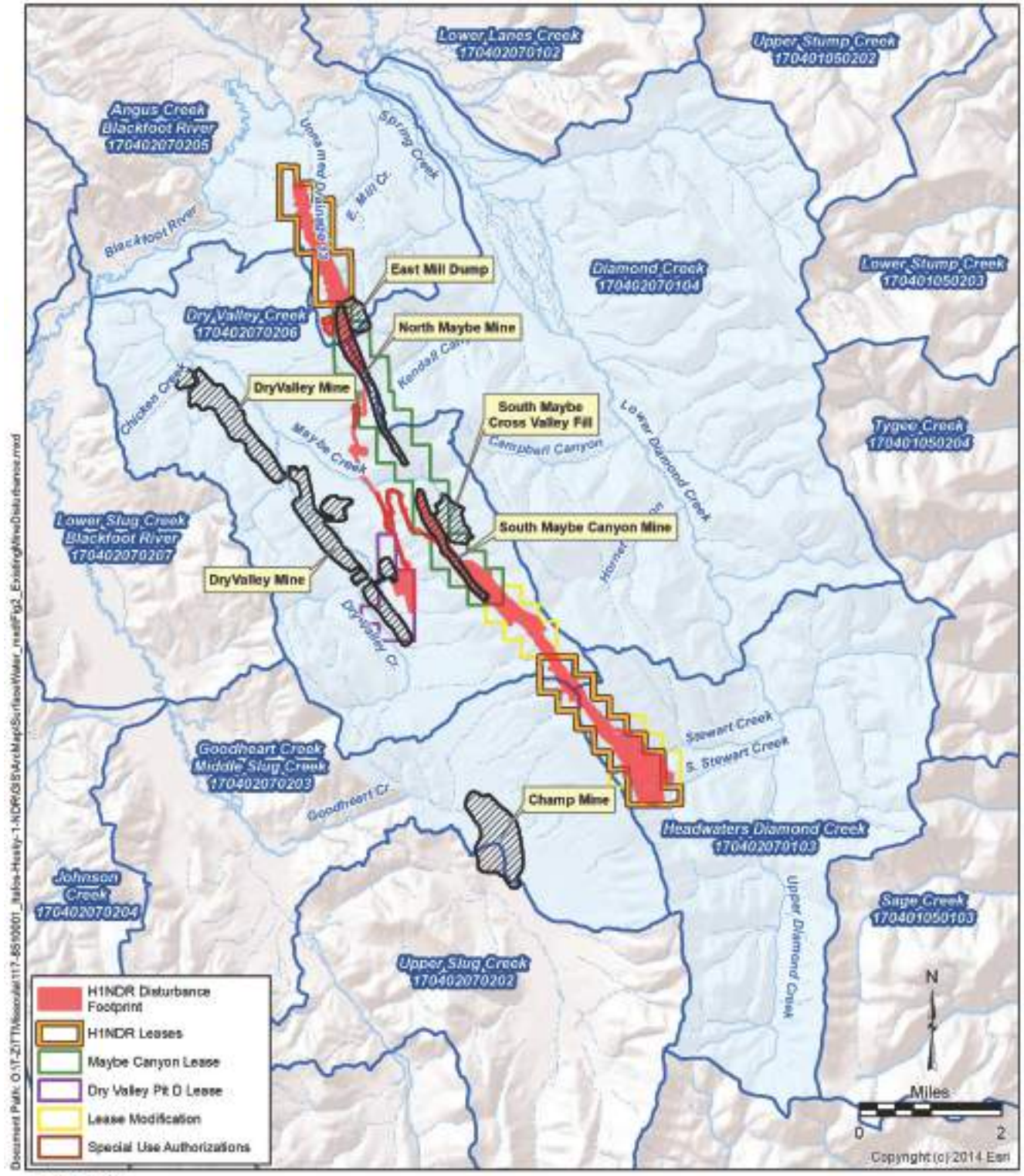
3.5.3 Environmental Consequences

3.5.3.1 Proposed Action

Surface Water Flow and Water Rights

Groundwater flow modeling showed no adverse impacts on surface water base flows in stream (Tetra Tech, Inc., 2021c). Specifically modeling of intermittent and perennial flows in Kendell Creek, East

Figure 35. Closed Mine Disturbance Areas



Mill Creek, Diamond Creek, Mosquito Creek and Dry Valley Creek showed no reduction in stream baseflow. After closure, model results suggest that negligible or minor increases in baseline flow could occur in East Mill Creek, Diamond Creek, and Dry Valley Creek after approximately 20 years as the potentiometric surface recovers in the reclaimed mine pits. This potential increase becomes asymptotic after approximately 40 years. The model results showed no impacts on flow regimes in the Blackfoot River and none are expected.

Groundwater flow modeling indicated that 28 mapped seeps within 1,000 feet of the proposed H1NDR pit boundaries could have reduced flow rates from reduced potentiometric heads that would result from mining (**Table 23**). The majority of these seeps occur near East Mill Creek, Maybe Creek, and Stewart Creek (**Figure 36**). These seeps do not contribute significant flow to these creeks and would be expected to have no or negligible affects to stream flows.

The realigned channel of a portion of Stewart Creek would be designed to convey the stream flow that would result from the 100-year, 24-hour storm event plus a 6-inch freeboard. Conceptual channel designs would incorporate a 60 mils HDPE liner under a bedding layer and rip rap for stability. This design would limit infiltration of the flow into the fill or substrate. The design life of the buried liner system would be 200 to 750 years (Peggs, 2003). There would be no impacts to streamflow or flow regimes in Stewart Creek from the realignment. The engineered channel would be expected to be stable withing the landscape because of the 100-year peak flow design capacity. There would be limited flow events exceeding design capacity; migration of the channel would not be expected.

The Proposed Action would not result in downstream impacts to water rights.

Surface Water Quality from Groundwater

Groundwater modeling indicates that the Proposed Action cover would allow a gradual and limited selenium discharge into the headwaters of Stewart Creek, Maybe Creek, and East Mill Creek **(Figure 37** through **Figure 39**). Selenium in groundwater discharging to these headwaters could exceed 20 to 50 µg/L, which is 10 times higher than the site-specific standard of 3.1 µg/L (**Table 24**) 20 years after closure. These concentrations would reduce to undetectable levels after approximately 50 years. Stewart Creek, South Stewart Creek, and Diamond Creek are not listed under Section 303(d) as impaired for Se (**Table 25**). Effects to water quality would be localized to headwater reaches where groundwater interactions occur and existing surface water flow would quickly mix with groundwater in the stream (Tetra Tech, Inc., 2021e). There would be no impacts on surface water quality or impacts would be negligible in downstream reaches of Stewart Creek and in Diamond Creek. No detectible impacts to water quality would occur in lower Diamond Creek, Dry Valley Creek, or the Blackfoot River. While impacts after mixing would be negligible, they would represent a new source of loading of Se to impaired streams, including East Mill Creek and the Blackfoot River.

Figure 37 through **Figure 39** present the predicted selenium concentration where groundwater discharges to Stewart Creek, East Mill Creek, and Maybe Creek.

Figure 36. Seeps

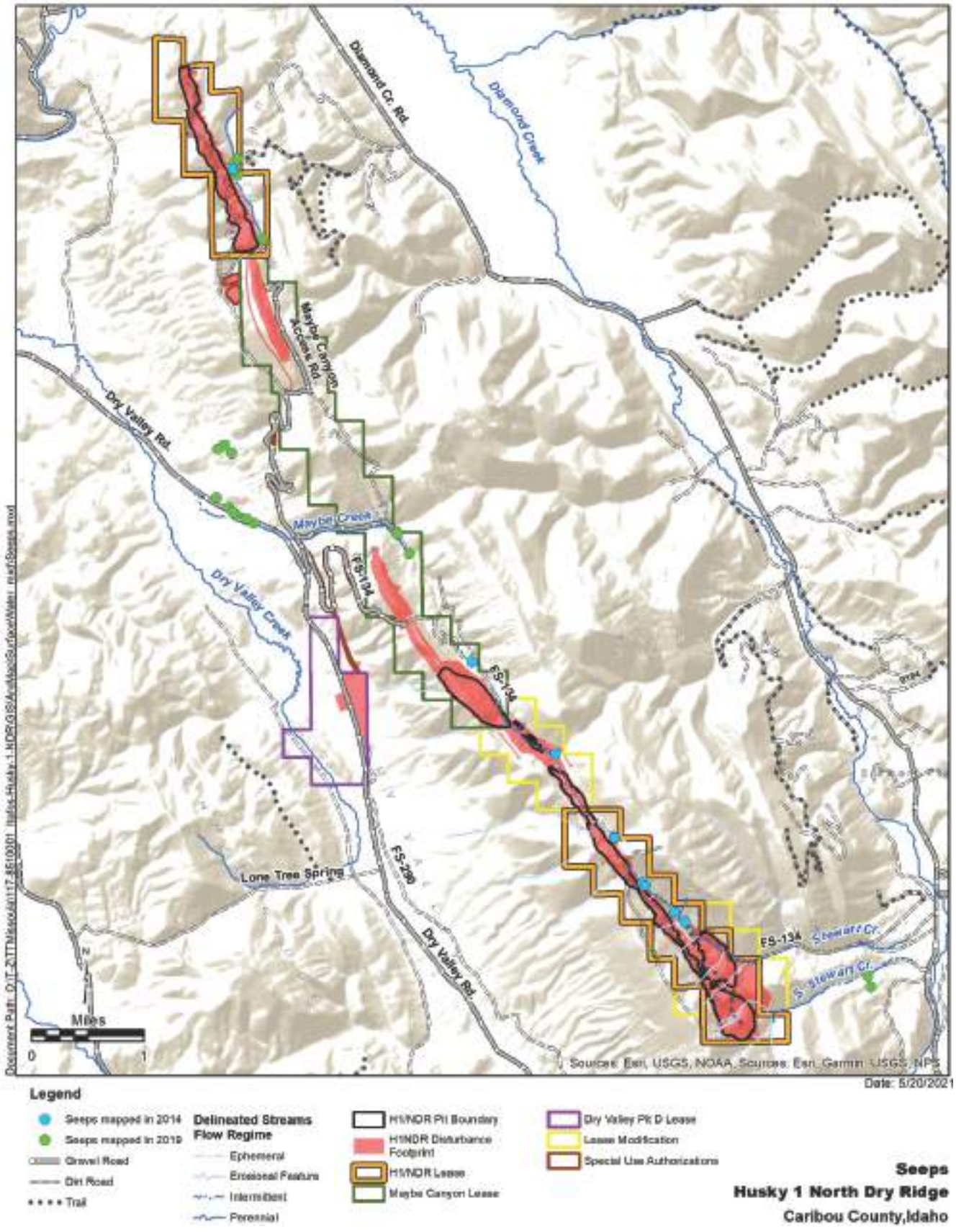


Figure 37. Proposed Action Simulated Selenium Discharging into Stewart Creek

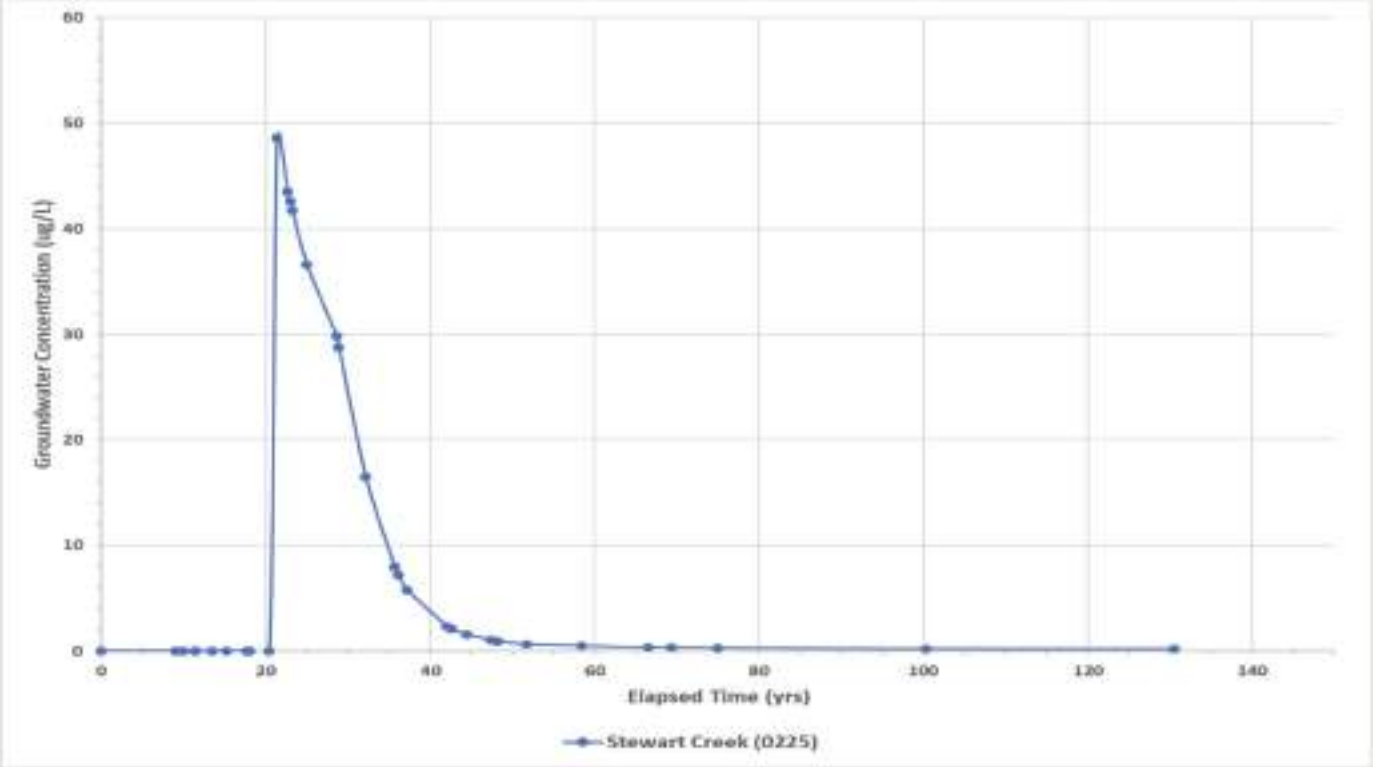


Figure 38. Proposed Action Simulated Selenium Discharging into East Mill Creek

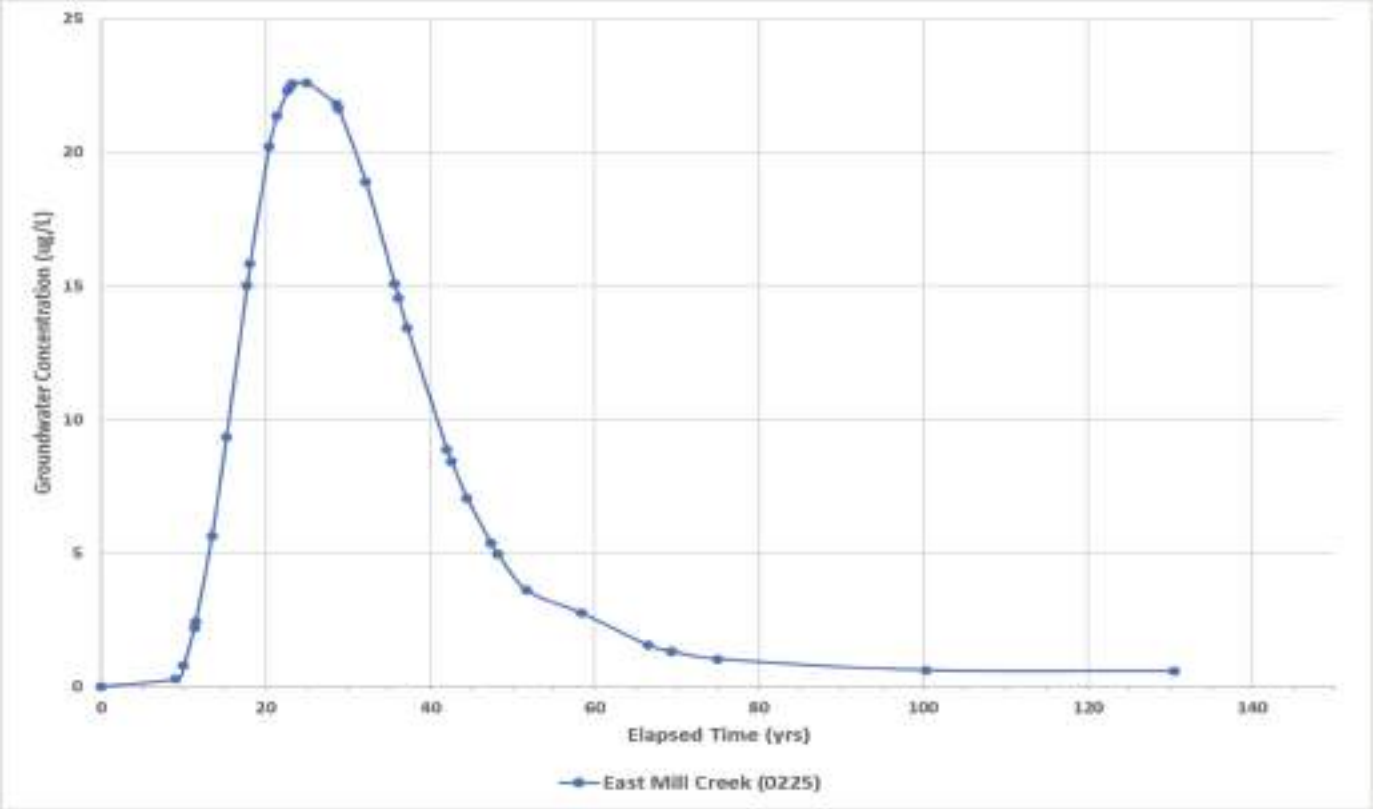
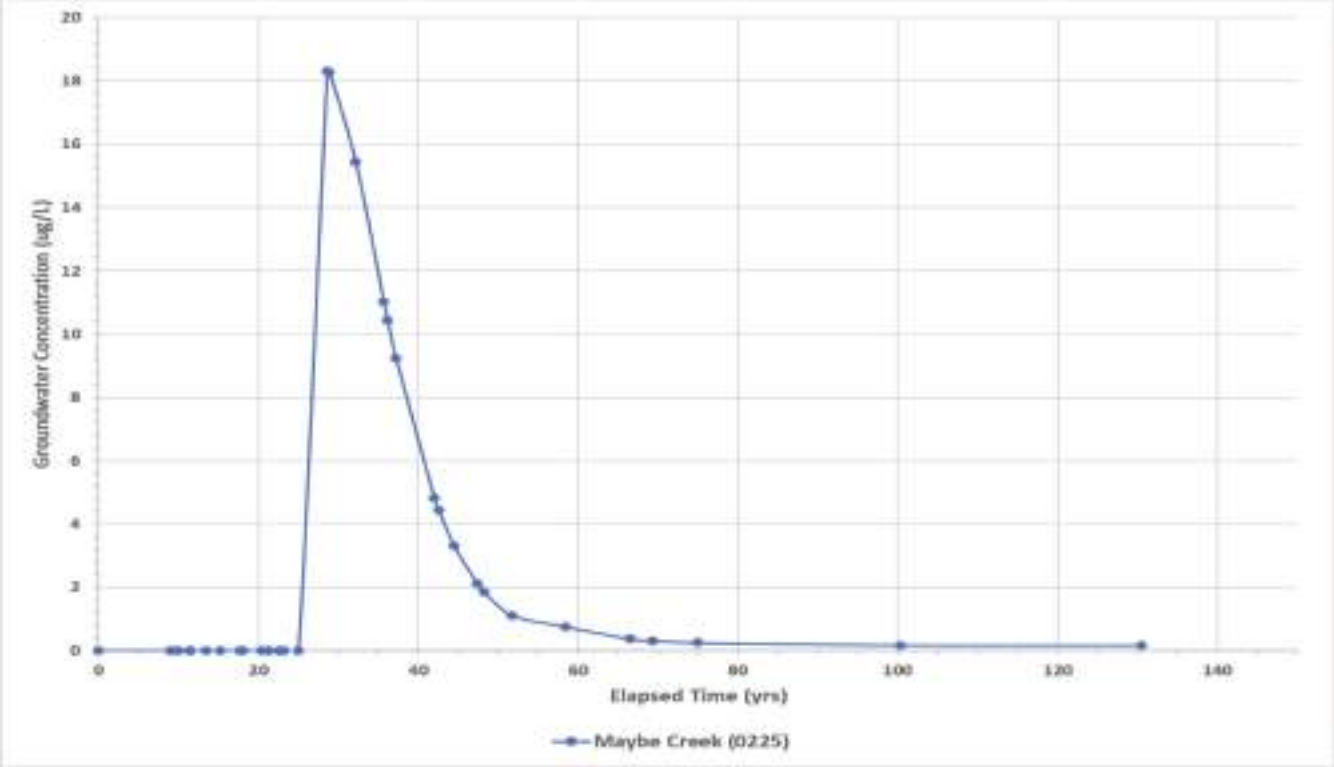


Figure 39. Proposed Action Simulated Selenium Discharging into Maybe Creek



Sedimentation

Minor impacts to stream water quality and sedimentation could occur during construction and realignment of Stewart Creek. These impacts would be short-term and confined to construction disturbance. BMPs and EPMs (Sections 2.2.9.4 and 2.2.9.5) would minimize sedimentation. Long-term impacts on stream water quality would not be expected in Stewart Creek because of the stream realignment prior to mining.

Closing NFS Road 134 would reduce sedimentation of Stewart Creek from the road and because of the realignment of Stewart Creek away from areas of disturbance. Once the road is reopened after reclamation conditions will return to their current status.

The site-specific stormwater management controls and BMPs would reduce the pollutants in stormwater discharged and ensure that stormwater discharges meet applicable Idaho water quality standards and stormwater regulations.

Impacts on surface water from construction or operation of the mine would be negligible because of the required permits and BMPs (MRP Surface Water Management Plan design for controlling surface water runoff and minimizing erosion, sedimentation (Itafos, 2020a, pp. D-1 Appendix D)) that would be employed.

Potential Conflicts with CERCLA actions from Maybe Creek Realignment

The Maybe Creek realignment would not result in additional impacts to water quality or produce conflicts with ongoing CERCLA actions (Section 3.2.1).

Because the channel will be constructed across limestone non-seleniferous fill and will be lined, the water being conveyed north to the Maybe Mine would not add loading of COPCs, including selenium to the areas under current remedial investigation.

3.5.3.2 No Action

Surface Water Flow and Water Rights

Stream flow and flow in seeps would not be affected.

Surface Water Quality from Groundwater

Stream water quality would not be affected above existing conditions. The streams that are listed as impaired under Section 303(d) of the Clean Water Act will remain in their current condition (**Table 25)**. CERCLA remediation would continue and surface water quality would eventually improve.

Sedimentation

Impacts to stream water quality from ground disturbance, erosion and sedimentation in the study are from the H1NDR Mine would not occur above existing conditions. NFS Road 134 would remain in place and likely continue to contribute sediment loads to Stewart Creek which is listed under Section 303(d) for sedimentation.

Potential Conflicts with CERCLA actions from Maybe Creek Realignment

Impacts to flow and water quality in Maybe Creek from the North Maybe Mine and South Maybe Canyon Mine and specifically the South Maybe Cross Valley Fill, would remain under current conditions. Site investigations and monitoring that are being conducted to define the nature and extent and the fate and transport of defined COPCs, including selenium, in support of a CERCLA Remedial Investigation/Feasibility Study would continue (see Section 3.2.1).

3.5.3.3 Alternative Cover

Surface Water Flow and Water Rights

The discharge of groundwater from the reclaimed mine pits to surface water would be less than under the Proposed Alternative, as indicated by the groundwater fate and transport model (Tetra Tech, Inc., 2021c). There would be no impacts on surface water baseflows.

Surface Water Quality from Groundwater

The Alternative Cover would reduce or prohibit the infiltration of meteoric water into the backfill and subsequent discharge to surface water. The groundwater model results indicate that limited discharge and undetectable loading of selenium and other COPCs would occur to Stewart Creek, Maybe Creek, and East Mill Creek. The maximum modeled concentration of selenium (0.2 µg/L) would be below analytically detectable levels and essentially represents zero loading of selenium to the streams. Impacts to surface water quality would be undetectable in these streams. No detectible impacts to water quality would be expected in the Blackfoot River.

Sedimentation

Impacts from sedimentation would be the same as the Proposed Action.

Potential Conflicts with CERCLA actions from Maybe Creek Realignment

Impacts from the Maybe Creek realignment would be the same as the Proposed Action.

3.5.3.4 Alternative Stream Routing

Surface Water Quantity and Flow

Impacts from water quantity and stream flow would be the same as described for the Proposed Action. Impacts to streamflow or flow regimes in Stewart Canyon would not be expected from construction of the alternate realignment at closure.

Surface Water Quality

Impacts to surface water quality would be expected to be the same as the Proposed Action.

Soil Erosion and Sedimentation

Impacts to water quality from surface disturbance, potential erosion and sedimentation would be expected to be the same as described for the Proposed Action.

Potential Conflicts with CERCLA actions from Maybe Creek Realignment

Impacts from the Maybe Creek realignment would be expected to be the same as the Proposed Action.

3.5.3.5 Alternative Access

Surface Water Flow and Water Rights

Impacts to water quantity and streamflow from the Alternative Road or the ATV trail option would be expected to be the same as described for the Proposed Action. To meet standards in the 2003 RFP, the road will be designed to avoid impacts on surface water flow.

Surface Water Quality from Groundwater

Impacts to surface water quality from the Alternative Road or the ATV trail option would be expected to be the same as the Proposed Action.

Sedimentation

Realigning NFS Road 134 or the ATV trail option would eliminate the close proximity of the road to Stewart Creek in the mining area. Sediment loading to Stewart Creek from the current road would be reduced or eliminated by rerouting 5.8 miles of the road away from close proximity to the creek. Potential impacts to water quality would be negligible or none from the new road segment.

Potential Conflicts with CERCLA actions from Alternative Access

Impacts from the Alternative Access road or ATV Trail would be expected to be the same as described for the Proposed Action.

3.6 Wetlands, Non-wetland Waters, and Riparian Vegetation

The Clean Water Act, as amended in 1972, establishes the basic structure for regulating discharges of pollutants into waters of the U.S., including wetlands. Impacts to jurisdictional wetlands would be permitted through the U.S. Army Corps of Engineers.

Section 404 404(b)(1) guidelines are the criteria used to evaluate discharges of dredged or fill material into waters of the United States. A fundamental principle of the Section 404(b)(1) guidelines is that dredged or fill material should not be discharged into wetlands and other waters, unless it can be demonstrated that there is not a practicable alternative to the proposed discharge that would have less adverse impact on aquatic resources. Section 404(b)(1) also specifies that the proposed discharge must

not cause or contribute to the violation of other applicable Federal or state laws (e.g., water quality standards, Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act), the project will not result in significant degradation of waters of the U.S., and any appropriate and practicable steps have been taken to minimize the adverse impacts on wetlands and other waters. This is referred to as the least environmentally damaging practicable alternative. For actions subject to NEPA, the 404(b)(1) guidelines provide the necessary information for evaluation.

3.6.1 Analysis Area and Methods

The wetland, non-wetland waters of the US, and riparian vegetation analysis area is the project footprint including all areas of surface disturbance from development of the mine pits and supporting infrastructure. The analysis area for downstream effects to wetlands and non-wetland waters is the same as the surface water analysis area, shown in **Figure 33**. The analysis area extends outside of the mine disturbance footprint to include surface water adjacent to or downstream from the project that may be affected by changes in water quantity or quality. Thus, the analysis area also includes a portion of the upper Blackfoot River Subbasin.

The issues for analyzing impacts on wetlands, non-wetland waters, and riparian vegetation and the methods that will be used to discuss them are shown in **Table 26.**

Table 26. Issues and Indicators for Wetlands, Non-wetland Waters, and Riparian

Issue	Analysis Method
Acres of wetlands and linear feet of streams (non-wetland waters) that would be permanently lost	Quantify the acreage of wetlands and linear feet of streams impacted and identify whether impacts are temporary or permanent. Qualitatively discuss the quality of wetlands impacted and the riparian vegetation loss from affected streams.
Hydrologic changes due to mine development on wetlands, including seeps and streams	Qualitatively discuss the potential effects using information provided in the project water resources analysis (surface and groundwater effects)
Stormwater runoff to contact wetlands and streams	Qualitatively discuss habitat degradation (sedimentation), potential plant uptake of COPCs, and proposed preventative measures.

3.6.2 Affected Environment

Wetlands

Baseline surveys delineated unique wetland features totaling 22.7 acres in the combined study areas. Wetland types mapped, based on the Cowardin classification system (Cowardin, et al., 1979) and the hydrogeomorphic classification system (Brinson, 1993), included palustrine emergent, a mosaic of emergent and scrub-shrub, a mosaic of scrub-shrub and forested (noted as having been partially logged), scrub-shrub, riverine, slope, and depressional.

Non-Wetland Waters and Riparian Vegetation

Non-wetland water features were mapped as segments depending on flow regime and organized by 6th level watersheds. The 6th-level watersheds in the analysis area are shown in **Figure 33**. Perennial and intermittent streams are also included in the riparian assessment. Groundwater is the primary hydrologic influence for all of those listed. Streams and water quality are shown in **Table 25**.

3.6.3 Environmental Consequences

3.6.3.1 Proposed Action

Wetlands

Acres of wetlands that would be directly impacted by dredge/fill activities as part of the construction of mine pits and roads, resulting in a permanent loss are shown in **Table 27**. The Feature Identification label from the baseline studies is provided as a cross-reference. **Figure 40** shows approximately where the impacts would occur. Impacts on wetlands would be permanent, but the acreage of wetlands lost is a relatively small total amount. This loss would be irreversible. Wetlands affected include small seeps and wetlands formed due to impoundments. The total loss of wetlands would be minor.

Table 27. Acres of Wetlands Disturbed by Type

Cowardin Classification[1] Hydrogeomorphic Class Feature ID2	Subwatershed	Comments	Artificial	Acres
PEMC Slope AB-092712-1052	Angus Creek-Blackfoot River	Wide, low-gradient section of East Mill Creek with slope seep contributing to hydrology. Wallow within wetland boundaries.	No	0.03
PEMC Slope AB-072613-1220	Angus Creek-Blackfoot River	Hillside, seep-fed, located on slope above East Mill Creek.	No	0.01
PEMC Slope DV-092912-0830	Dry Valley Creek	Small sedge, seep-fed, wetland in valley bottom.	No	0.01
PEMC Slope DV-071614-1130	Dry Valley Creek	Seep wetland located at the head of non-wetland water feature DV-082313-1330	No	<0.01
PEMCh Riverine DV-092912-1120	Dry Valley Creek	Fringe wetland around an impounded pond; water flows in and out of pond.	Yes; Excavated	0.07
PSSC Riverine DV-092612-1133	Dry Valley Creek	Stream partially impounded by road and adjacent wetland, constricted by culvert that runs under mine access road.	Yes; Impounded - culvert	0.05
Total Acres				0.17

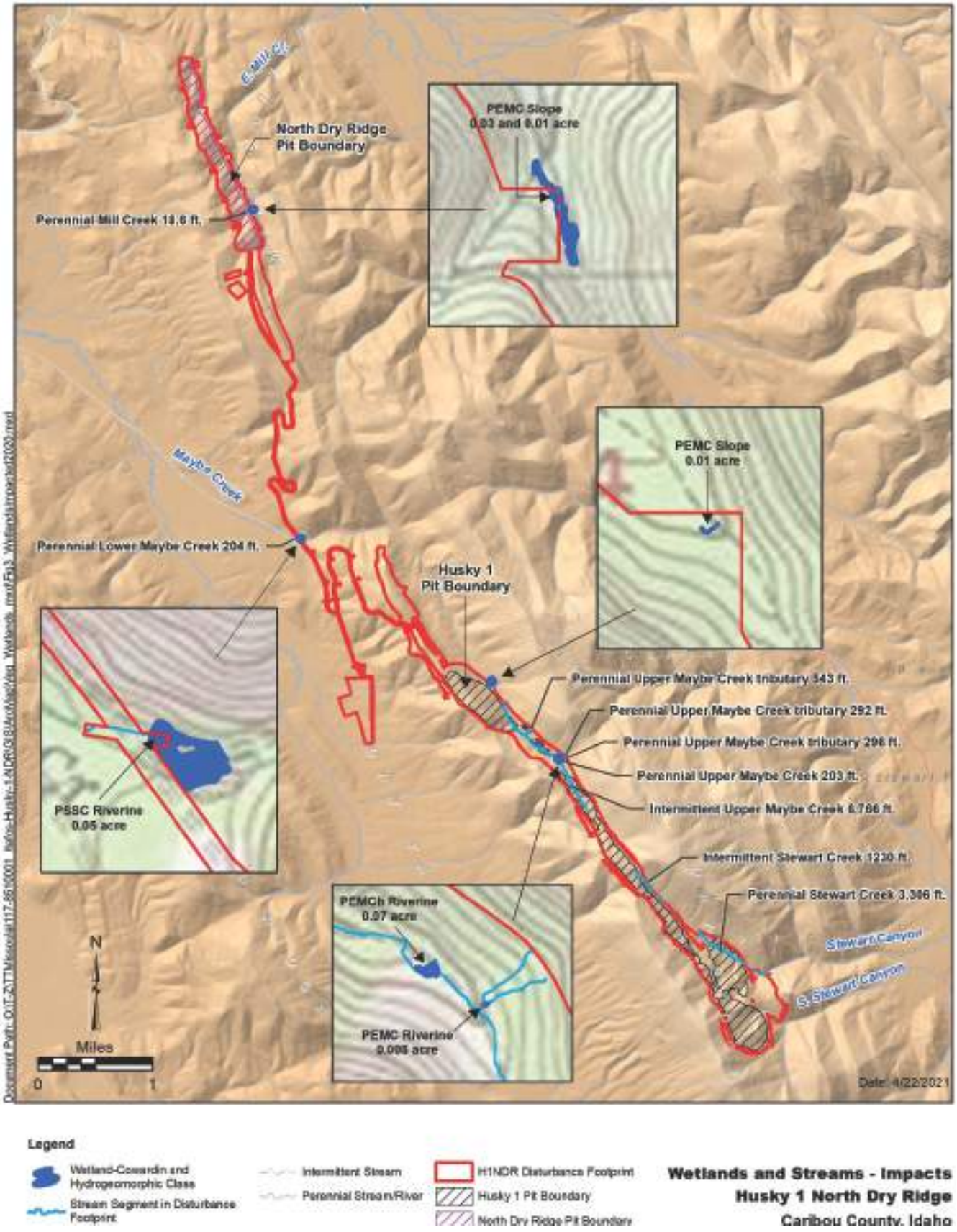
1 PEMC = palustrine emergent, seasonally flooded; PEMCh= palustrine emergent, seasonally flooded-diked/impounded; PSSC=Palustrine Shrub-scrub

2 Sources: (Tetra Tech, Inc., 2014c; Arcadis, 2020g)

Non-wetland Waters and Riparian

Perennial or intermittent segments of East Mill Creek, Lower Maybe Creek, Upper Maybe Creek, tributaries of Upper Maybe Creek, and Stewart Creek would be dredged, filled, and/or realigned under the Proposed Action. A total of 0.92 mile of perennial stream and 1.51 miles of intermittent stream would be impacted with development of mine pits and construction of roads. Riparian vegetation along the impacted segments would be removed, resulting in a permanent, irreversible loss.

Figure 40. Wetland impacts



Approximately 2.55 miles of ephemeral channel segments would also be dredged or filled. Impacts on riparian vegetation would not occur along these channels, as riparian vegetation does not occur. The general effect of the linear length of other waters lost would be a moderate impact. Impacts on riparian vegetation of the individual segments are discussed below.

Table 28 presents linear feet of streams impacted, grouped by subwatershed. **Figure 40** shows where impacts would occur.

Table 28. Linear Feet of Streams Impacted by Flow Duration and Subwatershed

Subwatershed	Stream Name Feature Identification[1]	Notes	Feet[3]
Perennial Stream Segments			
Angus Creek-Blackfoot River	East Mill Creek AB-092712-1030	East Mill Creek originates from the down- gradient side of a large reclamation area and supports several wetlands along its reach.	19
Dry Valley Creek	Lower Maybe Creek DV-072813-0945	Lower Maybe Creek channelized by railroad up-gradient and road lower in the valley. Three culverts in reach.	132
Dry Valley Creek	Upper Maybe Creek DV-092912-0830	Small stretch of upper Maybe Creek fed from wetland features (082313-1330 and 082313-1350), flows into an excavated pond.	203
Dry Valley Creek	Upper Maybe Creek tributary DV-082313-1350	Seep fed tributary to upper Maybe Creek, flows through wetland feature (082313-1330) before entering upper Maybe Creek.	361
Dry Valley Creek	Upper Maybe Creek tributary DV-082313-1330	Seep fed tributary to upper Maybe Creek with an old spring box at the source. One culvert along reach.	296
Dry Valley Creek	Upper Maybe Creek tributary DV-082313-1130	Seep fed tributary to upper Maybe Creek with shrub riparian community. One culvert along reach.	543
Headwaters Diamond Creek	Stewart Creek HD-093012-0340	Lower portion of Stewart Creek, seep fed, adjacent to access road.	3,307
Total Perennial:			4,860
Intermittent			
Dry Valley Creek	Upper Maybe Creek DV-092912-0820	Intermittent portions of upper Maybe creek. Seeps contribute flow to these sections.	6,744
Headwaters Diamond Creek	Stewart Creek HD-093012-0320	Includes a small seep within OHWM.	1,231
Total Intermittent:			7,974
Ephemeral			
Angus Creek-Blackfoot River	Constructed Drainage AB-092812-0120	Ephemeral dry roadside ditch that is part of past reclamation. Appears to have low flow. NHD shows a stream in area before disturbance.	10
Dry Valley Creek	Unnamed DV-092912-0240	Ephemeral dry, steep, gully with upland vegetation throughout the channel. OHWM is 3 feet wide and 1.5 feet in depth.	573
Dry Valley Creek	Upper Maybe	Ephemeral channel, OHWM 2.5 feet wide.	2,161

Subwatershed	Stream Name Feature Identification[1]	Notes	Feet[3]
	Creek DV-082213-0930		
Dry Valley Creek	Upper Maybe Creek DV-092912-0825	Ephemeral section of upper Maybe creek. Dry channel with upland vegetation, OHWM 3 feet wide, 1 foot deep. Bed and bank well defined.	400
Headwaters Diamond Creek	South Stewart HD-093012-1115	Steep ephemeral drainage.	2,454
Headwaters Diamond Creek	Unnamed HD-100112-0230	Ephemeral dry, steep, gully with upland vegetation throughout the channel. OHWM is 3 feet wide and 2 feet in depth. Flows into Stewart Creek.	206
Headwaters Diamond Creek	Unnamed HD-082713-1115	Ephemeral stream fed by runoff from low spot in road. Erosion control implements in place at bottom of short stream section.	217
Headwaters Diamond Creek	Unnamed HD-093012-1055	Ephemeral dry, steep, gully with upland vegetation throughout the channel. OHWM is 3 feet wide and 2 feet in depth. Not connect to other drainage systems.	875
Headwaters Diamond Creek	Unnamed HD-100112-1150	Steep ephemeral drainage. OHWM is 3 feet wide and 2 feet in depth.	2,186
Headwaters Diamond Creek	Unnamed HD-093012-0240	Ephemeral dry, steep, gully with some upland vegetation in the channel. OHWM is 3 feet wide and 2 feet in depth.	781
Headwaters Diamond Creek	Unnamed HD-100112-1100	Ephemeral dry, steep, gully with upland vegetation throughout the poorly defined bed and banks. OHWM is 3 feet wide and 1 foot in depth. Flows into Stewart Creek.	1,098
Headwaters Diamond Creek	Unnamed HD-093012-0205	Ephemeral dry, steep, gully with upland vegetation throughout the channel. OHWM is 5 feet wide and 2 feet in depth.	850
Headwaters Diamond Creek	Unnamed HD-093012-0212	Ephemeral dry, steep, gully. OHWM is 5 feet wide and 2 feet in depth. Feature 093012-0205 flows into this gully.	1,024
	Stream #S21	Ephemeral, no notes	588
Total Ephemeral:			13,421

1 Sources: (Tetra Tech, Inc., 2014c; Arcadis, 2020g)
2 P = perennial, I = intermittent, E = ephemeral, OHWM = ordinary high water mark
3 Calculated from GIS

East Mill Creek

The approximately 19 feet of East Mill Creek that would be impacted by development of the mine pit receives flow from an existing holding pond of the NDR reclaimed mine area. Additional flow is added from seeps. Riparian vegetation lost by development of the mine pit would include the vegetation community/cover types of aspen/mesic forb, barren, anchored log, mesic forb meadow, and conifer/mesic forb (Arcadis, 2020g). The seep wetlands lost would be considered a minor effect because a relatively small area would be affected. The associated riparian vegetation impacted would be a minor and long-term effect, but vegetation was characterized as heavily disturbed.

Lower Maybe Creek

Approximately 204 feet of Lower Maybe Creek that would be disturbed by the access road is channelized by the existing railway and road. The wetland associated with this perennial stream segment has formed from an impoundment caused by a culvert. Access road development would require placement of an additional culvert, which would result in a permanent loss of 0.05 acre of shrub-scrub wetland. However, the culvert would allow streamflow and connection between the wetland and the stream, maintaining the remainder of the existing wetland. The loss of a small portion of shrub-scrub wetland vegetation would be long-term and minor.

Sedimentation may occur during construction but would be minimized with implementation of BMPs and erosion control devices. Installation of a culvert would minimize sedimentation from road use.

Upper Maybe Creek and tributaries

Approximately 1.5 miles (7,757 feet) of Upper Maybe Creek would be realigned. Wetland communities and riparian vegetation lost would include mesic forb meadow, aspen/shrub, conifer, and aspen/mesic forb community types. The greenline transects results included anchored logs, indicating portions of this segment have been previously altered. The realignment would maintain flows during operations and would be re-established during the reclamation phases. See **Figure 14** for design details. Additional impacts shown in (**Table 28**) from culvert placements would occur to Upper Maybe Creek and tributaries. Loss of the riparian vegetation from realignment would be permanent and moderate.

Stewart Creek

Approximately 0.5 mile (2,557 feet) of Stewart Creek (perennial and intermittent segments) would be permanently realigned. Flow would be maintained, but riparian vegetation removed along the intermittent and perennial creek segments would be a moderate, permanent impact. Riparian vegetation was documented as approximately 80% cover as a mix of confer/shrub, shrub (*Salix* sp.), shrub/mesic forb, and *Carex* communities.

Water Quantity

Hydrologic changes to groundwater due to mine development would not occur to the degree that would alter hydrologic functions of wetlands, including seeps and non-wetland waters. Additional details are provided in Section 3.4 and Section 3.5, Groundwater Resources and Surface Water Resources, respectively. Water quantity would not be reduced because stream crossings and culverts would convey non-contact surface water under roads or other mining features to maintain drainage and water flows at a depth and volume similar to the surrounding portions of the stream. Natural flow would be maintained where fill materials and most culverts would be removed at the conclusion and drainages truncated by the pits would be re-routed to not change flow quantities. Impacts on wetlands, including seeps and non-wetland waters due to changes in water quantity would be negligible.

Water Quality

Degradation of wetlands and riparian habitat from erosion and sedimentation during construction and operations, or from stormwater runoff contacting wetlands and streams, would be minimized through design features, BMPs, adherence to 2003 RFP Standards, and implementation of a site-specific SWPPP. These measures would also prevent habitat degradation of adjacent and downstream wetlands and non-wetland waters due to sedimentation. The potential for plant uptake of COPCs would be minimized but not eliminated as per direction that would be follow in the Surface Water Management

Plan, Appendix D of the MRP. Water would be managed based on its potential for transporting COPCs, thus the potential of bioaccumulation would also be minimized.

EPMs and RMPs (Section 2.2.9) would minimize degradation of wetlands and non-wetland waters.

Sedimentation to wetlands and non-wetland waters from access and haul road construction would be minimized by proper placement and sizing of culverts to maintain connectivity between streams and wetlands at stream crossings and minimize erosion and sedimentation.

3.6.3.2 No Action

Under the No Action, there would be no acres of wetlands and no linear feet of streams and associated riparian vegetation impacted or lost. There would be no impacts to wetlands from erosion and sedimentation. No impacts would occur to wetlands, non-wetland waters, and riparian vegetation.

3.6.3.3 Alternative Cover

Acres of wetlands, linear feet of non-wetland waters, and riparian vegetation removed, and effects on water quality due to sedimentation would be the same as the Proposed Action. Groundwater flow modeling demonstrated that the alternative cover design would reduce infiltration of meteoric water into the backfill and subsequently, the discharge of selenium-contaminated water into seeps and streams would be reduced compared to the Proposed Action. Effects on water quality due to potential transport of COPCs from groundwater, and the potential for uptake by riparian and wetland vegetation, would be eliminated.

3.6.3.4 Alternative Stream Routing

Alternative Stream Routing would create 4,443 feet of new channel to reroute Stewart Creek during mine operations (Operational Realignment). Reclamation would return the alignment of Stewart Creek to its original location as a channel 4,705 in length (1,599 feet lined; 405 feet of unlined perennial; and 2,701 feet of unlined intermittent). Effects would be similar to the Proposed Action in that the stream is still being relocated, but the channel locations differ, as shown in **Figure 14**.

3.6.3.5 Alternative Access

Impacts on wetlands and non-wetland waters with the addition of the Alternative Road would be the same as the Proposed Action, except the additional effects on non-wetland waters as noted in **Table 29**. There would be no increase in acreage impacted. Road improvements under the Proposed Action that would affect Lower Maybe Creek would also occur under the Alternative Road or ATV trail.

Table 29. Access Road Linear Feet of Non-Wetland Waters Disturbed

Stream Name Feature Identification[1]	Feet of Additional Disturbance over Proposed Action	Additional Disturbance for ATV Trail
Maybe Creek (DV-072813-1400)	159	27

1 Sources: (Tetra Tech, Inc., 2014c; Arcadis, 2020g)

3.7 Aquatic Species

3.7.1 Analysis Area and Methods

The analysis area for aquatic species is the portion of the Upper Blackfoot River Subbasin shown on **Figure 41**. Streams and rivers and HUC-6 were used for the boundaries of the analysis area, with the

Blackfoot River as the northern boundary, the Diamond Creek and Headwaters Diamond Creek watersheds as the eastern and southern boundaries, and the Dry Valley Creek watershed and upper portion of the Middle Slug Creek watershed as the western boundaries. This topographically defined watershed area was selected to encompass all downstream aquatic species habitat that could be affected by transport of COPCs or sediment from the H1NDR Mine and existing and historic mines and includes the Blackfoot River within the Blackfoot Wildlife Management Area. The analysis of aquatic species is focused on fish and amphibians. Monitoring of fish and macroinvertebrates are surrogates to detect change or effects to other aquatic species, including mollusks and crayfish. Mollusks and crayfish could be present based on range and habitat suitability, but no mollusk and crayfish occurrences have been documented.

The issues for analyzing impacts on fish and amphibians and the indicators that will be used to discuss them are shown in **Table 30**.

Table 30. Issues and Indicators for Fish and Amphibians

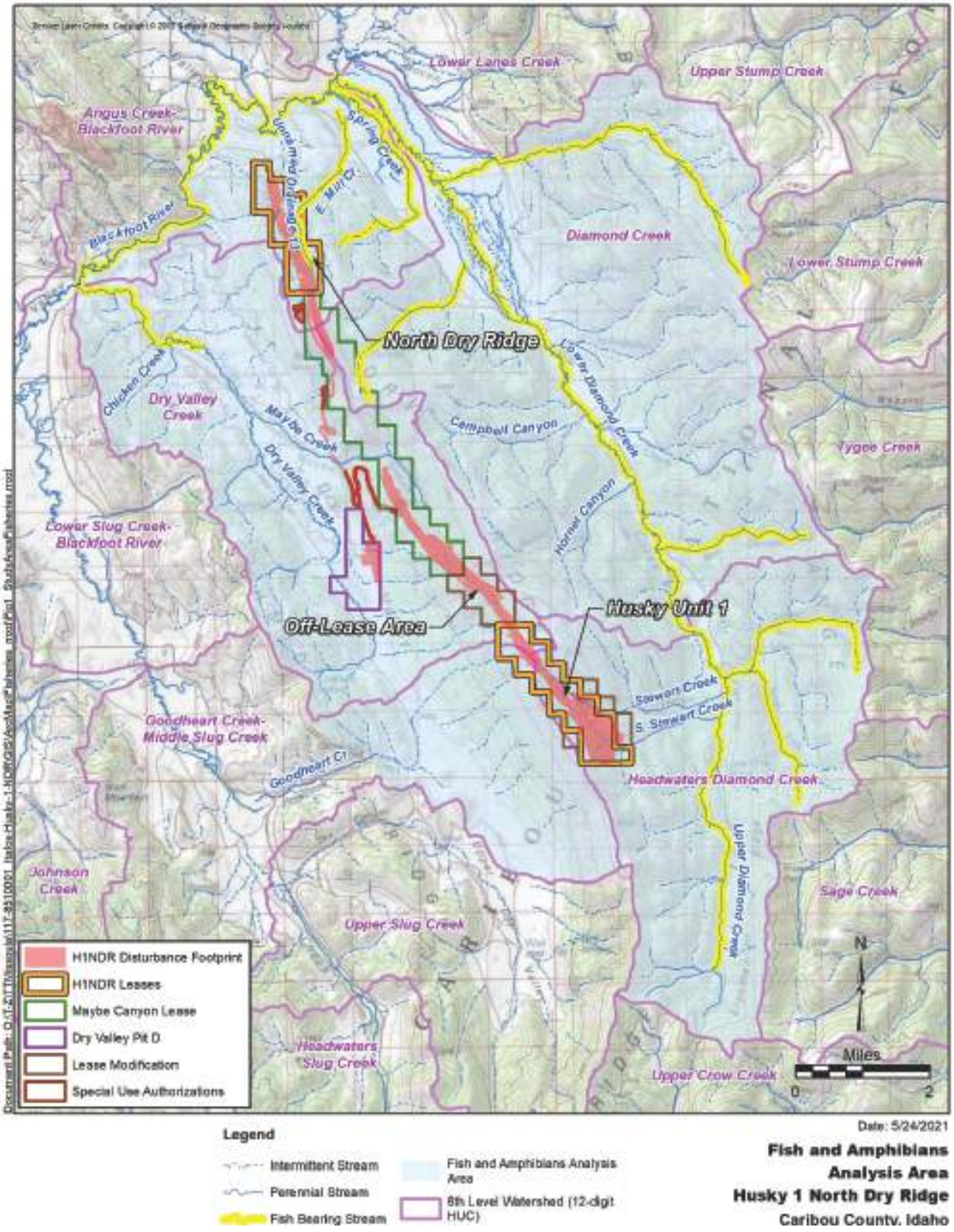
Issue	Analysis Method
Miles of fish and amphibian habitat modified or removed. Miles restored by reclamation to current conditions	Estimate miles of fish-bearing streams and fishless streams, number of ponds, acres of other amphibian habitat (forests), acres of wetlands, and acres of AIZ directly modified by mining and reclamation activities.
Reduction in the quantity of water in streams, ponds, and seeps to a degree that habitat for fish and amphibians and other would be affected.	Based on quantitative data on surface and groundwater resource impacts, assess if reductions in surface water volumes would affect occupied fish and amphibian habitat.
Alteration of surface water quality to a degree that fish and amphibians would be affected, including in the Blackfoot River	Based on surface and groundwater impacts and compare to applicable IDAPA aquatic life criteria. Effects analysis will consider existing conditions of surface waters. Selenium is the focus because it bioaccumulates through the aquatic food chain, because high levels can have adverse effects on fish. Increases in selenium levels in streams, ponds, and seeps and impacts on downstream fish reproduction and survival will be discussed qualitatively. Sedimentation of surface waters and effects on occupied habitat will be discussed qualitatively.
Effects on threatened, endangered, and sensitive fish and amphibian species	Based on analysis in above issues, qualitatively describe impacts on threatened, endangered, and sensitive species that occur in the analysis area.

3.7.2 Affected Environment

Fish and Amphibian Habitat

Fish habitat includes streams that support fish or have the potential to support fish. Fish habitat is primarily in perennial streams, with intermittent streams being used seasonally or in high water years. Ephemeral drainages that are dry except during storm events do not provide habitat for fish. Fish distributions in the analysis area were derived from IDFG mapped fish distributions (IDFG, 2006); Forest Service's fish sampling database for the Caribou Targhee National Forest; and the H1NDR baseline fish study (Arcadis, 2020e). Based on these data sources, there are approximately 57 miles of fish-bearing streams in the fisheries analysis area (**Figure 41**). Fish-bearing streams in the analysis

Figure 41. Fish and Amphibians Analysis Area



area that are not a primary or secondary receiver of water from H1NDR are not described further because these would not be affected by H1NDR. Fish-bearing streams downstream of H1NDR that are primary or secondary receiving waters are listed in **Table 31** along with the miles of stream in the analysis area. Although the headwaters of East Mill Creek are perennial, the midsection is usually dry, which precludes fish from occupying this portion of the stream. The upper half-mile of East Mill Creek (above the canyon bend) that is adjacent to H1NDR is considered fishless and not fish habitat. Fish are present in the portion of Dry Valley Creek near the confluence with the Blackfoot River but have not been detected in the upper reaches of Dry Valley Creek. Intermittent streams that were investigated as potential fish habitat during baseline surveys include Stewart Creek, which had water but no fish detected, and South Stewart Creek and Maybe Creek, which were dry (Arcadis, 2020e). Baseline water volumes in these streams are provided in **Table 23**.

Table 31. Fish Bearing Streams in the Analysis Area

Stream Name	Miles within Fisheries Analysis Area[1]	Primary Receiving Water[2] From H1NDR
Diamond Creek	18.9	Secondary
Blackfoot River	10.6	Secondary, tertiary
Timothy Creek	6.4	No
Mosquito Creek	4.2	No
East Mill Creek[3]	2.7	Primary
Timber Creek	3.2	No
Kendall Creek	2.9	No
Dry Valley Creek	2.9	Secondary
Bear Canyon	2.4	No
South Fork Timber Creek	2.3	No
Angus Creek	0.1	No
Total	56.6	

Note: totals may not add up exactly due to rounding.

1 Based on USGS National Hydrography Dataset, Yellowstone cutthroat trout distribution (May, et al., 2003), and fisheries surveys.

2 Based on surface water flow within HUC- 12, a primary receiving water is a stream that flows directly out of H1NDR; secondary receiver is a stream that a primary receiver flows into; tertiary receiver receives flow from secondary receiver streams

3 Formerly known as Mill Creek, Mill Canyon, or Mill Canyon Creek

Physical properties of stream water were recorded during the baseline fisheries study to identify any factors that could be limiting fish habitation. Temperature, pH, and dissolved oxygen levels were adequate for fish and would not preclude fish from inhabiting any of the surveyed streams. See baseline report for other details on streams, such as condition ratings based on stream macroinvertebrate index and abiotic conditions (Arcadis, 2020e).

Land uses in the analysis area include agriculture, grazing, and mining.

Amphibian habitat in the amphibian analysis area consists of natural and man-made ponds, seeps, and wetted sections of streams. Many of the smaller ponds and streams that were surveyed in baseline studies were dry by the end of summer.

Fish Species

A summary of game and non-game fish species documented in the H1NDR-influenced streams in the analysis area is provided in **Table 32**. The Blackfoot River supports a robust fishery for both diversity and abundance of fish species. Diamond Creek also supports a sustained fishery, particularly on the lower segments. There are currently a limited number of fish in East Mill Creek, with four fish or less captured at each sampling event during baseline surveys.

Table 32. Fish Species Present in the Analysis Area

Stream Name	Species Present	Data Source
Blackfoot River	Brook trout[1] Longnose dace Mottled sculpin Mountain sucker Paiute sculpin Redside shiner Sculpin, unknown species Speckled dace Utah sucker Yellowstone cutthroat trout	IDFG, unpublished data
Diamond Creek	Brook trout[1] Mottled sculpin Paiute sculpin Rainbow trout[1] Redside shiner Sculpin, unknown species Speckled dace Yellowstone cutthroat trout	USFS, IDEQ, unpublished data, H1NDR 2013 baseline study
East Mill Creek[2]	Brook trout[1] Yellowstone cutthroat trout	USFS, H1NDR 2013 baseline study

Source: (Arcadis, 2020e)
1 Non-native game fish
2 Formerly known as Mill Creek, Mill Canyon, or Mill Canyon Creek

Amphibian Species

Amphibian species that have range and suitable habitat in the analysis area include boreal toad, northern leopard frog (*Lithobates pipiens*), boreal chorus frog (*Pseudacris maculata*), and western tiger salamanders (*Ambystoma mavortium*) (IDFG, 2020). None of these have been documented in the analysis area except tiger salamanders. Tiger salamanders were observed in both the 2013/2014 and 2019 baseline studies, including in ponds and along the creek in East Mill Creek canyon, in ponds in the upper Maybe Creek drainage, in four natural and man-made ponds to the southeast of the H1NDR Mine (south of South Stewart Canyon), and in ponds near Dry Valley Creek (Arcadis, 2020f) (Tetra Tech, Inc., 2014c). Tiger salamanders also use upland habitat outside the breeding season, with upland use likely focused on the area within 1.5 miles of breeding ponds (Orloff, 2011).

Aquatic Influence Zones

There are 484 acres of AIZs mapped on NFS lands in the fish and amphibian analysis area (**Figure 42**), which includes streams and two small ponds/marshes. Other ponds and seeps are also present.

Quality of Fish and Amphibian Habitat

For streams that have fish (**Table 31**), the fish tissue criterion element supersedes the water column criterion element for the purposes of meeting water quality standards (see section below on Selenium Aquatic Life Criteria for Fish Tissue).

For fishless streams, the range of selenium concentrations measured during baseline water monitoring from May 2011 to October 2019 (Arcadis, 2020c) are provided in **Table 33**. The applicable criteria for fishless streams are the selenium concentration in the water column, where concentrations over 3.1 µg/L exceed the state-wide water column selenium criteria for protection of aquatic life. Selenium in these streams comes from the historic North Maybe Mine and South Maybe Canyon Mine (see Section 3.2.1) and all eventually flow into the Blackfoot River. Selenium levels in the streams varies seasonally and annually. High selenium levels are correlated with high streamflow, and therefore are highest during spring runoff and high run-off years (Hamilton & Buhl, 2003; Zinsser, et al., 2018).

The baseline surface water study found that selenium concentrations in ponds (amphibian habitat) in the analysis area often exceeded the state-wide water column criteria for lentic waters, which is 1.5 micrograms per liter (µ/L) (Arcadis, 2020c).

Table 33. Baseline Selenium Levels in Fishless Streams

Stream Name	Lowest Selenium Concentration (µg/L)	Highest Selenium Concentration (µg/L)	Exceeds 3.1 µg/L
Maybe Creek	0.34	2,600	Yes
Goodheart Creek	0.3	256.7	Yes
Unnamed Drainage 13	0.21	2.6	No
Stewart Creek	0.1	0.3	No
South Stewart Creek	0.25	0.25	No

Source: Final Surface Water Baseline Study Report Addendum (Arcadis, 2020c)

Selenium is measured in fish tissue to understand how selenium dissolved in water bioaccumulates and impacts fish. All streams in the analysis area fall under the Blackfoot River Subbasin site-specific aquatic life criteria at IDAPA 58.01.01.287.01. The site-specific fish tissue whole-body criterion is 12.5 milligrams per kilogram (mg/kg). The organisms in the Blackfoot River Subbasin that are most sensitive to selenium are trout species. The site-specific criteria, which is based on trout species, are also protective of other fish species and aquatic organisms, including insects, mollusks, and crayfish, that are less sensitive to selenium. Dace, shiners, sculpin and suckers are in general more tolerant of selenium and can inhabit selenium contaminated systems (EPA, 2016; Nu-West Industries, 2017). The fish tissue data are summarized in **Table 34** using data acquired from the interagency Idaho Fish Tissue database (Idaho Fish Sampling Protocol Technical Team, 2020).

Figure 42. Aquatic Influence Zones

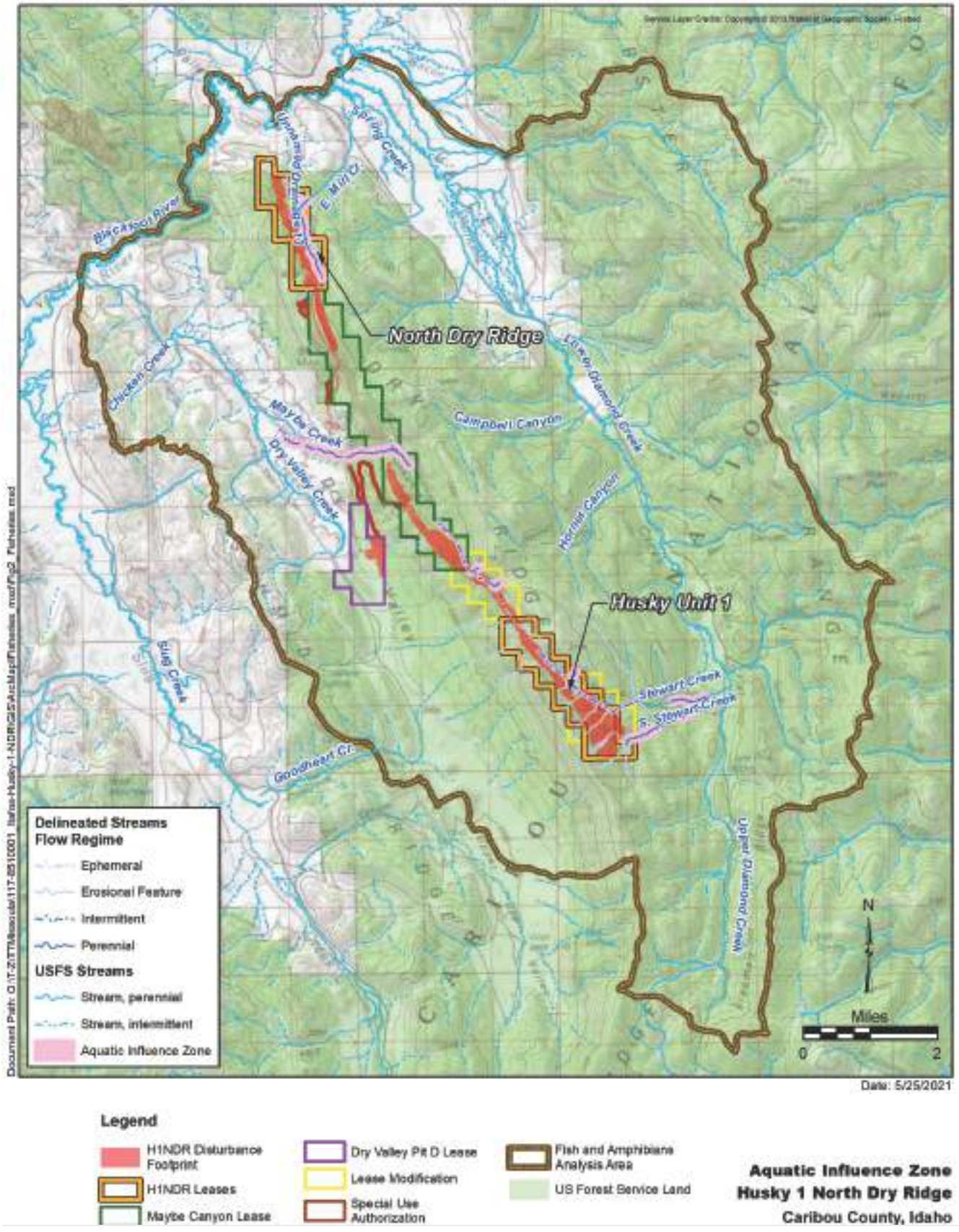


Table 34. Baseline Selenium Levels in Fish Tissue (Whole Body)

Stream Name	Sampling Year	Sampling Organization	Species (Number of Fish Collected)	Average Selenium Concentration (mg/kg)	Exceeds Fish Tissue Criteria of 12.5 mg/kg[1]
Blackfoot River	2007	IDFG	Yellowstone cutthroat trout (10)	16	**Yes**
		Greater Yellowstone Coalition	rainbow trout (4)	10	No
	2009	GEI Consulting Engineers and Scientists	Yellowstone cutthroat trout (10)	11	No
	2010	Greater Yellowstone Coalition	Yellowstone cutthroat trout (10)	11	No
	2011	Greater Yellowstone Coalition	Yellowstone cutthroat trout (9)	13	**Yes**
			brook trout (1)	14	**Yes**
	2012	Greater Yellowstone Coalition	Yellowstone cutthroat trout (8)	7	No
	2018	IDFG	Yellowstone cutthroat trout (10)	9	No
Diamond Creek	2007	Greater Yellowstone Coalition	Yellowstone cutthroat trout (10)	4	No
			brook trout (1)	5	No
	2008	Greater Yellowstone Coalition	Yellowstone cutthroat trout (10)	9	No
			brook trout (10)	5	No
	2010	Greater Yellowstone Coalition	Yellowstone cutthroat trout (10)	9	No
	2011	Greater Yellowstone Coalition	Yellowstone cutthroat trout (8)	6	No
			brook trout (2)	5	No
	2012	Greater Yellowstone Coalition	Yellowstone cutthroat trout (9)	7	No
			brook trout (1)	5	No
Dry Valley Creek	2005	IDEQ	Yellowstone cutthroat trout (7)	12.1	No
East Mill Creek[2]	2007	Greater Yellowstone Coalition	BRK (1)	37	**Yes**

1 Site specific criteria for Upper Blackfoot River, Whole body value

2 Formerly known as Mill Creek, Mill Canyon, or Mill Canyon Creek

Source: Idaho Fish Tissue Database (Idaho Fish Sampling Protocol Technical Team, 2020)

USFS Sensitive Species

Yellowstone Cutthroat Trout

Yellowstone cutthroat trout occur in the analysis area in large rivers and small streams, including the Blackfoot River, Diamond Creek, East Mill Creek, Kendall Creek, portions of Dry Valley Creek, Timothy Creek, Bear Creek, Coyote Creek, and Timber Creek. Diamond Creek is the primary tributary

of the Blackfoot River for spawning and rearing of Yellowstone cutthroat trout (USFS, 2009). Historically East Mill Creek supported a population of cutthroat trout (USFS, 2009) though the species is currently found only in small numbers in this stream, with only one or two caught at each sampling event in baseline and agency surveys (Arcadis, 2020e). The species has been documented in portions of Stewart Creek and Maybe Creek in the past (USFS, 2009) but not in recent surveys (Arcadis, 2020e). The population in the analysis area appears stable (IDFG, 2007).

Yellowstone cutthroat trout occupying the streams in the analysis area are either resident fish that occur year-round or are migratory fish, spending most of their life in the Blackfoot River or Blackfoot Reservoir but migrating into small streams in the spring to spawn (USFS, 2003a). Because of these different life histories, individual fish in the analysis area have different exposures to selenium. Selenium levels in streams in the analysis area are typically highest during spring runoff (Hamilton & Buhl, 2003), which is also the spawning season for cutthroat trout.

3.7.3 Environmental Consequences

3.7.3.1 Proposed Action

Fish and Amphibian Habitat

Habitat Loss/Mortality

The Proposed Action would not cause loss or physical alteration of fish habitat because no fish-bearing streams would be realigned, crossed, or otherwise by H1NDR modified. East Mill Creek is the only fish-bearing stream that is near the mine, but the upper portion within the mine operational zone does not support fish.

Approximately 49.6 acres of AIZs would be modified or relocated (**Table 35**), but none of the affected AIZs are fish-bearing streams. The modification and relocation of AIZs would be a temporary loss of amphibian habitat until drainages are reclaimed. Because flows equivalent to baseline conditions would be maintained and erosion protection measures would be implemented, there would be no reductions in water quantity or increased sedimentation in fish-bearing streams that are downstream of the impacted AIZs. Impacts to non-fisheries AIZs are not avoidable because the location of the pits is dictated by the physical location of the phosphate resource.

Amphibian habitat loss and mortality from ground clearing activities would occur. Mining would permanently remove 2 of 26 ponds (8%) in the amphibian analysis area, including one that is known to be used by tiger salamanders for breeding. A total of 0.9 miles of perennial stream, 1.5 miles of intermittent stream, and 2.6 miles of ephemeral channel would be impacted with development of mine pits and construction of roads. Approximately 1.5 miles (7,757 feet) of Maybe Creek and 0.5 mile (2,557 feet) of upper Stewart Creek would be permanently realigned to avoid pits and temporary and permanent OSA, including sections of Maybe Creek where tiger salamanders occur. Permanent drainage channels would be reproduced during reclamation. Therefore, riparian functions would return to these drainages over the long-term. Approximately 0.17 acres of wetland habitat would be permanently removed (mitigation for wetlands impacts would be off-site). Tiger salamanders would lose foraging and winter hibernation habitat within 1.5 miles of the affected ponds, and dispersal habitat along the affected streams in the analysis area. This could reduce the number of salamanders the analysis area can support. Amphibian mortality could occur during ground disturbing activities in breeding ponds and adjacent upland habitats.

Table 35. Mining Activities in Aquatic Influence Zone

Dataset	Acres[1]
H1 Highwall	0.6
Permanent Overburden Stockpile Area	20.1
Operational Zone	7.6
Pit Backfill*	9.8
Simplot Pipeline Reroute	0.8
Stream Realignment	3.7
Temporary OSA	0.5
Ultimate Pit Boundary[2]	10.3
Water Feature	6.5
Total	49.6

1 It is assumed that areas less than 0.5 acres are precision errors inherent in AIZ GIS mapping (compared to ground surface) and that the activity can easily avoid the AIZ.
2 The pit backfill and ultimate pit boundary overlap. The 10.3 acres of ultimate pit boundary is not included in the total.

Quality of Fish and Amphibian Habitat

Surface Water Quantity

There would be negligible changes to surface water volumes in streams because culverts at stream crossings would maintain drainage and water flows of non-contact water at a depth and volume similar to surrounding portions of the stream. Fill materials and culverts would be removed at the conclusion of mining to re-establish natural drainage ways and drainages truncated by the pits would be re-established in reclamation phases.

Groundwater flow modeling demonstrated no reduction in stream baseflow during mining, and a negligible increase in base flow in East Mill Creek, Diamond Creek, and Dry Valley Creek beginning 20 years after mining and lasting 40 years (See Section 3.5.3.1). Groundwater flow modeling also demonstrated that discharge volumes from 28 seeps within 1,000 feet of the pit boundaries would be reduced due to mining. The seeps are near East Mill Creek, Maybe Creek, and Stewart Canyon but these seeps do not contribute much flow to these creeks. Therefore, overall effects to fish habitat downstream from changes to base flow in streams would be negligible. Amphibian habitat could be reduced by the loss of water volume at the seeps.

Surface Water Quality

The proposed action could introduce sediment into surface water and selenium into groundwater and surface water, potentially affecting downstream surface water quality in 33.4 miles of fish-bearing stream (or 61% of the 55 miles of fish bearing streams in the analysis area). Effects on downstream fish and amphibian habitat from sedimentation would be negligible because BMPs would be implemented to minimize erosion and sedimentation in streams as described in the Surface Water Management Plan.

Groundwater flow modeling indicates that water from seeps that discharge to the headwaters of Stewart Creek, East Mill Creek, and Maybe Creek would contain selenium concentrations exceeding the IDAPA water column criteria for aquatic life (3.1 µg/L). Selenium concentration would exceed 3 µg/L in groundwater discharging to Stewart Creek from 21 to 39 years after mine closure, peaking at 49 µg/L at 21 years. Selenium concentration would exceed 3 µg/L in groundwater discharging to East

Mill Creek from 12 to 52 years after mine closure, peaking at 23 µg/L at 25 years. Selenium concentration would exceed 3 µg/L in groundwater discharging to Maybe Creek from 28 to 45 years after closure, peaking at 18 µg/L at 29 years. The concentrations would then reduce to undetectable levels. Effects on surface water quality from the groundwater discharge would be limited to the headwaters because existing surface water flow in these streams would mix with the groundwater, diluting the selenium concentration (See Section 3.6.3.1). The selenium concentration in Stewart Creek and Diamond Creek is expected to be below the IDAPA water column criteria (3.1 ug/L) (Tetra Tech, Inc., 2021e). In streams where selenium concentrations are currently above the 3.1 ug/L criteria, the level of increase in selenium concentrations in streams would be negligible (Tetra Tech, Inc., 2021e). Therefore, there would be negligible, long-term effects on water quality in Stewart Creek, East Mill Creek, Maybe Creek, Diamond Creek, and the Blackfoot River. However, even negligible amounts of selenium transported downstream would be additional loading to streams already impacted by historic selenium releases, and a new source of selenium to previously unimpacted streams.

Tiger salamanders could be exposed to high selenium concentrations in the localized area of groundwater discharge, but no fish occur at the headwaters. The expected selenium concentration in fish tissue cannot be predicted because the concentration of selenium in the water column of the streams cannot be quantified. However, the selenium concentration in the water column of Stewart Creek and Diamond Creek is expected to be below the IDAPA criteria (3.1 ug/L), which is protective of aquatic life. The negligible increase in selenium levels in downstream waters is expected to result in a negligible, long-term increase in toxicity impacts to fish, amphibians, and other aquatic life.

USFS Sensitive Species

The effects described above for general fish, including potential increases in toxicity from selenium loading and sedimentation in streams, apply to Yellowstone cutthroat trout because the species occurs in waters downstream of the H1NDR Mine. The site-specific selenium criteria were developed to protect the most sensitive species in the Blackfoot River system, which is rainbow trout. Yellowstone cutthroat trout are less sensitive to selenium compared to rainbow trout (Nu-West Industries, 2017; EPA, 2016). H1NDR may impact individual Yellowstone cutthroat trout or their habitat but will not likely contribute to a trend toward federal list or cause a loss of viability to the population or species. Sensitive fish and amphibian species that were dismissed from detailed analysis are listed in **Table 63**.

3.7.3.2 No Action

Under the No Action alternative, no new ground disturbance and no new exposure of selenium-bearing materials would occur; therefore, there would be no additional sediment or selenium releases into seeps and streams. Fish would continue to inhabit streams in the analysis area in their current condition, some of which are currently impaired due to elevated levels of sediment and selenium from historic phosphate mines. There would be no loss of amphibian habitat (forest, ponds, or wetlands). Tiger salamanders would continue to breed and forage in this habitat. Seeps would continue to discharge water at their current rates and streams would maintain their current volumes of water.

3.7.3.3 Alternative Cover

Groundwater flow modeling demonstrated that the alternative cover design would reduce infiltration of meteoric water into the backfill and subsequently, the discharge of selenium-contaminated groundwater into seeps and streams would be reduced compared to the Proposed Action. Gradual and limited migration of selenium to surface water would occur but would never exceed the IDEQ aquatic life criteria. Selenium concentration in groundwater discharging to Stewart Creek and East Mill Creek

would be below testing detection limits. Groundwater flow modeling estimates that the selenium concentration in groundwater discharging to Maybe Creek would peak at 0.2 µg/L 42 years after mine closure, which is below the testing detection limit. Therefore, new selenium loading into Stewart Creek, and additional selenium loading to Maybe Creek, and East Mill Creek would be negligible, and selenium toxicity effects to fish would be negligible. Impacts from sedimentation would be the same as the Proposed Action and would be negligible with implementation of BMPs. The reduction in volumes discharge from seeps to surface water would have no effect on the volume of water in fish-bearing streams.

3.7.3.4 Alternative Stream Routing

The alternative routing of Stewart Creek would have the same effects to fish and amphibians as the route proposed under the proposed Action. There would be no loss or alteration of fish habitat because no fish occur in this creek. The operational realignment of Stewart Creek would affect 0.1 acre of AIZ. The reclamation realignment would affect 3.0 acres of AIZ, of which 1.6 acres would be additional disturbance outside the Proposed Action disturbance footprint. Once reclamation is complete, AIZ function is expected to return over the long-term. The alternative routing would not change water quality in terms of selenium levels because the portion crossing the backfill would be lined and therefore there would be no contact with seleniferous material. Sedimentation would be the same as the Proposed Action and would be negligible because the same BMPs would be implemented. The alternative routing would not change water quantity (stream flow and stream regime) in Stewart Creek in the long term because natural flow would be restored. During reclamation, the permanent drainage channel would be reconstructed in the original Stewart Creek alignment, and riparian function and amphibian habitat would return over the long-term.

3.7.3.5 Alternative Road

The Alternative Road or ATV Option crosses 2.6 acres of 0.9 acres of AIZs respectively. There would be no loss or alteration of fish habitat because the alternative road/trail would not realign, cross, or otherwise physically modify any fish-bearing streams. No seeps would be affected by the alternative road. Constructing the Alternative Road or ATV Trail Option as a permanent replacement for NFS Road 134 would improve water quality in downstream fish and amphibian habitat in the long term because NFS Road 134 road is causing sedimentation in Stewart Creek. Although fish do not occur in Stewart Creek, they do occur directly downstream in Diamond Creek, and would benefit from the improved water quality. Sedimentation from the new road would be negligible because it would be engineered to minimize future erosion and BMPs would be used to control sediment release during construction. The Alternative Road or the ATV Trail Option would have no effect on selenium levels in water or fish tissue as no seleniferous materials would be exposed. The road/trail would not create any new stream crossings. Any potential crossings (i.e., where the road/trail crosses a draw but does not have a delineated stream) an armored wet crossing would be used. Therefore, there would be no effect on habitat quality in terms of the quantity of water in streams.

3.8 Vegetation

3.8.1 Analysis Area and Methods

The analysis area for general vegetation, TES plants, and noxious weeds **(Figure 43)** is the project footprint including all areas of surface disturbance from development of the mine pits and supporting infrastructure. The analysis area for impacts to forest stand structure and old-growth forest is the

project footprint plus the two 5th-level (HUC-10) within which the project is located: Upper Blackfoot River (ID-1704020702) and Lanes Creek-Diamond Creek (ID 1704020701).

The analysis area for old-growth forest extends to the Caribou Zone of the Caribou National Forest to allow for an evaluation of consistency with the desired future conditions set forth in the 2003 RFP (USFS, 2003a).

The issues for analyzing impacts on vegetation and the indicators that will be used to discuss them are shown in **Table 36**.

Table 36. Issues and Indicators for Vegetation

Issue	Analysis Method
Acres by type of vegetation impacted by disturbance	Calculate the acres of disturbance for each vegetation type and the percent of each type impacted relative to total disturbance. Evaluate acres of mature and late-seral forest by HUC 5 watersheds in the analysis area.
Suitable timber acres designated in the 2003 RFP	Percent of acres in 2003 RFP Prescription 5.2b that will be permanently converted to grass/shrub and no longer suitable for timber management, compared to the total acres of suitable timber on the Caribou National Forest, and disclose allowable sale quantity amount compared to forest-wide allowable sale quantity.
Acres of change by vegetation type and forest community structure change following reclamation	Qualitatively discuss reclamation, how vegetation types will change, and provide anticipated years for reclamation success and potential for pre-disturbance vegetation communities to return. Disclose acres by type that would change to a different type versus those considered a permanent loss. Evaluate change in forest structure stage, specifically change in acres of mature and late-seral forests at the scale of the 5th level HUC, to meet 2003 RFP
Acres of old-growth forest removed, and long-term change in old-growth characteristics	Use baseline survey data to document acres impacted and relative amount of old-growth at HUC-5 watershed level
Acres susceptible to the invasion or spread of noxious weeds, timeframe for a higher risk of invasion or spread and effects on native plant communities	Based on disturbance area as the footprint for potential invasion or spread, disclose areas of high risk and qualitatively discuss the potential for weeds to be an issue in the reclaimed areas; evaluate the adequacy of EPMs and BMPs to control weeds. Disclose noxious weeds that were identified in the baseline study and common to southeastern Idaho.
Effects on TES plant species or habitat	Baseline surveys confirmed no TES plants occur in the analysis area.

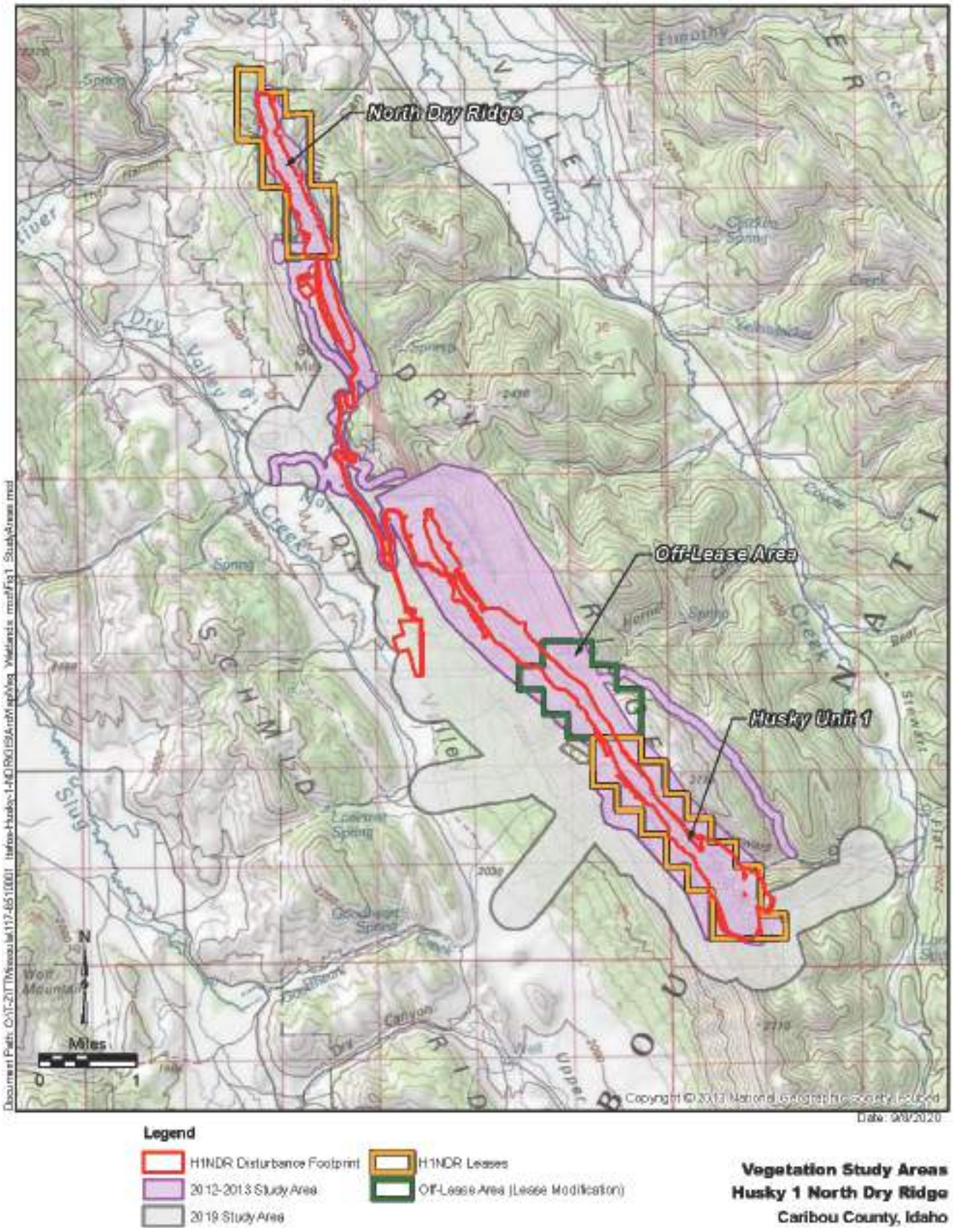
3.8.2 Affected Environment

Vegetation Types

The distribution of vegetation types across the analysis area is shown in **Figure 44.**

Forest vegetation types documented in the 2012-2013 study area from greatest percent cover to least in the study area are as follows: Mixed Conifer, Aspen/Conifer, Douglas-fir, Aspen, Dry Aspen, Dry Aspen/Conifer, Dry Conifer Mix, Subalpine Fir, Engelmann Spruce/Subalpine Fir, Subalpine Fir, Lodgepole Pine, Aspen/Subalpine Fir, and Forest Riparian Mix (Tetra Tech, Inc., 2014d).

Figure 43. Vegetation Analysis Area



Non-forest vegetation/cover types in the 2012-2013 study area from greatest% cover to least are as follows: Mountain Brush, Mine, Reclaimed Mine, Sagebrush, Riparian Shrub, Grass, Grass/Forb, Low Riparian, and Barren. The dominant cover type, as defined by the Society of American Foresters, is Douglas-fir, followed by aspen, and Engelmann spruce/subalpine fir. Lodgepole pine and limber pine were also documented in the study area but were less common (Tetra Tech, Inc., 2014d). The 2019 baseline surveys added woodland riparian mix to the vegetation types (Arcadis, 2020h).

Forested Stand Structure

The 2003 RFP has a standard that each 5th level HUC shall have at least 20% of the forested acres in the combination of mature and old age classes. The condition of all watersheds, as it relates to this 2003 RFP direction, was documented in a USFS report, Caribou National Forest, Forest Structural Age Assessment (Beck, 2016). The forest structure stage categories in that assessment were seedling/sapling, young/mid, mature, and late seral. The term late seral was used to reduce the confusion between the terms old and old-growth.

. The Upper Blackfoot River (HUC 1704020702) was categorized as: Seedling/sapling, 4%; Young/mid, 2%; Mature, 9%; Late-seral, 85%. The Lanes Creek-Diamond Creek (HUC 1704020701) was categorized as: Seedling/sapling, 6%; Young/mid, 4%; Mature, 11%; Late-seral, 79%.

The forest structural stage classification for the analysis area was confirmed and improved based on field review. Most stands in the analysis area were classified as mature/late seral, with lesser amounts of young/mid and less than 1% were classified as seedling structure. Overall, the forest structure of the analysis area is similar to that found in the watersheds as a whole.

Allowable Sale Quantity

Stands classified as suitable for timber management in an area designated with a Forest Vegetation Management emphasis (Prescription 5.2 contribute to the allowable sale quantity. The FEIS for the 2003 RFP indicates there are approximately 84,000 acres suitable for timber in Prescription 5.2 (USFS, 2003a, pp. 4-170). Current GIS data indicates there are 84,560 acres of suitable allowable sale quantity timberlands. For this analysis, the 2003 RFP acres will be used assuming this rounded number will account for changes from past actions.

Old-Growth Forest

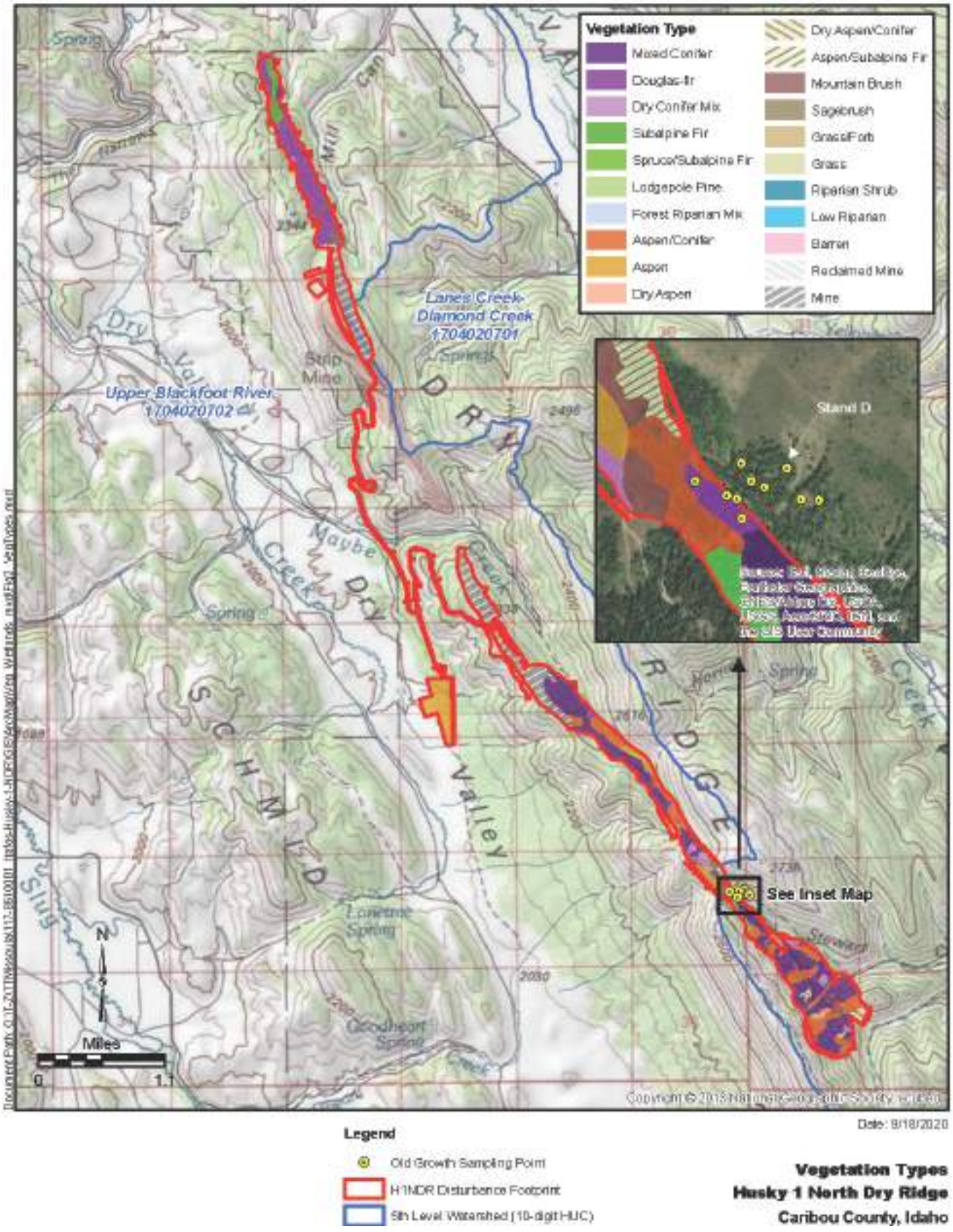
The second part of the structure standard in the 2003 RFP states that, at least 15% of the forested acres in a watershed are to meet or be actively managed to attain old-growth characteristics. The 2003 RFP also has a standard that states the *Characteristics of Old-Growth Forests in the Intermountain Region* (referred to as the Region 4 definition) (Hamilton, 1993) will be used to define old-growth until more current direction is developed.

An evaluation of old-growth forest was included in the baseline studies. That evaluation found one stand within the project footprint currently meets the structural R4 definition of old-growth for Interior Douglas-fir, low-productivity sites, referred to in baseline data as Stand D (Tetra Tech, Inc., 2014d),

Noxious Weeds

Baseline field survey methods included the mapping of Idaho State Department of Agriculture -listed (ISDA, Idaho State Department of Agriculture, 2019) and Caribou County-listed (Caribou County, 2019) noxious weeds, estimating the footprint of infestation, and identifying adjacent land uses that may contribute to the establishment and proliferation of noxious weeds.

Figure 44. Vegetation Cover Types and Subtypes



A total of 11 noxious weed species were observed during the baseline surveys; all of which are on the ISDA list, and seven of which are on the Caribou County list (Arcadis, 2020h). Past and current land uses or disturbances observed that could have led to the introduction and spread of noxious weed species included mining, roads, logging, wildfire, grazing, recreation, and railroad tracks.

3.8.3 Environmental Consequences

3.8.3.1 Proposed Action and Alternative Cover

Vegetation Types

Vegetation removal would occur. Acres of vegetation removed by vegetation type under the Proposed Action and the Alternative Cover are listed in **Table 37.**

Table 37. Vegetation or Land Cover Types Removed

Vegetation/Land Cover Type	Subtype – Acres Removed	Subtype Acres	Total Acres Removed and % of Analysis Area
Coniferous Forest	Mixed Conifer Douglas-fir Subalpine Fir Dry Conifer Mix Spruce/Subalpine Fir	338 136 28 27 7	536 47%
Aspen and Mixed Aspen/Conifer Forest	Aspen/Conifer Aspen Dry Aspen Dry Aspen/Conifer Aspen/Subalpine Fir	159 100 12 12 4	287 25%
Mine[1]	Mine	255	255 22%
Mountain Brush/Montane Shrub	Mountain Brush Montane Sagebrush	37 2	39 3%
Reclaimed Mine (crested wheatgrass/alfalfa)	Reclaimed Mine	29	29 3%
Barren	Barren	1	<1 <0.1%
Riparian Shrub	Riparian Shrub	<0.1	<0.1 <0.01%
TOTAL			1,146

1 Areas with disturbance such as previously mined areas with little to no reclamation, small portions of reclaimed mines within larger landscape of old mine, roads, and/or mine headquarters.

Under the Proposed Action, 98% of total disturbance would be reclaimed, with 19 acres (approximately 2%) remaining as exposed pit highwalls and portions of haul roads retained for use. Vegetation removal would be the same under the Alternative Cover alternative, but the acres of cover material would be reduced from 706 to 614. Approximately 80 acres of additional highwall would remain after reclamation under the Alternative Cover. For both, the highwall would be an irreversible change in the vegetation type.

Vegetation removal would be long-term, when considering the time required for vegetation cover to re-establish following mining and reclamation. Reclamation would occur concurrently with phased

mining using an approved seed mix of native grass, forb, and shrub species (Itafos, 2020a, pp. 5-15, Table 5-7); however, re-establishment of vegetation would require several growing seasons to reach adequate percent cover.

The Proposed Action and Alternative Cover would remove vegetation and change the current distribution and acreage of vegetation types following reclamation. The impact would be long-term, with only grassland, and eventually some shrubland, communities returning following reclamation. Vegetation types that re-establish following reclamation would differ across the analysis area over time when compared to those pre-disturbance. This change would be permanent for several vegetation types. Of the vegetation types impacted, 39 acres are a non-forest/shrubland community. These areas would initially re-establish as a grassland type and would then return to a grass/shrub community mix over the long term.

Approximately 822 acres of vegetation proposed for removal is currently a forested vegetation type. The forested types would not be expected to return, due to changes in soil conditions, removal of the aspen root system, and the lack of a seed source. A permanent change in vegetation type from forest to grassland/shrubland would occur over 72% of the analysis area. This would be an irreversible change in the vegetation type.

The remaining 285 acres affected in the analysis area are previously disturbed, mine, or barren area cover types, which would be converted to a grassland or grassland/shrubland mix and considered an improvement compared to existing conditions.

Given the permanent loss of forested types, and the resulting change in vegetation types and distribution of types across the analysis area, impacts to existing vegetation types under the Proposed Action and the Alternative Cover would be moderate.

Forested Stand Structure

The proposed action would reduce forest acres and acres of mature and late-seral classes but would not reduce mature/late seral acres to less than 20% of the total forested acres in either affected watershed.

Forested acres removed within the Upper Blackfoot River HUC (1704020702) would be approximately 486 acres. This would reduce the forested acres in the watershed to 37,600 from the current 38,086 acres. It would reduce the Mature/late seral acres to 35,315, keeping the watershed at about 94% mature/late seral.

Forested acres removed within the mature or late-seral stage in the Lanes Creek-Diamond Creek HUC (1704020701) would be approximately 336 acres, reduced to 41,553 acres from the current 41,889 acres. This would not reduce the forested acres in the watershed or reduce the Mature/late seral acres, keeping the watershed at about 90% mature/late seral.

Given the minimal change in forest structural stages the Proposed Action and the Alternative Cover would have minimal impact on the ability to meet the 20% mature/late seral Standard. The impact is the loss of forested acres.

The impact would be consistent with the Revised LMRP direction.

Allowable Sale Quantity

The timber removed from 2003 RFP Prescription 5.2 areas would count toward the annual allowable sale quantity. This area would not return to forest types following reclamation and would result in a permanent loss of forested types to support timber production. In turn, there would be an increase in

grassland/shrubland types across the analysis area. Approximately 530 acres of 2003 RFP Prescription 5.2 are in the disturbance area (Section 1.7). which is approximately 3.1% of the 172,502 acres of Prescription 5.2 acres (based on Caribou National Forest GIS data). After reclamation, approximately 294 acres of Prescription 5.2 would be maintained without timber on the backfill cover and therefore 294 acres would be removed from suitable timberlands, reducing the acres by 0.35% (294 ÷ 84,560), resulting in a reduction of the allowable sale quantity by 0.35%. This effect on allowable sale quantity would be permanent but negligible. The permanent loss of forested types and the change in vegetation types would be an irreversible impact.

Old-growth Forest

The proposed mine footprint would affect approximately 2.4 acres of Stand D which currently meets the structural definitions of old-growth. H1NDR activities would remove individual large, old trees, but the entire stand would not be removed. The removal of 2.4 acres of Stand D would result in some loss of old-growth values. Reducing the stand size by 2.4 acres would reduce the habitat value. However, the remainder would still function as old growth and be accounted for under old-growth for mapping purposes. The watershed where this stand is located is 90% mature/late-seral stands, therefore, opportunities to manage for old-growth objectives exist in adjacent areas. The 2003 RFP Standard of at least 15% of all the forested acres in the HUC are to meet or be actively managed to attain old-growth characteristics would be met.

Noxious Weeds

Removal of vegetation, soil disturbance, and human traffic and use of equipment would increase the opportunity for invasions and spread of noxious weeds. The risk would be highest within the proposed disturbance footprints and adjacent to roads. Noxious weeds will be continuously managed throughout mining. The MRP requires concurrent reclamation followed by monitoring for noxious weeds, therefore; the spread of weeds or introduction of new species will be limited and controlled. A noxious weed control program would be instituted throughout mining operations, during site closure, and would continue until agreement with the agencies that site closure is complete. The noxious weed control program would be designed and implemented according to the requirements of the ISDA and the 2003 RFP. With implementation of these proposed control measures, the potential for spread and invasion would be minimized. Degradation of vegetation composition from the potential increase in noxious weeds would be minor.

3.8.3.2 No Action

Vegetation Types

There would be no acres of vegetation removed and no impacts on vegetation.

Forest Stand Structure

There would be no acres of vegetation removed and no impacts on forest stand structure.

Allowable Sale Quantity

There would be no acres of vegetation removed and no impact on allowable sale quantity.

Old Growth Forest

There would be no impacts on old-growth forest.

Noxious Weeds

There would be no acres of vegetation removed and no potential increase in noxious weed spread or invasions. No impacts would occur to vegetation due to increases in existing populations or spread of new populations of noxious weeds.

3.8.3.3 Alternative Stream Routing

The operational realignment of Stewart Creek would remove approximately 5 acres of vegetation in addition to vegetation removed under the Proposed Action. This difference would not change effects on vegetation, including forested types, old-growth forests, allowable sale quantity, or noxious weeds as disclosed for the Proposed Action. Reclaiming the channel back to its natural location would disturb approximately 2.4 acres, but the area would have already been disturbed by mining.

3.8.3.4 Alternative Access

In addition to the vegetation removed under the Proposed Action (see **Table 37**), **Table 38** shows new disturbance by vegetation type to build a new, 7.6-mile access road or ATV trail between Dry Valley and Diamond Creek. Vegetation removed would be permanent.

Table 38. Vegetation or Land Cover Types Removed for Alternative Road or Trail

Vegetation/Land Cover Type	Subtype	Subtype Acres Removed for Road	Subtype Acres Removed for ATV Trail	Total Cover Type Acres Removed for Road	Total Cover Type Acres Removed for ATV Trail
Coniferous Forest	Mixed Conifer	4.6	1.1	21.7	6.8
	Douglas-fir	7.8	1.8		
	Subalpine Fir	0.5	0.2		
	Dry Conifer Mix	6.0	2.8		
	Lodgepole Pine	2.8	0.9		
Aspen and Mixed Aspen/Conifer Forest	Aspen/Conifer	10.3	3.6	14.9	5.1
	Aspen	3.6	1.2		
	Dry Aspen/Conifer	1.0	0.3		
Mountain Brush/Montane Shrub	Mountain Brush	4.5	1.7	4.5	1.7
Grass/Forb	Grass/Forb	0.4	0.2	0.4	.2
Disturbed		0.1	0	0.1	
TOTAL		41.6	13.9	41.6	13.9

Effects on forest stand structure and old-growth forest would be similar to those of the Proposed Action. The additional acres of forested type removed would not result in a detectible difference from effects under the Proposed Action. There would be no change in bioaccumulation, as the road/trail would not be reclaimed. Noxious weed spread and infestations of new populations of noxious weeds could occur with new disturbance and use of a new road in a previously undisturbed area. Effects would be minor with noxious weed management proposed.

3.9 Wildlife

3.9.1 Analysis Area and Methods

Analysis areas for wildlife vary and are based on species-specific seasonal and space use requirements, such as home range size and dispersal capability. For most species, the general wildlife analysis area encompasses Dry Ridge and the surrounding valleys shown on **Figure 33**, which was delineated using topographical features, watersheds, and other natural barriers (e.g., the Blackfoot River) as boundaries. This analysis area encompasses the lands that would be affected by H1NDR, including potential selenium transport through surface waters, and the surrounding lands that are similar habitat. The analysis area is sufficiently broad to capture local wildlife movement in and around H1NDR and population-level processes for a variety of species, including potential effects from adjacent mines and other disturbances. The greater sage-grouse analysis area is a 10-mile buffer around the H1NDR disturbance footprint and is based on sage-grouse Guideline 2 in the 2003 RFP. The Columbian sharp-tailed grouse analysis area is a 2-mile buffer around the H1NDR disturbance footprint and is based on sharp-tailed grouse Guideline 2 in the 2003 RFP. The big game analysis area is the IDFG Diamond Creek Game Management Unit 76 (**Figure 45**).

The issues for analyzing impacts on wildlife and the indicators that will be used to discuss them are shown in **Table 39**. Threatened/endangered and sensitive species that were dismissed from detailed analysis are described in **Table 63**.

Table 39. Issues and Indicators for Wildlife

Issue	Analysis Method
Wildlife habitat that would be lost or permanently altered, including loss of mature forest habitat	GIS calculations based on disturbance footprint to show acres of each habitat type disturbed or altered and whether the loss/alteration would be short term, long term, or permanent.
Risk of wildlife experiencing selenium toxicity, due to reclaimed vegetation selenium uptake or selenium contamination of wildlife water sources	Although there are other constituents of potential concern (COPCs) in the analysis area, selenium is the focus for the wildlife analysis because high levels can have adverse effects on wildlife and investigations of other constituents in the analysis area have found selenium to be the major contaminant of concern (IDEQ, 2004). The following will be completed as part of the analysis:
	Toxicity risk to wildlife foraging on reclaimed areas will be qualitatively assessed using existing literature.
	The potential for release of selenium to surface waters will be evaluated, taking into consideration mine design and BMPs, the results of the selenium fate and transport model, and the amount that would be released, if any. Wildlife access to potentially contaminated waters will be evaluated.
	Effects of selenium toxicity on terrestrial wildlife will be evaluated based on existing literature.
Threatened/endangered species that would be affected by habitat loss or alteration, or from mining noise/disturbance/human activities.	Canada Lynx: Loss of linkage habitat on the Caribou NF will be quantified. Connection of Dry Ridge to core/occupied habitat on adjacent forests will be discussed.
Sensitive species that would be affected by habitat loss and alteration, and mining	Species occurring on the Caribou NF per the 2016 Region 4 Sensitive Species List will be identified, habitat loss will be quantified, and effects of disturbance

Issue	Analysis Method
noise/disturbance/human activities	will be evaluated.
	North American Wolverine: Habitat loss will be quantified, including loss or disturbance of any denning habitat, if present.
	Greater Sage-grouse: H1NDR is not within a sage-grouse habitat management area. No habitat would be directly affected and no active leks are present within 2 miles. Effects (noise/disturbance) to active leks within 10 miles of H1NDR will be evaluated per the 2003 RFP.
	Northern Goshawk: Habitat loss will be quantified and loss or disturbance of any Nest Areas and Primary Foraging Areas will be evaluated.
Mule deer and elk that would be affected by habitat loss or alteration and from mining noise/disturbance/human activities	Following IDFG recommendations, mule deer and elk habitat suitability models will be used to identify suitable habitat and quantify habitat loss (winter and summer range) relative to suitable habitat available in Game Management Unit 76. Effects to any important areas (e.g., wallows, licks, hiding cover/security habitat, and fawning/calving habitat) will be discussed. Effects of increased human activity and noise will be evaluated.
Migratory birds that would be affected by habitat loss or alteration, and mining noise/disturbance/human activities	The analysis will focus on U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern (BCC), priority bird species identified by Idaho Partners in Flight, and Idaho Species of Greatest Conservation Need (SGCN). Species that occur in the analysis area (refer to baseline surveys/report) will be identified and discuss how they would be affected by the above issues. Number of nests affected and acres of habitat loss will be quantified. Displacement and potential for nest abandonment will be evaluated. Conservation measures to reduce impacts will be discussed.

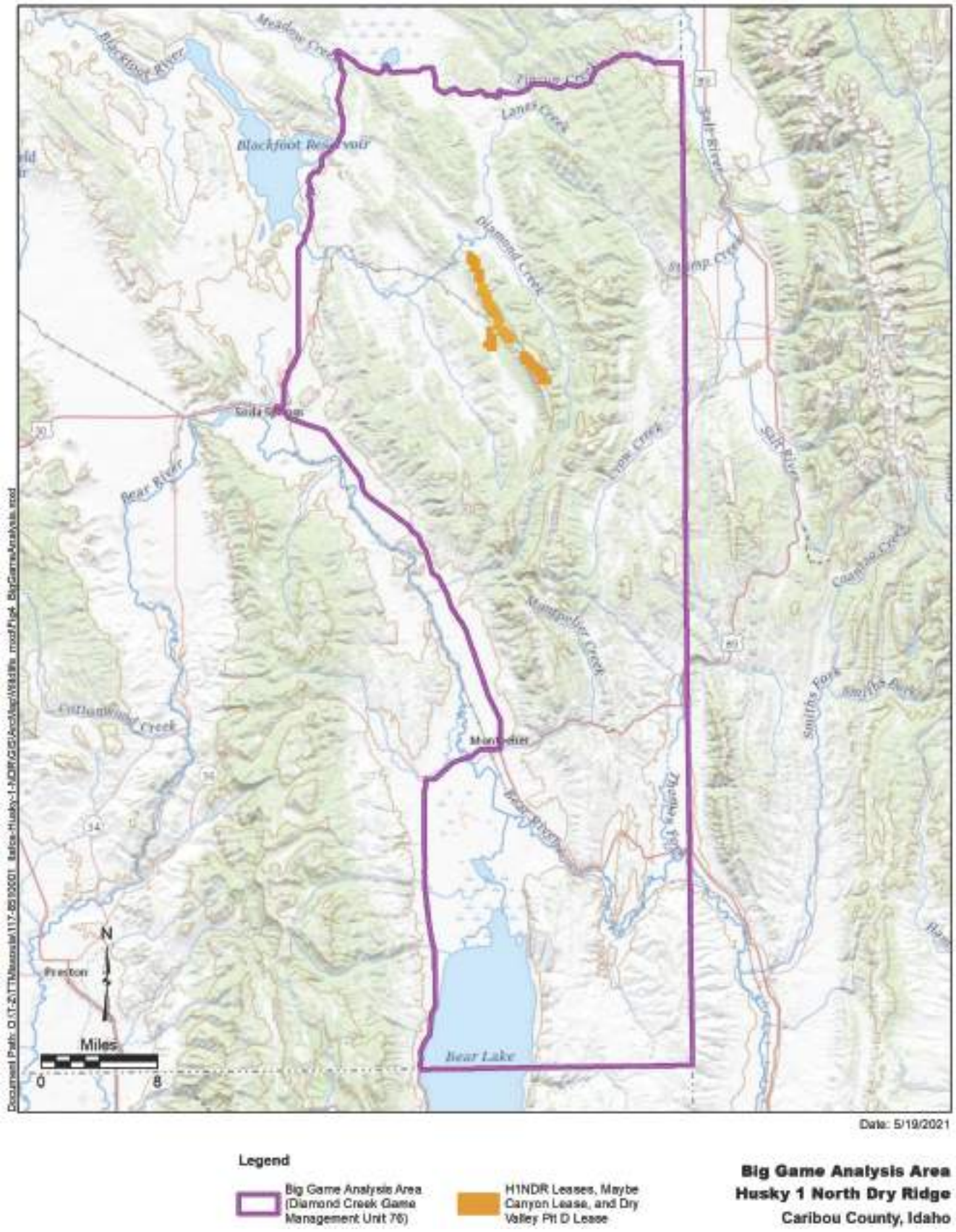
3.9.2 Affected Environment

Wildlife Habitat (acres)

The wildlife analysis area is shown on **Figure 33** and encompasses 65,418 acres. According to the Gap Analysis Project land cover map (USGS, 2011), wildlife habitat in the wildlife analysis area consists primarily of forests (63%), including coniferous, aspen, and aspen-mixed conifer forest (see **Table 40**). Other habitat types include riparian forest/woodland, montane sagebrush, mountain brush, basin sagebrush, mesic meadows, grassland, and rock outcrop. Field studies indicated that mountain brush dominates the mid-elevation slopes on the east and west side of Dry Ridge and is characterized by chokecherry (*Prunus virginiana*), serviceberry (*Amelanchier alnifolia*), Woods' rose (*Rosa woodsii*), currant (*Ribes* spp.), snowberry (*Symphoricarpos* spp.), and bitterbrush (*Purshia tridentata*) with sagebrush often mixed in. The GAP map shows only 347 acres of mountain brush communities in the analysis area but based on field mapping (Tetra Tech, Inc., 2014d), much of the montane sagebrush mapped by GAP is dominated or intermixed with mountain brush species. Therefore, the montane sagebrush and mountain brush GAP cover types were combined for analysis purposes.

Human-modified cover types each comprising less than 1% of the wildlife analysis area include agricultural, developed (mostly roads), logged/burned, and mines. The reclaimed mine areas are dominated by non-native vegetation that has been seeded, and typically are wheatgrass species and alfalfa.

Figure 45. Big Game Analysis Area



The forests on Dry Ridge are mostly mature, with the average age of trees in older stands ranging from 73 years to 257 years (Tetra Tech, Inc., 2014d; Arcadis, 2020h). There is one 11-acre stand of Douglas-fir that meet the USFS Region 4 definition of old-growth. The remainder of the forest stands are young to mid age classes, with a few sapling areas (less than 1%) that typically are aspen clones.

Table 40. Habitat Types in Wildlife Analysis Area

Habitat/Cover Type	Acres (Percent of Analysis Area)
Coniferous Forest	34,003 ac (52%)
Douglas fir	11,015 ac
Lodgepole pine	16,294 ac
Spruce fir	6,694 ac
Mountain brush/montane sagebrush	11,127 ac (17%)
Aspen	6,972 ac (11%)
Basin sagebrush-steppe	4,111 ac (6%)
Mesic meadow	4,107 ac (6%)
Riparian forest/woodland	2,221 ac (3%)
Human modified/disturbed	1,342 ac (2%)
Grassland	1,088 ac (2%)
Mixed aspen-conifer	280 ac (<1%)
Rock outcrop	136 ac (<1%)
Riparian marsh	31 ac (<1%)

Source: Gap Analysis Project landcover map (USGS, 2011)

Of the vegetation types in the wildlife analysis area, aspen communities support the highest biodiversity (IDFG, 2017). The diverse understory of shrubs and herbaceous plants provides high-quality forage for big game and other wildlife. Aspen stands also support migratory tree-roosting bats and cavity nesting birds due to the common presence of snags and decaying trees that are excavated by woodpeckers.

Existing land uses in the wildlife analysis area include phosphate mining, logging, roads, recreation, and domestic livestock grazing. Phosphate mining has occurred since the early 1900s (Lee, 2000). Historic phosphate mines in the wildlife analysis area include the Champ Mine, Maybe Canyon Mine (comprising the North Maybe and South Maybe Canyon mines), Dry Valley Mine, and a small portion of Smokey Canyon Mine. The Maybe Canyon Mine, which is between the H1 lease and the NDR lease, is currently undergoing investigation and remediation activities through CERCLA (see Section 3.2.1).

Selenium

The overburden layers that are removed from phosphate mines contain high levels of selenium (Mebane, et al., 2015). Historic mining practices resulted in leaching of selenium into the environment which has been detected in surface water, groundwater, sediments, soils, vegetation, and animal tissue in the wildlife analysis area, both at the mine sites and downstream (Southeast Idaho Phosphate Mine Site Trustee Council, 2015). Selenium is a naturally occurring element that is an essential micronutrient for various life forms but is toxic at high concentrations. Studies on selenium levels in bird eggs have found elevated selenium concentrations in eggs from bird nests around eight phosphate mines near H1NDR, portions of which overlap with the wildlife analysis area (Skorupa, et al., 2002;

Ratti, et al., 2006). However, no mortality or measurable effects to reproduction were found (Ratti, et al., 2006).

Selenium concentrations in vegetation from portions of the wildlife analysis area, including at the Maybe Canyon Mine, exceed Idaho's selenium removal action level of 5 mg/kg dry weight (IDEQ, 2004). Selenium concentrations in elk tissue and liver collected were correlated with distance from phosphate mine sites in southeast Idaho, with 50% of elk harvested within 2 miles of a historic mining area having elevated selenium concentrations in their organs. This indicates big game may be accessing seleniferous forage at reclaimed mine sites. The concentrations were approaching but did not exceed levels that would result in toxicity to the elk based on established large mammal risk thresholds for liver concentrations (Southeast Idaho Phosphate Mine Site Trustee Council, 2015). Selenium concentrations in deer or moose have not been studied. Selenium levels in small mammal prey exceeded background levels but were not found to be a bioaccumulation risk for carnivores (IDEQ, 2004).

Threatened and Endangered Species Habitat

Canada lynx use the wildlife analysis area occasionally during dispersal or exploratory movements, but no resident population is present, and no regular or long-term use of the analysis area is expected due to the limited suitable habitat. The wildlife analysis area is considered unoccupied based on the 1999-2003 National Lynx Survey (Interagency Lynx Biology Team, 2013), and Canada lynx were not detected in baseline snow-track surveys (Tetra Tech, Inc., 2014e). The Caribou National Forest is considered linkage habitat that connects to occupied habitat and core areas (USFS, 2007). Management direction is provided in the 2003 RFP for maintaining linkage habitat for Canada lynx, including vegetation, wildlife, and lands goals, objectives and standards (USFS, 2003a).

Sensitive and Management Indicator Species

Northern Goshawk (Sensitive and Management Indicator)

Northern goshawks occur throughout the Caribou NF. According to the USFS GIS database, there are no known nests or territories in the wildlife analysis area. The edge of one post-fledgling family area intersects the eastern boundary of the analysis area near Smoky Canyon. Northern goshawks were detected (seen and heard) in the wildlife analysis area in 2013 in South Stewart Canyon and again in 2019 in this same area (Stewart Canyon and South Stewart Canyon). Intensive nest searches were conducted in this area during both survey years, but no nests were found (Tetra Tech, Inc., 2014e; Arcadis, 2020i). These sightings could be of a non-breeding "floater" goshawk that is waiting for a territory vacancy, or it possibly has a nesting area that is outside the surveyed area. There are 41,255 acres of forest in the wildlife analysis area that are suitable goshawk habitat.

Bald Eagle (Sensitive)

A few bald eagles are known to use the Blackfoot River Narrows to the north of H1NDR, and they are occasionally observed on Diamond Creek (USFS, 2003b; IDFG, 2020). The sightings have been of 1 or 2 individuals and mostly during the spring and fall when eagles are migrating. No nests or large winter congregations occur in the wildlife analysis area.

Flammulated Owl (Sensitive)

Flammulated owls occur in the wildlife analysis area. They were detected in the southern portion of the H1 lease in 2010 (BLM and USFS, 2010), near East Mill Creek in 2011 (IDFG, 2020), north of Kendall Canyon in 2013 (Tetra Tech, Inc., 2014e), and in an aspen stand on the west slopes of Dry

Ridge in 2019 (Arcadis, 2020i). No nests were identified in intensive nest searches around detection locations. There are 41,255 acres of aspen and coniferous forest in the wildlife analysis area that are suitable habitat for flammulated owl.

Boreal Owl (Sensitive)

There is one record of boreal owls on the Soda Spring District of the Caribou NF, which was in the Aspen Range in a 70- to 100-year-old stand of lodgepole pine-Douglas-fir with aspen patches (IDFG, 2017). In the wildlife analysis area, there was one detection north of East Mill Creek canyon during the 2013 baseline survey (Tetra Tech, Inc., 2014e). No nests were identified in intensive nest searches around the detection location. There are 34,283 acres of conifer and aspen-conifer mixed forest in the analysis area that are suitable habitat for boreal owl.

Gray Owl (Sensitive)

Great gray owls have been documented in the wildlife analysis area during several different years, including north of East Mill Creek Canyon, and to the south of H1NDR on Freeman Ridge and in the upper portion of the Diamond Creek drainage (IDFG, 2020). H1NDR baseline surveys conducted during 2013 also detected great gray owls north of East Mill Creek Canyon and north of Stewart Canyon (Tetra Tech, Inc., 2014e). No nests were identified in intensive nest searches around detection locations. However, breeding was confirmed during the 2019 H1NDR baseline surveys when an adult and two juvenile great gray owls were observed south of South Stewart Canyon (Arcadis, 2020i). There are 46,450 acres of conifer and aspen forests and meadows in the wildlife analysis area that are suitable habitat for great gray owl.

Greater Sage-Grouse (Sensitive)

The H1NDR disturbance footprint is not in priority, general or important habitat management areas and there is no suitable habitat present. Within 2 miles of the proposed H1NDR mine disturbance footprint, there are no occupied leks. One pending lek (3C040) is in the 10-mile greater sage-grouse analysis area and is 1.2 miles to the west of H1NDR on private land, and one occupied lek (3C028) is 7.6 miles to the west. Beginning in 2017, one to four sage-grouse were observed at the pending lek over two consecutive years. No grouse have been observed at the pending lek since 2019.

Columbian Sharp-tailed Grouse (Sensitive and Management Indicator)

The analysis area for sharp-tailed grouse is a 2-mile buffer around the H1NDR disturbance footprint. There are two sharp-tailed grouse occupied leks in the analysis area, both of which were active in 2019 (IDFG, 2020). These leks are 3CT100 and 3CT100a in Dry Valley. Sharp-tailed grouse are also known to use the northern portion of the analysis area in the Blackfoot River Wildlife Management Area during other times of the year (IDFG, 2020). In the analysis area, there are 3,811 acres of breeding habitat (basin sagebrush, grasslands, agricultural areas) in the valleys and foothills and 12,412 acres of winter habitat (mountain brush and aspen stands) on adjacent mountain slopes.

Three-toed Woodpecker (Sensitive)

There are several records of this species occurring to the southeast of the wildlife analysis area on Webster Ridge (IDFG, 2020). During the 2013 H1NDR baseline surveys it was detected at multiple locations in the northern portion of the Dry Ridge, including Kendall Canyon, East Mill Canyon, and in and around the NDR lease boundary (the northern and eastern slopes of Dry Ridge) (Tetra Tech, Inc., 2014e). One instance of nesting was documented in an aspen snag. There are 34,283 acres of suitable conifer and conifer-aspen mixed forest in the wildlife analysis area.

Gray Wolf (Sensitive)

There are no known gray wolf packs in southeastern Idaho (Husseman & Struthers, 2016). Although lone wolves have been observed, there are currently no known packs, dens, or rendezvous sites in the wildlife analysis area. The entire 65,410-acre wildlife analysis area is suitable wolf habitat and ungulate prey (deer, elk, and moose) are plentiful.

Trumpeter Swan (Sensitive)

There have been several recent winter sightings on the Blackfoot River and near Diamond Creek of two to eight swans per sighting (IDFG, 2020). These streams are the only suitable swan habitat in the analysis area.

North American Wolverine (Sensitive)

There are no known wolverine occurrences in the wildlife analysis area, although there are recent occurrence records in all of the surrounding mountains, the closest of which is 4.2 miles to the east near Smoky Canyon (IDFG, 2020). Denning habitat is not present in the analysis area due to the lack of steep, high-elevation rocky areas and persistent, stable snow cover into spring. The limited rocky areas in the analysis area consist of isolated rock outcrops and rubble fields of moderate slopes but do not contain large boulders (Tetra Tech, Inc., 2014d).

The wildlife analysis area is at the southern limits of this species' range and is not within one of the major habitat blocks identified in the wolverine state management plan (IDFG, 2014a). Southeastern Idaho is predicted to support only one or two wolverines based on modeling. Furthermore, suitable habitat (elevations higher than 7,050 feet) in the 102-square mile analysis area comprises only 58 square miles, which is less than half the size of an average female home range. Based on this information and habitat conditions on Dry Ridge, the analysis area likely functions as a dispersal linkage to the major wolverine habitat blocks in Idaho but is unlikely to support breeding wolverines. The analysis area is within a predicted high use dispersal corridor (IDFG, 2014a).

Townsend's Western Big-eared Bat (Sensitive)

Townsend's big-eared bat has been found in caves and abandoned mines in various mountain ranges on the Caribou NF but no large concentrations are known (USFS, 2003b). There are no occurrence records in the wildlife analysis area, but acoustic surveys detected this species 10 miles to the west in the Aspen Range and therefore H1NDR is within this species' range (IDFG, 2020). There are hibernacula to the south and west, but these are more than 25 miles away from the analysis area (IDFG, 2020). Townsend's big-eared bat was not detected in the H1NDR baseline acoustic survey (Tetra Tech, Inc., 2014e). There is suitable foraging habitat and water sources throughout the wildlife analysis area but there are no known underground mines or caves that would provide roosting habitat or support large congregations of bats.

Mule Deer

Mule deer range in the big game analysis area is identified by IDFG models of mule deer summer and winter habitat in Idaho. The models link deer GPS locations with habitat variables influencing the probability of deer occurrence during each season. There is no mule deer winter range on Dry Ridge and limited range in lower elevations. Mule deer use most of the habitat types in the analysis area during summer, but some are more valuable than others. Therefore, to account for variation in habitat conditions in the analysis area, the IDFG habitat suitability model of mule deer summer range was used to identify the portions of the analysis area that are of similar suitability as Dry Ridge (i.e., model

values > 0.1), which is known to be highly productive. This method filters out the lowest suitability areas. There are 376,722 acres of habitat in the analysis area that have similar suitability as the mule deer summer range on Dry Ridge. Within the local watershed area (i.e. the general wildlife analysis area) there are 50,933 acres of suitable habitat. There are no well-defined migration routes in the area though some deer do make east-west migratory movements across Dry Ridge to reach winter range.

Elk

The IDFG modeled elk summer and winter habitat and migration corridors in Idaho by linking elk GPS locations with habitat variables influencing the probability of elk occurrence during these seasons. Elk use most of the habitat types in the analysis area, but some are more valuable than others. Therefore, to account for variation in habitat conditions, the IDFG habitat suitability models of elk summer and winter range were used to identify the portions of the analysis area that are of similar suitability as Dry Ridge (i.e. model values greater than 0.1), which is known to be highly productive summer range for elk and also used as winter range. There are 890,120 acres of habitat in the analysis area that have similar suitability as the elk summer range on Dry Ridge and 767,141 acres that have similar suitability as elk winter range on Dry Ridge. There are no well-defined elk migration routes in the area, though some migratory movements likely occur based on snow depths.

Migratory Birds

A variety of migratory birds that are associated with coniferous, aspen, or mixed aspen-coniferous forest; mountain brush; montane sagebrush-steppe; and forest riparian habitat occur on Dry Ridge. These include generalist species that are not limited to specific habitat types (e.g., American robin), common forest species such as mountain chickadee, and specialist species (e.g., cavity-nesting birds). A list of birds observed in the analysis area is provided in the baseline wildlife reports (Tetra Tech, Inc., 2014e; Arcadis, 2020i). Aquatic/wetland species observed during baseline surveys include sandhill crane, mallard, and American coot (Arcadis, 2020i). There are many other waterfowl and shorebird species that are known to occur in the lower elevations of the analysis area, such as at the Blackfoot River Wildlife Management Area, but do not commonly occur on Dry Ridge (IDFG, 2014c). Emergent wetland and aquatic habitat is limited on Dry Ridge. There are a few ponds and groundwater-fed wetlands, but most of this habitat is in the valley basins. Migratory birds reach their greatest abundance in the analysis area during the breeding season, which is May through August for most species.

3.9.3 Environmental Consequences

3.9.3.1 Proposed Action

Habitat Loss

Re-disturbance of the 255 acres of existing mine areas would be not be a habitat loss during H1NDR mining activities because these areas do not currently provide wildlife habitat. The total amount of wildlife habitat removed would be 890 acres (see **Table 37** for breakdown by habitat type).

Approximately 98% of the ground disturbance would be reclaimed to the existing use of wildlife habitat following reclamation. Reclamation in the existing mine areas would restore 255 acres of wildlife habitat. The reclamation seed mix is predominantly grass species, but some forbs would be included as well as bitterbrush and other shrubs that would benefit browsers, such as big game. The reclaimed areas would be predominantly grassland in the short-term but over the long term are expected to be a grass-shrub mix community. Species that use grasslands and grass-shrub mix may

benefit from the additional habitat that would exist post-reclamation. Some pit walls would remain and may be beneficial if it is suitable roosting habitat for bats and nesting habitat for cliff-nesting birds.

While the loss of 823 acres of forest habitat would be a small percentage of the wildlife analysis area, these forest habitat types support a high diversity of wildlife species and the existing mature conifer stands and aspen clones are of high value to many species, such as big game, tree-roosting bats, and numerous migratory birds (detailed discussion on specific species is given below). In addition, the loss would be permanent due to the need to prevent tree growth on the cap and cover areas and therefore would permanently reduce the number and diversity of forest wildlife species that can inhabit the analysis area. Given these factors and the additional impacts occurring from other phosphate mines, the permanent loss is considered a moderate effect overall to wildlife habitat in the analysis area. The loss of mature conifer, aspen, and mixed aspen-conifer forest in the cap and cover areas from maintaining them without trees would be an irreversible effect.

Selenium Toxicity

Selenium-bearing material would be exposed on the surface for a limited time due to concurrent reclamation practices and fugitive dust would be controlled through BMPs. Therefore, wildlife exposure to selenium in overburden or fugitive dust during mining would be limited. The risk of selenium toxicity in wildlife foraging in reclaimed areas would be negligible because the seed mix would contain low selenium accumulating and shallow rooted species and the thickness of the proposed covers would minimize selenium uptake in reclamation vegetation. Vegetation monitoring would ensure selenium concentrations are below BLM performance standards.

The greatest potential for wildlife selenium exposure is from water sources. Groundwater flow modeling has indicated that selenium loading in concentrations above 3.1 µg/L would occur in seeps discharging to Stewart Creek, Maybe Creek, and East Mill Creek from 12 to 52 years after mine closure (see section 3.7.3.1). The change in water quality is expected to be local to the headwaters of these streams as the groundwater would mix with the existing surface water and rapidly dilute the concentrations as the water moves downstream. Wildlife that are most sensitive to selenium toxicity (i.e., waterfowl, shorebirds) do not breed in these waters. Furthermore, because wildlife are mobile and likely use more than one water source, the risk is reduced. Selenium levels in wildlife could increase above current levels but are not expected to have measurable effects to survival or reproduction. However, given the existing high levels of selenium in other surface waters in the analysis area (**Table 25**), adding even negligible amount of selenium to these streams, and introducing a new source of selenium loading to streams that currently do not have high selenium levels adversely affects water quality in the wildlife analysis area and increases wildlife exposure to selenium.

Threatened and Endangered Species

Canada Lynx

Canada lynx dispersing through the area are likely to avoid the mine disturbance areas during the 15 years of mining. However, H1NDR would not preclude movement of lynx across Dry Ridge during mining or after reclamation because the forested habitats below the mine would provide connectivity to other blocks of lynx habitat and continue to function as linkage habitat. In addition, Dry Ridge is not identified as one of the important linkage areas on the Caribou NF. Therefore, effects to Canada lynx movement through the linkage habitat would be negligible.

There would be a permanent loss of 823 acres of forested habitat due to reclamation and maintenance as grassland. This loss would affect 2% of the forested habitat in the wildlife analysis area. Of the

forested habitat removed, 11 acres are of high suitability for lynx (7 acres of spruce-fir and 4 acres of aspen-spruce-fir mix). The removal of forest habitat would result in an adverse effect on Canada lynx linkage habitat because of the loss of stalking cover and shelter and reductions in prey populations. However, no resident lynx are present and dispersing lynx that wander through the analysis area can make long-distance movements and would be expected to travel to an area with higher quality habitat. Therefore, the loss of forest habitat is a minor but permanent adverse effect to linkage habitat.

The risk of exposure to selenium-contaminated waters after reclamation is low due to the transitory nature of lynx using the analysis area. Because there would be no long-term or regular use of such water, toxicosis is not expected and the effect of potential selenium releases on lynx would be negligible.

HINDR may affect a small number of individual Canada lynx that occasionally travel through the analysis area but would not affect populations. Due to minor permanent effects to the suitability of linkage habitat, negligible effects on lynx movement, and negligible effects from disturbance and potential selenium releases, H1NDR may affect but is not likely to adversely affect Canada lynx. The Proposed Action, Alternative Cover 1, and Alternative Cover 2 would have no effect on critical habitat because none is present in the analysis area.

Sensitive Species

Because mining would occur 24 hours per day, noise and other mining disturbance could interfere with breeding by both nocturnal (flammulated owl, boreal owl, great gray owl) and diurnal (three-toed woodpeckers) sensitive bird species in the adjacent forest habitat by masking vocalizations used to establish territories and locate mates. Light pollution extending beyond the mine site would reduce the area available for foraging because nocturnal owls are likely to avoid lighted areas. Lighting and noise could alter behavior or distribution but would not affect reproduction or survival.

Northern Goshawk

The Proposed Action would permanently remove 823 acres of conifer, aspen, and mixed conifer-aspen forests that are suitable northern goshawk habitat, affecting 2% of the forested habitat in the wildlife analysis area. Habitat would be removed within 300 feet of where a goshawk was observed in upper South Stewart Canyon in 2014. However, the majority of habitat would remain intact in Stewart Canyon and South Stewart Canyon where goshawks were observed during 2014 and 2019. No nests/nest areas are known in the analysis area and no habitat in the known post-fledgling family area would be removed. A pre-construction nest clearance survey would be conducted to ensure no new nests have been constructed since the baseline surveys. Noise and disturbance from mining would not be detectable at the post-fledgling family area that intersects the analysis area because it is 3.5 miles from the H1NDR disturbance footprint and is not within line-of-sight due to the intervening topography and vegetation. Noise and mining disturbance would be detectable in Stewart and South Stewart Canyon and other habitat adjacent to H1NDR. This could interfere with goshawk communication during the breeding season for the individual goshawk(s) using these canyons during mining and until reclamation is complete.

Overall, because no nest areas or post-fledgling family areas would be affected, a small percentage of the habitat in the analysis area would be permanently lost, and a small number of goshawks would be disturbed by mining/reclamation activities, the Proposed Action would have a moderate effect on northern goshawks. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

The Proposed Action would be consistent with the northern goshawk standards and guidelines in the 2003 RFP because no habitat would be removed or altered in active or historic nesting territories.

Bald Eagle

There would be no effect on nests or roost sites. There would be a negligible increase in selenium exposure. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

Flammulated Owl

The Proposed Action would permanently remove 823 acres of conifer, aspen, and mixed conifer-aspen forests that are suitable flammulated owl habitat, affecting 2% of the forested habitat in the wildlife analysis area. The habitat that would be removed includes areas in and near where flammulated owls were detected during 2014 near East Mill Creek Canyon and north of Kendall Canyon. The aspen clones on the west slopes of Dry Ridge where the owl was detected during 2019 would not be removed. No known nests would be removed. However, the loss of mature forests would result in large trees and snags that are potential nesting sites being removed.

The Proposed Action would have a moderate effect on flammulated owls due to the permanent removal of a small percentage of habitat and the 24-hour-per-day disturbance adjacent to occupied habitat that would occur over 15 years. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

The Proposed Action would be consistent with Flammulated Owl Habitat Guideline 1 in the 2003 RFP as no nest sites are known to occur in the analysis area and therefore no habitat around nests would be affected.

Boreal Owl

The Proposed Action would permanently remove 710 acres of conifer and aspen-conifer mixed forests that are suitable boreal owl habitat, affecting 2% of these forest types in the wildlife analysis area. The habitat that would be removed includes an area where the boreal owl was detected in 2013 north of East Mill Creek Canyon. No known nests would be removed. However, the loss of mature forests would result in large trees and snags that are potential nesting sites being removed.

The Proposed Action would have a moderate effect on boreal owls due to the permanent removal of a small percentage of habitat and the 24-hour-per-day disturbance adjacent to occupied habitat that would occur over 15 years. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

The Proposed Action would be consistent with Boreal Owl Habitat Guideline 1 in the 2003 RFP because no nest sites are known to occur in the analysis area and therefore no habitat around nests would be affected.

Great Gray Owl

The Proposed Action would permanently remove 823 acres of conifer, aspen, and mixed conifer-aspen forests that are suitable great gray owl habitat, affecting 2% of these vegetation types in the wildlife analysis area. No meadows would be removed. The forested habitat that would be removed includes an area where great gray owl was detected in 2013 north of East Mill Creek Canyon. Habitat in the area

where an adult with juveniles was detected around Stewart and South Stewart Canyon would not be impacted. No known nests would be removed.

The Proposed Action would have a moderate effect on great gray owls due to the permanent loss of a small percentage of habitat and the 24-hour-per-day disturbance adjacent to occupied habitat that would occur over 15 years. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

The Proposed Action would be consistent with Great Gray Owl Habitat Guideline 1 in the 2003 RFP because no nest sites are known to occur in the analysis area and therefore no habitat around nests would be affected.

Three-toed Woodpecker

The Proposed Action would permanently remove 710 acres of conifer and conifer-aspen mixed forests that are suitable three-toed woodpecker habitat, affecting 2% of these forest types in the wildlife analysis area. The forested habitat that would be removed includes an area where the species was detected in 2013 in the NDR lease area. Habitat would not be removed in several other areas where the species was detected on the north and east slopes of Dry Ridge. The Proposed Action would remove mature forests that have abundant decaying trees and snags. The removal of this critical habitat feature would be a loss of both foraging and breeding habitat, as dying trees and snags are needed for foraging on insects and excavating nest cavities each year.

Due to the permanent removal of mature forest and decaying trees/snags affecting a small percent of the forest in the analysis area, and disturbance adjacent to occupied habitat that would occur over 15 years, the Proposed Action would have a moderate effect on three-toed woodpeckers. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

The Proposed Action would remove snags and therefore may not be consistent with Snag/Cavity Nesting Habitat standards in the 2003 RFP; however, snag/cavity habitat standards and guidelines in the 2003 RFP do not apply to the 271 acres of disturbance in the Phosphate Mine Area Prescription 8.2.2(g) and 17 acres of disturbance in the Concentrated Development Area – Utilities Prescription 8.1(u). In the Elk and Deer Winter Range Prescription areas, the potential for woodpeckers is permitted to fluctuate and therefore the Proposed Action is consistent with the standards in these areas.

Greater Sage-Grouse

There would be no effect to priority, general, or important habitat management areas, or other suitable habitat. Noise and other mining disturbance would have no effect on the one occupied lek in the analysis area because it is more than 2 miles from H1NDR. Conservation measures do not apply to leks with a pending status and overall are not applicable to populations outside of habitat management areas. However, noise is unlikely to occur at a level that would mask sage-grouse auditory behaviors at the pending lek because of topographic screening (the pending lek is in the valley whereas H1NDR is on the top of the ridge). H1NDR may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

Columbian Sharp-tailed Grouse

The two occupied leks in the sharp-tailed grouse analysis area, Lek 3CT100a and Lek 3CT10, are 1.4 miles and 1.8 miles west of the proposed H1NDR mine disturbance footprint, respectively. The

proposed H1NDR mine is on top of Dry Ridge; therefore, visibility at these leks in Dry Valley is reduced due to the steep slopes on the west side of Dry Ridge. While mining noise and disturbance could be detectable at these leks, it is unlikely to occur at a level that would interfere with breeding behavior because the noise would attenuate over the distance and terrain. Therefore, noise and disturbance would have a negligible effect on sharp-tailed grouse.

The Proposed Action would result in the loss of 151.3 acres of mountain brush and aspen (winter habitat), which is 1.2% of the winter habitat in the 2-mile-buffer analysis area. No basin grasslands or sagebrush would be removed and therefore no breeding habitat would be affected. The removal of aspen would be permanent because tree growth would be prevented in the cap and cover areas. The reclaimed areas would be primarily grassland initially; however, the reclamation seed mix would include some native shrub species, such as bitterbrush, and is expected to be a shrub-grass mix over the long term, which could be suitable habitat for sharp-tailed grouse. Overall, because of the small percentage of the analysis area that would be affected and because the habitat would be restored over the long term, effects to sharp-tailed grouse from the loss of winter habitat would be minor. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

Trumpeter Swan

The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species. Swans would be exposed to a negligible increase in selenium.

Gray Wolf

The Proposed Action would remove 892 acres of habitat, affecting 1.4% of the habitat in the analysis area. The habitat loss would be temporary because the pit would be backfilled and disturbed areas would be reclaimed to grassland and grass-shrubland habitat, which would be suitable habitat for gray wolf. However, because the permanent removal of forested habitat would have an adverse effect on ungulate prey (see big game section below), the quality of the habitat for wolves would be reduced. No den sites or rendezvous sites are present and therefore none would be removed or affected by the Proposed Action. The mining disturbance and temporary habitat loss may displace individual wolves to other areas of Dry Ridge or change their behavior but would not affect survival. Furthermore, because no resident packs occupy the analysis area there would no disruption in breeding or population-level effects. Wolves dispersing through the area would likely avoid the mine disturbance areas during the 15 years of mining. However, the Proposed Action would not impede wolf movement across Dry Ridge during mining or after reclamation because the forested habitats below the mine would remain and this species can move long distances and avoid the mine pits. Therefore, effects to wolf dispersal movements would be negligible.

The temporary loss of habitat and mining disturbance may affect a small number of individual gray wolves that occasionally move through the analysis area but would not affect populations or dispersal movements. For these reasons, the Proposed Action would have negligible effects on gray wolf. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

North American Wolverine

The Proposed Action would result in the permanent loss of 823 acres of forest that is wolverine linkage habitat, affecting 2% of these forest types in the analysis area. Relative to the wolverine home range

size, the acreage that would be disturbed is negligible (1% of the female average home range size, and less than 1% of the male average home range size). No denning habitat is present; therefore, no den sites would be removed or affected by the Proposed Action. No resident wolverines or breeding populations occur in the analysis area, but the mining disturbance and loss of forest could disrupt movement/dispersal. This may alter an individual's behavior or space use but is unlikely to affect survival as this species easily moves long distances and could navigate around the mining disturbance. Furthermore, the effect would be short-term because wolverines would be able to travel through the impacted area following mine closure and reclamation, after the pits have been backfilled and reclaimed as grassland and grass-shrubland. Based on this analysis, the Proposed Action would have negligible effects on wolverine. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

Townsend's Western Big-eared Bat

The Proposed Action would result in the temporary loss of 892 acres of foraging habitat for Townsend's western big-eared bat, affecting 1.4% of the wildlife analysis area. Progressive mining and concurrent reclamation would reduce the area impacted at any one time. The disturbance areas would be reclaimed to grassland over the short term and over the long term are expected to be a grass-shrub mix, both of which would be suitable foraging habitat for this generalist species. No roosting habitat or hibernacula would be impacted because none are present in the analysis area. Because mining would occur 24 hours per day, lighting, noise, and other mining activities could disturb bats foraging in the area. This could alter individual behavior or make it more difficult to forage but it is not expected to affect survival or reproduction.

Over the long term, effects to Townsend's big-eared bat would be negligible because habitat loss would be temporary and would be reclaimed to suitable foraging habitat, individual bats may be present but large concentrations of this species do not occur, and no sensitive habitats (i.e., winter hibernacula or maternity roosts) would be disturbed. The Proposed Action may impact individuals and habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability in the population or species.

The Proposed Action would be consistent with bat guidelines in the 2003 RFP because no caves or underground mines are known in the analysis area and therefore no protection of these areas would be required.

Management Indicator Species

Effects to the two MIS species (sharp-tailed grouse and goshawk) are described previously under the sensitive species section. The Proposed Action is consistent with MIS Standard 1 in the 2003 RFP as this wildlife report assesses impacts to habitat and populations for the two MIS.

Big Game

Mule Deer Habitat

The Proposed Action would remove 892 acres of suitable mule deer summer range, affecting 0.1% of the suitable summer habitat in the big game analysis area (game management unit 76). At a more local scale (i.e. the general wildlife analysis area), the removal would affect 1.8% of the suitable summer habitat in the local watershed (including Dry Ridge, surrounding valleys, and slopes of adjacent mountains). At both the local and the game management unit scale, the loss would affect a relatively

small proportion of the habitat. However, the aspen habitat (111.9 acres removed) and mountain shrub habitat (39.4 acres removed) are disproportionately valuable to mule deer compared to other habitat types in the analysis area. Removing forest and shrub habitat would result in a loss of forage, cover needed for security and thermoregulation, and important areas such as some fawning habitat. There would be a permanent loss of coniferous and aspen forest because the reclaimed areas would be grassland over the short term and grass-shrub over the long term; trees would not be permitted to grow in the cap and cover areas. The reclamation seed mix would have some shrub species, including bitterbrush and snowberry, which are favored browse species, and therefore would provide some value as forage over the long term (post-reclamation). However, the loss of forest habitat would reduce cover and habitat diversity and quality on Dry Ridge, reducing the number of deer that can be supported (carrying capacity).

H1NDR in combination with the Maybe Mine would remove habitat across a nearly continuous 10-mile length of Dry Ridge. While mining would be progressive and concurrent reclamation would occur, the cumulative habitat loss/alteration and disturbance are likely to alter migration patterns of deer moving west across Dry Ridge to winter habitat near Soda Springs. Based on studies conducted at the Maybe Mine (Hemker, et al., 1984), deer are able to navigate around mines but the disturbance slows migration. The delay increases the risk of deer being caught in sudden autumn snow storms that result in rapid, deep snow accumulations that are difficult for deer to negotiate (Hemker, et al., 1984). Dry Ridge is not a major mule deer migration corridor, and therefore a relatively small proportion of the population would be affected. Once pits are backfilled and reclamation is complete, there would be no impedance of migration movements.

Elk Habitat

The Proposed Action would remove 892 acres of suitable elk summer range, affecting 0.2% of the suitable summer habitat in the big game analysis area (game management unit 76). At a more local scale (i.e., the general wildlife analysis area), the removal would affect 1.6% of the suitable summer habitat in the local watershed (including Dry Ridge, surrounding valleys, and slopes of adjacent mountains). At both the local and the game management unit scale, the loss would affect a relatively small proportion of the elk summer habitat. However, the aspen habitat (111.9 acres removed) and mountain shrub habitat (39.4 acres removed) are disproportionately valuable to elk compared to other habitat types in the analysis area. Removing habitat would result in a loss of forage and cover needed for security and thermoregulation, and important areas such as some calving habitat. Habitat removal would be limited in the known elk calving areas (aspen and mountain brush) on the southwest slopes of Dry Ridge because H1 is primarily in higher elevation coniferous forest, but some loss of calving habitat would occur elsewhere.

There would be a permanent loss of coniferous and aspen forest because the reclaimed areas would be grassland over the short term and grass-shrub over the long term; trees would not be permitted to grow in the cap and cover areas. The reclamation seed mix would include native and non-native grass and native shrub and forb species, and therefore would provide some value as forage in the long term (post-reclamation). However, the loss of forest habitat would reduce habitat diversity and quality on Dry Ridge, reducing the number of elk that can be supported (carrying capacity). Declines in the quality of summer forage affect elk body condition, calf growth, and winter survival rates (IDFG, 2014b).

The Proposed Action would remove 209 acres of suitable elk winter range, affecting 0.03% of the suitable winter habitat in the big game analysis area (game management unit 76). At a more local scale (i.e., the general wildlife analysis area), the removal would affect 0.8% of the suitable elk winter

habitat in the local watershed. At both the local and the game management unit scale, the loss would affect a relatively small proportion of the winter habitat. Based on the IDFG model, there is limited suitable winter habitat on Dry Ridge; most of the suitable winter range near Dry Ridge is at lower elevations.

Effects on elk migration would be negligible as there are no major elk migration corridors in the analysis area, and some elk remain on Dry Ridge through the winter.

The Proposed Action would remove 0.03 acre of the wetland (AB-092712-1052) where an elk wallow occurs along East Mill Creek. It is not known if the wallow itself would be impacted. Even if the wallow is not directly impacted, elk are unlikely to use any part of this drainage while mining activity is occurring due to the noise and disturbance. No known licks would be affected as none have been identified in the analysis area.

Noise and other mining disturbance could cause mule and elk to leave otherwise suitable habitat to avoid disturbance and potentially being displaced into poorer quality habitat. This could also reduce elk feeding and resting time and increase elk movement, resulting in higher energy expenditure (IDFG, 2014b). Past studies conducted around Maybe Mine indicated that for mule deer, displacement is generally temporary and localized and that deer habituate to regular disturbance occurring at mines (Merrill, 1984). However, disturbance is likely to have a greater effect during fawning/calving season (because productivity and fawn/calf growth can be reduced) and winter when elk are under greater stress. When exposed to simulated mining disturbance, elk on Dry Ridge abandoned traditional calving areas in favor of more coniferous forest, and moved calves further, increasing energy expenditure although no calf abandonment or mortality was documented (Kuck, et al., 1984). H1NDR disturbance would be adjacent or within 0.25 mile of aspen and mountain shrub habitat on west slopes. Much of the aspen and mountain brush habitat at lower elevations would be not be affected.

There could be increased big game mortality from motor vehicle collisions, particularly because mining would occur 24 hours per day. Vehicles and mining trucks would be traveling at low speeds, which would reduce the risk of collision.

Selenium Toxicity

Big game are not confined to a small area like livestock, and foraging over a larger area reduces the potential for toxicosis compared to concentrated use or chronic exposure (Southeast Idaho Phosphate Mine Site Trustee Council, 2015) in the localized mine area. No big game mortalities have been documented from selenium toxicosis at phosphate mines in southeast Idaho and no mortalities are expected under the Proposed Action.

Conclusions – Big Game

Big game would be affected by mining disturbance adjacent to important fawning/calving and summer habitat, disruption of migration of small numbers of deer, permanent removal of high value aspen habitat, and long-term removal of high value mountain brush. Big game have also been impacted by past habitat loss from other mines in the analysis area. Given that reclamation would return some shrub habitat over the long term, mining noise/disturbance would be temporary, and substantial areas of aspen and mountain shrub would remain intact on the west slopes of Dry Ridge, the effect would be moderate and localized to Dry Ridge. Given that mule deer numbers in GMU 76 are currently declining, adding additional impacts from H1NDR would have a moderate adverse effect to the overall mule deer population. The elk numbers are stable to increasing and therefore more resilient but given

the level and long-term nature of the impact, H1NDR would have a moderate adverse effect on the elk population in game management unit 76.

The Proposed Action would result in removal of 1.48 acres of Prescription 2.7.2(d) areas (Elk and Deer Winter Range). These areas would return to grass, forbs, and shrubs post-reclamation and therefore over the long term the Proposed Action would be consistent with the management direction for this Prescription. This prescription emphasizes management for vegetation and security habitat that provide quality big game winter range but does not exclude other uses.

The Proposed Action would be consistent with Guideline 1 in Prescription 8.2.2(g)- Phosphate Mine Areas (Biological Elements – Wildlife). Although mule deer migration could be slowed by construction of new pits, mining in phases and concurrent reclamation would reduce the effect to a smaller area affected at any one time. Reclamation (pits filled and vegetation reseeded) would restore migration habitat. Migration would also be improved because existing pits would be backfilled, increasing the area available for migration on Dry Ridge compared to baseline conditions.

Migratory Birds

The Proposed Action would remove 892 acres of migratory bird habitat, primarily coniferous, aspen, and mixed conifer-aspen forests and mountain shrub types that are used by a variety of migratory birds, including bird species of management concern or conservation concern. The loss of mature forest would be a permanent loss as these areas would be reclaimed to grassland and grass-shrub community and maintained to prevent tree growth. The Proposed Action would also remove important nesting and foraging structure for birds that are present only in mature forests, such as snags and dying trees that are crucial for cavity nesters, large diameter trees, and possibly existing raptor stick nests, which are often used over multiple years and by different species.

No take of nesting birds would occur because a nest clearance survey would be conducted 7-10 days prior to initiating timber removal or other ground clearing in the migratory bird breeding season construction to identify active nests. Avoidance measures (e.g., nest buffers) would be identified in coordination with the USFS and USFWS if active nests are present to avoid disturbing nesting birds or the taking of eggs or young.

Disturbance from noise and mining activity occurring 24 hours per day could interfere with breeding behavior as noise can mask bird songs, making it difficult for females to locate singing males and males may sing louder to compensate and use more energy. Mining would be progressive, and reclamation would occur concurrently, which would reduce the area affected by disturbance at any one time. In addition, mining disturbance would end once reclamation is complete.

Overall, due to minor effects from disturbance and selenium, measures to reduce the likelihood of mortality, and the permanent removal of mature forest habitat in a small area, the Proposed Action would have a moderate effect on birds.

The Proposed Action would be consistent with Land Bird Guideline 1 in the 2003 RFP because no stands of mature trees next to wet meadows would be removed (i.e., no wet meadows are in or adjacent to the proposed impacted area).

3.9.3.2 No Action

Habitat Loss

The existing 892 acres of mature conifer, aspen, and mixed aspen-conifer forest, mountain brush/shrub, and riparian shrub habitat would not be removed and therefore the wildlife habitat in the analysis area would continue to function as a large block of mature forest habitat intermixed with mountain shrub and montane sagebrush. There would be no effect on wildlife habitat.

Disturbance

Wildlife would continue to forage and breed in the analysis area at current levels of disturbance, primarily from dispersed recreational activities (e.g., camping, hiking, fishing, hunting, and road use). There would be no displacement effect because disturbance levels would not change.

Selenium Toxicity

There would be no additional selenium releases beyond what is currently occurring from historic mines in the analysis area. Wildlife would be exposed to selenium in soil, vegetation, surface water, and groundwater at current concentrations, which exceed IDEQ and BLM thresholds in some water bodies and vegetation.

Threatened and Endangered Species

Canada Lynx

Canada lynx would continue to use the area as linkage habitat during dispersal or exploratory movements. There would be no effect on Canada lynx or its linkage habitat because disturbance levels would not change, and linkage habitat would not be lost or altered.

Sensitive Species and Management Indicator Species

These species would continue to breed and forage in the 892 acres of suitable habitat on Dry Ridge. The 254 acres of existing mine disturbance at Maybe Mine would remain unsuitable habitat. No sensitive species or MIS would be affected because no habitat would be lost and there would be no change to current levels of disturbance.

Big Game

The 892 acres of big game habitat would remain in its current condition, and mule deer would continue to use the area as summer range and fawning habitat and during migration and elk would continue to use the area as summer range, calving habitat, and winter range. The 255 acres existing mine disturbance at Maybe Mine would remain unsuitable habitat. Mule deer would continue to migrate across Dry Ridge at their current rate. Calving and fawning habitat would be relatively undisturbed, except for possible impacts from dispersed recreational activities. There would be no effect on big game.

Migratory Birds

The 892 acres of suitable habitat would remain in its current condition and migratory birds would continue to forage and breed in the mature forests and mountain shrub habitat at their current population densities. Snags/decaying trees, woody debris, large trees, and understory would continue to provide important forest structure for a diversity of wildlife and their foraging and breeding needs. The 255 acres of existing mine disturbance at Maybe Mine would remain unsuitable habitat. There would be no effect on migratory birds.

3.9.3.3 Alternative Cover

The effects to wildlife from the Alternative Cover would be the same as the Proposed Action with the following important exceptions:

- Surface water would not be contaminated by selenium because discharge of contaminated groundwater from seeps around the pits would be reduced to negligible amounts (within the measure of error in the groundwater flow model) and therefore selenium concentrations released into streams would be none to negligible (below the limits of detection), and never above IDEQ aquatic life criteria. The risk of wildlife selenium toxicity would be negligible.
- Habitat types removed and reclaimed would be similar under the Alternative Cover, but with 80 additional acres of pit highwalls left exposed. Additional highwalls could provide more habitat for species that use cliff habitat (certain raptor and bat species). The acres of habitat reclaimed would be reduced to 614 acres compared to 706 acres in the Proposed Action. Effects to wildlife from changes to habitat would be the similar to the Proposed Action.

3.9.3.4 Alternative Stream Routing

The Alternative Stream Routing of Stewart Creek would have the same effects to wildlife as the Proposed Action routing except an additional 5 acres of habitat (coniferous forest and mixed aspen-conifer forest) would be temporarily removed. This is because the Alternative Stream Routing temporarily relocates Stewart Creek to the east into undisturbed habitat during mine operations whereas the Proposed Action routing of Stewart Creek is within the mine operational zone (disturbance footprint). The post-reclamation condition of wildlife habitat and riparian function would be the same as that expected under the Proposed Action. However, the stream restoration would occur at a different location (i.e., back to Stewart Creek's original location) compared to the Proposed Action.

3.9.3.5 Alternative Access

In addition to the habitat removed under the Proposed Action, the Alternative Road would permanently remove another 42 acres of wildlife habitat, including coniferous forest, aspen forest, mixed aspen-forest, mountain brush, and grass/forb for the road or 14 acres for the ATV Trail. Approximately 11.4 acres of the new road or ATV Trail would be in areas already disturbed that are currently not wildlife habitat. **Table 38** shows the acres of each habitat type that would be removed to build the Alternative Access road or ATV Trail. This road/trail would replace a portion of the current NFS Road 134 that accesses Dry Ridge from Stewart Canyon. Disturbance to wildlife from vehicles and recreational access currently occurs along NFS Road 134. Construction of the 6.5 miles of the new Alternative Road or ATV Trail would permanently shift this disturbance to a different location as the old road (portions of NFS Road 134) would be removed by mining.

3.10 Soils

3.10.1 Analysis Area and Methods

The soil analysis area is defined as the area where soil would be disturbed or salvaged, including H1NDR mine pits and other surface disturbance such as ancillary facilities and haul roads.

The issues for analyzing impacts on soils and the indicators used to discuss them are own in **Table 41**.

Table 41. Issues and Indicators for Soil

Issue	Analysis Method
Acres of soil by type that would be disturbed	GIS soil type analysis with disturbed areas
Potential for trace elements, including selenium, to be mobilized from OSAs to contaminate on-site or adjacent soil resources	Qualitative discussion of potential sources and impacts
Loss of soil productivity	Qualitative discussion of impacts
Soil loss	Qualitative discussion of impacts
Soil available to meet reclamation requirements	Calculated inches based on disturbance, soil type, depth, and reclamation needs.

3.10.2 Affected Environment

The Baseline Study Report for soil resources documented soil physical and chemical properties pertinent to the issues listed above (Tetra Tech, Inc., 2020). Data for comparison to a series of United States Department of Agriculture (USDA) reclamation suitability criteria were also collected (USFS, 2014). These data were evaluated in conjunction with volumetric calculations to determine the amount of each soil mapping unit and soil component that would be affected and the volume of soil of meeting USDA suitability ratings available for reclamation.

Changes to the proposed disturbance boundary made after publication of the Baseline Study Report necessitated extrapolating soil boundaries beyond the original analysis area based on vegetation, slope, and aspect as identified on aerial photos and topographic maps. An area in Section 15 was also identified as a location for a tipple and other support facilities and was not included in this analysis. The tipple area will undergo an Order 2 soil survey as a condition of permit approval.

The baseline soil survey identified and described 24 soil map units comprising 37 soil components or series (Tetra Tech, Inc., 2020). These soils typically had loamy textures (i.e., loam, sandy loam, and silt loam) although subsurface horizons encountered in concave swales at the toe of alluvial fans in map unit F had clay concentrations great enough to be considered limiting (**Table 42**). The percentage of clay within a soil profile increased with increasing depth throughout the analysis area. Generally, soil textures became increasingly silty and sandy further south in the analysis area.

Table 42. Soil Salvage Suitability Criteria

Suitability Criteria	Limiting to Soil Suitability	Somewhat Limiting to Soil Suitability	Not Limiting
Inches to Bedrock or Cemented Pan	Less than 20	20 to 40	Greater than 40
Percent Clay	Greater than 40	30 to 40	Less than 30
Percent Sand	Greater than 85	70 to 85	Less than 70
Cobble Content (3 to 10 inches)(% by weight)	More than 50	25 to 50	Less than 25
Percent by weight of Stone (more than 10 inches)	Greater than 15	5 to 15	Less than 5
K-Factor	Greater than 0.7	0.35 to 0.7	Less than 0.35
Calcium Carbonate (%)	Greater than 40	15 to 40	Less than 15
Sodium Adsorption Ratio	Greater than 13	4 to 13	Less than 4
Organic Matter Content (%)	0	Between 0 and 1	Greater than 1

Suitability Criteria	Limiting to Soil Suitability	Somewhat Limiting to Soil Suitability	Not Limiting
pH	Less than 5.5 or greater than 8.4	5.5 to 6.0 or 8.0 to 8.4	6.0 to 8.0
Electrical Conductivity (millimhos/centimeter)	Greater than 16	8 to 16	Less than 8
Inches of water per inches of soil (Available Water Holding Capacity)	Less than 0.05	0.05 to 0.1	Greater than 0.1
High susceptibility to wind erosion	NRCS Wind Erodibility Group 1 and 2[a]	Not Applicable	Not Applicable

Source: (USFS, 2010).

a Wind Erodibility Groups are based on soil texture and other factors as defined in Sections 618.77 and 618.95 of NRCS Soil Survey Handbook. Group 1 has the highest erodibility, with an index of 310 tons/acre/year. Group 2 has an index of 134 tons/acre/year (NRCS, 2019, p. B.29).

Coarse fragment content generally increased with depth in all map units across the analysis area. For most map unit components, coarse fragments were gravel less than 3 inches in diameter although cobbles ranging from 3 to 10 inches diameter were encountered. Subsurface horizon cobble content is limiting (**Table 42**) in some soil components in map units B1, H2, J2, and L.

Many of the soils had loamy surface textures with relatively high organic matter and high gravel content, which protects the undisturbed soils against wind erosion. However, if disturbed (cleared of vegetation) and in the absence of moisture, these soils may begin to erode and may be difficult to stabilize. Soil determined to have limiting suitability due to high susceptibility to wind erosion was the 12-inch to 30-inch depth in some portions (around 5%) of map units H1 and H2 having fine sandy textures. Wind erodibility presented no suitability limitations for other soil components or map units.

A soil's susceptibility to water erosion is often evaluated using a soil-erodibility factor (K-factor) (**Table 42**). Sixteen soil components or series had somewhat limiting suitability based on the K-factors. These soils were located on ridge crests and steep slopes originating from sandstones and siltstones. No soil components had limiting suitability based on their K-factor.

Much of the study area consists of slopes of sufficient steepness to produce landslides or other instabilities if severe precipitation or seismic events were to occur. Despite this potential, no indications of recent landslides were observed during field activities, and only one test pit location was present in an area where historic landslide activity was apparent and one where soil creep was observed. The landslide activity was observed on a very steep, east-facing slope in map unit B3. Soil creep in the form of deformed tree trunks was observed on a north-facing slope within map unit E3.

The Soil Baseline Study sampling found through laboratory testing that the average concentrations of antimony, cadmium, selenium, thallium, and zinc were elevated above ranges typical for soils in the United States (Kabata-Pendias, 2001). Other trace elements were present in concentrations that were within typical ranges, either for all samples or for most samples with occasional excursions above the typical range for certain elements.

Based on soil horizon depth, soil mapping boundaries, and the disturbance area, the volume of soil rated as "Not Limiting" or "Somewhat Limiting" was calculated for use as growth media (**Table 43**). Soil rated as limited would not be salvaged for reclamation use.

Table 43. Cubic Yards of Soil by Salvageable Suitability Criteria

Salvageable	Cubic Yards Available
Not Limiting	1,147,838
Somewhat Limiting	2,211,027
Total	3,358,864

Notes: The calculations were made using the acres of each map unit,% of each soil component comprising a map unit, thickness of each component horizon, and converted to cubic yards.

3.10.3 Environmental Consequences

3.10.3.1 Proposed Action and Alternative Cover

A total of 3.36 million cubic yards of soil are available for salvage from 1,076 acres to obtain growth media for reclamation; 1.86 million cubic yards of which are from within the mine pit boundaries. This acreage and soil volume do not include approximately 69 acres identified for the proposed tipple and associated access road which would undergo an Order 2 soil survey later.

Salvage would result in the degradation of soil structure and microbial activity, which are key factors affecting soil-water interactions, erosion, nutrient cycling, susceptibility to compaction, and the support of plant life (i.e. soil productivity) (Bronick & Lal, 2004). The resulting growth media would be susceptible to erosion during handling and storage and would exhibit decreased productivity upon placement in reclaimed areas. These effects would be long-term; however, soil salvage and growth media placement activities are designed to minimize the loss of functionality through direct placement of growth media upon being salvaged whenever possible. Growth media not directly hauled for use in reclamation would be temporarily stockpiled until needed for reclamation. Erosion prevention Best Management Practices such as seeding soil stockpiles and implementing run-on and run-off control measures would minimize loss of stockpiled soil and replaced growth media through erosion. This would subsequently conserve growth media thickness and minimize impacts to other resources.

Soil trace element total concentrations would be unaffected by soil handling operations. Trace element mobility would also be unaffected as the existing near-surface soil is currently subjected to the same atmospheric weathering processes as the resulting growth media placed for reclamation. The excavation would not cause a change in the oxidation state of trace element-containing minerals and subsequent increases in trace element mobility. The general trend is for trace element concentrations to be higher in soils located directly over the Phosphoria Formation. Mixing soils during salvage, storage, and replacement will dilute elevated trace element concentrations in Phosphoria Formation soils.

A minimum 20 inches of growth media would be placed on disturbed areas as part of reclamation (Itafos, 2020a). Only growth media identified as “Not Limiting” or “Somewhat Limiting” would be used to construct the cap and cover system on areas of backfilled overburden (Arcadis, 2020j). Within the disturbance boundary, 3.6 million cubic yards are “Not Limiting” or “Somewhat Limiting”. Equal distribution of this growth media across the 1,076-acre disturbance would allow 25 inches of “Not Limiting” and “Somewhat Limiting” growth media to be placed for reclamation.

Separate salvage and handling of nutrient-rich upper soil horizons (topsoil) and less fertile subsoil is not proposed. Mixing of these materials during salvage operations would result in an overall degradation of topsoil quality due to dilution of organic matter and microbial biomass.

In the 61-acre tipple area and 8 acres of associated access road, covering the tipple with a limestone cap without removing native soil would result in compaction and loss of soil microbial activity, and an irretrievable and irreversible reduction in the functionality of the upper portion of the soil profile. These impacts may or may not be more severe or of longer duration compared to mixing upper and lower soil horizons and storing in a stockpile as would occur at other areas where soil is salvaged. However, reclamation standards must be met.

3.10.3.2 No Action

The No Action Alternative would produce no change from current conditions. Direct and indirect effects on soil would not occur.

3.10.3.3 Alternative Stream Routing

Direct and indirect effects on soil would be the same as those described for the Proposed Action although an additional 4.9 acres of soil would be disturbed. Within this 4.9-acre area, 8,357 cubic yards of soil are available for salvage which does not include 3.2 acres of soil which fall outside of the existing soil mapping boundary.

3.10.3.4 Alternative Access

Direct and indirect effects on soil would be the same as those described for the Proposed Action although an additional 46 acres of soil for the road or 14 acres for the ATV Trail would be disturbed and not reclaimed as the relocated road would be permanent. Within this 46-acre area, 145,023 cubic yards of soil are available for salvage which does not include 12 acres of soil which fall outside of the existing soil mapping boundary. The 14 acres of the ATV trail would make 44,137 cubic yards of soil available for salvage (30.4% of the road based on acres).

3.11 Grazing

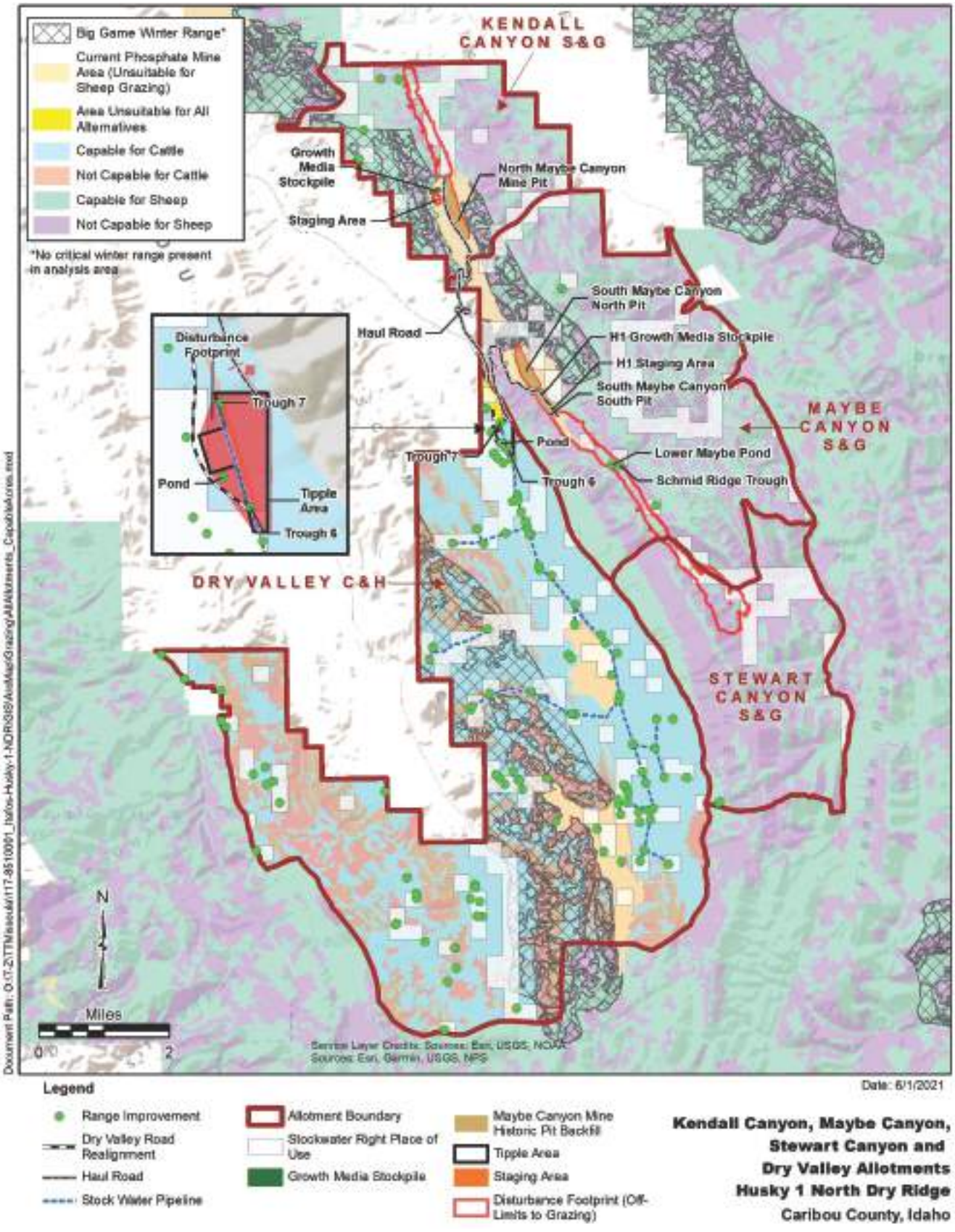
3.11.1 Analysis Area and Methods

The analysis area for grazing consists of the grazing allotment permit boundaries that contain the project footprint. The grazing analysis area is shown on **Figure 46**. Grazing permits beyond the grazing analysis area are controlled by other entities. The issues for analyzing impacts on grazing and the indicators that will be used to discuss them are shown in **Table 44**.

Table 44. Issues and Indicators for Grazing

Issue	Analysis Method
Acres of change in capable and suitable rangeland	Quantify the acres of capable and suitable rangeland impacted during and after mining.
Estimate short-term and long-term reduction in animal unit months (AUMs)	Based on vegetation type, capability, and suitability conversions calculate the estimated change in animal unit months (AUMs) short-term (during operations) and long-term (after reclamation).
Areas where the mining activities split an allotment or reduce movement to feed or water.	Qualitative discussion of effects and proposed EPMs and BMPs based on GIS mapping considering mining progression through phases and time until reclaimed.

Figure 46. Grazing Analysis Area



3.11.2 Affected Environment

The project footprint is located within three sheep and/or goat (S&G) grazing allotments. From north to south the S&G grazing allotments include Kendall Canyon, Maybe Canyon, and Stewart Canyon. The Dry Valley lease, where the Tipple site is proposed, is located within the North Division of the Dry Valley cattle and/or horse (C&H) grazing allotment, which is subdivided into Units 10, 11, and 12. The allotment areas and boundaries for the Dry Valley North Division units are shown on **Figure 46**. The 2020 USFS Annual Operating Instructions for these grazing allotments were obtained from the Caribou-Targhee National Forest website's Range Management page (USFS, 2020a). The Annual Operating Instructions provide the permitted number of animals, season of use, head months, and grazing rotation direction. Details for Kendall Canyon, Maybe Canyon, and Stewart Canyon grazing allotments are summarized in **Table 45** and the grazing schedule for the units in the Dry Valley North Division are summarized in **Table 46**. Not all of the range improvements listed in the Annual Operating Instructions locations are known precisely and therefore are not shown on **Figure 46**. Baseline studies delineated surface water features, including reivers, streams seeps, and ponds and no additional livestock water sources were found in the surface water analysis area shown in **Figure 33**.

An AUM is the amount of forage needed to sustain one cow or approximately five sheep for one month. For this report and consistency with the RFP process an AUM was based on a mature cow and 450-pound calf that consume 36 pounds of forage per day (1,080 pounds/month) and a head month was based on a ewe and 80 to 90-pound lamb consuming 7 pounds per day (210 pounds/month). Therefore, 1 AUM is equal to 5.14 head months.

Table 45. Summary of Grazing Allotments

Allotment Name[1]	Season of Use[1]	Number of Animals Authorized[1]	Permitted Head Months[1]	Permitted AUMs[2]	Improvements[1]
Kendall Canyon	June 25 to September 20	990	2,865	557	10 ponds, 1 trough
Maybe Canyon	June 20 to September 20	935	2,860	556	1 corral, 4 troughs, 3 ponds
Stewart Canyon	June 20 to September 15	910	2,634	512	Water tank
Dry Valley	June 6 to September 20	1,504	NA	5,291	7 cattleguards, 17 fences (25.7 miles), 39 ponds, 10 troughs, 6 pumps, 6 wells, 1 distribution pipeline

[1]Source: (USFS, 2020b; USFS, 2020c; USFS, 2020d).
[2] One AUM is equal to 5.14 HMs

Table 46. Dry Valley North Division Grazing Schedule

Unit/Division Name[1]	Season of Use[1]	Number of Days[1]	Number of Animals Authorized[1]	Calculated AUMs[2]
Unit 11	August 8 to September 20	44	614	842
Unit 12	July 6 to August 7	33	614	632

[1] Source: (USFS, 2020b)
[2] Calculated by multiplying Total Division AUMs by% of grazing season in each unit.
Notes: Only accounts for the North Division of the Dry Valley Allotment.

3.11.2.1 Tentative Carry Capacity

Tentative carrying capacity analysis is used by USFS to determine if current stocking rates are in line with forage production for the allotment. Determining the tentative carrying capacity for the allotments uses calculated forage production available for grazing which is factored into Animal Unit Months (AUM's) that can be compared with forage consumed in a permitted season vs forage produced on the allotment. Forage production is calculated considering the capable/suitable acres per community type, production potential (pounds/acre) per year, and the allowable % utilization. The available forage was divided by 1,080 pounds to determine AUMs available on capable/suitable acres within the community type(s). The AUMs for each community type were then added up for the entire allotment (**Table 47**). Phosphate mine areas are considered unsuitable for grazing and were not included in the tentative carrying capacity.

Table 47. Tentative Carrying Capacity by Allotment

Allotment	Acres[1]	Acres of Phosphate Mining Area[2]	AUMs Currently Permitted[3]	Pounds of Forage Available Per Year[4]	AUMs Available Per Year[5]
Kendall Canyon	5,183	447	564	1,304,213	1,208
Maybe Canyon	11,873	656	563	2,927,093	2,710
Stewart Canyon	6,476	0	519	1,314,970	1,215
Dry Valley Unit 11	1,985	60	842	882,457	817
Dry Valley Unit 12	1,973	87	632	1,035,468	959

1 GIS Analysis
2 2003 RFP Prescription 8.2.2(g).
3 Sheep allotments include 7 AUMs for horse use.
4 Available forage is based on potential production by community type and RFP allowable utilization: 45% use on winter range, 55% use on non-winter range, and 35% use on a stream that is rated Functioning at Risk (low). No critical winter range on allotments.
5 Based on a mature cow and a 450-lb calf that is eating 36 pounds of forage a day (1080 pounds/month).
Notes: Rounding may cause numbers to total differently than the table. Only accounts for the North Division of the Dry Valley Allotment.

3.11.3 Environmental Consequences

3.11.3.1 Proposed Action

The Proposed Action would disturb areas the allotments shown in **Table 48**, these areas would become unsuitable for sheep/cattle grazing until the restoration criteria identified in the MRP have been met and the area can be reopened to grazing according to the 2003 RFP. EPMs are included in Section 2.2.9.3 to address the loss of available surface water sources and range improvement water sources available for livestock use due to mining operations, this includes loss of use due to inaccessibility; which, is a critical concern of grazing allotment permittees since livestock would be prohibited from accessing mine areas, including haul roads, during the life of the mine with the exception of the scenario disclosed in the EPMs. As a BMP, Itafos personnel will visually survey the mine areas daily for the presence of livestock. If livestock are at potential risk, they will be removed from the area immediately (Itafos, 2020a).

With the implementation of the EPMs and BMPs, livestock would have ample access to feed and water on all allotments during mining and reclamation. There may be additional changes to capability based

on the criteria that areas must be within one mile of water, but because of the uncertainty of where, when, and for how long water sources would be lost the change in capability cannot be estimated at this time.

Long term, backfilling and reclaiming the historic North Maybe Mine pit and South Maybe Canyon South and North pits (currently unsuitable for grazing) would convert the historic pits to grassland capable and suitable for livestock grazing and is estimated to result in additional AUMs available per year when compared to the pre-mining tentative carrying capacity. It is ultimately the decision of the CTNF to determine the acres of rangelands that would be capable/suitable of supporting livestock grazing through analysis and any changes to capability/suitability would be done through revision of the Allotment Management Plans.

As discussed in Section 3.8.3.1, the majority of the vegetation type to be removed is coniferous forest (not capable) which would be converted to grass/shrub cover (capable) post-reclamation and slopes greater than 45% (not capable) would have a maximum slope of 33% (capable for sheep) post-reclamation. The capable/suitable acres disturbed by the Proposed Action and estimated changes in tentative carrying capacity for each allotment are shown in **Table 48**.

Restricted access due to mining activities would begin in production year 11 and conclude in year 17 (Itafos, 2021).

Kendall Canyon

There would be no impact to ten out of the 11 range improvements listed in the AOI or to Mill Canyon Creek and Kendall Creek with stockwater right places of use**.** The NDR mine pits, backfill activities at the North Maybe Mine historic mine pit, and NDR haul road would split the Kendall Canyon allotment area from north to south. Splitting the allotment would increase the complexity of the counterclockwise livestock rotation (USFS, 2020c) used to maintain vegetation and riparian standards. The west side of the allotment would be accessible to grazing only by crossing the mine area.

Maybe Canyon

The Lower Maybe Pond and Schmid Ridge Trough would be lost to livestock beginning in H1 Phase 4. The permanent realignment of Maybe Creek and Stewart Creek may result in a short-term loss of access to the Maybe Creek and Stewart Creek stockwater right place of use during the construction of the permanent stream beds. The haul road, backfill of historic South Maybe Canyon Mine pits, and portions of the H1 pits would divide the Maybe Canyon allotment from northwest to southeast. The counter-clockwise livestock rotation would be restricted across the mining leases and grazing rotation would increase in complexity during the life of the mine. With the allotment split, livestock would have very little access to water on the west side and ample access to water sources on the east side.

Stewart Canyon

Restricted access due to mining activities at H1 would begin in production year six and last until year 13. There would be no impact to the range improvements with known locations. The permanent realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use during the construction of the permanent stream bed. The Stewart Canyon allotment would not be completely bisected by the disturbance; therefore, the clockwise livestock rotation may not be as difficult as for Maybe Canyon and Kendall Canyon.

Dry Valley

The Tipple site and associated components would affect Units 11 and 12 of the North Division. No other divisions in the allotment would be affected by the Proposed Action. Range improvements with known locations, Trough 6, Trough 7, and one pond, would be lost to livestock. The Tipple would be on top of an underground water distribution pipeline (also a range improvement). Itafos would relocate the underground watering line outside of the tipple area and provide three troughs along the alignment to replace Troughs 6 & 7 and the disrupted pond.

The proposed Tipple would isolate the northern most portion of Unit 12 from the majority of the unit and a small portion of Unit 11 east of the proposed Dry Valley Road Realignment. This area would become unusable during the life of the Proposed Action. With the unit split, livestock would have very little access to water on the north end and ample access to water on the south end.

Table 48. Proposed Action Post-Reclamation Carrying Capacity by Allotment

Allotment	Capable/ Suitable Acres Disturbed	AUMs Currently Permitted[1]	Reduction in AUMs Short-term	Current AUMs Available Per Year[2]	Post Reclamation AUMs Available Per Year[2]	Change in AUMs
Kendall Canyon	101	564	47	1,208	1,300	90
Maybe Canyon	109	563	48	2,710	2,874	150
Stewart Canyon	105	519	48	1,215	1,322	108
Dry Valley Unit 11[3]	39	842	19	817	815	-2
Dry Valley Unit 12[3]	127	632	65	959	960	1

1 Sheep allotments include 7 AUMs for horse use.
2 Based on a mature cow and a 450lb calf that is eating 36 pounds of forage a day (1080 pounds/month).
3 Includes Area Unsuitable for All Alternatives shown on Figure 46.
Notes: Rounding may cause numbers to total differently than the table.

3.11.3.2 No Action

There would be no effects to current grazing practices. There are no other foreseen new activities within the grazing analysis area. Grazing analysis area uses would remain restricted in the current phosphate mine areas, the CERCLA activities from the historic Maybe Canyon leases would continue (see Section 3.2.1), as would the frequency of recreation, grazing and resource management currently existing. Ten-year grazing permits would continue to be issued. The No Action Alternative would result in the loss of the additional 338 AUM's from reclamation of the historic Maybe Mines and the conversion of unsuitable to suitable for grazing in portions of the H1 and NDR reclaimed mines.

3.11.3.3 Alternative Cover

The impacts to the Maybe Canyon, Stewart Canyon, and Dry Valley allotments would be the same as the Proposed Action.

Kendall Canyon

The short-term impacts on the allotment would be the same as the Proposed Action. After reclamation, fewer disturbed acres would be grassland capable and suitable for livestock grazing. Long-term there would be an increase of AUMs available per year when compared to the pre-mining tentative carrying capacity and be fewer AUMs available when compared to the Proposed Action. The post reclamation tentative carrying capacity is shown in **Table 49**.

Table 49. Alternative Cover Post-Reclamation Carrying Capacity

Allotment	Capable/ Suitable Acres Disturbed	AUMs Currently Permitted	Reduction in AUMs Short-term[1]	Current AUMs Available Per Year[2]	Post Reclamation AUMs Available Per Year	Change in AUMs
Kendall Canyon	101	564	47	1,208	1,288	80

1 Sheep allotments include 7 AUMs for horse use.
2 Based on a mature cow and a 450-lb calf that is eating 36 pounds of forage a day (1080 pounds/month).
Notes: Rounding may cause numbers to total differently than the table.

3.11.3.4 Alternative Stream Routing

The impacts on the Kendall Canyon and Dry Valley allotments would be the same as the Proposed Action.

Maybe Canyon

The Stewart Creek alternative operational realignment would temporarily occupy 5 acres of the allotment, 4 acres of which are classified as capable/suitable for grazing. The operational realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use during the construction of the operational stream bed. Itafos would supply a supplemental water source to livestock or allow access to the original stockwater right place of use during this time. During construction of the alternative reclamation realignment. The effects on the livestock rotation and access to feed and water would be the same as the Proposed Action.

After reclamation, the Stewart Creek alternative reclamation realignment would permanently occupy 5 acres of the allotment, less than 1 acre of which is classified as capable/suitable for grazing. The post-reclamation tentative carrying capacity is shown in **Table 50**.

Stewart Canyon

The Stewart Creek alternative operational realignment would not occupy any portion of the allotment therefore the short-term reduction in capable/suitable acres and annual reduction of AUMs would be the same as the Proposed Action.

The alternative reclamation realignment of Stewart Creek may result in a short-term loss of access to the Stewart Creek stockwater right place of use during the construction of the reclaimed stream bed. An EPM is included in Section 2.2.9.3 o address livestock access to surface water sources. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the Proposed Action. The post reclamation tentative carrying capacity is shown in **Table 50**.

Table 50. Alterative Stream Routing Post-Reclamation Carrying Capacity

Allotment	Capable/ Suitable Acres Disturbed	AUMs Currently Permitted	Reduction in AUMs Short-term[1]	Current AUMs Available Per Year[2]	Post Reclamation AUMs Available Per Year	Change in AUMs
Maybe Canyon	113	563	49	2,710	2,861	151
Stewart Canyon	105	519	48	1,215	1,322	107

1 Sheep allotments include 7 AUMs for horse use.
2 Based on a mature cow and a 450-lb calf that is eating 36 pounds of forage a day (1080 pounds/month).
Notes: Rounding may cause numbers to total differently than the table.

3.11.3.5 Alternative Access

The impacts to the Kendall Canyon S&G and Dry Valley C&H allotments would be the same as the proposed action.

Maybe Canyon S&G

The alternative road would permanently occupy 46 acres of the allotment, 25 acres of which are classified as capable/suitable for grazing, and result in the permanent loss of 11 AUMs in addition to the proposed action. The ATV trail would affect 14 acres of the allotment. Although the alternative road would permanently split the allotment, the grazing allotment permittee would be able to access the eastern portion of the allotment without crossing mine areas and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action. **Table 51** shows the post reclamation tentative carrying capacity. The ATV trail minimal acres are not likely to result in a loss of AUMs.

Table 51. Alterative Access Post-Reclamation Carrying Capacity

Allotment	Capable/ Suitable Acres Disturbed Road/Trail	AUMs Currently Permitted	Reduction in AUMs from Road Short-term[1]	Current AUMs Available Per Year[2]	Post Reclamation AUMs Available Per Year	Change in AUMs from Road Access
Maybe Canyon	134/111	563	59	2,710	2,849	139
Stewart Canyon	105/105	519	48	1,215	1,322	107

1 Sheep allotments include 7 AUMs for horse use.
2 Based on a mature cow and a 450-lb calf that is eating 36 pounds of forage a day (1080 pounds/month).
Notes: Rounding may cause numbers to total differently than the table.

Stewart Canyon

The alternative road or the ATV trail would permanently occupy less than one acre of the allotment, less than half an acre of which is classified as capable/suitable for grazing. When combined with the proposed action the short-term reduction in capable/suitable acres and annual reduction of AUMs would be the same as the proposed action.

Although a small portion of the alternative road would permanently occupy the allotment, it would allow grazing allotment permittees access to the allotment without crossing mine areas and sheep would be afforded the same crossing privileges they currently have on NFS Road 134. Therefore, the effects on the livestock rotation and access to feed and water would be the same as the proposed action. The post reclamation tentative carrying capacity is shown in **Table 51**.

3.12 Recreation, Access, and Roadless Areas

3.12.1 Analysis Area and Methods

The analysis area includes the H1NDR disturbance area and the major access roads and recreation infrastructure (roads, trails, campgrounds, rental cabins, etc.), an area of 36,636 acres (**Figure 47**).

The primary issues are listed in **Table 52** along with the indicators used to evaluate the measure of change between the current affected environment and the effects on recreation, access, and roadless areas.

Table 52. Issues and Indicators for Recreation, Access, and Roadless Areas

Resource	Issue	Analysis Method(s)
Recreation	Mining activities may change the existing Recreation Opportunity Spectrum.	Acres of disturbance affecting ROS classification.
	Loss of acreage available for short-term or long-term recreation uses, including hunting.	Changes in acreage available for dispersed (both motorized and non-motorized) recreation activities particularly hunting.
Access	Public access to recreational opportunities may be limited or prevented by mining activities.	Acres of public lands closed to public use during mining and reclamation.
		Miles of primary access roads closed to public use by mining and reclamation activities.
		Changes in the number of miles of NFS roads and trails open to motorized travel.
Roadless Areas	The project may result in new roads and other infrastructure within a designated inventoried roadless area	Acres of disturbance including roads and other infrastructure within a designated inventoried roadless area

3.12.2 Affected Environment

Recreation

Recreation is a common activity in the analysis area, including camping at developed USFS campgrounds and dispersed camping, hiking, biking, scenic driving, hunting, horseback riding, fishing, off-highway vehicle (OHV) use, snowmobile use, and cross-country skiing. Recreational use on National Forest System lands within the analysis area is managed based on ROS guidelines.

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (USFS, 1979) is used to classify recreation settings. The categories include Primitive, Semi-Primitive, Non-Motorized, Semi-Primitive Motorized, Roaded Modified, Roaded Natural, and Urban (USFS, 1979). **Figure 48** shows the ROS classifications and **Table 53** shows the acres in each category in the analysis area.

Table 53. Estimated Acres by ROS Category in the Analysis Area

Legend	Analysis Area Acres
Road Natural/Road Modified	18,455
Semi-Primitive Motorized	3,608
Semi-Primitive Non-Motorized	8,322

Dispersed Recreation

Dispersed recreation includes hiking, biking, scenic driving, hunting, horseback riding, fishing, OHV use, snowmobile use, and cross-country skiing. The dominant types of dispersed recreation in the vicinity are big game hunting for elk, moose, and deer; fishing; and camping (Transtrum, 2020). Hunting largely occurs in the analysis area from August 15 to June 7 with most occurring during the late summer and fall from mid-August to mid-November. Other dispersed recreation occurring in the area include snowmobiling, cross-country skiing, horseback riding, upland bird hunting, picnicking, driving for pleasure/sight-seeing, and off-road vehicle use. Popular dispersed use areas include the

Figure 47. Recreation, Access, and Roadless Area Analysis Area

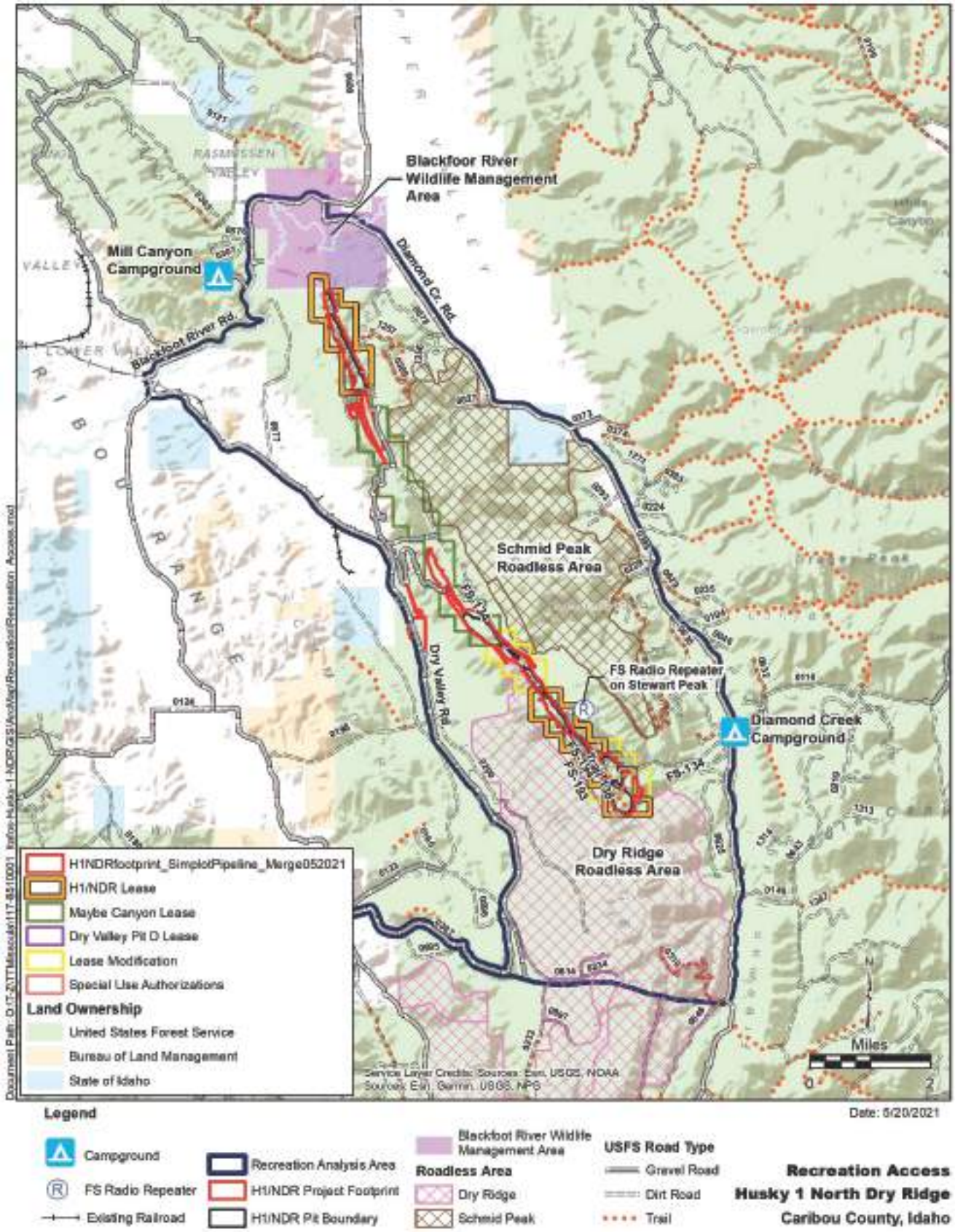
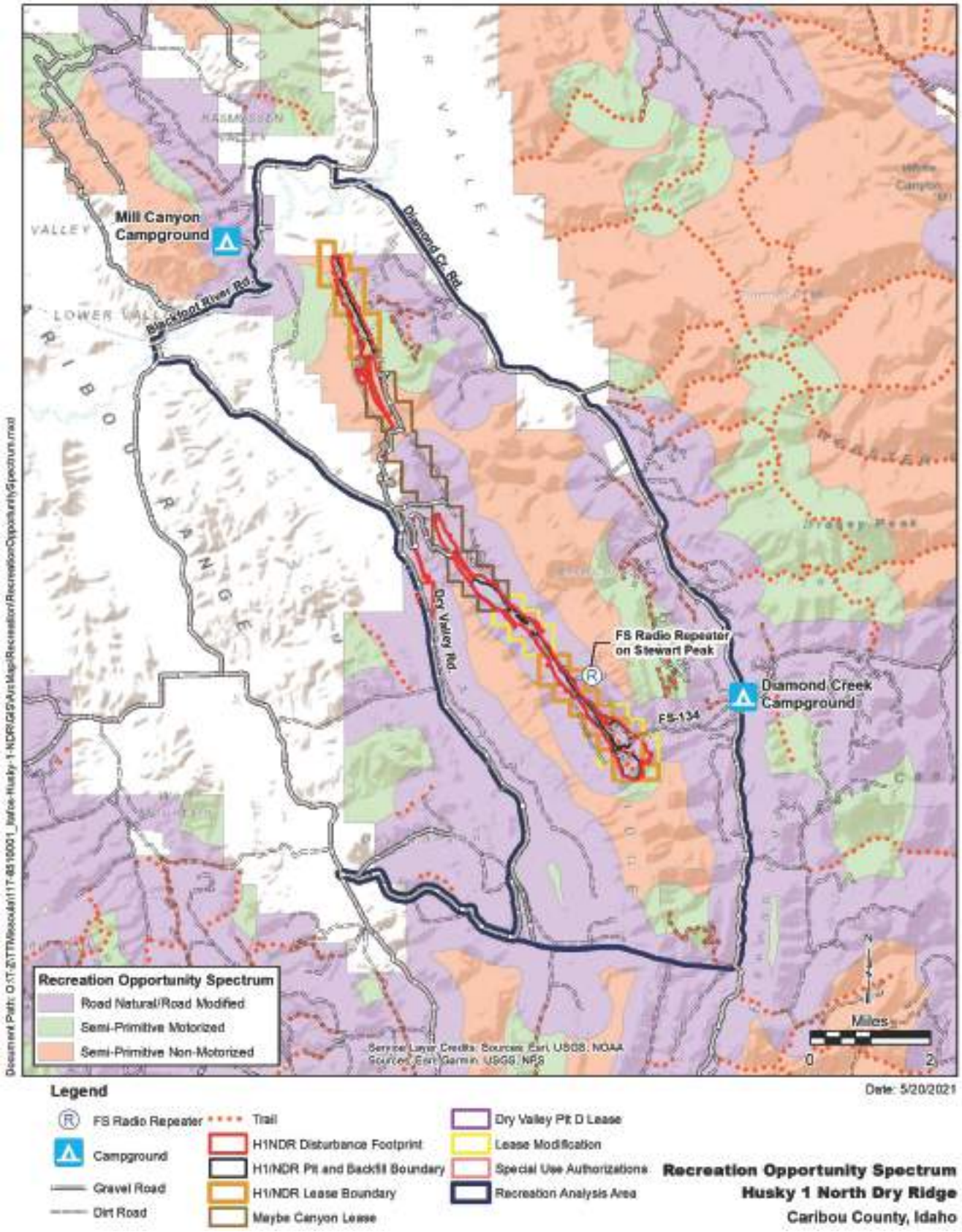


Figure 48. Recreation Opportunity Spectrum Categories in the Analysis Area



Blackfoot River, Diamond Creek and the canyons connecting Diamond Creek Road to Dry Ridge (such as Stewart Canyon and Kendall Canyon), and the Blackfoot River Wildlife Management Area.

The Blackfoot River Wildlife Management Area, which borders the north end of the Dry Ridge lease, is managed with a focus on the fisheries in the headwaters of the Blackfoot River and provides habitat for big game, upland game, and waterfowl. It is a popular fishing, hunting, and wildlife viewing area. Access to the site is provided by the Blackfoot River Road and Lanes Creek Road. Motorized vehicle use is restricted to public roads and parking areas. There are 0.6 miles of non-motorized trails in the Wildlife Management Area.

In total, there are 31,933 acres managed by the BLM, USFS, and the State available for recreation in the analysis area.

Hunting

The analysis area is within game management unit 76 (Diamond Creek). Hunting is allowed depending on species from a few weeks per year to all year, but it is concentrated from late summer to late fall in the analysis area. Hunting is the primary recreational activity in the analysis area.

Access

Non-Motorized Access

Non-motorized snow-free recreation activities include hiking, wildlife viewing, horseback riding, and mountain biking. Hunting may involve travel by motorized vehicle or by non-motorized means.

Hiking and stock travel are unrestricted on the forest with a few exceptions including special use and mine areas. There are no USFS trailheads but there are two IDFG trailheads located on the Blackfoot River Wildlife Management Area. Trails partially or completely within the analysis area are shown in **Figure 47**.

Use of National Forest for winter activities such as skiing, snowboarding, snowshoeing, and dog-sledding is unrestricted with a few exceptions including special use and mine areas. There are many opportunities for these types of use; however, some non-motorized winter travelers prefer a non-motorized setting for reasons of noise, fumes, safety, and wildlife disturbance (USFS, 2005a).

Motorized Access

Primary access to the NDR lease is from the west (Dry Valley). Primary public access to the H1 lease from the Dry Valley (western) side is via the Dry Valley Road which connects to NFS Road 134 and primary access from the Diamond Creek (eastern) side is via the NFS Road 134 off the Diamond Creek Road (**Figure 47**). The FS Stewart communication site is on a ridgetop 680 feet east of the H1 lease boundary (**Figure 48**). The site is accessed for site maintenance by a road partially within the H1 lease.

There are approximately 81 miles of NFS designated roads open to full size vehicles (greater than 50 inches width) in the analysis area, 54 of which can be traveled in a low clearance two-wheel drive vehicle with remaining 27 miles restricted to high clearance four-wheel drive vehicles.

ATVs, snowmobiles, motorcycles, and motorized trail bikes use approximately 15 miles of NFS trails in the analysis area and approximately 1 mile in the project footprint. Snowmobiling is a popular activity in southeast Idaho in general. The NFS lands outside of the current mining lease in the analysis area are currently open to cross-country snowmobile use.

Traffic

There are no traffic count data for any of the NFS or Caribou County roads near the proposed mine. However, the traffic on Blackfoot River Road, Dry Valley Road, and Diamond Creek Road could be characterized as comparatively "heavy" given the overall rural environment (Spencer, 2021). Dry Valley Road and Diamond Creek Road are currently unmaintained during the winter. Traffic on the Blackfoot River Road includes Rasmussen Valley Mine workers plus vendor vehicles (Spencer, 2021). Recreational traffic near the proposed mine is heaviest in the late summer and fall during hunting season (Transtrum, 2020).

Inventoried Roadless Areas

Small portions of the Dry Ridge and Schmid Peak Inventoried Roadless Areas occur within the analysis area. The Idaho Roadless Rule recommends Idaho Roadless Areas be managed as wild land recreation; primitive; special areas of historic and tribal significance; backcountry/restoration; and general forest, rangeland and grassland (USFS, 2008). These Inventoried Roadless Areas do not contain recommended wilderness under the 2003 RFP and are classified as Backcountry/Restoration and General Forest, Rangeland and Grassland management themes (USFS, 2008).

Dry Ridge Inventoried Roadless Area

The Dry Ridge Inventoried Roadless Area comprises 23,307 acres (USFS, 2003a). The major access roads are the Diamond Creek Road which parallels the northern portion of the eastern border, the Georgetown Canyon Road along the southern portion of the east border and the south, and the Slug Creek Road on the west. Other roads to the area are the Left Fork of the Georgetown Canyon Road from the southwest, and the Dry Canyon Road from the west (USFS, 1984).

There are 8,600 acres under the backcountry restoration theme and 14,900 acres under the general forest, rangeland, and grassland theme. The footprint of the Proposed Action and Alternative Cover includes approximately 19 acres of the Dry Ridge Inventoried Roadless Area, 1 in a Forest Plan Special Area and 18 in the General Forest, Rangeland, and Grassland theme.

3.12.3 Environmental Consequences

The impacts below are irretrievable during the period when access is prohibited.

3.12.3.1 Proposed Action, Alternative Cover and Alternative Stream Routing

Recreation

Recreation Opportunity Spectrum

Under the Proposed Action, Alternative Cover, and Alternative Stream Routing action alternatives, the project footprint would disturb 817 acres of Road Natural/Road Modified, 112 acres of Semi-Primitive Motorized, and 201 acres of Semi-Primitive Non-Motorized lands (**Table 54**).

Table 54. ROS Classes in the Analysis Area and the Project Footprint

ROS Classification	Analysis Area Acres	Project Footprint Acres
Road Natural/Road Modified	18,455	817
Semi-Primitive Motorized	3,608	112
Semi-Primitive Non-Motorized	8,322	201

A total of 1,130 acres currently available for dispersed recreation on NFS lands would be incrementally closed to the public during operations and reclamation. Recreationists, including hunters and campers, may choose not to use adjacent lands within approximately 0.5 mile of the proposed mining given noise, dust, etc. though these lands would remain open. Hunters or wildlife viewers that had used the analysis area previously could continue to pursue game on tens of thousands of acres of nearby public and private lands (where permitted) to which these species would likely migrate.

There would be no change in developed recreation acreage. However, the Mill Canyon Campground may see increased use as more Forest visitors travel the Blackfoot River Road given the closure of NFS Road 134. Though the NDR lease extends onto the Blackfoot River Wildlife Management Area, no portion of the mine footprint would.

Access

Acres available to the public for dispersed non-motorized recreation including hunting and winter motorized recreation (snowmobiling) would decrease by 1,130 acres. While approximately 98% of the 1,130 acres disturbed under this alternative would be reclaimed and re-opened for recreation, highwall areas may not be desirable for some recreational uses such as hiking and scenic driving because of the altered topography and vegetation resulting in long-term adverse impacts. Conversely, hunters may find these areas desirable, as the revegetated areas may supply early successional forage for game species attracting them to the area resulting in long-term beneficial impacts.

Miles of primary access roads closed to the public

Public access to NFS Road 134 would be closed for 4.6 miles from approximately the intersection of the Simplot slurry line to Dry Valley Road for the duration of mining and reclamation. During mining and reclamation, the Blackfoot River Road would be used as the primary means for the public to access Diamond Creek Valley and Dry Valley. After mining and reclamation is completed, and as part of mine reclamation, a new public access road in approximately the old location of NFS Road 134 would be re-established through the reclaimed mining area. Most newly proposed access and haul roads would be obliterated by pulling fill materials back into the road cuts. However, portions of the main haul road in Maybe Canyon and Stewart Canyon may be used to re-establish permanent access through the area. Intermittent access may be required for environmental monitoring, site inspections, and other post-closure activities at various sites throughout the project after mine closure. Simple two-track alignments would be allowed to develop to accommodate needed access, but these would not be open to the public. The mine would allow occasional access to the FS repeater site on the ridge 680 feet east of the H1 lease for maintenance.

The Proposed Action would result in adverse effects on recreation opportunities by temporarily reducing the miles of publicly accessible NFS roads. New roads would be built specifically to accommodate the mining activity would not be part of the USFS's Revised Travel Plan and would not be open to the public.

Changes in the miles of NFS roads and trails open to motorized travel

The NFS miles of roads and trails open to motorized travel would not change over the long term. The 1.2 miles of ATV Trail #138 in the proposed mine footprint would be open as long as possible and then closed when needed. It would then be opened again when mining has ceased in the immediate area and reclamation completed. The Proposed Action would have a temporary reduction in NFS road density, but over the long term there would be no change in the NFS road density as NFS Road 134 would be reopened following mining.

Traffic

The H1/NDR Mine would employ approximately 480 workers traveling daily from nearby communities such as Soda Springs. There may be a transitional period as the Rasmussen Valley Mine is reclaimed and the H1/NDR mine opened where traffic would travel to both sites. Mine worker and vendor traffic currently seen on Blackfoot River Road would shift to Dry Valley Road as the H1/NDR mine opens. This would likely result in a moderate increase in traffic along Dry Valley Road. Dry Valley Road would be plowed if the mine were to open, increasing traffic considerably during the winter months.

A minor increase in average daily traffic, including large delivery trucks going to and from the mine, would occur under these alternatives. The average daily traffic would increase along an approximately 2.9-mile segment of Dry Valley Road between the H1 and NDR pits and the proposed ore stockpile and train loading facility (tipple) and Dry Valley shop (Itafos, 2020d). With the closure of NFS Road 134, the Blackfoot River Road would serve as the primary route between Dry Valley and Diamond Valley and would see a minor increase in vehicles per day largely during the fall hunting season. Ore would be transported using 100-ton haul trucks which would result in approximately 66 daily trips along approximately 1 mile of Dry Valley Road to the tipple for transport to the rail line (Itafos, 2020a). Increased traffic from commuting mine employees and other mining-related traffic such as service, tire, fuel, welding, blasting, and water trucks would occur along the length of Dry Valley Road (Itafos, 2020a).

Roadless Areas

The 19 acres of the Dry Ridge Inventoried Roadless Area within the mine footprint are in a lease modification area and 18 acres would be used for the permanent OSA. Roads are permissible in the lease modification area within the Dry Ridge Inventoried Roadless Area in both the Forest Plan Special Management Area and the General Forest, Rangeland, and Grassland theme (Fuell, 2021).

Worksheets detail impacts on the Dry Ridge Inventoried Roadless Area wilderness attributes including recreation opportunities, special features, and manageability (Tetra Tech, Inc., 2021g). The ground disturbance, changes to vegetation communities, noise, visual disturbances would impact all these attributes except for manageability. The proposed action would not affect manageability because it would neither bisect or otherwise fragment it into smaller pieces that would not meet the size criteria (5,000 acres or more) nor reduce access. The affected attributes would be degraded during project activities and generally return to a stable condition post-reclamation. The worksheets also detail impacts to the roadless characteristics of soil, water, and air resources; sources of public drinking water; diversity of plant and animal communities; habitat for special status species and species dependent on large undisturbed areas of land; primitive and semi-primitive classes of recreation; reference landscapes for research study or interpretation; landscape character and integrity; traditional cultural properties and sacred sites; and other locally unique characteristics.

3.12.3.2 No Action

Recreation, Access, and Roadless Areas

Recreational opportunities would continue as currently seen; there would be no impact on recreation. Following revegetation and reclamation of previously mined areas, public access would be granted to most or perhaps all this acreage. Short-term effects to recreation and access within the analysis area

would be minor and adverse while long-term effects following past mine reclamation and remediation would be moderate and beneficial.

Access, including traffic, would continue as currently seen; there would be no impact on access. Following revegetation and reclamation of previously mined areas, public access would be granted to most or perhaps all this acreage. Short-term effects to recreation and access within the analysis area would be minor and adverse while long-term effects following past mine reclamation and remediation would be moderate and beneficial.

There would be no impacts on Inventoried Roadless Areas wilderness qualities or attributes and roadless area characteristics.

3.12.3.3 Alternative Access

Recreation, Access, and Roadless Areas

Similar to the Proposed Action, 1,130 acres currently available for dispersed recreation would be closed to the public during operation. However, the Mill Canyon Campground may not see increased use as Forest visitors would not have to travel the Blackfoot River Road to reach Diamond Creek given the construction of a new route crossing Dry Ridge under this alternative.

Though public access to 4.6 miles of NFS Road 134 would be prohibited from approximately the intersection of the slurry line to Dry Valley Road for the duration of mining and reclamation, under this alternative a new route over Dry Ridge including 6.1 miles of new road construction would maintain access between Dry Valley and Diamond Creek over the approximately 13-year life of the mine. This would become the new permanent NFS route and closed portions of NFS Road 134 would remain closed during mining and subsequently reclaimed following mining activities. The mine would allow occasional access on NFS Road 134 to the FS repeater site on the ridge above the H1 lease for maintenance. Effects on traffic would be the same as those of the Proposed Action, except the Blackfoot River Road would not need to serve as the primary route between Dry Valley and Diamond Valley and thus this road would not see an increase in vehicles per day as a result of the mine. A sub-alternative or option for the proposed route between Dry Valley and Diamond Valley is a 50-inch-wide ATV trail rather than a route suitable for motor vehicles; if this option were to be selected, there may be a minor increase in vehicular traffic along the Blackfoot River Road.

Approximately 20 acres of the Dry Ridge IRA are within the mine footprint in a lease modification area and would be disturbed under this alternative. Roads are permissible in the lease modification area that is within the Dry Ridge IRA in both the 1.7 acres of Forest Plan Special Management Area covering the Simplot slurry line and the remaining 18.6 acres of the mine footprint in the General Forest, Rangeland, and Grassland theme.

3.13 Social and Economic Conditions

3.13.1 Analysis Area and Methods

The social and economic analysis area is Caribou, Bear Lake, and Bannock counties, Idaho. While a small percentage of the workforce resides in Franklin County, this county is not considered in the analysis area because the percentage is small. The issues for analyzing impacts on social and economic conditions and the indicators that will be used to discuss them are shown in **Table 55**. Environmental Justice is considered but not studied in detail (**Table 63**).

Table 55. Issues and Indicators for Social and Economics

Issue	Analysis Method
Change in employment and income for workers and community, short-term and long-term.	Number of employees for mining and the processing plant, average salaries, compared to community employment and salary from the most recent US Census.
State and local tax revenue and federal payments change in the short-term and long-term.	Annual royalties and state taxes paid
Recreation Economy	Change in recreation employment and earnings based on US Census data.

3.13.2 Affected Environment

The economy in Caribou County and southeastern Idaho is heavily dependent on phosphate mining and processing. Surrounding counties primarily rely on agriculture. Itafos is a major employer in the Caribou County with more that 15% of the workforce in that county.

Employment and Income

It should be noted that the information provided in the existing conditions are largely from data collected before the effects of the 2020 Covid-19 pandemic were realized. Overall employment in the State of Idaho or the US may be reduced at the time of the Draft EIS publication. The 3-county analysis area, with the economy based in natural resource use and agriculture did not see significant declines.

Table 56 shows the employment and unemployment rates for the counties in the analysis area, Idaho, and the United States for 2019 and 2020. One can assume the differences between 2019 and the end of 2020 are a result of the pandemic. 2019 is shows as a more likely baseline to use for comparison of the impacts from the Proposed Action and other alternatives. **Table 57** shows the annual income in the 3-county area, Idaho, and the U.S.

Table 56. 2019 and 2020 Employment

Analysis Method	Caribou County	Bear Lake County	Bannock County	Idaho	US
2019 Unemployment[1]	2.7%	2.9%	2.8%	2.9%	3.7%
December 2020 Preliminary Unemployment[2]	2.7%	3.3%	4.5%	4.4%	6.7%
December 2020 Preliminary Workforce[2]	4,433	3,369	40,119	907,552	161 million

Sources:
1 (Headwaters Economics, 2021)
2 (Idaho Department of Labor, 2021)

Table 57. 2019 Annual Income

Analysis Method	Caribou County	Bear Lake County	Bannock County	Idaho	US
Per Capita Income	$42,527	$43,103	$39,246	45,632	$56,490
Median Household Income	$59,611	$54,265	$49,739	$53,089	$60,293
Average Earnings Per Job 2019	58,164	31,739	41,961	49,818	64,180

Data Source: (Headwaters Economics, 2021)

Itafos indicated that employment from mining would be about the same as has occurred at the Rasmussen Ridge and subsequent Rasmussen Valley mines, about 239 people, paying and average annual salary plus benefits of approximately $91,100 (Gilmer, 2021), resulting in an annual payroll and benefits from mining of approximately $22 million.

Revenue

In Fiscal Year (October 2019 through September 2020), 4.75 total million tons of raw phosphate ore were produced from Federal lands (DOI, 2021a). Gross Revenue to the US from Idaho was $5.5 million (DOI, 2021a).

The Federal Mineral Leasing Act of 1920 directs that half of all federally collected rents and royalties be distributed to the individual states where production occurred. Phosphate royalties are based on five percent of the value of the ore mined.

Ten percent of the rents and royalties amount is earmarked to be given to the county where production occurred. In calendar year 2020, the federal government distributed money from the natural resource revenues to state and local governments. The amount Idaho received is shown in **Table 59**.

Table 58 shows the federal revenue collected from phosphate mining within Caribou County in calendar year 2020.

Table 58. Calendar Year 2020 Federal Revenue Collected from Caribou County

Royalty	Other Revenue	Rents	Total
$9.9 million	$137,119	$14,351	$10.0 million

Source (DOI, 2021b)

Table 59. Disbursements to State and local governments in Idaho Calendar Years 2015-2020

	2015	2016	2017	2018	2019	2020
Total	$7.0 million	$5.5 million	$5.2 million	$4.4 million	$3.7million	$4.6 million

Source: (DOI, 2021c)

A mine license tax of 1% is collected by the state for the value of ores mined or extracted. In FY 2020, the state collected revenues of $116,862, up from $34,556 in 2019 from the mine license tax) (Idaho State Tax Commission, 2021, p. 6). Property taxes are levied by Caribou County on facilities and improvements constructed by companies. The average 2020 tax rate for rural areas in Caribou County was 1.045% (Idaho State Tax Commission, 2021, p. 13).

3.13.2.1 Recreation Economy

Because the impacts on the recreation economy from H1NDR are limited to the area of the project, the analysis of impacts on the recreation economy are based on Caribou County only. Impacts would not be detectable in Bear Lake or Bannock counties. While recreation is not an industry that the US census measures on its own, some measures can be interpreted to assist with understanding the recreation economy in Caribou County. **Table 60** shows the change in industry employment in Caribou County between 2001 and 2018 used to trend of the recreation economy.

Table 60. Recreation Economy Employment and Earnings 2001-2018

Socioeconomic Measure	2001	2010	2018
Employment			
Arts, entertainment, and recreation	39	57	59
Accommodation and food service	173	170	182
Earnings			
Arts, entertainment, and recreation	$105,000	$604,000	$1,169,000
Accommodation and food service	$2,050,000	$2,364,000	$4,841,000

Source: (Headwaters Economics, 2021)

3.13.3 Environmental Consequences

3.13.3.1 All Action Alternatives

H1NDR would allow Itafos to continue to produce phosphate for fertilizer important to agriculture in Idaho, the US, and globally.

Employment and Income

No changes in employment or income would occur with the Proposed Action except that over the life of the project, wages would likely increase at about the same rates as inflation or the cost of living. Itafos has stated that the workforce and equipment currently mining the deposits at the Rasmussen Valley Mine would be used at H1NDR when Rasmussen Valley is complete. Production would remain about the same, which would maintain employment at about the same level and continue through the 13 years of mine life then final reclamation and closure. The Proposed Action would maintain the 480 direct employment positions and associated wages and benefits.

It is expected that operations under the Proposed Action would begin as the Rasmussen Valley Mine deposits are exhausted. Businesses that currently provide goods and services in support of activities are expected to continue to provide those goods and services during operation of the Proposed Action.

Direct employment and income from mining and manufacturing would be extended for another 15 years of active mining and reclamation. The Proposed Action would result in the continued generation of $33 to $35 million in personal income and benefits per year. Based on this annual income, over the life of proposed mining activities, the Action Alternatives would generate up to $490 million in personal income and benefits.

Once H1NDR closes and reclamation is complete, employment and income supported by the project would end. This would result in a decline in the economy (employment, income, revenue, indirect business support) unless additional reserves are proposed and permitted for mining.

Revenue

Federal lease royalties are paid on any production from a lease in accordance with the terms specified by the BLM in the lease. Royalty rates a typically 5% of the gross value of production. Royalties and other revenues collected from federal phosphate leases would be split equally between the state where the activity occurs and the federal government by Federal law. The 50% received by the state are placed in the general fund and a special revenue fund for mineral impacts. Caribou County usually receives 10% of the general fund revenues from the state. Based on the August 1, 2019 through July 31, 2020 values (Guedes, 2021) the equation is:

$$Royalty\ Per\ Ton = 5\% \times [2020\ P_2O_5\ Unit\ Value] \times [\frac{\%\ P_2O_5}{Wet\ Ton} \times \frac{Wet\ Ton}{0.9\ Dry\ Ton} \times 100]$$

$$0.05 \times [\$1.357] \times \left[\frac{0.26\ P_2O_5}{Wet\ Ton} \times \frac{Wet\ Ton}{0.9\ Dry\ Ton} \times 100\right] = \frac{\$1.5278}{Dry\ Ton}$$

Each phase in H1 and NDR would mine approximately 27.5 million wet tons (**Table 5**) or 2.3 million wet tons per phase. At 10% water, each phase would mine an average 2.07 million dry tons. Phases are planned to be roughly one year. Based on the equation and a royalty of $1.5278 per dry ton, the royalty would be $3.15 million per phase. Over all 12 phases, the total royalty would be approximately $37.8 million. Approximately $18.9 million would be returned to the State of Idaho.

Each year the State of Idaho Tax Commission would collect 1% of the net value of ore production as a mine license tax. The funds would be added to the general fund at 66% and 34% to the abandoned mine reclamation fund. The value of the mine license tax would change with changes in the price of phosphate ore and the cost of mining. In 2013 and 2014, Idaho collected mine license taxes of $959,166 and $842,686, respectively. Phosphate mining accounts for 12% of the value of mineral production in Idaho. The state would also collect sales taxes from the mine and employees. Changes in revenue from sales and mine license taxes due to the action alternatives would be negligible because they maintain the current status for about 15 years.

Overall, changes in employment and income, revenue, and contributions from the action alternatives would be short-term because they last until the end of the project and negligible because they maintain the current status for about 15 years. The important contributions to the economy would continue with little change.

Recreation Economy

Because mining has been ongoing in the analysis area for decades, the impacts from past and present mining operations on the recreation economy as described in Section 3.13.2.1 can be used to project the likely impacts from the Action Alternatives. Employment in the recreation economy has been fairly stable over the last 20 years, slowing some between 2010 and 2018 as compared to 2001 to 2010 (**Table 60**). As phosphate mining was ongoing during this period, it appears that mining has not had a detrimental impact on employment in the recreation economy. The earnings have increased dramatically over this same period, more than doubling. Based on this information, phosphate mining in Caribou County has not had a negative impact on the earnings in the recreation economy in the past and is not likely to in the future. Mining is required by the 2003 RFP to protect surface resources to the extent possible and to reclaim areas so as not to diminish surrounding land uses. Impacts on the recreation economy would be negligible.

3.13.3.2 No Action

Overall impacts of the No Action Alternative to social and economic conditions would be long-term and major.

Employment and Income

The No Action Alternative would result in the loss of the jobs from the currently operating Rasmussen Valley Mine. Mine employees would not have a new deposit to mine and these mining positions would be eliminated. Some displaced employees may find employment at other mines although it is assumed that other operating mines are fully staffed and unlikely to be able to accommodate all the current

miners employed by Itafos. Depending on whether Itafos can obtain a source of ore for the processing facility in Soda Springs (purchase or alternative mining area), there could be a reduction in employment at the fertilizer manufacturing facilities in Soda Springs. Indirectly, purchases from businesses that support the mining and processing industries would be reduced. The reductions would be proportional to the reduction in overall phosphate mining and processing under the No Action Alternative. Should the processing facilities close due to a lack of available phosphate, losses to businesses throughout the economy could be major.

Revenue

The No Action Alternative would cause sales, use, and property tax revenues generated by phosphate mining operations discussed in Section 3.13.2 to be reduced once existing operations at the Rasmussen Valley Mine end and reclamation is complete. This would result in a decrease in revenues for Caribou County and in other analysis area counties from the circulation of payroll dollars.

The federal government would not receive royalty payments as described in Section 3.13.2 and would realize a decrease in the corporate income tax paid. These impacts would be negligible. Under the No Action Alternative, Idaho and Caribou County would not receive royalty proceeds dispersed to the state by the federal government. Further, the state would not collect the mine license tax of 1% of the value of ores mined or extracted and would realize a decrease in the corporate income tax paid. These impacts would be negligible to minor when compared to the overall annual operating budgets of these entities.

Recreation Economy

It is not known whether the recreation economy would be harmed or improved under the No Action alternative. A reduction in employment could mean that fewer people would recreate in Caribou County. Or the measures noted in **Table 60** could be supported by out of town visitors, that may or may not increase. Impacts on the recreation economy would be negligible.

3.14 Tribal Treaty Rights

The federal government has a unique relationship with American Indians and Alaska natives as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, judicial decisions, and agreements. Indian treaties are negotiated contracts made pursuant to the Constitution of the United States and take precedence over any conflicting state laws. Treaties are considered the 'supreme law of the land'.

Unlike the federal government's relationship with state and local governments, the United States government has a trust responsibility to federally recognized American Indian tribes that covers lands, resources, and other assets. As part of this trust responsibility, the federal government has an obligation to protect and preserve treaty rights. Specifically, the federal government and represented federal agencies have a responsibility and obligation to consider and consult on potential effects to natural resources related to the tribal treaty rights or cultural use.

3.14.1 Analysis Area and Methods

The analysis area for tribal treaty rights and interests includes the surface disturbance footprint, leases, lease modifications, and special use authorization areas which total 4,293 acres **(Figure 49)**. Approximately 99% (4,246 acres) of the analysis area consists of NFS land, and as the Fort Bridger Treaty of July 3, 1868 (15 Stat. 673) reserves rights for the Shoshone and Bannock Tribes to hunt, fish,

gather, and exercise other traditional uses and practices on unoccupied federal lands, the analysis area is appropriate. 'Unoccupied' denotes public domain lands free of residence or settlement by non-Indians." (Herrera, 139 S. Ct at 1701). The federal mineral leases provide the contractual rights to occupy and mine the deposit. The lease lands and surrounding facilities constitute a "temporary occupation" of the public domain, not subject to treaty rights for the practical duration of mining.

The issues for analyzing impacts on tribal treaty rights and the indicators that will be used to discuss them are shown in **Table 61**.

Table 61. Issues and Indicators for Tribal Treaty Rights

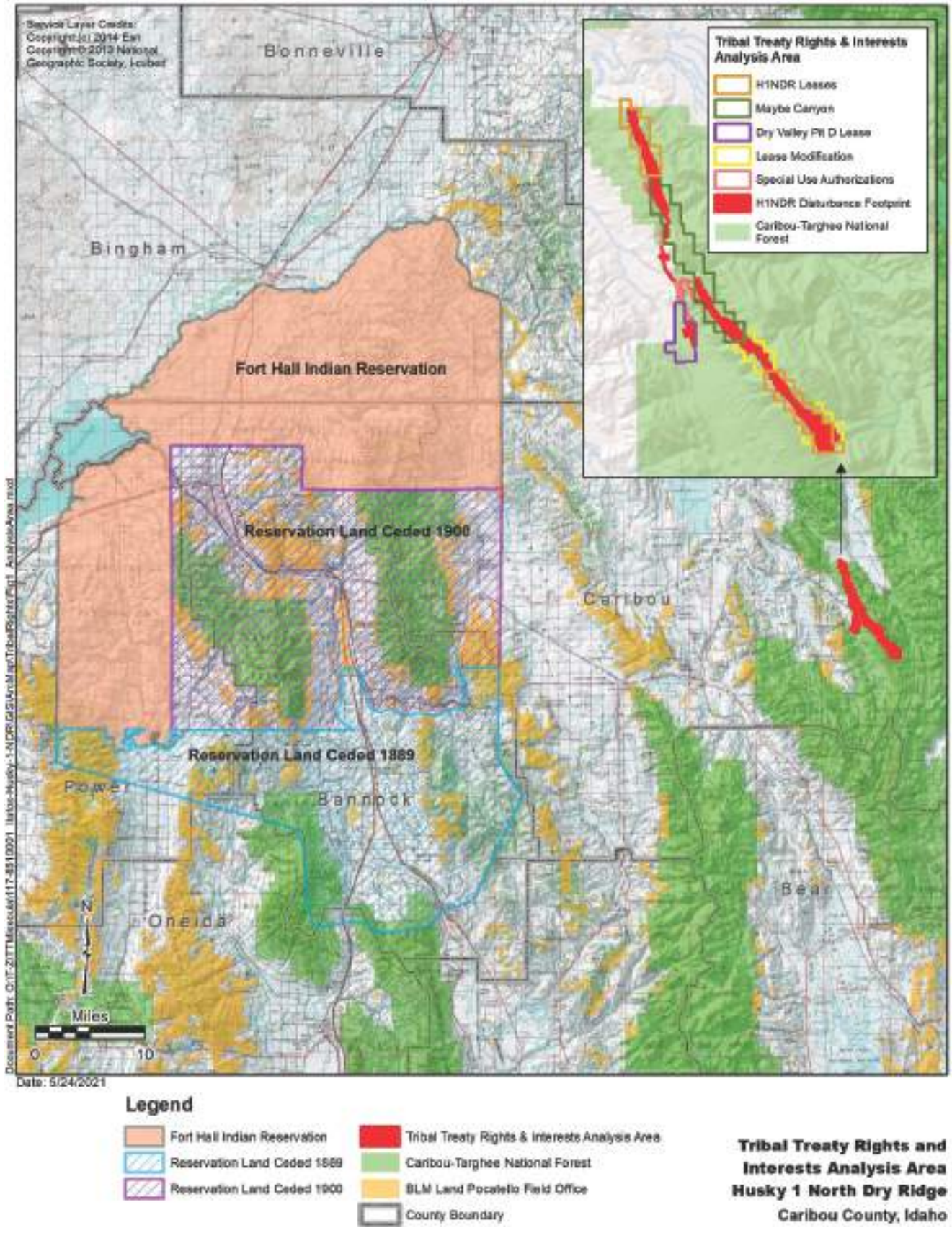
Issue	Analysis Method
The Shoshone-Bannock Tribes' ability to access unoccupied lands of the United States where they may exercise treaty-reserved rights in accordance with the terms of the Fort Bridger Treaty of 1868.	Acres of unoccupied lands available or unavailable during mining activities and the Tribes' ability to access these acres.
Effects on fisheries, water, grazing rights, vegetation, wildlife, cultural resources, traditional cultural properties, and visual resources that are important to the Tribes and those effects on traditional practices.	Changes in the quality and quantity of valued resources on unoccupied public land including water, fisheries, vegetation, wildlife, cultural resources, traditional cultural properties, and visual resources and the effect of these changes on the Tribes. Changes in the uptake of contaminants of potential concern (COPCs) by wildlife and vegetation in mining disturbed areas and areas that are reclaimed.

The identified issues draw from a letter the Shoshone-Bannock Tribes wrote to the BLM, dated November 9, 2012, in which the Tribes present preliminary scoping comments in response to the original H1NDR project and government-to-government consultation (Small, November 9, 2012). Although the original H1NDR represents a different project, it is similar to the current proposed Project. The 2012 letter discusses the Tribes' ties to their ancestral homeland and continuing visits to sacred sites and traditional gathering locations outside the reservation boundaries. Tribal members exercise their treaty rights as they hunt, fish, and gather wild resources to maintain cultural ties to the land and continue a subsistence lifestyle. The Shoshone-Bannock Tribes have concerns about potential impacts to natural resources, the degradation of federal lands, and the consequential potential impacts to treaty rights.

The Tribes have long been concerned about phosphate mineral exploitation and, accordingly, the Tribes established the Shoshone-Bannock Tribes policy for management of Snake River basin resources (Shoshone-Bannock, 1994). The policy states the following:

> *The Shoshone-Bannock Tribes (Tribes) will pursue, promote, and where necessary initiate efforts to restore the Snake River systems and affected unoccupied lands to a natural condition. This includes the restoration of component resources to conditions which most closely represents the ecological features associated with a natural riverine ecosystem. In addition, the Tribes will work to ensure the protection, preservation, and where appropriate the enhancement of rights reserved by the Tribes under the Fort Bridger Treaty of 1868 (Treaty) and any inherent aboriginal rights.*

Figure 49. Tribal Treaty Rights and Interests Analysis Area



The BLM and the Caribou-Targhee National Forest recognize rights granted to the Shoshone-Bannock Tribes by the 1868 Fort Bridger Treaty. Measures are included in the action alternatives to provide for and facilitate use of tribal treaty rights and interests on unoccupied public lands and meet federal trust responsibilities. To that end, this document examines the acres of unoccupied federal land and temporary mining occupation in the analysis area and the effects to fish, water, vegetation, wildlife, and cultural and visual resources on these lands. Information on these resources, including project effects, is taken from baseline reports dating from 2013 to 2020. These technical reports can be found in the project record. Additionally, the Tribes have concerns about habitat conversion, mine reclamation work, and access to study area lands. This document will address these concerns with a discussion on how the effected natural and cultural resources affect tribal treaty rights and interests.

3.14.2 Affected Environment

The H1NDR phosphate mine project is in southeast Idaho. While the analysis area is outside the Fort Hall reservation boundary, Article 4 of the Fort Bridger Treaty of 1868 states Shoshone and Bannock tribal members “will make said reservations their permanent home, and they will make no permanent settlement elsewhere; but they shall have the right to hunt on the unoccupied lands of the United States so long as game may be found thereon" (Shoshone-Bannock Tribes, 1869). The Shoshone-Bannock have used the analysis area for subsistence, traditional cultural practices, ceremonial, and social purposes from time immemorial.

Federal lands in the BLM Pocatello Field Office area and the Caribou-Targhee National Forest total 530,305 acres and over 3 million acres of land, respectively (see Figure 43). The majority of the 4,293-acre analysis area is on National Forest System lands and represents about 0.1% of the forest area within the Caribou-Targhee National Forest. Most of the acres are undeveloped and, as such, these acres are considered unoccupied lands, subject to tribal treaty rights. Phosphate mining, directed by Congress under the Mineral Leasing Act of 1920, is considered a temporary surface use, and would temporarily change the occupancy of the federal lands where mining activities occur.

For the original H1NDR project, tribal consultation between the BLM and the Shoshone-Bannock tribes began in February 2012 and extended through September 2014. Although this consultation work represents a different mine project, similarities with the current proposed Project suggest the identification of previous consultation work is justified.

Consultation for the current H1NDR Project began in January 2021 when the BLM and USFS staff met with the Shoshone-Bannock tribes to discuss the proposed mine project.

On April 7, 2021 the Shoshone-Bannock Tribes submitted another letter to the BLM that discusses comments on the public scoping notice for the current proposed Project (Boyer, 2021). The letter states the Tribes view approval of H1NDR as an abrogation of their treaty rights, guaranteed in the Fort Bridger Treaty. Additionally, the letter discusses resource studies and reclamation work the Tribes consider necessary to preserve their ability to exercise traditional and treaty-reserved rights on unoccupied lands.

As part of the resource studies request, the Tribes inquired about an extension of study timelines to span several seasonal and annual cycles to help understand mine project impacts on surface water, groundwater, vegetation, and wildlife. Itafos would be required to continue groundwater and surface water monitoring during the life of the mine, and groundwater monitoring wells would be installed per IDAPA 37.03.09 Well Construction Rules (see Section 2.2.9.7).

Subsequent seasonal or annual surveys for wildlife and vegetation resources have not been conducted. The purpose of the original surveys was to identify species within the study area and evaluate each species for mine project impacts. Multi-year surveys tend to examine population increases or decreases, and this intent does not align with the purpose of the original surveys. Additional tribal concerns discussed in the 2021 letter include the following:

- Protection of Blackfoot River corridor and surrounding habitat.
- Protection of groundwater as a potable water source for future users.
- Possible contamination of groundwater from interconnecting core holes created by exploratory drilling, the exposure of transmissive rock formations during mining, and other geologic events. Groundwater contamination my exit through seeps and drainage into surface waters that connect to the Blackfoot River.
- The possibility of encountering groundwater during pit excavation should be considered; the Tribes consider this an unacceptable practice.
- Tribes request permanent overburden storage areas and ore stockpile near the tipple must be lined with impermeable materials to prevent leachate infiltration into the subsurface.
- Tribes request overburden backfilled into the mine pits be sealed with impermeable capping materials to prevent leachate production and infiltration into the subsurface.
- BLM must be immediately notified of all spills, leaks, and accidental disposal of hazardous materials and chemicals. Spill/leak containment must be applied on all containers that exceed 5 gallons of liquid.
- Any wells/core holes to be used for groundwater monitoring will comply with IDAPA 37.03.09 Well Construction Standards Rules.
- Importance of the mine area as a traditional location for hunting mule deer and elk.
- If mule deer/elk fawning and calving occurs in the mine area, the Tribes request mining activities be delayed until after the fawning/calving season is completed.
- Additional surveys for Columbia spotted Frogs, American Three-toes Woodpecker, Great Gray Owls, and Boreal Owls.
- Tribal verification of documented archaeological and ethnographic resources as the Tribes have an expanded definition of cultural resources.
- Compliance with Section 106 of the National Historic Preservation Act and assessment of any significant findings by a representative of the Shoshone-Bannock Tribes. Additionally, the Tribes request a stop work order be implemented for inadvertent discoveries and immediate tribal notification should occur regarding any such discoveries.
- Tribes request a viewshed analysis be completed with participation from the Tribal Cultural Resources staff as adverse impacts to the visual landscape are a possibility.
- Restoration of existing native plant communities in the mine area, and the control/management of noxious or invasive species by Itafos during the life of the mine.

- Mitigation on the 1,146 acres of disturbance should include the preparation of a watershed management plan, and continued groundwater and surface water monitoring during the life of the mine.
- Mine reclamation plan should include full restoration of overland routes and timber cleared areas; the decommissioning of temporary roads; the capping/abandonment of core holes, boreholes, and wells; and the mitigation of impacts from mine facilities followed by the decommissioning of all mine facilities.
- Tribes request access to timber cut during mining activities for use as poles, posts, and firewood.

A portion of the above Tribal study requests have already been completed (i.e., baseline studies of surface water, groundwater, vegetation [including a culturally-sensitive plant survey], wildlife, Section 106 compliant cultural resource surveys, a viewshed analysis, and the preparation of a surface water management plan). Because the Tribes have a unique perspective concerning the identification of cultural resources and visual impacts, their 2021 letter requested tribal participation for these resource studies. Consultation for the original H1NDR project, which began in 2012, included discussions about tribal participation in resource-related fieldwork. However, tribal involvement in resource data collection did not occur before work on the original H1NDR project ceased in December 2014.

Several of the above tribal requests are already in place and include the utilization of native plants for revegetating the site, and the use of liners at the permanent overburden storage area and the tipple area to prevent transport of any contaminants. The request to seal backfilled mine pits with an impermeable cap is not feasible (see Section 2.6.3.2). However, a liner that prevents pollution would be employed and use of this liner is described in the project groundwater model. Itafos would also be required to control and manage the spread of noxious or invasive species during the life of the mine.

Regarding wildlife concerns, surveys for Columbia Spotted Frogs, American Three-toed Woodpecker, Great Gray Owls, and Boreal Owls were included in the original 2012-2013 winter survey. All the bird species were found to occur in the area, but the amphibian survey did not locate frogs of any species. The Columbia Spotted Frog is listed as a sensitive species on the Caribou National Forest, but no occurrences have been noted near the mine area, and the species is not known to occur anywhere in Caribou County.

Consultation between the BLM and the Shoshone-Bannock Tribes is an on-going process, and details of the Tribal resource study and reclamation requests still need to be finalized. As a result, this section continues with an examination of issues expressed in the Tribe's 2021 letter (Boyer, 2012) to the BLM.

3.14.3 Environmental Consequences

3.14.3.1 Proposed Action and Alternatives

The impacts below are irretrievable during the period when access is prohibited.

Access

Phosphate ore recovery is considered a temporary surface use and occupancy would slightly change the amount of unoccupied federal land in the analysis area while active mining and reclamation activities occur. The Proposed Action would disturb approximately 1,146 acres and a local, short-term, temporary loss of access to these lands for exercising tribal treaty rights would occur. During mining, public and tribal access to the active areas of the mine would be restricted to protect the safety of the public and tribal members per MSHA regulations. Reclamation would take place incrementally but

concurrent with mining operations. The areas within the mine footprint are not disturbed all at once and most areas would still be accessible to tribal members to exercise Treaty rights. Only a portion of the mine would be active at a given time. However, the unreclaimed highwall within the H1 Pit and partially reclaimed haul roads would result in the permanent long-term loss of 124 acres of vegetative habitat which represents 2.8% of the 4,293-acre analysis area. Although loss of access would be short-term and temporary, the BLM recognizes that even a small temporary loss of access is considered to be a significant impact by the Shoshone-Bannock Tribes.

Grazing

The H1NDR mine area is outside of the ceded land boundary of the Fort Hall Indian Reservation so grazing rights would not be affected. Mine work would not affect grazing rights within the ceded lands boundary.

Fisheries and Water Quality

The analysis area is not known as a desirable place to fish because the size of the streams and their associated drainage basins do not appear to support large fish numbers. Additionally, some streams lack a persistent year-round flow regime and connectivity to larger fish-bearing streams. The Blackfoot River, north of the analysis area, has the most robust fishery in the region because it has the stream and watershed size to support large fish numbers, especially Yellowstone cutthroat trout. There would be no effects on tribal treaty rights for fishing in the Blackfoot River as this waterbody is not affected by the H1NDR mine project. Additionally, there would be no effects on tribal treaty rights for fishing in the analysis area because the predicted water quality to streams would be within the cold water biota standard. Consequently, mine work would not affect the fishery or fish populations in the analysis area.

Historic phosphate mines in southeast Idaho are known to be a source of selenium in streams and Maybe Creek, East Mill Creek, and the Blackfoot River likely contain selenium contaminated Yellowstone cutthroat trout and Brook trout. The Bureau of Community and Environmental Health and the Agency for Toxic Substances and Disease Registry investigated trout species in the Blackfoot, Salt and Bear River watersheds to determine if selenium levels in these fish posed a health risk (IDHW, Idaho Dept. of Health and Welfare, 2013). The BCEH found that fish selenium levels fell below levels of health concern and concluded that eating trout harvested from the subject watersheds was not expected to harm people's health.

The IDEQ is applying the Clean Water Act to this mining proposal which does not allow additional selenium loading to the Blackfoot River (Section 3.5.3) from this project The mitigation measures described in Section 3.3.3 are designed to prevent additional loading of COPCs to surface water at the site, including the Blackfoot River If there is no selenium loading to surface water, there should be no loading of other COPCs. Additionally, non-COPC impacts to surface water would be below Clean Water Act levels by appropriate implementation of best management practices (reference related section of EIS that has this detail).

No impacts to fish or water quality are anticipated as project activities are expected to meet all surface water quality standards and no mining would occur below the present-day water table. Areas that currently have health issues with consumption of water would not experience worsening conditions, and in the long term, filling and covering the existing pits would improve groundwater quality.

Vegetation and Wildlife

The Shoshone and Bannock Tribes gathered a variety of plants for food, medicine, domestic purposes, ceremonial purposes, and adornment (Holmer & Boudreau, 1986; Walker, 1971). Some of these traditionally important plants occur in the analysis area, including elderberries, chokecherries, gooseberries, currants, grouse whortleberries, black currants, serviceberries, and huckleberries. Direct impacts to general vegetation would occur with vegetation removal from 1,146 acres. In consideration of the time required for the vegetation cover to re-establish itself after reclamation, mine disturbance would decrease available acreage for exercising tribal treaty gathering rights by 1,146 acres on a long-term basis.

The vegetation at the site would also be indirectly impacted by overburden removal as the vegetation types re-established following reclamation would differ compared vegetation from to pre-mine disturbance conditions. Currently, vegetative types in the disturbance footprint include 39 acres of non-forest/shrubland, 823 acres of forest, and 285 acres of disturbed, mine, or barren cover. The non-forest/shrubland community would initially re-establish as a grassland type and then return to a grass/shrubland community mix over the long-term. Alternatively, the forest acres would not return due to changes in soil properties and removal of the existing aspen root system. These 823 acres (72% of the disturbance area) would permanently change from forest to grassland/shrubland cover. The remaining 285 acres of disturbed or barren cover would re-establish as a grassland or grassland/ shrubland mix community, an increase over existing conditions.

The Shoshone and Bannock Tribes have expressed concern over habitat conversion, and the replacement of 823 forest acres to grassland/shrubland acres would represent a permanent, adverse effect to tribal treaty rights for gathering resources commonly found in a forest environment. Alternatively, the expansion of grassland/shrubland acres over the long-term would increase gathering opportunities for resource collection in this type of habitat.

Primary large game species available in the analysis area include elk and mule deer, and the mine area has been a traditional location for Tribal members to hunt these animals. Elk and mule deer favor aspen and mountain shrub habitats for forage, thermoregulation and calving/fawning areas. The mine area appears suitable for calving and fawning, and this topic is discussed in the wildlife section (Section 3.9.3).

The Proposed Action would result in the permanent loss of 823 forest acres which would reduce habitat diversity and quality on Dry Ridge, and thus likely decrease big game carrying capacity in the analysis area. The combined H1NDR and Maybe mine projects would also remove mule deer habitat across a nearly continuous 10-mile length of Dry Ridge. This habitat loss would likely alter patterns of deer movement west across Dry Ridge to winter habitat near Soda Springs. However, Dry Ridge is not a major mule deer migration corridor so only a relatively small percent of the population could be affected. Overall, the Proposed Action would have a moderate adverse effect to elk and mule deer populations in the analysis area.

Small game species observed in the analysis area that may be subject to hunting include Columbian sharp-tailed grouse, and some migratory birds. Two occupied leks occur between 1.4 miles and 1.8 miles west of the proposed mine disturbance footprint. Mining noise and disturbance would be muted at these distances so the Proposed Action would have a negligible effect on sharp-tailed grouse breeding behavior. Additionally, no basin grasslands or sagebrush are slated for removal so no breeding habitat would be affected. Winter habitat, which consists of mountain brush and aspen, would

be impacted with the removal of the forested acres. However, the reclamation seed mix would include some native shrub species which could be suitable habitat for sharp-tailed grouse. Overall, the Proposed Action would have a minor effect on sharp-tailed grouse habitat, and it appears unlikely this effect would cause a loss of species viability in the analysis area.

Migratory bird habitat primarily includes coniferous, aspen, and mixed conifer-aspen forests and mountain shrubs. This habitat would be impacted in the disturbance footprint with the permanent removal of 823 forest acres and the subsequent conversion to grassland/shrubland cover. Additionally, forest removal would eliminate nesting and foraging structures for birds that only occur in mature forests. To reduce the chances of mortality during the migratory bird breeding season, a nest clearance survey would be conducted 7-10 days prior to timber removal or other ground clearing activities. This effort would be coordinated with the US Forest Service and the US Fish & Wildlife Service. Lastly, mining activity can affect migratory bird breeding behavior when mine noise masks bird songs making it difficult for females to locate singing males. However, this would be a short term effect as mine noise would cease once reclamation work is complete. Given the loss of forest acres, the measures to reduce bird mortality, and the minor effect from mine noise, the Proposed Action would have a moderate effect on migratory birds in the analysis area.

Vegetation grown during reclamation work would be protected from accumulating contaminants like selenium and other COPECs (see Section 3.8.3), thus ensuring safety for both big game animals grazing the site and Shoshone-Bannock Tribal members resuming their traditional hunting and gathering practices. With the mitigation of possible vegetative contamination, a risk assessment concerning traditional Native American subsistence lifeways in the reclaimed mine area is not necessary.

Cultural Resources and Traditional Cultural Properties

Six cultural resource inventories that cover the majority of the analysis area have identified 13 prehistoric and historic sites (Greiser, et al., 2013), (Herbel & Greiser, 2013), (Herbel, et al., 2014) (Herbel, et al., 2015), (Larsen, 2014), (Barclay, 2020) Of the 13 sites, nine have been determined as not eligible for listing in the National Register of Historic Places (NRHP), and the eligibility of the remaining four sites is undetermined. However, the BLM has determined one of these four sites is not eligible for NRHP listing; Idaho SHPO has not yet concurred with this determination. Sites determined to be ineligible to the NRHP would not be affected by project activities, but sites determined eligible to the NRHP could be adversely affected. Sites with an undetermined eligibility status should be treated as an eligible site until a final determination is made. Eligible sites would require avoidance or additional work to mitigate adverse effects.

No NRHP eligible sites occur within the 1,146-acre disturbance footprint so there would be no direct impact to significant cultural resources. The three sites with no NRHP eligibility determination represent prehistoric lithic scatters located about one-quarter mile to over one-half mile in distance from the nearest proposed mine feature, a haul road. Given this distance, indirect project impacts appear unlikely.

Traditional cultural properties (TCPs) refer to locations associated with the beliefs, customs, and practices of a living community of people that have been passed down from generation to generation. These properties are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community. Because of their significance, TCPs are generally eligible for listing in the National Register (Parker & King, 1998).

In their 2012 letter to the BLM, the Shoshone-Bannock Tribes discuss the importance of their ancestral homeland and their ability to continue to hunt, fish, and gather wild resources on unoccupied lands. By exercising their treaty rights, tribal members can maintain ties to their homeland and continue to practice the subsistence lifestyle of their ancestors (Small, November 9, 2012).

Neither the Agrium H1NDR phase of consultation (2012-2014) or the current H1NDR consultation work between the BLM and the Shoshone-Bannock Tribes identified any TCPs in the analysis area. As the BLM/USFS continue to consult with the Tribes, the identification of TCPs in the analysis area may be possible. With the current absence of TCPs in the analysis area, no project impacts to TCPs would occur.

If any undocumented cultural resources are discovered during mining activities, operations in the immediate area of the discovery would halt. Itafos would contact the BLM or the Forest Service, and agency staff or authorized representatives would document and evaluate the discovery. If necessary, a treatment plan would be developed and implemented.

Additional Topics of Tribal Concern

The following topics of Tribal concern do not fall within the parameters of the previous resource discussions, so they are individually addressed below.

- To comply with the Tribal request regarding spills, leaks, and accidental disposal of hazardous materials and chemicals, all spill reporting would be conducted per the Spill Prevention, Control, and Countermeasures Plan (see Section 2.2.9.6) according to federal regulations.
- The Tribal request for access to timber cut during mining activities was considered by the federal agencies and determined it was not feasible due to safety and material handling considerations.
- The Tribal concern that work to mitigate mine impacts includes the restoration of overland routes and timber cleared areas, the decommissioning of temporary roads and mine facilities, and the capping/abandonment of core holes, boreholes, and wells is addressed in the Mine and Reclamation Plan. Additionally, mine impacts are considered and analyzed throughout this EIS document.

3.14.3.2 No Action

Under the No Action Alternative, the federal leases would not be subject to phosphate mining, and there would be no impacts to identified resources that affect Tribal treaty rights and interests. Loss of access would not occur at the 1,146 acres slated for mine development. No mining or exposure of selenium-bearing materials would occur and there would no potential for sediment and selenium releases into streams from the H1NDR Mine area. Fish would continue to inhabit streams and ponds in the vicinity, some of which are impaired due to elevated levels of sediment and selenium from historic phosphate mines, but the amount of these pollutants would not increase. Vegetation would not be removed from 1,146 acres and there would be no loss of forest habitat or forest-dwelling plants and animals. Cultural resources would not be subject to disturbance from phosphate mining activities.

The current H1NDR project would not mine the subject leases and cause any impacts to resources important to the Shoshone-Bannock Tribes under the No Action Alternative. However, the mine leases under the current project may be mined in the future under the auspices of another project.

3.14.3.3 Alternative Road

The Tribes have requested that overland routes impacted by mining be restored. Construction of the alternative road would not infringe upon the treaty rights of the Shoshone-Bannock Tribes. The alternative road would ensure access for tribal members to exercise their treaty rights to hunt, fish, and gather resources within unoccupied lands. The new road also reduces the potential for sediment adversely affecting Stewart Creek and adding to downstream effects because it moves the road away from the stream.

3.14.3.4 Alternative Stream Routing

The alternative routing of Stewart Creek would not impact tribal fishing rights or alter fish habitat because no fish occur in this creek. Additionally, water quality would not degrade as a liner would be used in the backfilled mine pits to eliminate contact with seleniferous material and prevent seepage into backfill. In the long term, water quality would be maintained as Stewart Creek's natural flow would be restored during reclamation. A temporary creek alignment would be in place during the mine years, but reclamation would create a permanent channel that roughly follows the pre-disturbance alignment of Stewart Creek. Both plant and animal habitat would return to Stewart Creek over the long-term.

3.15 Climate Change and Greenhouse Gases

3.15.1 Analysis Area and Methods

The analysis area for climate change and greenhouse gas emissions is the disturbance area. This is a suitable analysis area to consider the impacts that climate change would have on H1NDR and that H1NDR would have on the climate due to the level of emissions and impacts compared to natural conditions. The impacts of climate change beyond H1NDR are not relevant to the decision and will not provide information to the decision-makers.

The issues for analyzing impacts on tribal treaty rights and the indicators that will be used to discuss them are shown in **Table 62**.

Table 62. Issues and Indicators for Climate Change and Greenhouse Gases

Issue	Analysis Method
Predicted long-term changes in climate may affect H1NDR reclamation and closure	Independently modeled climate predictions through 2099 are disclosed. (This information is used in other resource sections, such as Vegetation Section 3.8.3 and Groundwater 3.5.3, among others).
Greenhouse gas emissions from mining and the effect the change in vegetation types may have on carbon sequestration.	Greenhouse gas emissions inventory and calculated changes in carbon storage based on trees versus grass and shrubs (pre-mining comparted to reclamation cover types).

3.15.2 Affected Environment

Overall, the steep and rugged topography of the mountain ranges provides conditions with 60 to 80 inches of annual precipitation in higher elevations and as little as 15 inches of precipitation at lower elevations. This translates to heavy snowfall at high elevations throughout the subregion, with prevailing winds dispersing snow accumulations on exposed ridges and slopes.

Increases in annual and seasonal minimum and maximum temperatures are expected in the area where H1NDR is located, based on climate models. Two model scenarios are reported in Joyce and Talbert (2018), which places the southern portion of the Caribou-Targhee National Forest and H1NDR in the Southern Greater Yellowstone subregion. Increases in median minimum temperature above freezing occur in the more extreme of the modeling scenarios, but not the other. Annual precipitation projections are highly variable with no discernible trend over time or between the two scenarios. Seasonal temperatures are projected to increase and may cross biologically meaningful thresholds in particular seasons. Minimum seasonal temperatures are projected to rise in all seasons under both model scenarios, as is the maximum seasonal temperatures. Thus, the frequency of days with extreme heat in summer is likely to increase (Joyce & Talbert, 2018). **Figure 50** provides some details on the two model outcomes[5]. Model uncertainty, similar to the groundwater model discussed in Section 3.4.3 (simplicity, assumptions, data availability, and timeframe) apply to climate models, only to a greater degree, because climate models are even more complex. Modelling climate includes even more complex systems with more variability and inputs and broader assumptions about how the system works and what affects it.

Figure 50. Summary of Climate Projections for Southern Greater Yellowstone Zone

Subregion	Temperature	Precipitation	Seasonality
Southern Greater Yellowstone	By 2100, median maximum temperature is projected to rise about 5 °F under RCP 4.5 and about 11 °F under RCP 8.5; projections for the two RCPs begin to diverge around 2040. By 2100, median minimum temperature is projected to increase about 6 °F under RCP 4.5 and about 12 °F under RCP 8.5. Median minimum temperatures are projected to remain below freezing under RCP 4.5. However, minimum temperatures are likely to rise to just under freezing by 2100 under RCP 8.5.	Annual precipitation projections are highly variable with no discernible trend under RCP 4.5 and a slight increasing trend under RCP 8.5.	Maximum temperature is projected to increase in all seasons, with winter temperatures rising about 3 °F and all other seasons rising about 5 °F under RCP 4.5 by the end of the 21st century. Under the warmest scenario, seasonal temperatures increase about 10 °F in winter, spring, and fall, but by more than 12 °F in summer by the end of the 21st century. Median minimum temperatures for all seasons by the 2080s are projected to be outside of historical ranges in the warmest scenario. Median minimum spring and fall temperatures are projected to increase, such that some projections rise above freezing by the end of the 21st century under the RCP 8.5 scenario.

Source (Joyce & Talbert, 2018, p. 41 Table 3.3).

[5] The two models were RCP 4.5 and RCP 8.5. (RCP stands for representative concentration pathways). RCP 4.5 is "Two intermediate stabilization pathways in which radiative forcing is stabilized at approximately 4.5 W m^2 after [year] 2100." and RCP 8.5 is "One high pathway for which radiative forcing reaches greater than 8.5 W m^2 by 2100 and continues to rise for some amount of time. The emphasis was on adding different amounts of energy to the climate system over time. Scientists reviewed current estimates (which are also based on models) on radiative forcing, the total amount of extra energy entering the climate system throughout the 21st century and beyond. The report states that "These scenarios capture a moderate and a high future warming." When estimating the future temperatures "Probabilistic estimates of temperature increase above preindustrial levels based on representative equilibrium climate sensitivity distribution" (see Table 3.2 in Joyce and Talbert, 2018).

3.15.3 Environmental Consequences

3.15.3.1 All Action Alternatives

The total annual emissions of carbon dioxide equivalent (CO_2e) from stationary sources for H1NDR are estimated as 17,668 metric tons per year (Arcadis, 2021g). The emissions inventory considered mobile and stationary equipment, operating time and activities, fuel type, type and age of equipment (newer equipment produces fewer emissions), number of employees, waste generation and disposal, and project location. EPA estimates that "*in 2019, U.S. greenhouse gas emissions totaled 6,558 million metric tons of carbon dioxide equivalents, or 5,769 million metric tons of carbon dioxide equivalents after accounting for sequestration from the land sector*" (EPA, 2019). H1NDR annual emissions would be 0.00031% of the US emissions.

The projected slightly warmer winter temperatures could shift the average timing of snowmelt and surface water runoff to earlier in the year, which may result in runoff and infiltration to increase during the winter and early spring and be lower during the late spring and summer. Climate change would increase the average volume of runoff and infiltration generated by individual storms, but it is uncertain if the total volume of runoff and infiltration during an average year would be greater or less than currently predicted (BLM, USFS, USACE, IDEQ, 2016). Because these trends would begin several decades in the future and extending to the end of the century, the impacts would not affect the active H1NDR project, but could affect the cover performance after reclamation. This anticipated change in timing of the runoff is accounted for in the sensitivity tested for the groundwater fate and transport model and disclosed in Section 3.4.3. The sensitivity testing included higher than average infiltration of 1.5 times base rate.

Because Rasmussen Valley is currently operating and would be replaced by H1NDR, the emissions would not increase but would be extended by about 15 years. Effects of H1NDR on climate would continue after the mine is closed because of the long (estimated 100 years) residence time for certain greenhouse gas in the atmosphere.

Due to the nature of the climate and the relatively low level of continuing emissions over the 14-year mining and reclamation period, there would be no impacts on the climate from the project. While emissions can be calculated, the levels would be below detectible. While vegetation would be removed, vegetation will also be reclaimed in in Rasmussen Valley Mine and concurrently on H1NDR as the project progresses. Carbon sequestration in timber would switch from trees to carbon sequestration in grasses and shrubs after reclamation. Grasses store carbon underground. Project emissions would be indistinguishable compared to the No Action.

3.15.3.2 No Action

Climate change would be the same as anticipated and described under the action alternatives except that there would be no effects on climate change.

3.16 Resources Considered but not Studied in Detail

This EIS was prepared under the 2020 CEQ regulations for implementing NEPA (CEQ, 2020), which, at §1502.1, states "Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses. An environmental impact statement is a document that informs Federal

agency decision making and the public." Questions on impacts raised in scoping were considered and although not discussed in detail in the DEIS, have been summarized in **Table 63**. Some of the impacts have been addressed in other documents or do not distinguish between alternatives.

Table 63. Resource Impacts Not Discussed in Detail in the EIS

<table>
<tr><th>Resource</th><th>Impacts or Rationale for Not Discussing in Detail</th></tr>
<tr><td>Air Quality</td><td>No air permit to construct would be required; therefore, no air quality dispersion modeling was conducted. Section 651 of the Rules for the Control of Air Pollution in Idaho (IDAPA 58.01.01) requires reasonable precautions to minimize fugitive dust. Fugitive dust emissions would be controlled as described in Section 2.2.9.1 (Itafos, 2020a, pp. 5-14). Because selenium is part of the PM emissions, selenium dispersal would be managed with implementation of the fugitive dust controls. The effects would be minor and short-term and would meet IDEQ permitting standards. Reasonably foreseeable impacts from H1NDR emissions is not expected to have adverse impacts on air quality or air quality related values. Impacts on air quality would be negligible and short-term.
An "estimated worst-case annual controlled emissions" was disclosed in the Rasmussen Valley Mine alternatives considered in the Rasmussen Valley EIS (BLM, USFS, USACE, IDEQ, 2016, pp. 4-23 Table 4.2-1, 4-29 Table 4.2-4) based on the Rasmussen Ridge Mines air permit application using published USEPA air pollutant emission factors known as AP-42 (USEPA 2009), and stationary combustion emissions. The hours of operations and equipment fleet for the Rasmussen Valley Mine are nearly identical; therefore, the same methodology was used to calculate the estimated worst-case annual controlled emissions for the Proposed Action which are shown in the table below.
Tons Per Year of Emissions from All Sources, H1NDR Proposed Action
<table>
<tr><th>PM10</th><th>PM2.5</th><th>SO2</th><th>NOx</th><th>CO</th><th>VOC</th></tr>
<tr><td>471</td><td>131</td><td>92</td><td>2,406</td><td>1,230</td><td>129</td></tr>
</table>
Source: (BLM, USFS, USACE, IDEQ, 2016, pp. 4-29 Table 4.2-4).
Notes: PM10 – particulate matter less than 10 microns in diameter; PM2.5 - particulate matter less than 2.5 microns in diameter; SO2 – sulfur dioxide; NOx – oxides of nitrogen; CO – carbon monoxide; VOC – volatile organic compound</td></tr>
<tr><td>Noise</td><td>There are no sensitive noise receptors near H1NDR. There would be no impacts on sensitive noise receptors. Impacts on wildlife from noise are discussed in Section 0.</td></tr>
<tr><td>Scenery</td><td>Visual quality was reviewed from several key observation points and considered the 2003 RFP Visual Quality Objectives. The mine would not be visible from several viewpoints, is in the distance at others, and, in all cases, the 2003 RFP Forest-wide and standards and guidelines for scenic resources would be met (Tetra Tech, Inc., 2021f). The Proposed Action and action alternatives would be consistent with 2003 RFP standards and guidelines. Reclamation would reduce adverse effects on visual quality in Partial Retention VQO areas by grading the disturbed areas to blend in with the surrounding landscape topography and revegetating with an applicable native seed mix.
In the Alternative Cover, a small area of highwall left after reclamation of NDR Pit 2 and Pit 3 (on the west side of the pits) may be visible from Viewpoint 9 In the Smid Ridge Inventoried Roadless Area, and Viewpoint 42 in the Blackfoot River Wildlife Management Area. 1.1 acres of the highwall would be in partial retention VQO within the NDR Phosphate Lease. Impacts on scenery would be minor and long-term.</td></tr>
<tr><td>Cultural Resources</td><td>Six cultural resource inventories that cover the majority of NDR, Maybe Canyon, and H1 Leases and the Off-Lease Area were completed from 2012 to 2019 by Historical Research Associates (Greiser, et al., 2013), (Herbel & Greiser, 2013), (Herbel, et al., 2014) (Herbel, et al., 2015); Sundance Consulting, Inc. (Larsen, 2014); and Arcadis (Barclay, 2020).
The inventories identified 20 sites and 1 isolate within the analysis area; 5 of these cultural resources occur within the H1NDR disturbance footprint. Of the 21 sites/isolates, 15 sites</td></tr>
</table>

Resource	Impacts or Rationale for Not Discussing in Detail
	and the 1 isolate have been determined not eligible for listing in the National Register of Historic Places (NRHP), and the remaining five sites have an undetermined or unevaluated status. Although the Idaho State Historic Preservation Office (SHPO) lists Site 24CU292 as unevaluated, the BLM has determined this site does not qualify for NRHP eligibility. To date, Idaho SHPO has not concurred with this determination (Barclay, 2020). All 5 sites located within the H1NDR disturbance footprint have been determined not eligible for listing in the National Register of Historic Places. There would be no impacts on cultural resources because no historic properties occur within the H1NDR disturbance footprint. However, the potential exists for the discovery of cultural resources during mining operations, and an EPM included in Section 2.2.9 discusses the management of discovered cultural or historical resources. The H1NDR mine project is a federal undertaking and compliance with Section 106 of the National Historic Preservation Act is required. As such, the project lead federal agency would consult with the Idaho SHPO about the Area of Potential Effect (APE) and NRHP eligibility for sites with an undetermined/unevaluated status. Tribal Treaty Rights, including Tribal cultural resources, are address in Section 3.14.
Threatened, Endangered, Sensitive Plants and State Ranked Plants	Surveys in 2012-2013 and 2019 (Tetra Tech, Inc., 2014d; Arcadis, 2020h) (Arcadis, 2020h) found no threatened or endangered plants, plants designated by the IDFG with a State Rank of 1, 2, or 3, or plants included on the USFS Intermountain Region Sensitive Species List. There would be no impact on threatened, endangered, or sensitive plants.
Threatened, Endangered Fish	No federally listed fish occur and would therefore not be affected. No threatened, endangered, or proposed fish or amphibians occur in the analysis area. See official species list from USFWS (U. S. Fish and Wildlife Service, 2021). The Proposed Action would not jeopardize the continued existence of any listed species. There would be no impact on threatened or endangered fish.
Threatened, Endangered Wildlife	Threatened and endangered wildlife are discussed in the Biological Assessment. Monarch Butterfly - H1NDR is considered low suitability for monarchs. H1NDR is not likely to jeopardize the continued existence of the monarch butterfly because neither individual monarchs nor its breeding habitat are likely to occur in the analysis area. No critical habitat has been proposed as the butterfly is a candidate species.
Sensitive Wildlife	Boreal Toad - The Idaho Fish and Wildlife Information System does not have records of the species in the analysis area but boreal toads have been found in streams to the north (Lanes Creek, Landers Creek) and southeast (South Fork Sage Creek) (Tetra Tech, Inc., 2014c). Baseline surveys did not detect boreal toads, tadpoles, or egg masses in the analysis area (Arcadis, 2020f). Suitable habitat for boreal toads in the analysis area is primarily found in the forested areas of Dry Ridge and its eastern slopes. Columbia Spotted Frog - This species does not occur in the analysis area. There are no records of this species in Caribou County (IDFG, 2020), and none were encountered during baseline amphibian surveys (Tetra Tech, Inc., 2014c; Arcadis, 2020f) or in previous amphibian surveys on the Caribou National Forest (Burton & Peterson, 1998). According to current range maps (IDFG, 2020), H1NDR is not within this species' geographic range. Northern Leatherside Chub - Surveys were conducted in the Salt River drainage and the Upper Blackfoot River drainage in 2017, including some streams in the analysis area, and were focused on streams with occurrence records or suitable habitat. Northern leatherside chub was not detected in the analysis area (Kikkert, et al., 2020), and is not found anywhere in the Upper Blackfoot River basin. Harlequin Duck, Pygmy Rabbit, and Spotted Bat are dismissed from further review because they are unlikely to occur in the wildlife analysis area due to the lack of suitable habitat and lack of known occurrences or range mapped in the area. Peregrine Falcon - No occurrences of peregrine falcon have been documented in the wildlife analysis area and breeding is not expected in the due to the lack of cliff sites for

Resource	Impacts or Rationale for Not Discussing in Detail
	nesting. There would be no loss of habitat or disturbance effects to this species. There are no nests within 2 miles.
Paleontological Resources	Areas to be disturbed are classified as having moderate potential for vertebrate fossils or scientifically significant invertebrate fossils (Erathem-Vanir Geological Consultants, 2009) or unknown fossil potential (Park City Formation) (McKelvey, 1959). Fossils may be damaged or destroyed or H1NDR may unearth vertebrate fossils that would otherwise remain undiscovered. None of the fossils are unique as they can be found throughout the region. Impacts on paleontological resources would be local, long-term, and minor. An EPM is included in Section 2.2.9 stating that if intact vertebrate fossils are exposed during mining activities, the locations would be recorded and, if possible, the fossil may be tentatively identified. Notification would be provided to the BLM and USFS.
Environmental Justice	The US Census provides data (U.S. Census, 2019) on demographic and income for Caribou, Bear Lake, or Bannock counties. The data indicates that no low-income, minority, or American Indian populations occur that would experience disproportionately high or adverse effects from H1NDR. Combined minority populations in 2019 data (not "White alone") are highest in Bannock County with 9.4%, compared to 7.0% of Idaho. Low-income population (percent of people below the poverty level) in 2019, is highest in Bannock County at 12.5%, compared to the Idaho total of 11.2%, and American Indian populations are again highest in Bannock County at 3.8% compared to the Idaho total of 1.7%. None of these metrics indicate an appreciably higher minority, low income, or American Indian population. An EJSCREEN Report using EPAs tool was run for block group 16029902001 where the project is located. With the exception of the population over 64 years of age (which is 1% higher), all of the demographic indicators measured by the screen are lower than the state, EPA region, and national indicators (EPA, 2021), confirming there are no minority or low income populations. The proximity to CERCLA sites discussed in Section 3.2.1 are mentioned in the EJSCREEN. Tribal Treaty Rights are address separately in Section 3.14. While the Shoshone Bannock Tribe uses the lands, they would not be affected more than any other group that hunts, fishes, gathers or recreates in the area. The mine site was selected because that is where the phosphate occurs and not based on the surrounding population demographics.
Bioaccumulation in Vegetation	Reclaimed areas would be reseeded with an agency-approved seed mix predominantly of native species, with three non-native grass species to assist in soil stabilization. The potential for COPC uptake by vegetation would be minimized by the proposed post-closure cover design and by use of the agency-approved seed mix, which would avoid the use of selenium-accumulating plants and deep-rooted species. No trees or legumes would be included, and plant roots would not extend below the cover, to reduce the potential for bioaccumulation of COPCs (including selenium) in the reclaimed vegetation and ensure that tree roots do not compromise the cover effectiveness. Selenium would not accumulate in concentrations in excess of the stated BLM Pocatello ARMP guidance level of 5mg/kg plant dry weight. Reclamation would be monitored to ensure performance.
Geologic Hazards (earthquakes causing landslides)	Earthquake - Historical earthquake and Quaternary faults were identified from US Geological Survey (USGS, 2020). Moderate to high earthquake hazard, with small to moderate earthquakes in the past indicating a potential for future earthquakes. Historical evidence by (Keefer, 1984) indicates that localized rockfall can occur with a local magnitude 4.0 earthquake and rock slope instability for earthquakes above magnitude 5.0 (Day, 2002). potential for a ground motion earthquake strong enough to cause structure damage or landslides during operations is low. Landslide - Historical landslide evidence from the Idaho Geological Survey, Landslides in Idaho map (Adams, et al., 1991) did not identify any recent landslide activity near the project site. The area is at low landslide risk. Backfill and road reclamation fill slopes would be reshaped to a 3H:1V minimum slope. Slopes designed in the H1NDR open pits would be based on experience at nearby mining

Resource	Impacts or Rationale for Not Discussing in Detail
	operations in similar formations. The required maximum 3:1 slope has historically been effective as a safe slope stability to be used. Although natural slopes in the area are steeper, man-made slopes following reclamation would not exceed 3h:1v and are considered geotechnically stable to meet USFS standards. No impacts are anticipated from geologic hazards.

Preparers and Reviewers

The EIS and the baseline on which it is based was prepared and reviewed by an interdisciplinary and interagency review team of professionals and consultants.

Table 64. Agency Reviewers

Name	EIS Review Responsibility	Education (degrees) and years for work experience
James M. Joyner	Clean Water Act (Section 404) Permitting, Wetlands, Surface Water	M.S. Biology, B.S. Biology, 26 years' experience
Stan Christensen	State of Idaho Department of Environmental Quality	B.S. Geology, 5 years' work experience
Dell Transtrum	Recreation, IRA, Access	B.S. Rangeland Management, 13 years' experience
Thomas E. Brown, P.E.	Engineering	B.S. Civil Engineering, 21 years' experience
Scott A. Miller, PG	Groundwater, Surface Water, Geochemistry	M.S. Hydrology, B.S. Fisheries and Wildlife Management, 25 years' experience
Mariah Radue	Minerals Special Uses	M.S. Quaternary and Climate Studies, B.A. Geology, 2 years' experience
Rose Lehman	Botany and Climate Change	B, A. Botany, 27 years' experience
Dominique Brough, PG	USFS Geologist	B.S. Geological Sciences, 13 years' experience
Brian T. Deeken	CERCLA	B.S. Geology, 20 years' experience CERCLA, 5 years' experience
Kevin P Parker	Grazing	B.S. Range Science, 30 years' experience
Lindsay D. Johansson	Cultural Resources	PhD Anthropology (Archaeology), M.A. Anthropology, B.A. Anthropology, 15 years' experience
Lee Mabey	Fisheries	M.S. Fisheries, B.S. Fisheries, 28 years' experience.
Steve Armstrong	Cultural Resources	M.A. Anthropology, B.S. Sociology, 34 years' experience
Gary Billman, P.G.	IDL	B.S. Geology, 15 years' experience
Wesley Gilmer, P.E.,	BLM Project Lead	B.S. Mining Engineering; 2 years regulatory experience, 30 years total
Marde Mensinger	Entire Document	B.S. Business Management, 3 years' experience
Dave Marr	Soil	B.S. Soil Science, 18 years' experience
Bill Stout;	Programmatic Phosphate Support and Review	M.S. Natural Science, 20 years' experience
Louis Wasniewski	Hydrology and Water Resources	M.S. Forest Hydrology, B.S. Water Resources, 27 years' experience
Nathan Yorgason	Wildlife	B.S. Wildlife and Range Management. 23 years of experience

Table 65. EIS Prepares

Name	EIS Responsibility	Education (degrees) and years for work experience
Amy L Hudson, PhD	Geology and Minerals, Groundwater	PhD. Geoscience (hydrogeology and geochemistry specialty), M.S. Environmental Science and Engineering, B.S. Geology and Environmental Science, 22 years' experience
Guy Roemer	Groundwater	M.S., Nuclear Engineering, B.S., Nuclear Engineering, 24 years' experience
Keith Steven Thompson	Geology and Minerals	B.S. Geology, M.S. Geology, 41 years' experience
Richard P. Dombrouski, P.E., P.G.	Geologic Hazards	M.S. Engineering Geology, B.S. Engineering Geology, 35 years' experience.
Lynn M. Peterson	Cultural Resources and Tribal Treaty Rights & Interests	M.S. Anthropology, B.A. Anthropology, GeoTechnology Certificate, 30 years' experience
Wendy Rieth	Fisheries/Amphibians, Wildlife	M.S. Wildlife Biology, B.S. Wildlife Ecology and Conservation 18 years' experience
Shane Matolyak	Soil Resources	M.S. Land Reclamation. B.S. Environmental Science and Biology, 18 years' experience
Cameo Flood	Social and Economic	B.S. Forestry, 36 years' experience.
Michele Weidner	Vegetation, Wetlands and Riparian	M.S. Vegetation Ecology, B.S. Forestry, 20 years' experience
Audrey Crockett	Groundwater	M.S. Hydrogeology, B.S. Environmental Science, 5 years' experience
Molly Baron	Groundwater	B.S. Geological Engineering, 5 years' experience.
Kristin McClure	Grazing	B.S. Environmental Engineering, 6 years' experience
Tim Reeves	Surface Water	M.S. Range Management (water resources), B.S. Range Management, 35 years' experience.
Keith Pohs	Recreation and Access	M.S. Earth Science, B.A. Geology, 22 years' experience
Sonya Cadle	Water Modeling	M.E. Geological Engineering, B.S. Geology, 18 years' experience

Table 66. Baseline Preparers

Name	Baseline Responsibility	Education (degrees) and years for work experience
Amy Hudson, Ph.D., CPG,	Geochemistry Study Plan	PhD Geoscience (hydrogeology and geochemistry specialty), M.S. Environmental Science and Engineering, B.S. Geology and Environmental Science, 22 years' experience
William Craig, LG, LHG	Groundwater Model and Data Collection	M.S., Geology (Hydrogeology) BS, Geology, Trinity University, 25 years' experience
James Maus	Surface Water Data Collection	M.S. Hydrogeology, BA, Environmental Geology (Hydrogeology and Geography), 22 years' experience

Name	Baseline Responsibility	Education (degrees) and years for work experience
Shane Matolyak	Soil Survey and Baseline Report	M.S. Land Reclamation, B.S. Env. Science and Biology. 18 years' experience
Paul Spillers	Soil	B.S. Geology, 34 years' experience
Weber Greiser - HRA	Cultural Resource Inventory and Class I Survey	M.A. Anthropology, 45 years' experience
Thad Jones	Vegetation & Wetlands Data Collection and Reporting	M.S., Forestry, B.S., Forestry, 11 years' experience
Corey Sandow	Fish & Wildlife Data Collection and Reporting	B.S. Biology, 3 years' experience
Hillary Heist	Fish & Wildlife Collection and Reporting	B.S. Wildlife & Wildlands Management, 19 years' experience
Dulaney Barclay	Lead author on the Cultural Resources Baseline Study Report Addendum	M.A. Anthropology; B.S. Geology; 30 years' experience
Mike Hay	Lead author on the Geochemical Baseline Characterization Study Report	Ph. D., Environmental Engineering and Water Resources B.S. Engineering Physics, 17 years' experience
Mishal Al-Johar	Groundwater Technical Lead	M.S. Geological Sciences specialized in Hydrogeology; B.S. Geological Sciences, 10 years' experience:
Paige Cowley	Lead author on the Riparian and Wetland Baseline Study Report Addendum	M.S., Biology, B.S. Wildlife Management 2007, 38-hr U.S. Army Corps of Engineers Wetland Delineation Training, 10 years' experience:
Jesse Hemmen	Lead author on the Surface Water Baseline Study Report Addendum; Lead author on the Groundwater Baseline Study Report	B.A. Geology, M.S. Geology, 16 years' experience:
Cynthia Nicely	Lead author on the Vegetation Baseline Study Report Addendum	M.S. Biology (Ecology and Systematic Biology), B.S. Biology (Botany), 16 years' experience
Khua Moua	Lead author for the Wildlife Baseline Study Report Addendum and the Boreal Toad Baseline Study Report Addendum	B.S. Wildlife Biology; 10 years' experience

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Appendix A
Itafos Submitted Framework for Compensatory Mitigation

Introduction

The Husky 1 North Dry Ridge Mine and Reclamation Plan proposes to disturb 1,146 acres (Table 4). Alternatives would disturb different acres, as shown in Table 11. Itafos has proposed offsetting the predicted impacts on wildlife and wildlife habitat. Section 3.9.3 discloses impacts on wildlife and wildlife habitat.

As described in Section 2.2.9.18, BLM recently changed their policy on compensatory mitigation. In anticipation of the likely future direction to include options for compensatory mitigation before the final EIS is released and records of decisions signed, Itafos has submitted the framework for a mitigation plan to offset the impacts on wildlife habitat. This outline is included as a conceptual compensatory plan, based on the impacts stated in Chapter 3. Details will be added to the compensatory mitigation plan specific to the final selected alternative and after consideration of public comment.

Compensatory mitigation for any remaining effects would be consistent with the BLM's management responsibilities under the FLPMA and P.L. 103-64, the Department of Interior, Public Lands Policy: Implementing Mitigation at the Landscape Scale (600-DM-6) issued on 10/23/2015 (DOI, 2015); and the National Environmental Policy Act (40 CFR 1508.1(s)) and/or any applicable BLM policy or regulation in place at the time of BLM's decision. The CEQ regulations make the following definition: *Mitigation* means measures that avoid, minimize, or compensate for effects caused by a proposed action or alternatives as described in an environmental document or record of decision and that have a nexus to those effects. While NEPA requires consideration of mitigation, it does not mandate the form or adoption of any mitigation. Mitigation includes: (1) Avoiding the impact altogether by not taking a certain action or parts of an action. (2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (5) Compensating for the impact by replacing or providing substitute resources or environments (CEQ, 2020).

Compensatory Mitigation

The compensatory mitigation would include implementation of wildlife habitat creation or enhancement. Itafos may elect to pay for and conduct or contract the work themselves or may make an in-lieu contribution to a third party organization. The in-lieu fee to a third party to use for the benefit of wildlife habitat. Mitigation activities would occur in southeastern Idaho.

Itafos' mitigation framework is included for public comment. Details of the mitigation plan will be formalized after consideration of public comment and alternative has been selected. The mitigation will be required as part of the selected alternative and a condition of approval in the Record of Decision.

The following information is presented to describe how compensatory mitigation has been implemented previously. In the recent past, the final EIS for Rasmussen Valley Mine (BLM, USFS, USACE, IDEQ, 2016) proposed by Agrium include compensatory mitigation. BLM's Record of Decision provided a detailed description of the analysis used to determine an appropriate amount of mitigation and the required process to provide that mitigation. Agrium was required to provide approximately $1.2 million dollars for activities through the Sagebrush Steppe Land Trust. Funds contributed by Agrium were matched and in-kind contributions were made, so that the total project

funding over 2019 and 2020 was increased substantially. Projects included multiple stream and watershed enhancement projects within the Blackfoot River watershed, conservation easements, as well as numerous aspen restoration projects. **Table A-1** shows the projects funded, who implemented the project and the initial cost from the funding Agrium provided.

Table A-1. Projects funded through the Sagebrush Steppe Land Trust 2019/2020

Project Name	Applicant Name	Amount Funded from Trust	Total Project Funding
IDFG- Blackfoot River Watershed Restoration	IDFG	$250,000	$727,000
TU- North Fork Tincup Process-based Restoration	Trout Unlimited	$50,000	$156,000
SSLT- Weaver Little Valley Conservation Easement	Sagebrush Steppe Land Trust	$63,656	$525,884
USFS- Stauffer Creek Restoration	USFS	$75,000	$799,000
USFS- Hubler Creek Aspen Restoration	USFS	$83,000	$166,000
USFS- Strawberry Aspen Restoration	USFS	$64,000	$128,000
USFS- John Wood Forest Management	USFS	$57,000	$114,000
Blackfoot River Watershed Restoration	IDFG	$510,000	$727,000
Tincup Creek Restoration Phase II	Trout Unlimited	$50,000	$156,000
Blackfoot River Fisheries Habitat Improvement	Trout Unlimited	$39,090	$525,884
Ephraim Aspen Enhancement	USFS	$30,000	$799,000
Totals		$1,271,746	$4,870,377

Itafos Compensatory Mitigation Framework

ITAFOS Conda LLC
3010 Conda Road
Soda Springs, ID 83276

July 29, 2021

Bureau of Land Management

Idaho Falls District BLM
1405 Hollipark Dr.
Idaho Falls, Idaho 83442

Attn: Mary D'Aversa

Re: Compensatory Mitigation Proposal for Husky 1 North Dry Ridge (H1NDR) Mine

Dear Ms. D'Aversa

On July 12, 2021, Assistant Director, Resources and Planning, for the Bureau of Land Management (BLM), David Jenkins issued Instruction Memorandum (IM) 2021-038. The purpose of IM 2021-038 was to rescind IM 2019-018. Both IM's address the issue of compensatory mitigation for projects affecting public lands subject to the National Environmental Policy Act (NEPA). IM 2019-018 stated that outside of direct statutory mitigation requirements, the BLM could not interpret the Federal Land Policy and Management Act (FLPMA) to require offsite mitigation as a required condition for projects on public lands. While IM 2021-038 rescinded the previous IM, the BLM has not yet established specific policies for determining compensatory mitigation. IM 2021-038 has two requirements that help guide the compensatory process while such policies are being developed.

1. [While policies are being developed] *offices should consider and implement compensatory mitigation on a case-by-case basis...*
2. *For NEPA documents that are near completion for an action (e.g., a preliminary Draft Environmental Impact Statement (EIS) is in the final stages of review), implementation of this policy may be modified to fit the specific circumstances as to not delay the publication of the NEPA document...*

Itafos Conda LLC (Itafos) submitted a Mine and Reclamation Plan (MRP) for the Husky 1 North Dry Ridge Mine (H1NDR) Project (the "Project") in April of 2020. The Project began the formal NEPA process through publication of the Notice of Intent (NOI) in December of 2020. The Project schedule submitted with the NOI anticipated a June of 2021 publication of the Draft EIS. The submittal of the MRP and the publication of the NOI occurred while IM 2019-018 was in effect.

Itafos is committed to the environmental stewardship of the project and the surrounding resources. As of the writing of this memorandum, a Preliminary Draft EIS is in the final stages of review. To avoid delay to the NEPA process, Itafos proposes the Project consider the most recent compensatory mitigation calculation used for a southeast Idaho phosphate mine project, which could be scaled to fit H1NDR. The proposed compensatory mitigation calculation has been thoroughly vetted through the NEPA process and public comment. It is defensible and has a proven track-record of successful mitigation outcomes.

MITIGATION PROPOSAL

Itafos understands that other companies' recent phosphate mine projects in the southeast Idaho phosphate patch were permitted (2019, 2020) with zero off-site compensatory mitigation requirements, and that this fact should be a consideration when determining final compensatory calculation and schedule for the H1NDR Project. The last phosphate mine project that required offsite compensatory mitigation was the Rasmussen Valley Mine, currently operated by Itafos. Itafos remains committed to our environmental stewardship responsibilities and looks forward to participating in the positive generational impacts such compensatory mitigation projects can provide to the local environment.

IM 2021-038 states that compensatory mitigation should be considered and implemented on a case-by-case basis. IM 2021-038 allows flexibility for individual BLM offices to determine how compensatory mitigation will be assessed and implemented for specific projects. IM 2021-038 also states that implementation of this IM shall not delay the NEPA process for projects near completion of an action, such as publication. The H1NDR project is in the final stages of review, prior to publication. As such, Itafos proposes the following process for determining compensatory mitigation for the H1NDR project that will satisfy:

1. Itafos' commitment to sustainability and environmental stewardship
2. IM 2021-038's directive to implement a case-by-case compensatory mitigation plan
3. IM 2021-038's mandate that NEPA not be delayed by the implementation of this IM

The most recent phosphate mine permitted by the BLM Pocatello Field Office (PFO) that provided compensatory mitigation was the Rasmussen Valley Mine (RVM). Within the NEPA analysis, the BLM PFO conducted a Habitat Equivalency Analysis (HEA) to determine the necessary compensatory mitigation required for the RVM. The RVM HEA analysis was comprehensive and underwent thorough public input through the NEPA public comment process. As such, both the HEA process and the RVM HEA analysis are well vetted and satisfy the NEPA requirements.

While the RVM HEA analysis was conducted concurrently with other NEPA analysis, it still took well over two years to complete. An independent HEA analysis for the H1NDR project is not practical because it would violate the mandate established in IM 2021-038 to not delay ongoing NEPA projects, nor is it necessary to achieve the desired outcome.

Itafos proposes to use the RVM HEA compensatory mitigation calculation and then scale that dollar amount to fit the H1NDR project. Scaling would be on an acres-to-acres basis as well as a dollar per acre

basis. Itafos proposes taking the compensatory mitigation payment and acres impacted (both of which are in the RVM HEA and NEPA documentation) and develop a mitigation dollar per acre impacted compensatory mitigation rate. This rate would then be applied to the acres impacted at H1NDR. This proposed method of calculating compensatory mitigation for H1NDR provides a proven, defensible, and efficient solution to comply with IM 2021-038. Specifically,

1. It provides a mechanism for Itafos to implement a high level of environmental stewardship
2. It provides a NEPA vetted mechanism for determining compensatory mitigation
3. It supports IM 2021-038's directive to consider and implement compensatory mitigation on a case-by-case basis
4. It supports IM 2021-038's mandate not to delay ongoing NEPA projects

Sincerely,

Tim A. Vedder III
General Manager
Itafos Conda LLC
Owner/Officer/Legal Rep

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Appendix B
Geochemical Characterization Tables

Table B-1. Husky Geochemical Characterizations (Laboratory Results) by Rock Type and Constituent

Lithology	Category	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
Alluvium	Average	8,068	0.439	7.54	9.01	27.6	14,473	323	67.4
Alluvium	Maximum	27,200	1	18.1	16.4	57	27,400	2,210	180
Alluvium	Minimum	4,100	0.0946	3.8	5.4	13	7,020	150	28.2
Dinwoody	Average	-	-	-	-	-	-	-	-
Dinwoody	Maximum	-	-	-	-	-	-	-	-
Dinwoody	Minimum	-	-	-	-	-	-	-	-
Foot-Wall Mud	Average	5,858	1.05	11.32	50.8	34.7	8,291	139	129
Foot-Wall Mud	Maximum	12,800	3	22.7	90	62	13,600	333	241
Foot-Wall Mud	Minimum	1,990	0.293	4.9	27.5	17	3,070	23.1	64
Hanging-Wall Mud	Average	10,603	0.348	14.118	11.9	29.1	17,068	235	127
Hanging-Wall Mud	Maximum	22,100	1	42.8	94.9	61	25,200	759	283
Hanging-Wall Mud	Minimum	5,600	0.0946	5.2	1.6	15	10,500	86.2	43.7
Limestone	Average	1,212	0.34	2.482	7	7.47	3,657	130	32.4
Limestone	Maximum	8,080	3	22.3	97.3	67	20,200	3,180	481
Limestone	Minimum	308	0.0946	0.568	0.935	0.229	1,040	59	5.2
Rex Chert	Average	3,221	0.225	4.0097	2.94	18.8	11,705	190	55.3
Rex Chert	Maximum	23,200	2	26.1	25.1	76	49,600	714	223
Rex Chert	Minimum	516	0.0946	1.03	0.481	8	4,700	50.5	9.7

Table B-1 (continued). Husky Geochemical Characterizations (Laboratory Results) by Rock Type and Constituent

Lithology	Category	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Zinc (mg/kg)
Alluvium	Average	7.02	-	9.6	291
Alluvium	Maximum	27.0	0.472	17.0	722
Alluvium	Minimum	1.89	-	5.00	150
Dinwoody	Average	-	-	-	-
Dinwoody	Maximum	-	-	-	-
Dinwoody	Minimum	-	-	-	-
Foot-Wall Mud	Average	17.1	2.03	27.2	825
Foot-Wall Mud	Maximum	32.0	4.09	176	1,380
Foot-Wall Mud	Minimum	10.0	0.656	9.00	392
Hanging-Wall Mud	Average	19.3	0.689	10.6	522
Hanging-Wall Mud	Maximum	65.0	2.25	35.0	1,130
Hanging-Wall Mud	Minimum	4.57	0.340	2.00	111
Limestone	Average	1.58	-	4.00	220
Limestone	Maximum	34.0	8.86	81.0	2,290
Limestone	Minimum	0.308	-	1.00	32.1
Rex Chert	Average	2.71	-	4.26	212
Rex Chert	Maximum	60.0	0.992	56.0	1,140
Rex Chert	Minimum	0.632	-	2.00	43.6

Table B-2. NDR Geochemical Characterizations (Laboratory Results) by Rock Type and Constituent

Lithology	Category	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
Alluvium	Average	14,092	0.956	11.297	8.3	39.5	17,898	276	75
Alluvium	Maximum	33,400	4	33.9	35.6	132	37,600	4,690	405
Alluvium	Minimum	5,230	0.0946	3.1	1.3	9	8,000	121	13.8
Dinwoody	Average	21,037	-	4.744	0.26	21.7	30,122	4,908	27.8
Dinwoody	Maximum	33,400	0.0945	6.7	0.406	32	39,000	13,500	33.9
Dinwoody	Minimum	14,200	-	3.2	0.102	15	24,000	1,730	22.4
Foot-Wall Mud	Average	11,251	4.47	11.32	114	55.5	9,197	127	260
Foot-Wall Mud	Maximum	14,400	5	22.7	116	56	12,100	240	308
Foot-Wall Mud	Minimum	8,790	4	4.9	113	55	6,990	67.1	219
Hanging-Wall Mud	Average	22,890	0.347	22.433	24.4	49.9	23,319	141	108
Hanging-Wall Mud	Maximum	27,200	2	30.8	76.1	67	31,600	475	208
Hanging-Wall Mud	Minimum	20,500	0.122	16.4	16.5	43	14,900	67.4	71.8
Limestone	Average	2,063	0.252	3.684	3.73	8.89	3,811	151	36.8
Limestone	Maximum	21,800	2	24.4	94.3	46	17,300	776	485
Limestone	Minimum	316	0.0946	0.775	0.182	0.229	550	64	6.8
Rex Chert	Average	8,528	-	6.701	1.78	37.8	16,642	134	66.2
Rex Chert	Maximum	21,700	0.348	18.8	20	90	38,000	2,210	215
Rex Chert	Minimum	2,530	-	3.2	0.358	17	6,780	27.6	27.6

Source: (Arcadis, 2020a, p. Table 14)

Table B-2 (continued). NDR Geochemical Characterizations (Laboratory Results) by Rock Type and Constituent

Lithology	Category	Selenium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Zinc (mg/kg)
Alluvium	Average	9.2	0.610	9.6	312
Alluvium	Maximum	115	1.15	36.0	1,800
Alluvium	Minimum	1.44	0.340	2.00	47.8
Dinwoody	Average	0.523	-	0.692	74.5
Dinwoody	Maximum	1.31	0.565	0.880	124
Dinwoody	Minimum	0.346	-	0.504	25.0
Foot-Wall Mud	Average	159	8.38	49.6	2,879
Foot-Wall Mud	Maximum	261	9.37	56.0	3,250
Foot-Wall Mud	Minimum	97.0	7.49	44.0	2,550
Hanging-Wall Mud	Average	46	1.40	22.4	567
Hanging-Wall Mud	Maximum	2,400	6.50	54.0	1,940
Hanging-Wall Mud	Minimum	9.00	0.670	14.0	354
Limestone	Average	6.17	-	2.19	183
Limestone	Maximum	206	7.01	28.0	6,900
Limestone	Minimum	0.296	-	0.389	14.3
Rex Chert	Average	8.6	-	6.69	225
Rex Chert	Maximum	48.0	1.17	17.0	890
Rex Chert	Minimum	3.08	-	2.00	63.1

Table B-3. Pit Backfill/OSA Unsaturated Source Term Concentration (mg/L)

Constituent	Pore Volume[1]	South Maybe Canyon Mine-S	South Maybe Canyon Mine-N	H1-N	H1-X	H1-L	H1-E	H1-S	North Maybe Mine	NDR
Total Selenium	0.5-1	1.739	1.691	2.086	3.077	2.859	3.117	3.163	6.757	4.966
	0.5-2	0.0089	0.0088	0.0099	0.0131	0.0124	0.0127	0.0133	0.5966	0.4206
	1	0.909	0.884	1.091	1.61	1.494	1.629	1.654	3.842	2.787
	2	0.0065	0.0066	0.0072	0.0094	0.0105	0.0112	0.0109	0.0514	0.0425
	3	0.0039	0.0045	0.0039	0.0056	0.0063	0.0066	0.0066	0.0281	0.0249
	4	0.0039	0.0045	0.0037	0.0047	0.0051	0.0053	0.0052	0.0274	0.0244
Dissolved Selenium	0.5-1	1.6216	1.5746	1.9467	2.8698	2.6733	2.9163	2.9558	7.1465	5.1526
	0.5-2	0.0082	0.0081	0.0092	0.0119	0.0113	0.0116	0.0121	0.5873	0.4062
	1	0.8487	0.8239	1.0189	1.5019	1.398	1.5244	1.5459	4.0429	2.8796
	2	0.0089	0.0087	0.0099	0.0132	0.0137	0.0142	0.0144	0.0516	0.0429
	3	0.0032	0.0037	0.0032	0.0045	0.0052	0.0056	0.0054	0.0228	0.0203
	4	0.0029	0.0035	0.0027	0.0037	0.0041	0.0043	0.0042	0.0248	0.0224
Total Antimony	0.5-1	0.0037	0.0036	0.0042	0.0059	0.0057	0.0059	0.0062	0.0048	0.0049
	0.5-2	0.0013	0.0012	0.0014	0.0019	0.0019	0.0018	0.002	0.0042	0.0041
	1	0.0025	0.0024	0.0029	0.004	0.0039	0.004	0.0042	0.0045	0.0045
	2	0.0016	0.0016	0.0019	0.0024	0.0022	0.0024	0.0024	0.0026	0.0025
	3	0.0014	0.0014	0.0016	0.002	0.0019	0.0021	0.0021	0.0012	0.0012
	4	0.0011	0.0011	0.0012	0.0014	0.0014	0.0015	0.0014	0.001	0.0011
Total Arsenic	0.5-1	0.0019	0.0022	0.0018	0.0023	0.0024	0.0024	0.0025	0.0052	0.0046
	0.5-2	0.0026	0.0029	0.0026	0.0035	0.0038	0.0038	0.0039	0.0062	0.006
	1	0.0022	0.0026	0.0022	0.0028	0.0031	0.0031	0.0032	0.0056	0.0053
	2	0.0028	0.0031	0.0028	0.0038	0.0043	0.0044	0.0045	0.0108	0.0121
	3	0.0021	0.0026	0.0018	0.0024	0.003	0.003	0.003	0.0108	0.0139
	4	0.0015	0.0018	0.0014	0.0017	0.0022	0.0021	0.0022	0.0106	0.015
Total Cadmium	0.5-1	0.0023	0.0024	0.0024	0.0032	0.0034	0.0036	0.0036	0.1349	0.1196
	0.5-2	0.0003	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004	0.0002	0.0004
	1	0.0013	0.0014	0.0014	0.0018	0.0019	0.0021	0.0021	0.0711	0.062

Constituent	Pore Volume[1]	South Maybe Canyon Mine-S	South Maybe Canyon Mine-N	H1-N	H1-X	H1-L	H1-E	H1-S	North Maybe Mine	NDR
	2	0.0003	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	3	0.0004	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
	4	0.0004	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
Total Copper	0.5-1	0.002	0.0027	0.0015	0.0017	0.0017	0.0015	0.0017	0.0057	0.0038
	0.5-2	0.0014	0.0022	0.0009	0.0009	0.0009	0.0009	0.0009	0.0023	0.0009
	1	0.0017	0.0025	0.0012	0.0013	0.0013	0.0012	0.0013	0.0041	0.0024
	2	0.0011	0.0013	0.0009	0.0009	0.0009	0.0009	0.0009	0.0012	0.0009
	3	0.0012	0.0015	0.0009	0.001	0.0011	0.0011	0.0011	0.0017	0.0015
	4	0.0011	0.0015	0.0009	0.0009	0.001	0.001	0.001	0.0019	0.0015
Total Iron	0.5-1	0.082	0.114	0.069	0.1	0.128	0.145	0.133	0.125	0.085
	0.5-2	0.102	0.139	0.088	0.129	0.158	0.179	0.166	0.213	0.169
	1	0.092	0.126	0.078	0.114	0.142	0.161	0.148	0.167	0.126
	2	0.106	0.113	0.118	0.172	0.176	0.195	0.19	0.27	0.189
	3	0.088	0.1	0.091	0.125	0.136	0.151	0.144	0.462	0.308
	4	0.05	0.055	0.051	0.069	0.07	0.076	0.075	0.509	0.339
Total Manganese	0.5-1	1.53	1.493	1.758	2.368	2.608	2.923	2.756	2.036	1.762
	0.5-2	1.471	1.419	1.751	2.511	2.337	2.549	2.573	1.228	1.074
	1	1.497	1.453	1.751	2.435	2.473	2.737	2.664	1.649	1.429
	2	1.994	1.925	2.389	3.477	3.242	3.535	3.577	1.368	1.285
	3	1.876	1.833	2.237	3.281	3.074	3.352	3.391	1.683	1.408
	4	1.647	1.603	1.972	2.904	2.706	2.949	2.991	1.176	0.906
Total Nickel	0.5-1	1.013	0.979	1.216	1.778	1.631	1.775	1.807	1.263	1.071
	0.5-2	0.646	0.623	0.778	1.141	1.024	1.114	1.141	0.66	0.57
	1	0.837	0.808	1.006	1.473	1.34	1.457	1.488	0.977	0.83
	2	0.501	0.484	0.604	0.889	0.797	0.867	0.889	0.464	0.406
	3	0.362	0.35	0.435	0.639	0.574	0.623	0.639	0.417	0.331
	4	0.288	0.278	0.347	0.509	0.458	0.498	0.51	0.234	0.172

Constituent	Pore Volume[1]	South Maybe Canyon Mine-S	South Maybe Canyon Mine-N	H1-N	H1-X	H1-L	H1-E	H1-S	North Maybe Mine	NDR
Total Thallium	0.5-1	0.0004	0.0004	0.00041	0.00045	0.00047	0.00043	0.00047	0.00131	0.00137
	0.5-2	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00111	0.00093
	1	0.0004	0.0004	0.0004	0.00043	0.00044	0.00042	0.00044	0.00122	0.00116
	2	0.0004	0.0004	0.00041	0.00052	0.00058	0.00048	0.00058	0.00114	0.00118
	3	0.00041	0.00043	0.00041	0.00045	0.00047	0.00043	0.00047	0.00069	0.00072
	4	0.00041	0.00043	0.00041	0.00045	0.00047	0.00043	0.00047	0.00069	0.00068
Total Uranium	0.5-1	0.0213	0.0212	0.0241	0.0329	0.0317	0.0342	0.0343	0.0294	0.0272
	0.5-2	0.0202	0.0203	0.0228	0.0312	0.0295	0.0321	0.0321	0.02	0.018
	1	0.0208	0.0208	0.0235	0.0321	0.0306	0.0332	0.0333	0.0249	0.0228
	2	0.0163	0.0163	0.0184	0.0251	0.0236	0.0257	0.0257	0.0172	0.0169
	3	0.0116	0.0117	0.013	0.0176	0.0169	0.0185	0.0183	0.0179	0.0138
	4	0.0089	0.0088	0.0101	0.0133	0.0126	0.0138	0.0137	0.0093	0.0067
Total Zinc	0.5-1	1.0165	0.9765	1.231	1.814	1.6476	1.7987	1.8329	2.8263	2.3122
	0.5-2	0.2731	0.2626	0.329	0.4805	0.4282	0.4649	0.4775	1.1836	0.9859
	1	0.6607	0.6347	0.7992	1.1757	1.0635	1.1597	1.1838	2.0489	1.6738
	2	0.5993	0.5755	0.725	1.0659	0.9483	1.0308	1.0592	0.5998	0.4365
	3	0.5868	0.5659	0.7079	1.0406	0.9263	1.007	1.0345	0.2306	0.189
	4	0.4879	0.4705	0.5881	0.8636	0.7685	0.8352	0.8581	0.1629	0.1196
Total Sulfate	0.5-1	1140.2	1108.3	1330	1853.7	1961.4	2171.1	2095.7	1181	1163.4
	0.5-2	1000.3	961.8	1206.3	1764.8	1631.3	1785.4	1805.9	861.4	894.9
	1	1069.8	1034.7	1267.8	1810	1800.1	1982.6	1954.4	1027.8	1035.2
	2	865.5	830.6	1041.7	1513.8	1348.9	1466.9	1503.4	819.1	827.9
	3	709.2	681.1	848.9	1220.3	1091.2	1187	1213.1	722.4	610
	4	686.3	659.2	821.9	1183.1	1054.6	1146.5	1173.5	459.4	311.6

Constituent	Pore Volume[1]	South Maybe Canyon Mine-S	South Maybe Canyon Mine-N	H1-N	H1-X	H1-L	H1-E	H1-S	North Maybe Mine	NDR
Total Dissolved Solids	0.5-1	1929.2	1948.3	2144.4	2909.5	3211.8	3477.7	3376.4	3663.6	3730.4
	0.5-2	1763.3	1714.2	2071.4	2922.6	2726.8	2969.7	2992.9	1909.9	1909.1
	1	1843.1	1828.9	2104.1	2914.7	2975	3228.3	3189.5	2828	2853.7
	2	1552.6	1504.6	1830.7	2590	2337.2	2533.4	2584.6	1626.3	1636.1
	3	1300.6	1260	1525.3	2132.3	1932.8	2094.3	2130.9	1420.9	1216.8
	4	1156.2	1117.4	1360.8	1912.3	1729.9	1871.5	1909.3	742.6	574.6

Source: (Arcadis, 2020b, p. Table 9)