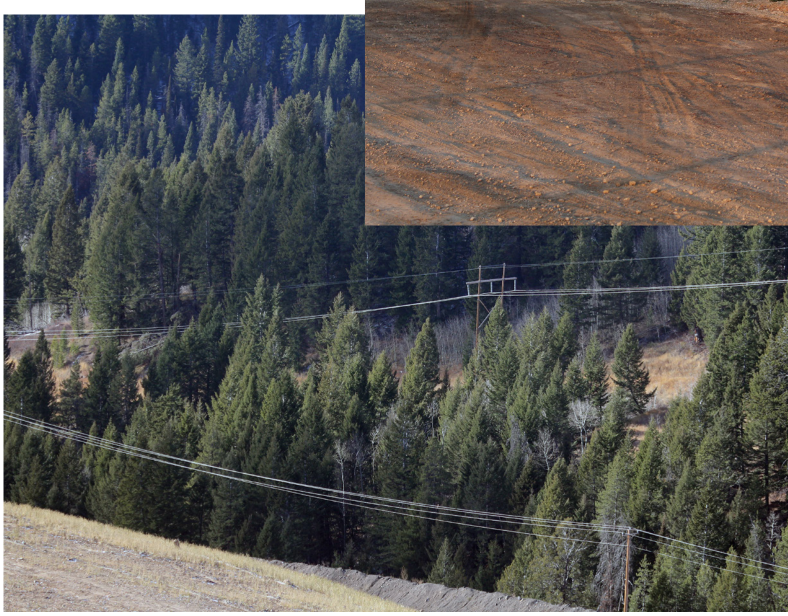
Draft Environmental Impact Statement for the Proposed East Smoky Panel Mine Project at Smoky Canyon Mine



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September 2018

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DOI-BLM-ID-I020-2014-0046-EIS

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED EAST SMOKY PANEL MINE PROJECT
AT SMOKY CANYON MINE

LEAD AGENCY:	Bureau of Land Management Idaho Falls District Pocatello Field Office
JOINT LEAD AGENCY:	U.S. Department of Agriculture Forest Service Caribou-Targhee National Forest
COOPERATING AGENCY:	Idaho Department of Environmental Quality Idaho Department of Lands Idaho Office of Energy and Mineral Resources
PROJECT LOCATION:	Caribou County, Idaho
DATE DRAFT EIS FILED WITH EPA:	September 2018
QUESTIONS ON THE DRAFT EIS CAN BE DIRECTED TO:	Kyle Free, Project Lead BLM Pocatello Field Office 4350 Cliffs Drive Pocatello, Idaho 83204 (208) 478-6352
MAILING AND EMAIL ADDRESSES FOR SUBMITTAL OF COMMENTS ON DEIS:	East Smoky Panel Mine DEIS C/O Stantec Consulting Services Inc. 3995 South 700 East, Ste. 300 Salt Lake City, Utah 84107-2540

ABSTRACT

This Draft Environmental Impact Statement analyzes impacts from developing the proposed East Smoky Panel Mining and Reclamation Plan at the J.R. Simplot Smoky Canyon Mine in southeast Idaho. The Proposed Action includes developing and mining an open pit east of the current mine on three federal mineral leases held by Simplot; modifying one of those leases to accommodate efficient pit development; amending the Revised Forest Plan for a utility corridor relocation; constructing ancillary facilities including transmission lines, haul roads, and stormwater control structures on private lands or under Special Use Authorizations; backfilling the Panel B pit with additional overburden; reclaiming mine disturbances using a store and release cover on top of the placed overburden; and topsoiling/reseeding the majority of the total disturbance. Use of existing support and mill facilities would continue. An alternative to the Proposed Action is analyzed. It is generally the same as the Proposed Action, but the pit footprint would be smaller, avoiding mining the cherty shale. This would reduce selenium in the combined overburden materials and allow a topsoil-only cover on the East Smoky Panel and the currently approved cover on Panel B. The reduced pit shell would reduce the disturbed area by 78 acres, but the pit would be mined deeper and with steeper highwalls to allow equivalent ore recovery. The No Action Alternative is also analyzed and site-specific mitigation measures developed.

RESPONSIBLE OFFICIAL FOR DEIS:	Mary D’Aversa BLM Idaho Falls District Manager
EIS NUMBER:	DOI-BLM-ID-I020-2014-0046-EIS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The following information is provided as a convenient synopsis for the public. However, this synopsis is not a substitute for review of the complete Draft Environmental Impact Statement (DEIS). If there are any inconsistencies between this Executive Summary and the DEIS, the DEIS controls.

BACKGROUND

J.R. Simplot Company's (Simplot) existing Smoky Canyon mining and milling operations were authorized in 1982 by a mine plan approval issued by the Bureau of Land Management (BLM) and Special Use Authorizations (SUAs) issued by the U.S. Forest Service (USFS) for off-lease activities, supported by the Smoky Canyon Mine Final EIS and Record of Decision (ROD). Mining operations began in 1984 and have continued ever since with the mining of Panels A through G. As mining progressed through each mine panel, mine and reclamation operations were reviewed and the environmental effects assessed under the National Environmental Policy Act (NEPA). Supplemental Mine and Reclamation Plans detailing the development and reclamation of each panel were approved with subsequent decisions made by the BLM for on-lease operations and by the USFS for operations conducted off lease. Mining operations are now complete in Panels A, C, D, and E and those areas are reclaimed. Mining continues in Panels B (immediately adjacent to portions of the proposed East Smoky Panel Mine Project Area), F, and G with concurrent pit backfilling and reclamation.

This Environmental Impact Statement (EIS) is being prepared by the BLM, Pocatello Field Office, and the U.S. Forest Service (USFS), Caribou-Targhee National Forest (CTNF), in response to the proposed Mine and Reclamation Plan (M&RP) and lease modification for the Smoky Canyon Mine, East Smoky Panel (the Project).

PROPOSED ACTION

The Proposed Action consists of the following:

- Development of three federal mineral leases that Simplot currently holds, and development and reclamation of an open pit phosphate mine with a store and release cover over backfilled overburden and associated infrastructure;
- Modification of one existing lease by adding 120 acres for mining-related disturbance for a portion of the pit and associated backfill;
- Development, construction, and reclamation of infrastructure including portions of transmission lines, haul roads, and other miscellaneous disturbances off-lease on federal land administered by the USFS, requiring SUAs;
- Amendment to the Caribou National Forest (CNF) Revised Forest Plan (RFP) that would relocate a designated utility corridor south around the southern end of the proposed open pit; and,
- Revision of reclamation plans for Panel B to add additional backfill, resulting in contours closer to the original topography, and use of a store and release cover in place of the previously approved "cap" for coverage of seleniferous material.

The development of the East Smoky Panel would require the removal, transportation, and placement of overburden, most of which would be used to backfill the mined out East Smoky Panel pit. The remaining overburden would be placed in previously disturbed mining areas at Panel B.

All run-of-mine (ROM) overburden would receive a geologic store and release cover system consisting of chert, overlain by Dinwoody and/or Salt Lake Formation, and a topsoil layer. This type of cover system is designed to limit the percolation of meteoric water into the seleniferous overburden beneath, by increasing runoff and retaining moisture within some of the cover layers that would be available to plants and evapotranspiration. By reducing water movement into the seleniferous overburden, the intent of the store and release cover is to reduce the amount of selenium that can be transported by groundwater away from the overburden pile.

The existing processing and ancillary facilities for the East Smoky Panel would continue to be used. Electric power for the proposed mining operations would be provided with the existing power lines. However, two segments of existing power lines are proposed for reroute around the proposed East Smoky Panel. A Revised Forest Plan (RFP) amendment would be required to change the management prescription of the lands contained in the proposed transmission line reroute to allow designation of a 200-foot wide utility corridor for the new route and revised SUA. This Project would both use existing SUAs and require additional new SUAs.

Applicable Environmental Protection Measures (EPMs) described in previous FEISs and RODs for the Panels B and C and the Panels F and G projects would continue to be implemented. EPMs specific to the Proposed Action and Action Alternative for this Project would also be implemented.

The mine life of the East Smoky Panel pit would be up to 12 years, depending on different blending scenarios with the ore from the remaining permitted Smoky Canyon Mine panels. Concurrent reclamation work is proposed and would continue on both federal and split estate lands for approximately two to three years following completion of mining. The East Smoky Panel would add approximately three years to the overall life of the Smoky Canyon Mine.

The reclamation plan covers approximately 98 percent of the total new disturbance, in addition to the areas of redisturbance, with a small pit area situated on private land owned by Simplot that would be left unreclaimed.

ACTION ALTERNATIVE

One Action Alternative was fully evaluated in the DEIS: Alternative 1 – Reduced Pit Shell with Soil-only Cover. Under Alternative 1, the overall mining operations, mining sequences and other associated ancillary operations and disturbances would remain the same as described for the Proposed Action, including the need for the lease modification. However, the ultimate pit shell footprint would be reduced by approximately 78 acres compared to the Proposed Action. The reduction in area results from the steeper pit wall slopes that would be used to reduce mining the cherty shale that contains a high concentration of seleniferous material.

The East Smoky Panel pit under this alternative would receive a topsoil cover, but the currently approved cover would be used for Panel B. Not encountering the cherty shale under Alternative 1 would reduce the seleniferous nature of the combined overburden materials, so the geologic store and release cover would not be needed.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed M&RP for development of the East Smoky Panel and proposed SUAs would not be approved, no modification to the existing mineral lease would occur, the CNF RFP would not be amended, and mining at other panels of the Smoky Canyon Mine would continue as currently authorized. Mining in Panel B would proceed as currently planned by Simplot and authorized by the BLM. Simplot would retain and be eligible to invoke the mining rights granted in their existing federal leases at another time, with a revised M&RP that meets all regulatory and other established requirements.

AGENCY PREFERRED ALTERNATIVE

Following their review of the environmental impacts as discussed in the DEIS, the BLM and USFS have identified Alternative 1: Reduced Pit Shell with Soil-only Cover as their Preferred Alternative for this Project because this alternative:

- Reduces the size of the proposed pit and new surface disturbance by approximately 78 acres.
- Increases the amount of overburden proposed to be placed in Panel B, returning the topography in this area back closer to original contours.
- Reduces the amount of unreclaimed highwall by approximately three acres.
- Eliminates mining the cherty shale material which would reduce the seleniferous nature of the combined overburden materials, resulting in a soil-only cover needing to be used.
- Reduces the amount of discount service acre years (DSAYs) under the Habitat Equivalency Analysis (HEA) by approximately 5,500.

The Agency Preferred Alternative would reasonably accomplish the purpose and need for the federal action, while giving consideration to environmental, economic, and technical factors.

ENVIRONMENTAL IMPACTS

The environmental effects of the Proposed Action have been evaluated and compared to Alternative 1 in **Chapter 4** of the DEIS. A listing of the primary environmental impacts for the Proposed Action and Alternative 1 is shown in **Table 2.8-1**. The environmental impacts of the Proposed Action and Alternative 1 are only briefly summarized in the following narrative and a detailed impact analysis is provided by resource in **Chapter 4**.

Geology, Minerals, Topography, and Paleontology

The Proposed Action and Alternative 1 would commit phosphate resources to development. Approximately 60.2 million Bank Cubic Yards (BCY) of overburden would be removed from the pit area as part of exposing the mineral resource, and then either placed back in the East Smoky Panel pit or added to the already mined Panel B area. This would be a long-term, major, local impact on geologic resources. This mining activity would result in physical changes to topography; creation of man-made slopes and highwalls that are designed for stability; and movement of overburden to pit backfills. Final reclaimed configurations would mimic the pre-mining landforms and slope aspects. This would be a minor but long-term impact. Under the Proposed Action, about 12 acres of the topographic disturbance for the East Smoky Panel pit would be permanent where a portion of highwall and pit would not be reclaimed due to lack of available backfill. Under Alternative 1, it would be slightly fewer at 9 acres.

Effects to paleontological resources could occur from the disturbance of the ore and overburden removal during mining, along with road construction and other miscellaneous disturbance activities. Rock units disturbed would be in the Dinwoody Formation, various members of the Phosphoria Formation, Wells Formation, and alluvium. Fossils in the geologic units that would be disturbed are not restricted only to the Smoky Canyon area and are likely to be found throughout the outcrop area of these formations in Southeastern Idaho. This is expected to present a negligible impact.

Impacts from Alternative 1 would be similar, although the pit would have a smaller footprint, by approximately 78 acres.

Air Resources

Mining operations would impact air resources primarily by emissions of dust and motorized equipment exhaust including particulates, nitrogen oxides, carbon monoxide, volatile organic compounds, and sulfur dioxide. With the annual emission estimates for the Proposed Action being similar to the annual quantity of previously modeled emissions, it is unlikely that the National Ambient Air Quality Standards (NAAQS) thresholds would be approached. The air emissions would occur during active operations. A large percentage of the fugitive particulate emissions generated from mining and transportation activities would settle out quickly near their point of generation.

Greenhouse gas (GHG) emissions associated with the Proposed Action would be generated from combustion of fossil fuels in mining and support equipment and include carbon dioxide, methane, and nitrous oxide. However, because neither the Proposed Action nor Alternative 1 require any additional fuel burning equipment or activities, there would be no increase to the annual GHG emissions. Instead, the current annual level of GHGs emitted would be extended by approximately 3 years.

Noise

The noise impacts from activity during operation of the Proposed Action and Alternative 1 would be primarily generated by drilling, blasting, equipment operation, haul truck use, and other vehicle use. The level of noise impact would be similar to the current noise impacts from the existing Smoky Canyon Mine. None of the expected noise levels would exceed the Environmental Protection Agency (EPA) guidelines for outdoor noise limits to protect against effects on public health and welfare. Consequently, the noise effects from the Proposed Action and Alternative 1 would be short-term and negligible or minor at the closest sensitive receptor due to the distance from the mine.

Water Resources

The Proposed Action and Alternative 1 would have negligible impacts to groundwater quantity or groundwater elevation in the Wells Formation aquifer. There would be no change to the amount of groundwater extracted for mine operations. The amount of water added to the open pit from potential isolated highwall seeps of alluvium or Rex Chert groundwater would be negligible compared with the net percolation through the surface of the pit backfills. Mining the lower benches of the later phases of the East Smoky Panel could seasonally intersect the saturated portion of the Wells Formation where mean groundwater elevations are near the base of the proposed pit excavation. Reductions in groundwater flow across the West Sage Valley Branch Fault in the vicinity of the East Smoky Panel could potentially reduce flow in downgradient springs associated with the Dinwoody Formation and the Rex Chert that are sustained by this groundwater flow.

This effect on these springs would have implications on stream flow in Roberts and Tygee Creeks, reducing or eliminating those flows for the long term. The impact to Roberts Creek would be a direct impact and the impact to Tygee Creek would be indirect and due only to potential reductions from sources (Roberts Creek, ESS-1, ESS-2, and LinS) that are tributary to it. Additionally, there would be some storm flow reductions due to stormwater management, which would be reestablished after reclamation. However, Simplot currently has a water right that allows diversion of Roberts Creek. Further, Tygee Creek streamflows increase further downstream due to contributions from other tributaries, which would compensate for the aforementioned streamflow reductions.

The primary mechanism for impacting groundwater and surface water quality would be due to the potential for contaminants of potential concern (COPCs) to leach from the pit backfills via vertical percolation of recharge, eventually reaching and impacting the underlying Wells Formation groundwater. COPCs carried through for groundwater fate and transport modeling for the Proposed Action and Alternative 1 were selenium, manganese, total dissolved solids (TDS), and sulfate. Model-simulated impacts to groundwater quality in the Wells Formation are generally greatest near the backfilled open pits. Away from the pit backfilling, these impacts diminish.

Selenium does not exceed the regulatory primary groundwater standard (0.05 mg/L) at any time during the 300-year model time frame for the Proposed Action or Alternative 1, but selenium concentrations of 0.001 mg/L would reach Hoopes Spring and remain at that approximate level until year 300. Under the Proposed Action, a large manganese plume greater than the secondary groundwater standard of 0.05 mg/L is predicted to extend from the East Smoky Panel west under much of the B-Panel and down to Hoopes Spring. The greater than 0.05 mg/l plume for manganese in the Wells Formation develops rapidly below and south of the pit backfill and then gradually continues to move south. Manganese concentrations would be much lower under Alternative 1. For most of the modeling done for sulfate under both the Proposed Action and Alternative 1, groundwater concentrations in the Wells Formation are much less than the 250 mg/L secondary groundwater standard. Last, TDS concentrations in Wells Formation groundwater would show a greater than 500 mg/L plume developing under the pit backfill (500 mg/L is the applicable secondary groundwater standard) under both the Proposed Action and Alternative 1. This plume increases in size and begins to degrade due to ongoing recharge through the cover, reaching about 300 mg/L by the end of 300 years. No COPCs were predicted to reach Lower South Fork Sage Creek Springs.

The selenium contributions from the East Smoky Panel under the Proposed Action and under Alternative 1 to Hoopes Spring would have a minor impact to Sage and Crow creeks, both of which are already impacted beyond the current chronic aquatic life criterion for selenium. The manganese contribution under the Proposed Action would represent a greater increase than selenium, but there would be no water quality standard violated for this COPC. Manganese contribution to surface water would be negligible for Alternative 1. Sulfate and TDS contributions would be negligible under both the Proposed Action and Alternative 1.

No groundwater rights would be impacted, but water rights associated with LinS (also known as the Linford Spring) and with Tygee Creek could be negatively impacted due to potential flow reductions.

Soils

The Proposed Action and Alternative 1 would directly impact soil resources within the Project Area by removing it from areas prior to disturbance due to mining and related activities. These direct impacts to soil resources include loss of soil during salvage, loss due to erosion of stockpiles or reclaimed areas, exposure and potential mobilization of selenium, and reduced productivity. There would be no indirect impacts to soil resources. However, EPMs would reduce these types of impacts. Soil stockpiles would be protected from erosion by seeding and establishment of short-term vegetation cover and soil surveys have determined that approximately 4.3 million bank cubic yards of combined topsoil and subsoil is suitable and available for reclamation. Incorporation of slash and vegetative materials into the growth medium during stripping would increase the organic matter content of the material and elevate the production potential. Further, reclamation of disturbed areas that are no longer required for active mining operations would be conducted concurrent with other mining operations. This would reduce the time that soil remains stockpiled, and would allow for direct-haul in some cases. Last, topsoil would be sampled prior to placement to determine agronomic characteristics, which would then dictate fertilizer types and application rates, if any are needed. Combined, impacts to soil resources would be major and long term for both the Proposed Action and Alternative 1, though the area of disturbance would be 78 acres fewer for the latter.

Vegetation and Wetlands

The Proposed Action would remove up to 728 acres of upland (non-wetland) vegetation and zero acres of wetland vegetation and Alternative 1 would remove 78 fewer acres, all upland vegetation. The upland vegetation that would be removed is primarily in the aspen/conifer vegetation type. Following mining activities, reclamation would revegetate 98 percent of the cleared areas, however the resulting species composition and community structure would be different than before the disturbance resulting in a long-term direct impact. Aspen, aspen mix, and conifer habitat would be permanently lost, which includes snag-producing forest habitat, which are well-represented on the landscape. Overall effects of the Proposed Action and Alternative 1 to upland vegetation would be long-term and minor. There would be no direct impacts to wetlands, but minor indirect impacts could occur due to sediment loading or flow alterations. The effects of noxious weeds from the Proposed Action or Alternative 1 would be short-term and minor due to BMP implementation. No plant species listed as threatened, endangered, or proposed; no CTNF sensitive plant species; and no CTNF Watch rare plant species are anticipated to occur or have been observed during baseline studies, thus impacts to sensitive plants are not anticipated to occur.

Wildlife

Impacts of the Proposed Action and Alternative 1 on terrestrial wildlife would include: 1) immediate, direct effects in terms of wildlife mortality, disturbance, and displacement; and 2) changes in wildlife behavior and composition associated with long-term changes in land cover and reclamation. The majority of disturbed habitat (98 percent) would be forest lands that would be reclaimed with grasses and shrubs. Over the long term, reclaimed areas would likely regain the level of wildlife habitat services provided by the baseline on-site big sagebrush and high-elevation rangeland habitat types. However, even after reclamation, the Proposed Action would result in the net debit of 33,551 DSAYs and Alternative 1 would result in 5,488 fewer DSAYs than the Proposed Action. This habitat alteration and forest fragmentation would cause long-term species composition changes. However, both the Proposed Action and Alternative 1 would unlikely impact entire populations and would have negligible to minor impact to individuals or habitat for: bald eagle, boreal owl, brewer sparrow, Columbian sharp-tailed grouse, greater sage grouse, flammulated owl, great gray owl, northern goshawk, olive-sided flycatcher, peregrine falcon, prairie falcon, sagebrush sparrow, American three-toed woodpecker, trumpeter swan, willow flycatcher, Uinta chipmunk, gray wolf, Canada lynx; amphibians/reptiles including the northern leopard frog, common garter snake, and boreal toad; migratory birds in general, and raptors in general. There could be minor impacts to bats and upland game birds and minor to moderate impacts to big game.

Fish and Aquatics

The Proposed Action and Alternative 1 would result in direct disturbance of approximately 21 acres of Aquatic Influence Zones (AIZs), but given the nature of the AIZs as non-perennial and lacking connection with perennial waterbodies, effects to them would overall be minor. Reductions in flow in Roberts Creek due to spring flow disruption or elimination would have a moderate impact to aquatic habitat, but impacts would be reduced to minor given the current habitat quality. Related reductions in flow to Tygee Creek would be moderate to major in the upstream areas, but negligible downstream. Impacts to aquatic habitat due to manganese, sulfate, and TDS contributions from Hoopes Spring due to development of the East Smoky Panel Mine would be negligible but long term. For selenium, due to its bioaccumulative properties, impacts to aquatic habitat from the Project would be minor but long term. Indirect impacts to macroinvertebrates in area streams would be negligible to minor due to either bioaccumulation of selenium or flow alterations in Roberts or Tygee creeks. Last, indirect impacts to fish would be minor to moderate due to predicted streamflow losses in Tygee Creek, but negligible to minor in Roberts Creek. There is the potential for indirect effects to fish populations in Hoopes Spring, Sage Creek, and Crow Creek from predicted increases in selenium, manganese, sulfate, and TDS concentrations. The predicted increases in manganese, sulfate, and TDS are expected to be small and impacts to fish populations are expected to be negligible. For selenium, there is more uncertainty with determining significance due to uncertainty regarding the impacts of existing selenium levels, but impacts to fish populations from the Project are not expected to be more than minor due to the small increases.

Land Use (Grazing and Recreation) and Transportation

The Proposed Action and Alternative 1 would convert primarily undeveloped forest land to mining. It would change the character of a small portion of an adjoining private parcel owned by Simplot from forest to an industrial use, which would be a minor impact to private land uses.

The Proposed Action and Alternative 1 would result in 30 additional acres of CTNF land bound under SUAs in the Study Area. This would be a negligible reduction in CTNF land in the Study Area available for public use.

The transmission line relocation into a location with no CNF RFP designated utility corridor would be inconsistent with the RFP and would require an RFP amendment. The RFP amendment would change the land use to a utility corridor on 1.8 acres (< 1 percent) of CTNF in the Study Area which would be a negligible effect.

Mining and infrastructure development under the Proposed Action would remove 594 acres from the Pole Draney Allotment in the short term, which based upon the numerical ratios would be a loss of 23 percent of the allotment acres and AUMs in the Study Area (moderate effect) and a loss of 5 percent of the acres and AUMs in the allotment as a whole (minor effect). Under current usage the permittee only spends 13 and 19 days in the area as the sheep make their way between the Pole Canyon Dump south of the Project Area and the ground north of the Smoky Canyon Road and the Project Area. Therefore, over the life span of active mining and reclamation, the permittee would gradually lose up to approximately 19 days per year of grazing time on NFS lands. Due to active mining in the Project Area, the ability to move a band of sheep throughout the allotment while remaining on NFS lands would become extremely difficult if not impossible, especially along the southeastern portion of the allotment. Based upon the impacts from the Proposed Action combined with the effects and days lost from mining previous panels over the years, it is anticipated that the remaining permitted allotment area would not likely be sufficient to sustain the permitted number and duration of the existing permit without mitigation. This could result in a moderate and long-term impact to the permittee.

Grazing impacts would occur until the disturbed areas have been reclaimed and their rangeland capacity restored (as determined by the CTNF via restoration criteria). The long-term objective of the reclamation revegetation would be a vegetative community suitable to support the post-mining land uses of grazing and wildlife habitat. Therefore, there would be a negligible impact on long-term forage value under the Proposed Action.

In the short term, approximately 49 percent of the available CTNF land in the Study Area would be disturbed by mining or mining infrastructure and be unavailable to recreation (which are currently fairly limited), or would become unavailable to public recreation due to safety concerns and limited access related to crossing active mining operations. Once reclamation restores the land to its post-mining condition access would be restored. Given that recreation in the Study Area is not as popular as in other parts of the CTNF due to the presence of the mine, and the approximately 3,000,000 acres of greater CTNF available for recreation, this effect would be negligible to minor. Further, while the reclaimed Project Area may not be as suitable for some types of recreation due to altered topography, the revegetated areas may be more desirable for hunting due to better forage or cover for game species.

There would be approximately 4.5 miles of new haul roads constructed in the Study Area over the life of the Project. The public would not be allowed access on these roads during the life of the Project, but they would be reclaimed and access would be allowed after that time. There would not be any changes to public access on CTNF roads. Traffic would not increase on public roads in the Study Area; there would not be any additional employees traveling to the mine and the current number of haul trucks and other vehicles would continue as in the existing operations.

Visual Resources

As mining progresses under the Proposed Action and Alternative 1, it would open views of the mine from the lower elevation areas to the east because vegetation would be removed and the mine would extend over the eastern side of the ridge above Sage Valley. This would cause the mine to become more visually dominant from the east side in both the middle ground and background and would have a minor to moderate adverse effect on visual quality depending on the viewpoint.

Construction of various mining components and mining operations would require disturbance that removes vegetation cover, exposes soil, and alters landforms, which would affect the form, line, texture, and color elements of the existing visual environment creating a contrast in the visual landscape. Over the life of the mine, there would be permanent facilities (topsoil stockpiles, borrow pits, haul roads, stormwater ponds, and the two power lines that would be relocated), and personnel, vehicles and heavy equipment moving around the site that may be visible from outside the Project Area.

Overall views of the mine under the Proposed Action and Alternative 1 would be most pronounced from the higher elevations although visual effects are likely to be minor due to limited viewing opportunities at higher elevations surrounding the area, the transitory nature of people moving through these areas (there are not any campgrounds or other similar facilities that would create longer period views of the site), and the locations of these areas which are typically at greater distance from the mine.

During construction and mining the landscape character would be unavoidably altered by harvesting trees, removing vegetation, and exposing soil. When newly disturbed, there would be moderate effect on visual quality due to the high contrast. In addition to soil colors, textures change depending on how the soil has been disturbed. For example, in some places the mining would result in high wall slopes with benches (up to 715 feet high) that would create straight horizontal lines. These straight lines would contrast with the irregular forms of trees and ridgelines near the site from the foreground and middle ground views. Over time these slopes would erode and weather and the horizontal lines would become less discernable.

Relocation of the transmission lines could alter views to various levels depending upon the segment and potential viewers. Lighting would affect the night sky in the Project vicinity and would be noticeable due to the lack of lighting in the general area (existing sources of light outside the mine are from a few residences and the occasional vehicles passing through the area).

Reclamation activities would also produce visual effects that contrast with surrounding areas. These impacts would mostly be temporary until revegetation occurs but could produce strong contrasting elements in the viewscape. These temporary effects could be negligible to minor in intensity depending on the viewer and location.

Cultural Resources

The entire Area of Potential Effect (APE) has been inventoried for the presence of cultural resources. Two cultural resources were identified but were found as not eligible for the National Register of Historic Preservation (NRHP). Therefore, no historic properties (cultural sites eligible for the NRHP) have been identified in the cultural resources survey area. Under the Proposed Action and Alternative 1, no historic properties are within the areas of proposed disturbance. Neither the Proposed Action nor Alternative 1 would affect known historic properties.

Native American Concerns and Treaty Rights Resources

The Proposed Action and Alternative 1 would affect certain natural resources within the Project Area that are the subject of Shoshone-Bannock Tribal Treaty rights. There would be temporary impacts to the access of those resources. In consultations with the Shoshone-Bannock Tribes, they noted that any loss of Treaty Rights is significant to them and could potentially affect all tribal members.

The overall impact to Treaty Rights access from the Proposed Action and Alternative 1 would be local, short-term, and negligible (less than 0.1 percent of the CTNF). Neither would change the status of federal lands on the CTNF. There would be no impacts to Tribal sacred sites or prehistoric archaeological sites from the Proposed Action and Alternative 1. After reclamation, Tribal access would be restored as vegetation would be replanted, wildlife would return, and water would be usable. Unreclaimed areas on private land for the Proposed Action and Alternative 1 would not return to their original character.

Social and Economic Resources

From a socioeconomic perspective, the primary impact of the Proposed Action and Alternative 1 would be to extend the mine's operations for approximately three years past what is currently predicted. The Proposed Action and Alternative 1 would have essentially no impact other than to extend current conditions regarding land ownership, population and demographics, housing availability and pricing, local government finances and services including community services, employment, and wages and income. Overall, the impacts of the Proposed Action and Alternative 1 would be beneficial, short-term, and major.

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CHAPTER 1 INTRODUCTION, PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Impact Statement (EIS) is being prepared by the Bureau of Land Management (BLM), Pocatello Field Office, and the U.S. Forest Service (USFS), Caribou-Targhee National Forest (CTNF), in response to the proposed Mine and Reclamation Plan (M&RP) and lease modification for the Smoky Canyon Mine, East Smoky Panel (the Project). J.R. Simplot Company (Simplot) submitted the original M&RP in November 2013 (Simplot 2013) and an amendment to the M&RP in July 2015 (Simplot 2015). Simplot proposes: 1) development of federal mineral leases IDI-015259, IDI-026843, and IDI-012890 held by Simplot and, development and reclamation of an open pit phosphate mine and associated infrastructure on a combination of federal and split estate[1] lands; 2) modification of Lease IDI-015259 by adding 120 acres along the southwest side of the existing lease for mining-related disturbance; 3) development, construction, and reclamation of infrastructure including portions of transmission lines, access roads, and other miscellaneous disturbances off-lease on federal land administered by the USFS, requiring Special Use Authorizations (SUA); 4) an amendment to the Caribou National Forest (CNF) Revised Forest Plan (RFP) that would relocate a designated utility corridor south around the southern end of the proposed open pit in order to relocate an existing 115 kilovolt (kV) line; and 5) revising reclamation plans for Panel B to provide a complete backfill rather than the existing previously approved partial backfill. This would occur by backfilling with overburden from the East Smoky Panel and use of a store and release cover in place of the previously approved "cap" for coverage of seleniferous material. The general location of the Project is shown on **Figure 1.1-1**. The Project Area is generally defined as the geographic area that includes the proposed disturbance footprints of the Project.

1.1.1 Background

The existing Smoky Canyon mining and milling operations were authorized in 1982 by a mine plan approval issued by the BLM and SUAs issued by the USFS for off-lease activities, supported by the Smoky Canyon Mine Final EIS and Record of Decision (ROD). Mining operations began in Panel A in 1984 and have continued ever since with the mining of Panels A through G. As mining progressed through each mine panel, mine and reclamation operations were reviewed and the environmental effects assessed under the National Environmental Policy Act (NEPA). Supplemental M&RPs detailing the development and reclamation of each panel were approved with subsequent decisions made by the BLM for on-lease operations and by the USFS for operations conducted off lease.

A supplemental EIS was prepared in 2002 approving additional mining and expansion of Panels B and C, Panel B occurring within the northern portion and immediately adjacent to portions of the proposed Project Area. BLM and USFS completed an EIS for the Panels F and G Mine Plan

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[1] Split estate lands are those where the surface rights are in private or State of Idaho ownership and the mineral resources are owned and managed by the federal government. In this Project, the surface rights of split estate lands are owned by Simplot.

in 2007. BLM and USFS completed an EIS for the Panels F and G Lease and Mine Plan Modification Project in March 2015. Mining operations are complete in Panels A, C, D, and E and those areas are reclaimed. Mining continues in Panels B, F, and G with concurrent pit backfilling and reclamation.

1.1.2 About This Document

This document follows regulations promulgated by the Council on Environmental Quality (CEQ) for implementing the procedural provisions of the NEPA (40 Code of Federal Regulations (CFR) 1500-1508), regulations promulgated by the Department of the Interior (DOI) applicable to BLM for implementing the procedural provisions of the NEPA (43 CFR 46); regulations promulgated by USFS for implementing the procedural provisions of the NEPA (36 CFR 220); BLM's NEPA Handbook (H-1790-1), and the USFS Handbook of Environmental Policy and Procedures (FSH 1909.15).

Chapter 1 describes the purpose of and need for the proposed Project, the roles of the Agencies, provides a general history of the Smoky Canyon Mine, outlines public participation in the EIS process, and lists the issues and indicators generated by public participation in the Project scoping process.

Chapter 2 provides applicable background information on the Smoky Canyon Mine, including this Project; describes existing and proposed operations; and presents and compares alternatives to the Proposed Action.

Chapter 3 summarizes the affected environment that is associated with the Proposed Action and Alternatives.

Chapter 4 details the environmental consequences that are associated with the Proposed Action and Alternatives, and lists potential mitigation actions to reduce or minimize impacts.

Chapter 5 describes the potential cumulative impacts associated with the Proposed Action and Alternatives.

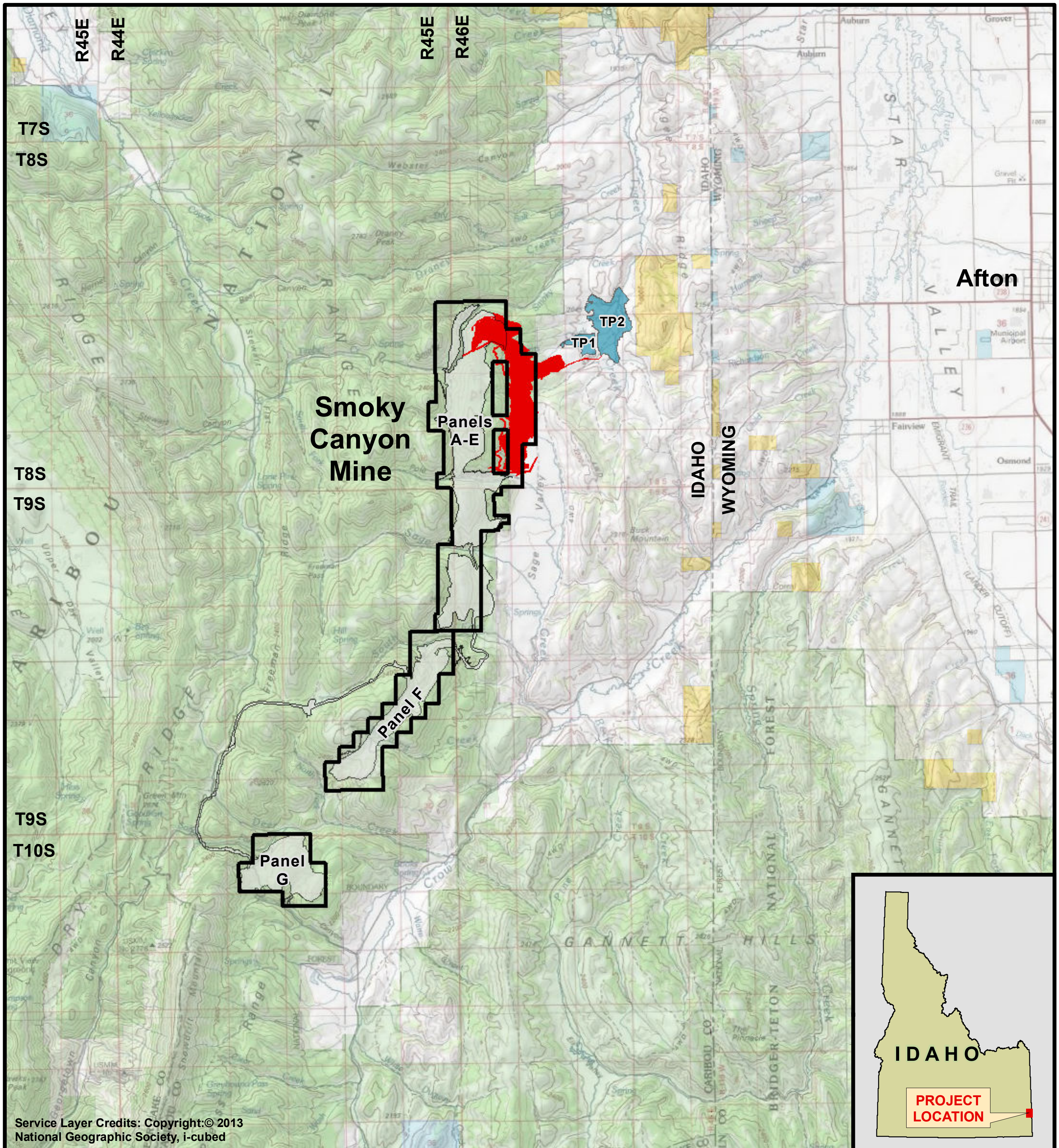
Chapter 6 describes consultation and coordination with state and federal agencies and provides a list of the EIS preparers.

Chapter 7 lists references cited in developing the EIS and provides the index, acronyms, units of measure, and glossary of terms.

1.2 LEAD AND COOPERATING AGENCIES

The BLM is required to evaluate mining proposals and issue decisions related to the phosphate leases, as directed by the Mineral Leasing Act of 1920. This includes ensuring economically viable development of the phosphate resources, in accordance with federal law and regulations governing federal leases, including the requirement for ultimate maximum recovery (43 CFR 3594.1), and allowing the lessee to exercise its right to develop the lease. Such is the case for consideration of whether to enlarge lease IDI-015259.

USFS authorization is required for operations related to the Project located outside of the phosphate lease boundaries on National Forest System (NFS) lands, such as portions of the haul roads, borrow areas, stormwater control features, and topsoil storage areas.



Legend

- Proposed East Smoky Panel Disturbance
- Smoky Canyon Mine Existing Leases
- Existing Mine Disturbance Boundary
- Existing Tailings and Diversion Ponds (TP)

Land Ownership

- BLM
- Private
- State
- USFS

N

Project Location: SE Idaho, T8S, R46E, Sec. 19-21 & 29-32

0 2.5 5 Miles

Note: Disturbance that would occur outside National Forest System Land (both on and off lease) would be on split estate land.

Figure 1.1-1
General Project Area
East Smoky Panel Mine EIS

The USFS must determine whether and how to authorize these operations. Because the on-lease operations would occur on NFS lands, the USFS is a joint lead agency in the analysis of potential effects to those lands. The BLM would consult with the USFS in completing the effects analysis for on-lease operations and ensure that any mining and reclamation operations approved for NFS lands would comply with the RFP.

Because of these agency-specific responsibilities, the BLM is the lead agency for this EIS and the USFS is the joint lead agency.

Cooperating agencies are those federal, state, or local agencies that have jurisdiction by law and or special expertise with respect to any environmental impact related to a proposal (40 CFR Section 1508.5). The Idaho Department of Environmental Quality (IDEQ) is charged with implementing certain environmental laws and regulations within the State of Idaho including the Idaho Environmental Protection and Health Act (EPHA), the Idaho Water Quality Act, and rules and standards including the Idaho Ground Water Quality Rule. In addition, the IDEQ has authority to implement portions of the Federal Water Pollution Control Act through the Idaho Water Quality Standards and Wastewater Treatment Requirements. The Idaho Department of Lands (IDL) is the State of Idaho's agency charged with regulating mine reclamation on all lands in the state, regardless of ownership. The Office of Energy and Mineral Resources (OEMR) has special expertise in coordinating comments amongst the various Idaho state agencies. Therefore, by a Memorandum of Understanding (MOU) signed by the BLM, USFS, IDEQ, OEMR, and IDL, the IDEQ, OEMR, and IDL are cooperating agencies for this EIS (BLM et al. 2014 and BLM and OEMR 2017).

Hereafter in this document the lead and cooperating agencies are referred to collectively as the "Agencies."

1.3 PURPOSE AND NEED

The purpose of the proposed federal actions for the BLM and USFS is to decide whether to approve, approve with modifications, or deny Simplot's proposed M&RP for the Project. Simplot proposed the M&RP for the Project to exercise their right to develop the federal mineral leases they hold. The lease modification would enlarge existing Lease IDI-015259 to encompass a portion of the proposed East Smoky Panel pit and associated disturbance, without which Simplot would be unable to maximize ore recovery in the East Smoky Panel. In addition, Simplot has proposed to deposit overburden from the East Smoky Panel in the Panel B pit area, which would minimize the seleniferous footprint of the mine by avoiding the creation of additional external overburden disposal areas, while continuing to meet reclamation goals to return the Panel B area to more natural contours.

The need for the proposed federal actions for the BLM and the USFS is to evaluate Simplot's proposal pursuant to applicable laws and regulations. The BLM is required to evaluate mining proposals and issue decisions related to the phosphate leases, as directed by the Mineral Leasing Act of 1920. This includes ensuring economically viable development of the phosphate resources, in accordance with federal law and regulations governing federal leases, including the requirement for ultimate maximum recovery (43 CFR 3594.1), and allowing the lessee to exercise its right to develop the lease. Such is the case for consideration of whether to enlarge lease IDI-015259. USFS authorization is required for operations related to the Project located outside of the phosphate lease boundaries on NFS lands, such as portions of the haul roads, borrow areas, stormwater control features, power line, and topsoil storage areas. The USFS must determine whether and how to authorize these operations. Since the on-lease operations would occur on NFS lands, the USFS is a joint lead agency in the analysis of potential effects to those lands, and the BLM has consulted with the USFS in completing the effects analysis for on-lease operations.

1.4 AUTHORIZING ACTIONS

1.4.1 Federal Decisions to be Made

The BLM and the USFS will make separate but coordinated decisions related to the proposed Project. The BLM will approve, approve with modifications, or deny the M&RP; and determine whether to modify lease IDI-015259. In addition, the BLM will decide whether or not to approve a modification to the existing B-Panel Mine Plan. These decisions will be based on the EIS, public and agency input on the EIS, and any recommendations the USFS may have regarding surface management of leased NFS lands. The USFS will make recommendations to the BLM concerning surface management and mitigation on leased lands within the CTNF. SUAs from the USFS would be necessary for any off-lease disturbances/structures located within the CTNF and associated with the Project (e.g., topsoil storage, borrow areas, stormwater control features, transmission line relocation, and the dewatering pipeline). All proposed SUAs for the Project are described in **Chapter 2**. A forest plan amendment by the USFS would be necessary to change the route of an existing utility corridor designated by the RFP in order to relocate the existing 115 kV power line contained within the rerouted corridor around the southern portion of the proposed pit.

1.4.2 Permits, Approvals, and Consultations

The existing and proposed mining operations must comply with laws and regulations for mining on public land. In addition to the BLM and USFS, other federal, state and local agencies have jurisdiction over certain aspects of the Project and any potential action alternatives. **Table 1.4-1** lists these agencies and identifies their respective authorization or oversight responsibilities.

Table 1.4-1 Agency Involvement and Potential Affirmative Actions Required for the Project

ACTION	NATURE OF ACTION	APPLICABLE PROJECT COMPONENT	ANTICIPATED RESOLUTION
BLM			
ROD	Compliance with NEPA	Activities affecting federal lands and resources	Required for final approval
M&RP Approval	Authority under the Mineral Leasing Act and compliance with 43 CFR 3590.2a, 3592.1a and applicable federal land use plans	Activities affecting federally leased mineral resources (IDI-015259, IDI-026843, and IDI-012890)	Pending after ROD on the final EIS
Lease Modification	Authorize expansion of existing lease boundaries in compliance with 43 CFR 3510	Expansion of existing federal phosphate lease IDI-015259	Pending after the ROD

ACTION	NATURE OF ACTION	APPLICABLE PROJECT COMPONENT	ANTICIPATED RESOLUTION
Government to government consultation with the Shoshone-Bannock Tribes	Consultation with the Fort Hall Council of the Shoshone-Bannock Tribes is required on land management activities and land allocations that could affect treaty rights	All Project components	Consultation with the Fort Hall Council of the Shoshone-Bannock Tribes as required by law will continue throughout the EIS process
Mineral Material Sale (noncompetitive)	Authority under the Materials Act and compliance with 43 CFR 3602.30 to 3602.34 and applicable federal land use plans	Activities affecting federal resources	Pending after the ROD
USFS			
Special Use Authorization	Surface disturbance on NFS lands off-lease	Disturbance of NFS lands outside existing mineral leases	Pending after the ROD
Mineral Materials Permit (Use Permit)	Removal of mineral materials such as GM, alluvium, colluvium, or aggregate from USFS managed lands for use on federal or state lands; 36 CFR Part 228, subpart C – Disposal of Mineral Materials	Removal of mineral materials such as GM, alluvium, colluvium, or aggregate from borrow areas on USFS managed lands for use on federal or state lands	Approval must be obtained before commencement of borrow of material from USFS managed lands Pending issuance of the USFS ROD
Mineral Materials Permit (Negotiated Sale Contract)	Removal of mineral materials such as topsoil, alluvium, colluvium, or aggregate from USFS managed lands for use private lands; 36 CFR Part 228, subpart C – Disposal of Mineral Materials	Removal of mineral materials such as topsoil, alluvium, colluvium, or aggregate from borrow areas on USFS managed lands for use on private lands	Approval must be obtained before commencement of borrow of material from USFS managed lands Pending issuance of the USFS ROD
USFS Recommendation to the BLM	Under the Mineral Leasing Act, on NFS lands the USFS makes recommendations to the BLM regarding mineral leasing and development activities on federal mineral leases with respect to compliance with the RFP and other forest management concerns (these recommendations do not constitute or imply a permit or USFS decision)	Lease modification and M&RP approval	Recommendations issued after availability period for final EIS

ACTION	NATURE OF ACTION	APPLICABLE PROJECT COMPONENT	ANTICIPATED RESOLUTION
Government to government consultation with the Shoshone-Bannock Tribes	Consultation with the Fort Hall Council of the Shoshone-Bannock Tribes is required on land management activities and land allocations that could affect treaty rights	All Project components	Consultation with the Fort Hall Council of the Shoshone-Bannock Tribes as required by law will continue throughout the EIS process
U.S. Environmental Protection Agency (EPA)			
National Pollution Discharge Elimination System (NPDES) Multi-Sector General Permit	Protects quality of surface waters from stormwater discharge under Clean Water Act	Storm Water Pollution Prevention Plan (SWPPP)	Annually renewable SWPPP to be updated, as applicable and needed, pending ROD
Spill Prevention Control and Countermeasures (SPCC) Plan	Provides management direction for potential spills	Bulk petroleum products storage	In place. Updated as needed for changes in operations
U.S. Fish and Wildlife Service (USFWS)			
Endangered Species Act Compliance (Section 7)	Protects threatened or endangered species	Any activity, such as displacement or habitat disturbance, potentially affecting listed or proposed threatened or endangered species	Biological Assessment (BA) will be prepared for the agency preferred alternative prior to the issuance of the ROD; consultation will take place with the USFS
Migratory Bird Treaty Act	Protects migratory birds	All surface disturbing activities	Analysis to be completed
Bald and Golden Eagle Protection Act	Protects bald and golden eagles	All surface disturbing activities	Analysis to be completed
U.S. Army Corps of Engineers (Corps)/Joint Application			
Permit to Discharge Dredged or Fill Material (Section 404 Permit)	Authorized placement of fill or dredged materials in Waters of the U.S. or adjacent wetlands Clean Water Act Compliance	Disturbances of waters of the U.S., including wetlands	Analysis to be completed and permit obtained if needed
IDEQ			
Air Quality Permit	Release of air pollutants in compliance with the existing Smoky Canyon Mine permit	Elements that contribute to air quality issues, such as blasting, hauling, or crushing	Required air approvals for existing property already in hand; further permit updates, as needed, pending ROD

ACTION	NATURE OF ACTION	APPLICABLE PROJECT COMPONENT	ANTICIPATED RESOLUTION
401 Certification	Water quality certification for NPDES permit and authorized placement of fill or dredged material in waters of the U.S. and/or wetlands	SWPPP and disturbances of waters of the U.S., including wetlands	Analysis to be completed
Ground water quality Point-of-Compliance Determination, as required by the Idaho Ground Water Quality Rule (at Idaho Administrative Procedures Act (IDAPA) 58.01.11.401)	Issuance of Point-of-Compliance determination, which will ensure no adverse impacts to ground water and interconnected surface waters outside the mine area	Mine pits and overburden/interburden storage areas	Simplot will apply to IDEQ, proposing points of compliance near to the mining area; IDEQ will evaluate hydrogeology, potential contaminants, and effect before issuing a point-of-compliance determination (IDEQ 2015a)
Resource Conservation and Recovery Act program (adopted federal standards)	Management of hazardous waste	Storage and off-site disposal of hazardous wastes	Exempt Small Quantity Generator Notification already completed
Idaho Department of Water Resources (IDWR)			
Water Monitoring Well(s) Drilling Permit	Construction Permit for Development of Monitoring Well(s)	Monitoring Well(s)	Permits would be obtained prior to construction of wells
Idaho Department of Lands (IDL)			
State Mine Reclamation Plan Approval	Plan approval	M&RPs	Required for all surface mining activities in Idaho. Issued after reclamation plan is coordinated with IDL and approved by BLM and USFS.
Idaho State Historic Preservation Office (SHPO)			
Section 106 Compliance	Protects cultural and historical resources under the National Historic Preservation Act	All ground disturbing activities	ISHPO concurrence needed and required prior to issuance of USFS and BLM RODs
Caribou County			
Conditional Use Permit	Approval of construction of facilities within an approved land use	General facilities	None anticipated

The U.S. Army Corps of Engineers (Corps) exerts regulatory jurisdiction over waters of the U.S., including wetlands, pursuant to Section 404 of the Clean Water Act (33 United States Code (U.S.C.) 1344). Section 404 of the Clean Water Act requires a Corps permit be obtained prior to discharging dredged or fill material into waters of the U.S., which includes most perennial and intermittent rivers and streams, natural and man-made lakes and ponds, irrigation and drainage canals and ditches that are tributaries to other waters, and wetlands.

The enforcement of federal laws that protect migratory birds and endangered species lies with the USFWS and not primarily with the land management agencies (BLM and USFS). The USFWS will review the BA for listed plant and animal species prepared by the USFS for the agency-preferred alternative. The USFWS will conduct consultations with the land management agencies as they deem necessary and provide direction as required for protection of species within their regulatory authority.

Simplot's existing and current EPA NPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity would be maintained and updated as needed.

1.5 RELATIONSHIP TO AGENCY AND OTHER POLICIES AND PLANS

1.5.1 Federal Land Management Plans

The Project has been reviewed for compliance with agency policies, plans, and programs. The BLM Record of Decision and Approved Pocatello Resource Area Resource Management Plan (ARMP; BLM 2012) states leasable minerals on the CNF will be managed consistent with the applicable Forest Plan. In addition, since the Project involves split-estate lands where private land overlies BLM managed federal mineral estate, the Project would need to be in compliance with Goal ME-2 of the BLM's ARMP which includes the following:

- any operations plan will be coordinated with the surface owner to mitigate impacts as practical and as required by established requirements;
- On split-estate lands, stipulations, mitigation, and reclamation requirements for mineral development operations will be the same as on public lands and/or equivalent to State standards; Mitigation prescribed for federal mineral development on split estate lands (sub-surface) will apply only to the development of the federal minerals and will not dictate the surface owner's management of their private lands. Mitigations will be applied as restrictions to only those surface activities conducted for purposes of developing federal mineral that are permitted, licensed, or otherwise approved by the BLM;
- Exceptions to surface development restrictions could be granted if requested or agreed to by the surface landowner; and,
- Applicable Idaho Standards for Rangeland Health (BLM 1997) will be employed to determine the success of reclamation, rehabilitation, or restoration activities following major surface disturbances on public lands.

Further, **Chapter 4** (**Appendix 4A**) provides Project compliance information for various resources relevant to ARMP Goals, Objectives, and Actions for split-estate lands.

<u>Conformance Language for the Greater Sage-grouse ARMPA</u>

The Record of Decision for the Idaho and Southwestern Montana Approved Resource Management Plan Amendment (ARMPA) was signed on September 21, 2015. The ARMPA amended all of the Land Use Plans within Idaho that have greater sage-grouse habitat and thus amends the ARMP. The ARMPA identifies and incorporates measures to conserve, enhance, and restore greater sage-grouse habitat by avoiding, minimizing, and compensating for unavoidable impacts of threats to greater sage-grouse habitat. The ARMPA addresses threats to greater sage-grouse and its habitat identified by the greater sage-grouse National Technical Team (NTT), by the USFWS in the March 2010 listing decision, as well as those threats described in the USFWS's 2013 COT report. The ARMPA establishes Objectives, Management Decisions, Buffers, and Required Design Features to protect and restore greater sage-grouse habitat. Idaho uses a conformance review form to document how each project proposal conforms to the ARMPA. However, for this Project, because there is no greater sage-grouse habitat within the Project Area, the conformance review form does not apply and the Project conforms to the ARMPA.

<u>CNF Revised Forest Plan</u>

The CNF RFP which guides land use developments and activities in the Project Area, recognizes phosphate mining as an appropriate use of NFS lands in this portion of the CNF.

As part of the RFP, management prescriptions have been developed and are applied to specific areas of the NFS lands to attain multiple-use and other goals and objectives. The Project Area includes the following management prescriptions: Prescription 2.8.3 – Aquatic Influence Zones, Prescription 5.2 (b) – Forest Vegetation Management, Prescription 8.1 (b) – Concentrated Development Areas, Prescription 8.2.1 – Inactive Phosphate Leases, and 8.2.2 (g) – Phosphate Mine Areas. (USFS 2003a). The majority of the Project Area is within the 8.2.1 Management Prescription. This management prescription area is shown on Map 11 of the RFP (USFS 2003b). It is basically a 0.5-mile buffer around Known Phosphate Lease Areas (KPLA) and inactive leases that existed at the time the RFP was prepared, and it was intended to include phosphate mining operations and ancillary facilities needed for development of mines within the 8.2.1 management prescription area. This same area is also covered by other management prescriptions discussed in the land use section of **Chapter 3**. Those are the prescriptions that guide USFS management until a site-specific, phosphate mine development plan is submitted to the USFS. Then the area of the specific mine plan is intended to only be managed under Prescription 8.2.2, Phosphate Mine Areas.

The management prescriptions are not designed to stand alone and are part of the management direction package presented in the RFP. Where a management prescription allows an activity, such as the development of existing phosphate leases, the standards and guidelines in the prescription in the Forest-wide direction (explained below) would provide specific parameters within which the activity must be managed. In land areas where prescriptions are applied, direction provided under each prescription would override Forest-wide direction if there were a conflict. Under Prescription 8.2.2 (USFS 2003a), site-specific mining and reclamation plans developed by the mining industry will be jointly reviewed and evaluated by the USFS, BLM, and other regulatory agencies with jurisdiction through the environmental analysis process. One of the goals of this prescription is to "[p]rovide for phosphate resource development with consideration given to biological, physical, social, and economic resources" (USFS 2003a).

The RFP also provides Forest-wide guidance for desired future conditions (DFCs) for each resource. From these DFCs, Forest-wide goals have been formulated, and, for some resources, objectives have been developed to help measure the progress in meeting these goals and achieving DFCs. Standards and guidelines, by resource, are presented in the RFP and are used to promote the achievement of the DFCs and to assure compliance with laws, regulations, executive orders, or policy direction established by the USFS. Disclosure of and compliance with these Forest-wide Standards and Guidelines and the applicable prescriptions listed above are discussed within this EIS in **Chapter 4** (**Appendix 4A**).

The approach for active phosphate leases in the RFP (USFS 2003a) is to incorporate best management practices (BMPs) into the conditions of approval for site-specific mining and reclamation plans, and to allow for developments in research and technology over time to be incorporated into the prescribed practices and monitoring systems. In addition, in order to relocate the existing 115 kV power line, which is currently within an existing utility corridor designated by the RFP, within a rerouted corridor around the southern portion of the proposed pit, an amendment to the RFP would be required.

1.5.2 Inventoried Roadless Areas Management on the CTNF

In August 2008, the Roadless Area Conservation, National Forest Lands in Idaho Final Environmental Impact Statement (FEIS; USFS 2008a) was issued, and the Final Rule and Record of Decision on Idaho Roadless Area Conservation were published in the Federal Register on October 16, 2008. The October 16, 2008 final Idaho Roadless Rule is currently the law of the land in Idaho. None of the proposed mining activities would be located within Inventoried Roadless Areas (IRAs); therefore, the Idaho Roadless Rule would not be a consideration for this Project.

1.5.3 Instruction Memorandum No 2018-093 Compensatory Mitigation

This policy provides guidance to the BLM relating to the imposition of offsite mitigation. Under limited circumstances, the agency will consider voluntary proposal for compensatory mitigation that are appropriately analyzed. In all instances BLM must refrain from authorizing any activity that causes unnecessary or undue degradation pursuant to FLPMA Section 302 (b). Preventing unnecessary or undue degradation does not mean preventing all adverse impacts upon the land. When BLM is considering compensatory mitigation as a component of the project submission BLM's NEPA analysis should evaluate the need for compensatory mitigation by both considering the effectiveness of the compensatory mitigation and comparing the proposal with and without off-site compensatory mitigation.

1.5.4 Instruction Memorandum No. ID-2013-040 Habitat Equivalency Analysis

Instruction Memorandum (IM) ID-2013-040 outlines the Idaho BLM guidance for appropriate use of Habitat Equivalency Analysis (HEA) as part of the impact analysis of phosphate mining project proposals within the context of NEPA documents. Using HEA as a tool will help the BLM achieve a better NEPA analysis.

The BLM will use HEA to inform its direct and indirect effects analysis and to compare alternatives within the area of impact. The use of the HEA will not be to exact mitigation.

1.6 PUBLIC SCOPING

The originally proposed East Smoky Panel M&RP was submitted to the BLM and CTNF in November 2013. The Notice of Intent (NOI) to prepare an EIS for the Project was published in the Federal Register on April 3, 2015. A copy of this NOI is included in the Public Scoping Summary Report, East Smoky Panel Project Environmental Impact Statement (Scoping Report; Stantec 2015a). Legal notices announcing the Agencies' request for public scoping comments for the Project were published in newspapers that serve communities near the Project location in Pocatello, Idaho and Afton, Wyoming on April 3 and April 8, 2015, respectively. A news release was submitted to approximately 40 television stations, radio stations, and newspapers on April 3, 2015 and Project information was posted on BLM and USFS planning websites (Stantec 2015a).

A public mailing list was compiled and 96 scoping letters were sent to federal, state, and local government agencies, groups, and members of the interested public. Three public scoping meetings were held: one at the Civic Center in Afton, Wyoming, on April 21, 2015; one at the Shoshone-Bannock Hotel Event Center in Fort Hall, Idaho, on April 22, 2015; and one at the BLM Pocatello Field Office in Pocatello, Idaho, on April 23, 2015. The open house style meetings provided a description of the Project, maps and photo displays of the Project Area, and a forum for exchange of information and ideas or concerns related to the Project. Comment forms were available at the meetings and agency, proponent, and consultant representatives were present to answer questions as needed.

Public comments regarding the Project were solicited and compiled in the Scoping Summary Report (Stantec 2015a) to help determine the issues and alternatives for evaluation in the environmental analysis. By the close of the scoping period on May 4, 2015, 9 comment letters had been received for the Project. Comments were submitted by agencies, entities, and interested citizens. A complete list and copies of all written comment letters, forms, and e-mails can be found in the Scoping Summary Report (Stantec 2015a). Preliminary concerns identified included potential effects of the Project to water resources and from selenium releases, but also included potential effects and or cumulative effects of the Project regarding air quality, climate change, human health and safety, socioeconomics, wildlife, reclamation and financial assurance, and mitigation and monitoring for mine operations. These are further discussed in **Section 1.8**.

1.7 TRIBAL TREATY RIGHTS AND NATIVE AMERICAN CONSULTATION

Federal agencies acknowledge the federal trust responsibility arising from Indian treaties, statutes, executive orders, and the historical relations between the United States and Indian tribes. The Shoshone-Bannock Tribes have ancestral Treaty Rights to uses of the CTNF. The relationship of the U.S. government with Native American tribes is based on legal agreements between sovereign nations. The Fort Bridger Treaty of July 3, 1868, granted hunting, fishing, and gathering rights to tribal members on “all unoccupied lands of the United States so long as game is present thereon.” This right applies to all public domain lands reserved for National Forest purposes that are presently administered by the CTNF. USFS managers have a responsibility to ensure consideration of those resources essential for the Tribes to exercise their treaty rights. Treaty rights are governed by the law of the United States as set forth by the U.S. Supreme Court. Consultation with the Fort Hall Business Council of the Shoshone-Bannock Tribes is required on land management activities and land allocations that could affect these rights. Concerns and objections that the Shoshone-Bannock Tribes have with this Project are discussed in this EIS, and revolve around impacts to their tribal treaty rights.

Applicable Forest-wide goals and standards of the USFS CNF RFP (USFS 2003a) regarding tribal coordination are listed below.

Forest-wide Goals:

- Tribal Treaty rights and other federal trust responsibilities are met and Tribal governments are involved in planning and implementation of programs of mutual interest.

- The Forest recognizes the tribes' right to self-determination and control of their resources and their relationship both among themselves and with non-Indian governments, organizations, and persons.
- Culturally significant items and sites are identified, protected, and treated within the context of the culture that identifies and values them.
- Relationships with American Indian populations are improved to better understand and integrate Tribal needs and desires with Forest management activities.

Forest-wide Standard: Forest consultation procedures and intergovernmental agreements with the tribes to guide future cooperative efforts shall comply with the protocols set forth in the National Resource Book on American Indian and Alaska Native Relations Working Draft 1995 or its successor (USFS 2003a, Caribou RFP 3-35).

Desired Future Conditions: Lands within the Forest serve to help sustain and provide opportunities for traditional American Indian land and resource uses. The opportunities help sustain the American Indians' way of life, cultural integrity, social cohesion, and economic wellbeing (USFS 2003a, Caribou RFP 3-35).

The ARMP (BLM 2012) and BLM policy acknowledge a relationship between the U.S. Government and American Indian tribes based on Indian trust responsibilities and other legal agreements such as treaties made between these sovereign nations. As a federal agency, the BLM shares in the federal trust responsibility to the Shoshone-Bannock Tribes on the management of federal lands. The federal trust responsibility is related to traditional/cultural uses, as well as the health of the land and water resources and therefore to the socio-economic needs of the Shoshone-Bannock Tribes. Consultation with the Shoshone-Bannock Tribal Council is required on land management activities and land allocations that could affect these rights. The goal of this coordination is to assure that tribal governments, Native American communities, and individuals whose interests might be affected have a sufficient opportunity for productive participation in BLM resource management decision making as set forth in the BLM Manual Section 8160.

The ARMP (BLM 2012) guides land management activities on public lands administered by the BLM. Land management decisions such as mineral leasing and mining need to recognize these rights and trust responsibilities. The BLM also administers the subsurface mineral estate, for phosphate and other leasable minerals, on the CTNF. The 1868 Fort Bridger Treaty reserves off reservation treaty rights to Tribal members. Provisions of the Fort Bridger Treaty reserve the Shoshone-Bannock people's rights to practice hunting, gathering, fishing, and traditional use on all unoccupied public lands. As these treaty rights are related to surface management, and not the mineral estate, the BLM relies on coordination with the USFS and compliance with the CNF RFP (USFS 2003a) to ensure sufficient protection of those resources to which the Shoshone-Bannock people have certain rights.

BLM and USFS staff met with Shoshone-Bannock Tribal staff on December 17, 2014 to provide descriptions of the Project and discuss items of concern. A certified letter was sent to the Tribe Business Council Chairman on March 31, 2015 to describe the Project and provide notice of the public meetings, one of which was held at the Shoshone-Bannock Hotel Event Center on April 22, 2015. Consultation with the Tribes will continue throughout the EIS process.

1.8 ISSUES AND INDICATORS

The issues to be evaluated in this EIS are derived from the Scoping Summary Report (Stantec 2015a). That document summarized the comments received during public scoping from agencies, groups, and the public, and organizes the comments into categories, which became the basis for defining issues.

Pursuant to CEQ NEPA regulations (40 CFR 1501.7), it is through the scoping process that the lead agency (a) determines the scope and significant issues to be analyzed in depth in the EIS and (b) identifies and eliminates from detailed study the issues that are not significant, narrowing the discussion of such issues to a brief presentation in the EIS as to why they will not have a significant effect on the human environment. In brief, the scoping comments must be reviewed to determine the significant issues in the context of NEPA and for preparing an EIS.

By the close of the scoping period on May 4, 2015, nine comment letters had been received. Copies of all written comment letters are included in Scoping Report (Stantec 2015a).

Within the nine comment letters, a total of 156 concerns were identified. Contained within those concerns, issues were identified and categorized into resource categories. The defined issues are presented under components of the human and natural environment that are customarily addressed in impact analysis. The indicators are typically the quantifiable criteria that are used to judge the significance of the impact, although some issues rely on a discussion of effects for comparison purposes or an evaluation of the impact instead of a quantifiable indicator. Indicators are based on regulatory requirements, baseline data, trends, and best management technology and typically only apply to impacted resources discussed and analyzed in **Chapter 4**.

In addition to the comments received from the external scoping process, internal (Agencies) scoping identified either similar issues or additional issues covered in this EIS.

Resource issues derived from concerns raised and identified during scoping and their associated indicators are summarized in **Table 1.8-1**. The table also identifies in which section of the EIS the issue is addressed. A complete summary of concerns identified during scoping, including those concerns that may not be specifically addressed in this EIS, is provided in the Scoping Summary Report (Stantec 2015a). The issues included in **Table 1.8-1** are issues that relate to environmental impacts to resources. Many of the concerns brought forward through scoping are not included in the table because they deal with disclosure, policies, procedures, or other processes that the Agencies are required to follow. Those scoping concerns are important and will be addressed in the EIS, the ROD, or supporting documentation.

Table 1.8-1 Issues and Indicators Derived from Scoping

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Air Quality and Climate Change	The Project has the potential for emission of air pollutants including those associated with airborne particulate matter from mining activities and exhaust emissions from haul trucks and other mining equipment. The Project has the potential to increase emissions from construction and operation and release greenhouse gas (GHG) emissions including CO_2, N_2O, and CH_4 from proposed mining activities.	Increase in emissions of air pollutants including fugitive dust (airborne particulate matter) from proposed mining activities and exhaust emissions from haul trucks and other mining equipment. Increase in emissions of GHG including carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) from proposed mining activities.	Chapter 4 – Air Resources
Cultural Resources	Cultural resources may be impacted by the Project.	Number of historic properties (cultural sites eligible for the National Register of Historic Places [NRHP]) impacted by the Project.	Chapters 3 and 4 – Cultural Resources
Fisheries and Aquatics	The Project may affect cutthroat trout, other native fish, amphibians, fisheries resources, or aquatic resources in the Project Area due to habitat alterations.	The length of intermittent and perennial stream channels directly affected by the Project, and comparison with the undisturbed lengths of these stream channels in the Project Area. Acres of aquatic influence zone (AIZ) habitat to be affected and comparison with undisturbed acreage of this habitat in the Project Area. Quantities of suspended sediment, selenium, and other heavy metals and other contaminants of concern resulting from the Project in fishery resources in the area, with emphasis on compliance with applicable aquatic life water quality standards.	Chapters 3 and 4 – Fisheries and Aquatics
Geology and Geochemistry	Physical and chemical characterization of ore and solid wastes and wastewater should be determined to provide projections and potential impacts of wastewater and solid wastes from the Project.	Estimates of waste rock and ore volumes generated from the Project and the chemical characterization.	Chapters 2 and 4 – Geology, Minerals, and Paleontology

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Grazing	The Project may result in impacts to grazing in the Study Area.	Acres of suitable livestock foraging areas to be disturbed and the length of time livestock would be excluded from the mining areas, and comparison with undisturbed acres of grazing allotments in the Project Area. Changes in vegetation or forage value as a result of the reclamation mix.	Chapter 4 – Land Use and Transportation
Hazardous Materials	Potential for spills due to transporting, containing and cleaning up fuels, solvents, lubricants, hazardous materials, explosives, and human waste.	Compliance with appropriate local, state, and federal standards for handling of fuels, hazardous materials, and solid wastes	Chapter 2 – Section 2.3 Existing Operations
Land Use and Transportation	There are potential adverse impacts to private property owners in the region. The Project may cause changes to the USFS road network in and around the Project Area, from Off-Highway Vehicle (OHV) and All-Terrain Vehicle (ATV) use and mining activities.	Changes in access to private property. Increase/decrease in traffic. Relative increase in traffic on public roads in the Project Area as a result of proposed mining activities, change in traffic types, and road design features to deal with this. Changes in existing primary access to and through the CTNF on county or open USFS roads caused by the Project-related activities, including access to private lands (number of private landowners impacted).	Chapter 4 – Land Use and Transportation Chapter 4 – Land Use and Transportation Chapter 4 – Land Use and Transportation
Noise	Noise impacts from mine operations, mine traffic on haul roads, and traffic on access roads may affect Project Area residents and wildlife.	Estimated noise levels (decibels) from mining operations, haul truck traffic related to mining, and access road traffic and proximity to sensitive receptors.	Chapters 3 and 4 – Noise

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Recreation	Recreational use and public access to the Project Area may be limited or prevented by mining activities.	Acres of and number of recreational access points temporarily closed and/or blocked to public use. Locations of primary access roads blocked or closed by the Project. Changes in the quality of recreational use of the area including fishing, hiking, riding, wildlife viewing, and hunting.	Chapter 4 – Land Use and Transportation
	Impacts may occur from OHV and ATV use on reclaimed and closed roads.	Predicted use of recreational vehicles on reclaimed area or roads with consideration of methods used to prevent OHV and ATV use.	Chapter 3 – Land Use, Transportation, and Special Designations
Water (Selenium)	Impacts may occur from further deposition of selenium into the environment and the effectiveness of mitigation measures needs to be disclosed, plus the cumulative effects of the proposed operation, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) related removal and remediation components, and with other phosphate mines in the region, needs to be evaluated.	Predicted changes in water quantity and quality based on water and contaminant transport modeling within the Project Area and within the Cumulative Effects Areas (CEAs).	Chapter 4 and 5 – Water Resources
	Impacts may occur from the potential for increased selenium rich runoff from all aspects of the site – roads, stockpile areas, and active and reclaimed surfaces.	Predicted changes in water quantity and quality based on water and contaminant transport modeling.	Chapter 4 – Water Resources

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Socioeconomics	Potential for closure of the mine and effects on the local economy of affected communities should be evaluated.	Numbers of employees, contractors, and their dependents that could be affected by potential mine and fertilizer plant closure and loss of personal/public income. Estimated economic and social impacts of the Proposed Action, Action Alternatives, and No Action Alternative.	Chapters 3 and 4 – Social and Economic Resources
	Efficient recovery of the phosphate resource should be discussed.	Phosphate resource (tons) that would not be recovered under the No Action Alternative.	Chapters 3 and 4 – Social and Economic Resources
Soils	Soil quantity may be insufficient for reclamation plans.	Estimated volumes of stockpiled and direct placed soil.	Chapters 3 and 4 – Soils
Threatened, Endangered, Candidate, and Sensitive Species	Short and long-term impacts to threatened and endangered (T&E) wildlife species and their habitat, candidate T&E species and their habitat, species of special concern and their habitat, and migratory birds and their nesting sites could occur.	Disruption of movement corridors between habitat areas. Disruption and displacement of threatened, endangered, or sensitive species at lek, nest, or roost sites. Disturbance to threatened, endangered, or sensitive species from noise and mining activity. Mortality of threatened, endangered, and sensitive species through vehicle and power line collisions. Presence/lack of presence of species in the Project Area.	Chapter 4 – Wildlife Resources Chapter 5 – Wildlife Resources

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Vegetation and Noxious Weeds	The mining operations and related transportation activities may affect vegetation patterns and productivity in the Project Area.	Acres of vegetation communities that would be disturbed by the Project and also potentially subjected to an increase in weed invasion. Acres of disturbed areas that are planned for reclamation and the types of vegetation that would be restored. Acres of permanent vegetation conversion from forest to non-forest cover and predicted re-growth rate back to forest conditions. Discount service acre years (DSAYs) lost through the Proposed Action and Action Alternative.	Chapter 3 – Vegetation and Wetlands Chapter 4 – Vegetation and Wetlands
Visual Resources	Visual impacts of the Project should be disclosed.	Estimated compliance with the Visual Quality Objectives in the USFS Visual Management System. Change in scenery, from baseline to projected, from various public and occupied points within the Study Area.	Chapter 4 – Visual Resources
Water	The mining operations and related transportation activities may cause changes to the quantity and quality of surface water or groundwater in the Project Area and within the affected watershed area.	Current status of groundwater and surface water quantity and quality in the Project Area. Acreage and percentage of hydrologic disturbance within the affected watershed. Predicted changes to quantity and quality of groundwater and surface water from the Project. Predicted performance of cover systems and resulting impacts to water quality and quantity.	Chapters 3 and 4 – Water Resources

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Water continued	The EIS should identify fault lines that influence the production of natural springs, the water resources of the area, and the supporting hydrology to fully assess the potential impacts of the Project on the adjacent springs and streams as well as groundwater recharge.	Identification of springs and streams that would be impacted by the Project. Predicted changes to the quantity and quality to springs and streams.	Chapter 4 – Water Resources
	The Project may result in water rights being obtained and impacted and potential water diversions.	Water rights are described and compliance of the Project with rights determined. Analysis of impacts from any water diversion. Estimated flows at key locations.	Chapter 3 – Water Resources Chapter 4 – Water Resources
	The Project may result in: (1) changes in the volume and timing in surface runoff water caused by the operations; (2) increases in suspended selenium, temperature, sediment, turbidity, and contaminants of concern in downgradient streams, ponds, and other surface waters, with regards to applicable surface water quality standards; (3) reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping water supply well (s).	Changes in the volume and timing in surface water runoff caused by the Project. Increases in suspended sediment, turbidity, and contaminants of concern in downgradient streams, ponds, and other surface waters, with regards to applicable surface water quality standards. Reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping of any water supply well(s). Project-related impacts affecting the 303(d) listing and Total Maximum Daily Loads (TMDLs).	Chapters 3 and 4 – Water Resources
Water and Wetlands	Construction of mine facilities and other surface disturbances may directly affect wetlands and Waters of the U.S. (WOUS) and could include increased metal and sediment loading in surface waters and/or changes in water quantity/quality in both surface waters and groundwater supporting WOUS.	Wetland acres and/or length of jurisdictional channels that would be disturbed by the Project. WOUS crossings caused by the Project and associated new transportation corridors. Change in function and value of all wetlands disturbed by the Project.	Chapter 3 – Vegetation and Wetlands

RESOURCE	ISSUES	INDICATORS	WHERE ADDRESSED IN EIS
Wildlife	The mining operations and related transportation facilities may physically affect terrestrial wildlife and significant wildlife corridors, through direct disturbance and fragmentation of their habitat, as well as reduction in amounts and quality of available water.	Acres of different wildlife habitats physically disturbed over the life of Project. Acres of disturbance to and the proximity of Project operations to high value habitats such as: crucial and or high value big game ranges, significant migration corridors, wetlands, and seep and spring areas. DSAYs lost through the Proposed Action and Action Alternative.	Chapter 3 – Wildlife Resources Chapter 4 – Wildlife Resources
	Exposure of wildlife to selenium or other harmful contaminants.	Acres of habitat disturbance in the Project Area. Reclamation efforts to prevent uptake of selenium in vegetation. BMPs or mitigation measures to prevent exposure and bioaccumulation.	Chapters 3 and 4 – Vegetation and Wildlife Resources
Wildlife, Vegetation, and Water	Cumulative impacts should consider, (1) large scale conversion of many miles of more or less contiguous bands of partial woodlands and sage scrub to pits, rock faces and meadows, and what effect that will have on the environment; and (2) the impacts to surface and groundwater within the larger spatial and temporal context of past, present, and likely future mines in this area; (3) potential impacts to natural resources due to potential foreseeable actions (e.g. expansion of mine on private land or other ground disturbing action that could natural resources) regardless of what agency (federal or non-federal) undertakes the action (40 CPR§ 1508.7); and (4) removing sources of contamination.	Cumulative impacts analysis evaluates the disturbance associated with the Project in conjunction with other disturbances in the CEA and anticipated future impacts in the CEA, by resource.	Chapter 5 – Wildlife Resources, Vegetation and Wetlands, and Water Resources

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

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CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter provides background information on Simplot's existing operations at the Smoky Canyon Mine, along with detailed descriptions of Simplot's Proposed Action, one action alternative, alternatives that were considered and/or eliminated from detailed analysis, the No Action Alternative, and the Agency Preferred Alternative. The Agency Preferred Alternative was identified by the Agencies after comparing predicted environmental impacts associated with the Proposed Action, Alternative 1, and the No Action Alternative.

2.2 MINE HISTORY

2.2.1 Background

Simplot has been involved in phosphate mining in Southeastern Idaho since 1945. As described in **Section 1.1.1**, Simplot began extracting phosphate ore from deposits located on federal land at its Smoky Canyon Mine in eastern Caribou County, Idaho in 1984. The operation has included mining with standard open pit techniques in mine panels (Panels A through G) and then concentrating the phosphate content of the ore in an onsite mill. The concentrate is pumped through a buried pipeline to Simplot's existing fertilizer manufacturing plant (Don Plant) in Pocatello, Idaho. Tailings from the Smoky Canyon milling operation are disposed in two on-site permitted tailings disposal ponds located on private land owned by Simplot.

2.2.2 Past Environmental Impact Reviews

There have been a number of environmental reviews conducted under NEPA for the Smoky Canyon Mine property and operations.

The first EIS for the Smoky Canyon Mine was prepared in 1981 by the U.S. Geological Survey (USGS), then in charge of administering phosphate mining on federal lands, in conjunction with the USFS. This initial EIS was followed by numerous NEPA documents examining the environmental impacts of various components and expansions of the mine. Ultimately, mining of Panels A through E was authorized.

Leasing, lease modifications, and exploration activities in Panels F and G (also known as the Manning Creek and Deer Creek lease areas) were analyzed between 1994 and 2007 through several Environmental Assessments and EIS documents, including an EIS for the Panels F and G Mine Plan in 2007. The mining of Panels F and G was authorized by the 2008 RODs issued by BLM and USFS upon the completion of the 2007 FEIS. Most recently, lease and mine plan modifications for Panels F and G proposed by Simplot were evaluated in an EIS issued in 2014. RODs for the lease and mine plan modifications were issued in 2015.

Relative to the Project, the Agencies prepared a Supplemental EIS for Panels B and C of the Smoky Canyon Mine, published in 2002, with the ROD also issued in 2002. The decisions in the ROD provided for development of the Panels B and C pits and disturbing approximately 274 acres. Upon completion of mining, the Panel B pit was to be backfilled with overburden to produce a topographic condition similar to natural conditions. A portion of the highwall approximately 2,800 feet long with a maximum height of 250 feet was to remain after reclamation at the northeast edge of the pit, facing southwest (BLM and USFS 2002a).

In 2007, documentation of Land Use Plan Conformance and a Determination of NEPA Adequacy was prepared and a modification was approved to address a request by Simplot to extend Panel B to allow additional ore recovery, increase reclamation slopes by approximately 7.5 acres at steeper than 3 horizontal to 1 vertical (3H:1V) to reduce the amount of surface water that may percolate into backfill that may affect groundwater quality, and reduce the chert cover thickness from 8 feet to 4 feet to better schedule use of available chert (BLM 2007a).

An additional Determination of NEPA Adequacy was also prepared in 2008 to address a minor modification to the existing Smoky Canyon Mine M&RP, which included relocation of the Panel B Runoff Recharge Area (RRA) to the northwest portion of the panel; modification of the design of the Panel B reclamation surface to deliver clean water to the proposed RRA; and an increase in disturbance from the Panel B in-pit road by seven acres (BLM 2008a).

In 2010, an Environmental Assessment was prepared (BLM 2010a) and a Finding of No Significant Impact (BLM 2010b) documented the decision of the BLM (BLM 2010b) authorizing expansion of the Panel B pit on the northeast end by 18 acres, an increase in the amount of seleniferous overburden backfilled into the pit, and a reduction in the seleniferous footprint of the approved Panel B external overburden fill by 20 acres. The modification area was to be completely backfilled and reclaimed according to the provisions of the Supplemental EIS as previously described.

In 2015, the BLM issued a Categorical Exclusion allowing for an additional 3.4 acres of disturbance within Lease IDI-012890 to stabilize the Panel B footwall to prevent footwall failure. The additional disturbance was estimated to generate an additional 1.7 million bank cubic yards (BCY) of non-seleniferous overburden; would not increase the seleniferous footprint of the mine; or result in measurable change to the final mine configuration (BLM 2015a).

2.2.3 CERCLA Studies and Remediation

CERCLA, enacted by Congress in 1980 and amended in 1986, was enacted to respond to pollution and the threats posed to human health and the environment resulting from the release, or imminent threat of a release, of hazardous substances. CERCLA provides that the parties responsible for the pollution pay the costs to investigate and remediate contaminated sites.

Beginning in 1996, livestock deaths associated with selenium poisoning were identified at a phosphate mine other than the Smoky Canyon Mine in Southeastern Idaho. The livestock deaths associated with selenium poisoning prompted response by the regulatory agencies, the phosphate mining members of the Idaho Mining Association, tribal agencies, and other stakeholders. In 2000, many of these parties entered into an Area-Wide Administrative Order on Consent (AOC) to further evaluate and address area-wide and site-specific human health and ecological risks related to past phosphate mining in Southeastern Idaho. Signatory agencies involved in the Area-Wide AOC include IDEQ, BLM, USFS, EPA, and Bureau of Indian Affairs (BIA). This agreement also included a process for separate AOCs at specific mining properties that would describe the approach to conducting site investigations (SIs) and Engineering Evaluations/Cost Analyses (EE/CAs) that would lead to removal actions necessary for remediation of environmental contamination from existing mining disturbances.

Concentrations of selenium in water sources in the vicinity of the Smoky Canyon Mine began increasing in 1995, and this upward trend continued at some sites for more than a decade. In 2003, Simplot entered into AOCs for the Smoky Canyon Mine with federal and state agencies. The subsequent SI, completed under the 2003 AOC, determined that selenium and other hazardous substances are being released from the site into the environment. The SI found that rock mined as overburden provided the sources for releases. Most of the mine facilities were constructed prior to the discovery of selenium releases. Since discovery, mining companies and the regulatory oversight agencies have worked to understand release mechanisms and to develop best management practices to prevent releases.

The 2003 AOC divided the Smoky Canyon Mine area into two parcels, known as Area A and Area B. Area A included historically mined areas and related facilities located on NFS land under lease and special use permit, which includes Panels A, B, C, D, and E. Area B included the tailings ponds and surroundings and also overlaps the East Smoky Panel Mine disturbance area. The AOC required that Simplot conduct a SI and EE/CA in Area A; this was completed in May 2006. For Area B, it required Simplot to conduct environmental investigations and an ecological risk assessment.

The Agencies continue to work with Simplot to remediate selenium issues at the Smoky Canyon Mine. The SI and EE/CA findings resulted in the Pole Canyon overburden disposal area (ODA) Removal Action (RA), which was accomplished in 2008 and a follow-up RA in 2015/2016. The Pole Canyon ODA is located south of the East Smoky Panel Mine area. Moving from the RA phase to the CERCLA remedial response phase of the project, the Smoky Canyon Mine entered into an Administrative Settlement Agreement and Order on Consent/Consent Order for a Remedial Investigation/Feasibility Study (RI/FS) with the USFS, IDEQ, and EPA in 2009. The RI/FS was conducted for Area A, with sampling of various media occurring between 2010 and 2013. Pilot studies for selenium treatment were also begun at the Hoopes Springs area south of the East Smoky Panel Mine area and are ongoing. The final RI report was completed in 2014 (Formation Environmental 2014). The USFS is currently underway and will analyze potential response actions at the Smoky Canyon Mine. The selected remedial action will be documented in a CERCLA Record of Decision.

The potential relationship between the Project and these future remediation projects will be determined through ongoing studies and analysis in conjunction with groundwater and geochemical predictions made as part of this EIS. In turn, baseline studies (e.g., ground water, surface water, etc.) conducted for this EIS may provide supporting information to the ongoing CERCLA process. For example, two wells (GW-29 and GW-30) that were drilled and developed within the East Smoky Panel Mine area for baseline sampling were constructed to meet CERCLA standards to facilitate this dual use.

2.3 EXISTING OPERATIONS

2.3.1 General Location

Figure 1.1-1 shows the Project location and land ownership in and around the Smoky Canyon Mine. The Smoky Canyon Mine is located in Caribou County, Idaho approximately 10 air miles west of Afton, Wyoming on the east slope of the Webster Range between Smoky Canyon to the north and South Fork Sage Creek to the south. Access to the mine is gained by traveling west on state Highway 238/Nield Avenue from Afton approximately 3 miles, then continuing north about

4 miles toward Auburn to the intersection with the Stump-Tygee Creek Road, then approximately 8 miles south and west to Smoky Canyon.

Overall, the existing operations extend along an axis approximately 10.5 miles north to south/southwest on the east flank of the Webster Range. Elevations in the Smoky Canyon Mine area range from about 6,600 feet above mean sea level (AMSL) at the tailing pond area to about 8,300 feet AMSL along the ridge of unnamed peaks immediately west of the mine.

2.3.2 Land Ownership and Currently Approved Disturbance

The existing mining and milling operations are contained within a combination of federal phosphate mineral leases administered by the Pocatello Field Office of the BLM and SUAs administered by the CTNF. Existing mining operations are located on Federal Phosphate Leases IDI-012890, IDI-026843, IDI-027801, IDI-015259, IDI-27512, IDI-01441, and IDI-30369. The federal land surface is administered by the CTNF, Soda Springs and Montpelier Ranger Districts. Total currently approved disturbance at the Smoky Canyon Mine totals approximately 4,000 acres.

2.3.3 Facilities Descriptions and Locations

The existing mine and mill operations consist of mine Panels A through G plus the mill/shop facilities and tailings ponds. **Figure 2.3-1** shows the existing facilities and the tailings ponds in relationship to the Project Area.

The mill and administrative and maintenance facilities are located in Smoky Canyon near the northern end of the mining operations. Mine Panel A is immediately east of the mill. Panels B and C are located north of the mill, and Panels D, E, F, and G are toward the south.

Existing facilities at the Smoky Canyon Mine include an access road, office/shop complex, security office, mill, ore stockpiles, open pits, backfilled pits, external ODAs, industrial and culinary well, tailings ponds, power lines, tailings pipelines, concentrate slurry pipeline, and ancillary facilities such as runoff control ditches and ponds, storage yards, and "Hot Start" (mine equipment fueling, fuel storage, and parking) areas (**Figure 2.3-1**). In addition, a portable crusher is currently permitted for the Smoky Canyon Mine, and would continue to be used as necessary. A pug mill utilized for mixing Dinwoody Formation material and bentonite is also permitted for use at the site. These facilities would continue to be used during the mining activities described as part of the Proposed Action (**Section 2.4**). Detailed descriptions of the major facilities are as follows:

Security Office: Security staff provides around the clock (24 hours per day/7 days a week) coverage of the mine facility. Along with security personnel, this facility houses a conference room, offices, bathroom facilities, and employee lockers.

Office, Warehouse, Maintenance Shop: The office/shop complex consists of a combination shop and office building. This building contains the office, warehouse, and repair shop facilities. Employee parking, truck wash bay, tire shop, mill, and emergency generators are also located at the office/shop complex. The offices accommodate mine management personnel and warehouse/purchasing personnel, and are located upstairs above the shop and adjacent to the warehouse. The maintenance shop accommodates the maintenance staff that work on company mobile equipment.

Mill: The mill is housed in the same building where raw phosphate ore is fed from the outside via front-end loaders. The ore is milled into a fine powder/slurry with water through crushing and grinding operations. The phosphate-containing minerals are beneficiated (separated) from the rest of the rock and then are pumped through the concentrate slurry pipeline to the Don Plant in Pocatello for further processing. The tailings slurry (beneficiation waste) from the mill is gravity fed through the pipeline to the tailings ponds for disposal.

Wash-bay: This area is used for steam washing of company mobile equipment. An oil-water separator system for used-oil recovery is connected to the wash bay.

Fuel/Used Oil Containment Area: South of the wash bay building and east of the mill (in the yard), are aboveground storage tanks for anti-freeze, diesel fuel (low-sulfur), gasoline (lead-free), used oil, and used anti-freeze. These tanks are located within secondary containment bermed areas lined either with concrete (used oil and antifreeze), or polyethylene (diesel fuel and gasoline). An SPCC Plan is in place.

Tailings Thickener: Once the ore is beneficiated, the non-ore rock slurry is piped to a thickener, located 0.25-mile north of the mill, and sent in a pipeline to the tailings ponds. Water is then recirculated back to the mill via underground return pipelines.

Industrial Well: The industrial well provides fresh water for the mill operations and is located approximately 0.75-mile north of the shop, near Smoky Creek.

Culinary Well: The Smoky Canyon Mine's potable water source is supplied by a culinary well completed in the Dinwoody Formation located in the southeast quarter of Section 18 on the north side of the USFS road.

Hot Starts: The "Hot Starts" is the name given to the staging area for the mobile equipment used in the mining operations. Service islands for maintenance and fueling of a number of vehicles simultaneously, lubing services, and fuel/lube oil tanks (all tanks are protected in a containment area lined with a polyethylene liner) are located here. The Hot Starts are located near the actual mining area for convenience and accessibility. The Hot Starts area is relocated, as needed, to adjust to the mine area location.

Tailings Ponds No. 1 and No. 2: Located approximately 3.2 air miles northeast of the mill area in the Tygee Creek drainage, this area consists of two tailings ponds with associated delivery lines, return lines, and pump houses.

Bone Yard: This is a temporary storage area for large reusable mining equipment, parts, and recyclable materials. Some material located here can be reused in the mining operation. This is not a fixed facility.

Ammonium Nitrate/Fuel Oil (ANFO) Storage: This is a staging area for blasting materials (kept separate from the explosives magazines for safety reasons). Ammonium nitrate and emulsion are stored separately, in above ground storage tanks in this area. Ammonium nitrate is not explosive until mixed with the fuel oil. The materials are only mixed when pumped directly into the blast holes. This area is a completely fenced, secured area under video surveillance and equipped with motion detectors. These surveillance videos are archived for a set amount of time as well. This area is capable of being monitored 24-hours a day through the onsite security office.

2.3.4 Existing Operations

Current mining operations are occurring at Panels B, F, and G; past mining has occurred at Panels A, C, D, and E. Each panel consists of one or more open pits and associated external overburden disposal sites. Mining at Smoky Canyon began with Panel A and proceeded southward through Panels D and E. As mining progressed southward along the strike of the deposit, the mined out pits have been backfilled with overburden. Panels A, C, D, and E have been fully reclaimed and portions of Panel B have also been reclaimed, with concurrent reclamation being implemented at the actively mined panels.

Mining at the Smoky Canyon Mine occurs along a southward trending phosphate deposit that dips to the west. Strip mining of this deposit continues down-dip until overburden stripping ratios hinder economic operations. As mining has progressed southward along the strike of the deposit, the mined out pits have largely been backfilled with overburden. Excess overburden has been disposed of in external ODAs. Inactive areas of the external ODAs and backfilled pits have been reclaimed with vegetation as approved by the regulatory agencies.

Current operations at the Smoky Canyon Mine include drilling, blasting, loading, and hauling of ore and overburden using a shovel and truck fleet and mining in the active panels is expected to continue up to potentially another ten to fifteen years.

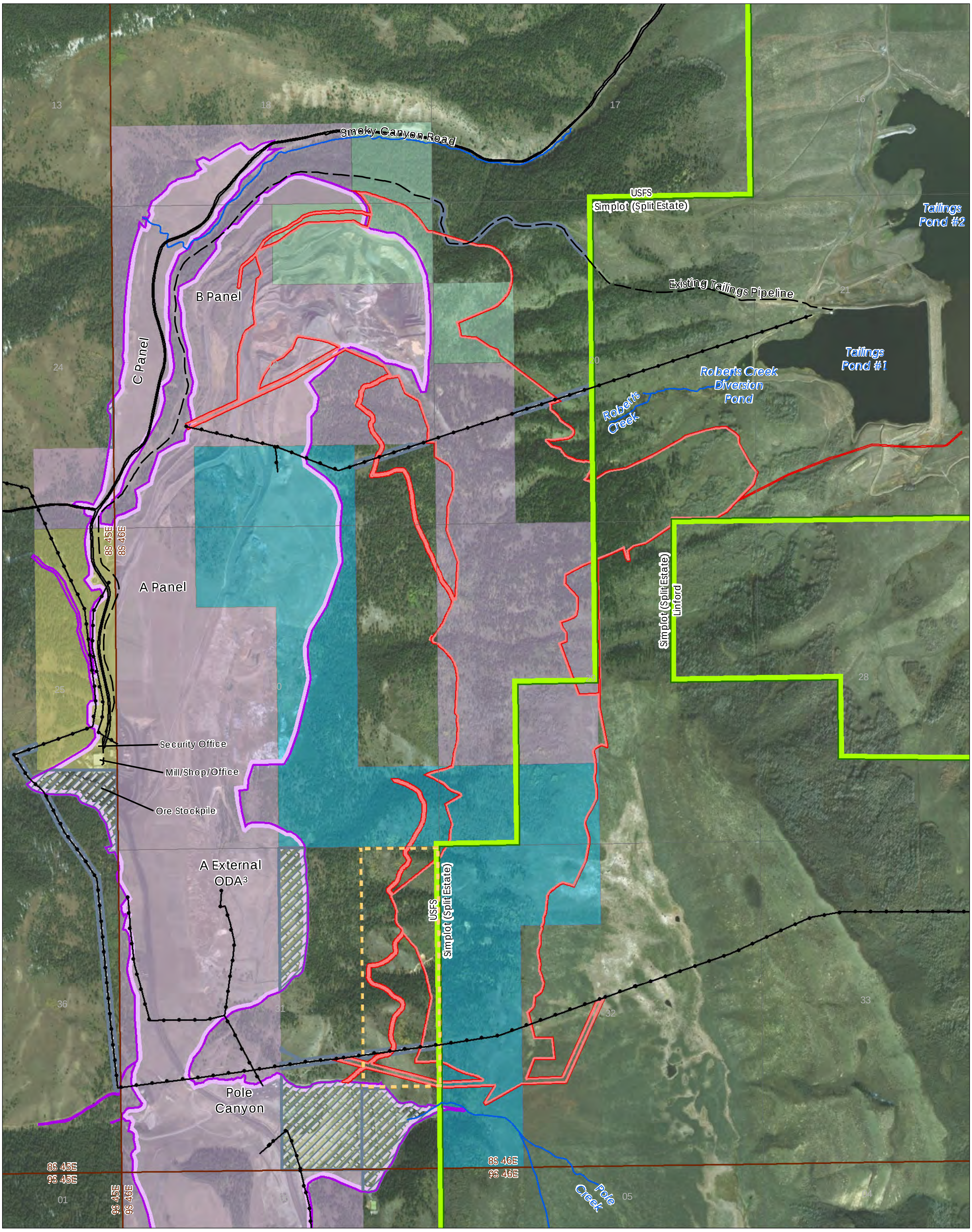
The following description of mining operations applies to the existing operations. Thus, because the Project Area would be an extension of the existing mining operations, the following description of mining operations also applies to the Project.

The mine is operated 24-hours per day throughout the year with crews working overlapping shifts. Hard rock overburden is drilled with blast hole drills. Each blast hole is loaded with a mixture of ANFO. The loaded blast holes are typically detonated 3 to 4 days a week. On average, 400 blast holes are detonated per week. Softer overburden is ripped with dozers. A number of 15- to 27-cubic-yard diesel-powered hydraulic shovels are used to load ore and overburden into off-road type haul trucks.

Ore and overburden are loaded into 150-ton rear dump haul trucks. Depending on the concentration of phosphate mineral in the rock, the trucks deliver the material to one of the mill ore stockpiles, external overburden disposal areas, or previously mined pits as backfill. Water trucks are used to water haul roads, ancillary roads, and the active pit floors to control dust. Roads are also maintained with motor graders. Other equipment used in the operation includes: pickup trucks, vans, service trucks, maintenance trucks, explosives trucks, and other miscellaneous support equipment.

Erosion and sediment transport related to the mine disturbances are addressed with a SWPPP that includes design and construction of ditches, settling ponds, culverts, sediment traps and other methods included in normal BMPs. The mine also maintains a SPCC Plan to reduce the risk to inland waters from petroleum releases.

Ore is hauled in trucks to the on-site mill. At the mill, the ore is wet ground and the phosphate mineral is physically concentrated. The phosphate concentrate slurry is pumped in a buried pipeline west to the Simplot fertilizer plant in Pocatello (Don Plant).



Legend

- Existing Tailings Pipeline
- Existing Overhead Power Line
- Project Area Boundary
- Existing Disturbance Boundary
- Surface Ownership Boundary
- Township Boundary
- Section Boundary

Lease

- IDI-012890
- IDI-015259
- IDI-026843
- IDI-027801
- Proposed Lease Modification Area
- Existing Special Use Authorization (SUA)

Notes
1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. ODA: Overburden Disposal Area
4. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
5. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1,500 3,000
Feet
1:20,000 (at original document size of 11x17)
N

Figure 2.3-1
Project Area and Existing Phosphate Leases, SUAs, and Mining Development
East Smoky Panel Mine EIS

The tailings slurry from the mill is piped to the tailings ponds located east of the mine property where the tailings solids settle out. Water from the tailings ponds is recycled back to the mill for reuse. Additional makeup water is provided by the industrial well near the mill.

The current Smoky Canyon Mine operations and facilities provide the infrastructure that would be needed for the Project. All necessary facilities, utilities, equipment, staff, and procedures are present and/or approved to recover the phosphate ore reserves in the Project Area. The ore in the proposed panel is readily accessible to the existing operations through the extension of the mining operation east from the trend of the previously and currently mined ore bodies in Panels A through E.

2.4 PROPOSED ACTION

2.4.1 Overview

As submitted by Simplot, the Proposed Action would consist of mining the East Smoky Panel, constructing topsoil stockpiles, reclamation material borrow areas, stormwater ponds and ditches, potentially a dewatering pipeline, haul roads, relocation of two existing power lines, and providing for complete backfill rather than the existing partial backfill in a portion of Panel B using overburden from the East Smoky Panel. As a part of the Project, lease IDI-015259 would be modified by adding 120 acres along the southwest side of the existing lease for mining-related disturbance (**Figure 2.4-1**). The Project would also include development, construction, and reclamation of portions of transmission lines, access roads, and other miscellaneous disturbances (e.g., sediment ponds, topsoil stockpiles) off-lease on federal land administered by the USFS, requiring several new SUAs. All these Project features are discussed in more detail in the following sections. While the majority of Project disturbance would occur within a new proposed disturbance boundary, portions of the East Smoky Panel pit and haul road would occur within the previously authorized disturbance boundary for Panel B, along with Panel B backfill.

2.4.2 Land Ownership and Mineral Rights

The proposed Project would occur on federal and split estate lands in existing federal phosphate leases IDI-015259, IDI-026843, and IDI-012890 held by Simplot. Off-lease portions of the mining disturbance would occur on NFS land under existing SUAs, on NFS lands that would require new SUAs (**Section 2.4.9**), and on split estate lands. In addition, all mineral rights associated the Project are federally held except in portions of Sections 21, 29, and 32 which are held in half interest by Simplot with half interest retained by Raymond S. Petersen and Sons Inc., where future exercise of those mineral rights may be affected by topsoil stockpiles, borrow areas, proposed access roads, a potential dewatering pipeline, and storm water control features.

2.4.3 Pits and Overburden

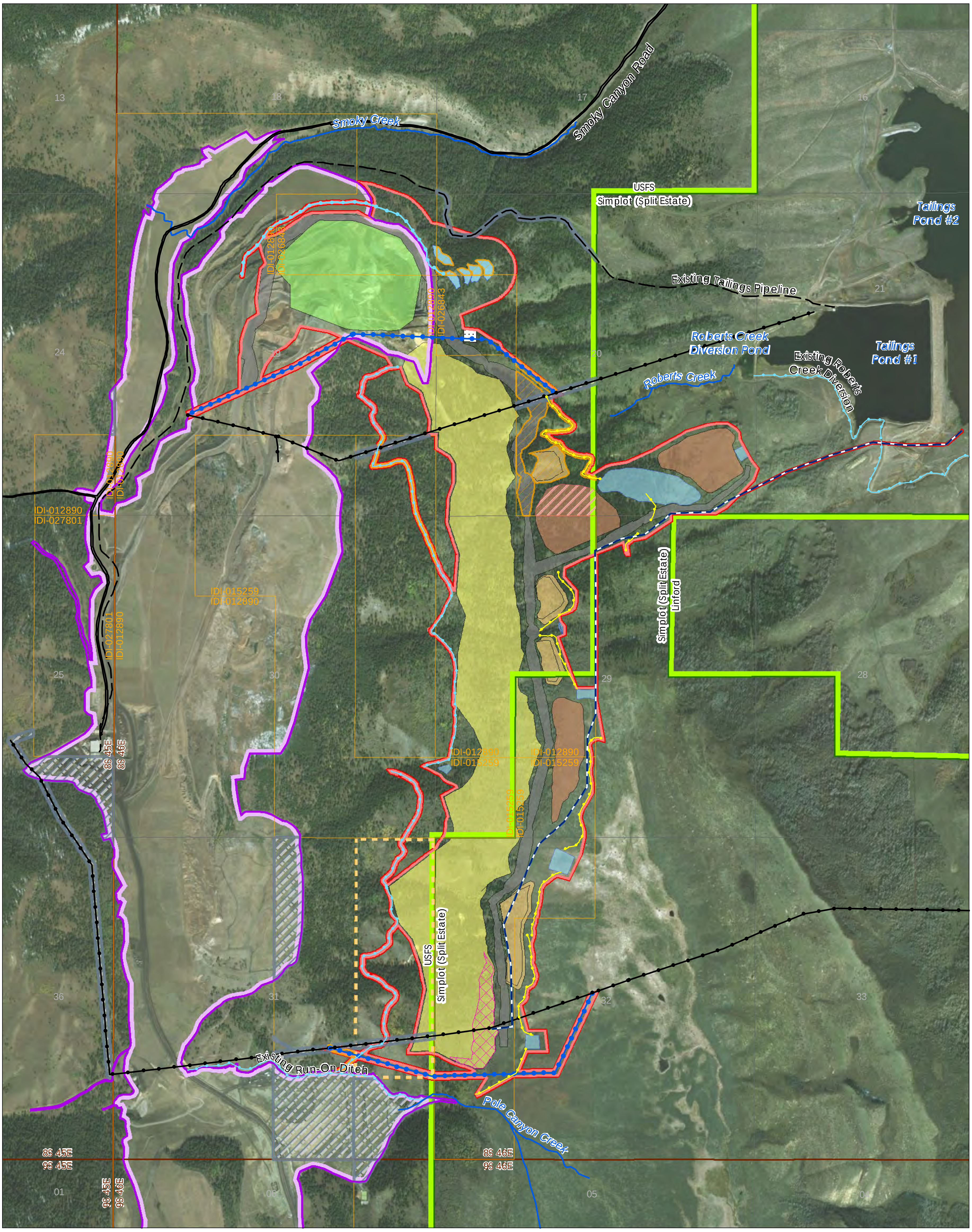
While mining in the northern portion of the East Smoky Panel pit, overburden would be placed directly into the previously mined Panel B pit. The additional material would elevate the reclaimed selected surface contours to be closer to the pre-mining topography. Placement of this additional material would not increase Simplot’s planned disturbance acreage, the authorized / permitted disturbance acreage for Panel B, or the mine’s seleniferous footprint; it would simply add volume for providing complete backfill. Overburden from the middle and southern portions of the pit would be backfilled into the East Smoky Panel pit for concurrent reclamation. The in-pit backfill would be maximized and there would be no external overburden placement, with the exception of some low-seleniferous overburden (low seleniferous overburden refers to any waste rock material not from the Meade Peak Member) to be used in haul road and ramp construction. An external haul road is proposed along the length of the ultimate pit. Chert and limestone from pit overburden would be used for coarse and durable armor in haul road, ditch, culvert, and pond design. All run-of-mine (ROM) overburden would receive a geologic store and release cover system consisting of chert, overlain by Dinwoody and/or Salt Lake Formation, and a topsoil layer. This type of cover system is designed to limit the percolation of meteoric water into the seleniferous overburden beneath, by increasing runoff and retaining moisture within some of the cover layers that would be available to plants and evapotranspiration. By reducing water movement into the seleniferous overburden, the intent of the store and release cover is to reduce the amount of selenium that can be transported by groundwater away from the overburden pile.

2.4.3.1 East Smoky Panel Pit

The development of the East Smoky Panel pit would require the removal, transportation, and placement of approximately 60.2 million BCY of overburden. Of this total, an estimated 50.8 million BCY or (85 percent) would be used to backfill the mined out East Smoky Panel pit. Approximately 1.4 million BCY of topsoil would be removed and stored in topsoil stockpiles (**Figure 2.4-1**), held in reserve for reclamation.

As mining progresses, the pit would be backfilled to reclamation contours concurrent with mining. All backfill would be placed in pits or on previously disturbed mining areas (i.e. Panel B). In addition, exposure of center waste shales (i.e., the shale that lies between the upper and lower ore beds and contains high concentrations of selenium and other COPCs) to meteoric weathering processes would be minimized by covering this material as soon as practicable during backfill operations. No segregation of waste materials is planned for backfilling operations under the Proposed Action, including any backfill into saturated zones. All overburden disposal areas have been designed to minimize surface impacts and to insure maximum overburden stabilization.

The development of the ore deposit would result in one ultimate pit representing approximately 302 acres of pit disturbance. The pit would be developed in seven distinguishable mining phases (**Figure 2.4-2**) executed sequentially from north to south. The ultimate pit is designed with a typical "V" cut configuration. Pit widths of the seven distinguishable mining phases, from highwall to footwall crests, would range from approximately 1,700 feet at the widest in the southern portion of the ultimate pit, to approximately 900 feet at the narrowest point. Pit elevations would range from 7,350 feet at the highest point on the ultimate pit wall to the 6,635-foot elevation of the ultimate pit floor for an overall elevation difference of 715 feet. The existing surface topography varies across the East Smoky Panel; however, the average pit depth for the seven mining phases would be 250 feet deep.



Legend

- Proposed Dewatering Pipeline
- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Run-On Diversion Ditch
- Run-Off Diversion Ditch
- Existing Tailings Pipeline
- Township Boundary
- Section Boundary
- Project Area Boundary
- Surface Ownership Boundary
- Existing Disturbance Boundary
- Proposed Lease Modification Area
- Existing Lease Boundary
- Existing Special Use Authorization (SUA)
- Proposed Special Use Authorization (SUA)
- Proposed Mineral Materials Permit Area

Mine Components

- Haul Road
- Borrow Pit
- Panel B Additional Backfill Area
- Pit
- Stormwater Pond
- Topsoil Stockpile
- Unreclaimed High Wall
- Lube Car

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E Caribou County, Idaho

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Figure 2.4-1
Proposed Action Components
East Smoky Panel Mine EIS

Pit walls are designed at an overall angle of 34 degrees on the west side of the pit and 40 degrees or less on the east side. Safety benches would be installed at least every 50 vertical feet to catch raveling material from the walls. These design slopes are currently utilized in the active and historic pits at the Smoky Canyon Mine and have been proven to be safe and effective in similar conditions. In addition to safety incorporated in design, Simplot would implement a comprehensive monitoring program (**Section 2.5.2**) to track wall and dump stability during mining.

The last cut (Phase 7) is proposed to be mined at the terminal south end of the ultimate pit. Overburden from this last cut would be temporarily placed elsewhere in the pit and rehandled back into the final pit. The majority of this final pit would be situated on private land owned by Simplot. Seleniferous overburden would be dozed or hauled back into the bottom of the pit; non-seleniferous overburden would then be hauled and placed over the seleniferous wastes, along with the proposed store and release cover (**Section 2.4.12**). Mining in Phase 7 may result in intercepting the groundwater which may require pit dewatering. In this event, this water would be piped to the tailings ponds (**Section 2.4.5.3**).

Ideally, the footwall is designed to follow the dip of the ore for stability and safety. However, due to faulting, overturned, and nearly vertical dipping beds, an intact, safe footwall is not anticipated. A layback of 34 to 45 degrees would mitigate footwall stability problems.

The ultimate pit design and disturbance are shown on **Figure 2.4-2**. Because of progressive pit backfilling and concurrent reclamation, unreclaimed pit disturbance at any point in time would be minimized to the extent feasible. The unreclaimed portion of pit disturbance would be situated entirely on private land owned by Simplot.

The mine life of the East Smoky Panel pit would be up to 12 years, depending on different blending scenarios with the ore from the remaining permitted Smoky Canyon Mine panels. Concurrent reclamation work is proposed and would continue on both federal and split estate lands for approximately two to three years following completion of mining. While the mining sequence is shown in **Figure 2.4-2**, the length of time any phase of the East Smoky Panel is open and being mined may vary from this estimate depending on ore blending scenarios. The East Smoky Panel would add approximately three years to the overall life of the Smoky Canyon mine.

2.4.3.2 Panel B

Disturbance within the previously authorized disturbance boundary for Panel B under the Proposed Action would consist of the backfilling of overburden from the East Smoky Panel into the Panel B pit area. This would minimize the seleniferous footprint of the mine by avoiding creation of an external ODA for the East Smoky Panel overburden. In addition, placement of East Smoky Panel overburden in the Panel B pit area would elevate the final contours for the Panel B pit closer to the pre-mining topography (**Section 2.4.11.1**).

The Panel B portion of the Project Area would also contain disturbance associated with portions of the East Smoky Panel pit and associated haul road. Approximately 3.7 acres of the East Smoky Panel pit would be developed within the previously authorized disturbance boundary for Panel B in Lease IDI-012890. Additionally, the haul road running the length of the East Smoky Panel pit would extend north into the previously authorized disturbance boundary for Panel B, wrapping around the northern boundary of the Panel B additional backfill area, redisturbing approximately 27.3 acres in leases IDI-026843 and IDI-012890.

as needed to reduce erosion in transition areas, junctions, and discharge areas. Once mining has been completed, the last area to be mined would not be completely backfilled and would be used to collect runoff.

For the Project, run-on and run-off stormwater would be managed to correspond to aggregated phases of mine development. Ditches and ponds would be designed to accommodate peak flow from a 100-year 24-hour precipitation event.

The overburden fill areas would be constructed, where possible, with convex faces to eliminate the concentration and channeling of water run-off on the longer overburden faces and reduce run-off erosion.

Where drainage channels would be permanently routed over overburden fills, channels would be designed to be stable without damage for the peak flow from a 100-year, 24-hour storm on top of snowmelt. To prevent seepage into underlying seleniferous overburden, a clay liner would be installed under the channel. The overburden directly underlying the channel bottom and for a distance of 50 feet on either side of the channel would consist of chert or other low seleniferous overburden material. The channel surface would be protected from erosion with chert riprap. A high-density polyethylene (HDPE) plastic liner may also be used instead of the clay liner if sufficient clay or other suitable material is not available.

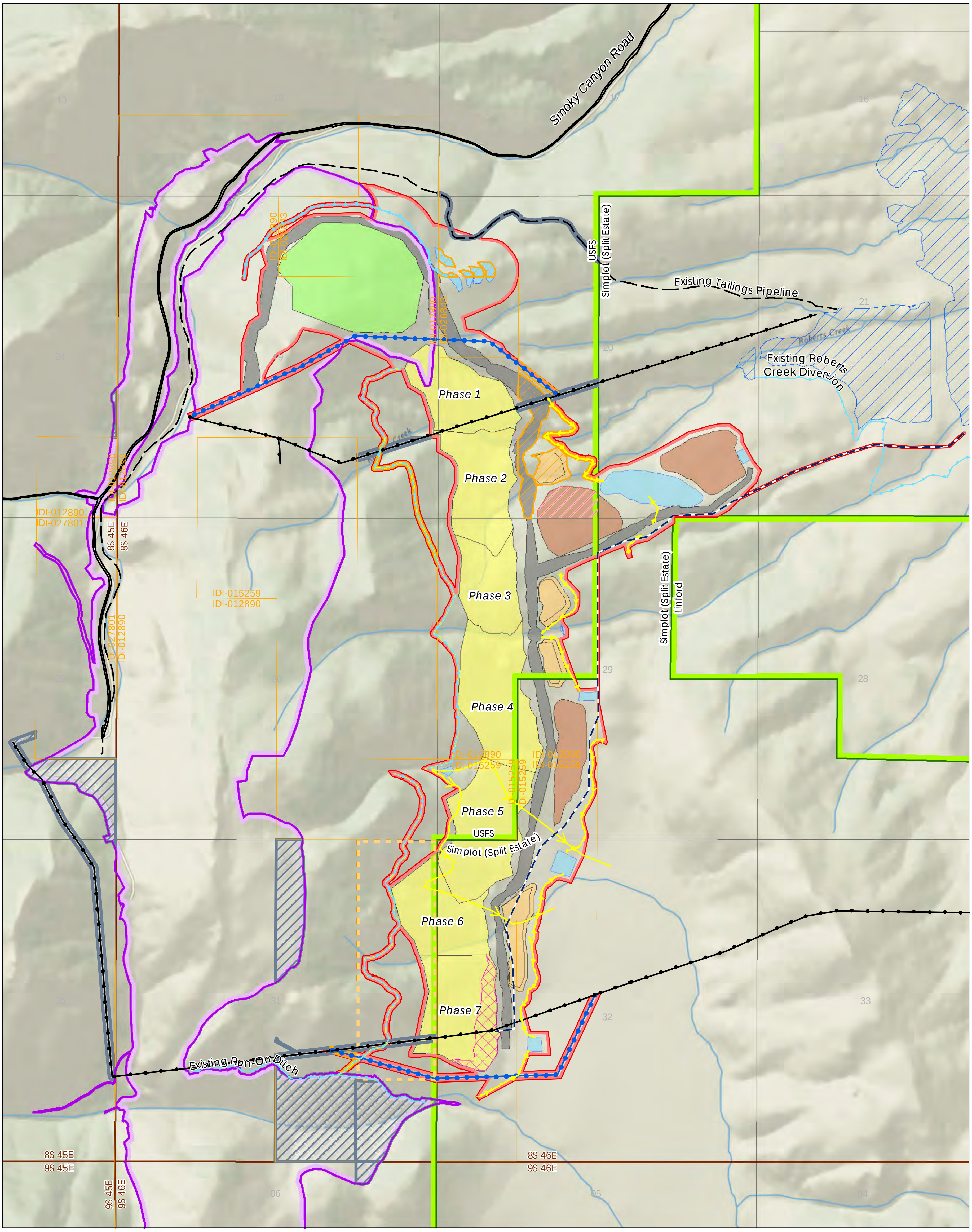
Sedimentation ponds designed to control runoff and sedimentation would be located off seleniferous overburden fills and primarily on Dinwoody or Salt Lake Formation areas. Surface soils would be removed from pond locations; however, little infiltration can occur vertically into the Dinwoody or Salt Lake Formation material, therefore the ponds would rely on evaporation to remove water rather than infiltration.

2.4.3.3 Groundwater Dewatering

During the last phase of mining in the southern portion of the East Smoky Panel pit, there is potential for groundwater to be encountered during mining of the lower benches of the pit. Should groundwater enter the active mining area, the water would be directed to a sump pump and pumped to the tailings pond via a dewatering pipe system located on split estate lands where Simplot holds the surface ownership (**Figures 2.4-1** and **2.4-2**). Pit dewatering, should it occur, would be estimated to last several weeks.

2.4.3.4 Tailings Ponds

The existing Smoky Canyon Mine tailings ponds (**Figure 2.3-1**) would be utilized for the Project without modification. The estimated remaining capacity of Tailings Pond 2 (TP2) is 20 million cubic yards (CY). On average, approximately 550,000 CY of capacity is used each year from tailings, thus the life of the pond is estimated to be about 36 years, with adequate capacity to support development of the Project



Legend

- Proposed Dewatering Pipeline
- Existing Tailings Pipeline
- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Run-Off Diversion Ditch
- Run-On Diversion Ditch
- Drainage
- Project Area Boundary
- Surface Ownership Boundary
- Proposed Lease Modification Area
- Existing Lease Boundary
- Existing Special Use Authorization (SUA)
- Proposed Special Use Authorization (SUA)
- Proposed Minerals Material Permit Area

Mine Components

- Haul Road
- Borrow Pit
- Panel B Additional Backfill Area
- Pit
- Stormwater Pond
- Topsoil Stockpile
- Unreclaimed High Wall
- Existing Disturbance Boundary
- Existing Tailings/Diversion Pond
- Township Boundary
- Section Boundary

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 2.4-2
Mining Sequence and Ultimate Pit
East Smoky Panel Mine EIS

2.4.4 Haul Roads

Due to the proximity of the Project to the existing mill and other Smoky Canyon Mine operations and the relatively small East Smoky Panel pit ore reserve volume, it was determined that truck haulage would be the most efficient method to transport ore to the existing mill location. Haul roads would be used to haul ore and overburden in 150-ton haul trucks. Access ramps built into the pit walls would be limited to approximately 8 to 10 percent grade for safety and to maximize haul truck efficiencies.

Several external pit roads would be required throughout the life of the mine for both overburden and ore transportation. All of these roads would be constructed of chert or limestone with cut side ditches, culverts as appropriate, and fill side berms where necessary for safety.

Approximately 4.5 miles of new haul roads would be required in the Project Area over the life of the mine. Total disturbance due to haul roads for the Proposed Action is approximately 96 acres (approximately 27 acres would be redisturbance). All haul road disturbance would be reclaimed. For the most part, all of these roads would be contained on lease. However, in a few small areas (approximately 12 acres) USFS SUAs (**Section 2.4.9**) would be required for haul roads.

Simplot is proposing an external haul road along the length of the ultimate East Smoky Panel pit to haul:

- Overburden to Panel B and back into the pit;
- Ore to the mill;
- Material from borrow areas to cover seleniferous overburden; and,
- Topsoil to reclaim disturbed areas.

The haul roads would also divert and control surface water and stormwater. All proposed haul roads external to the East Smoky Panel pit are designed to minimize surface impacts and to insure maximum efficiency in truck haulage.

2.4.5 Power Line Relocation

As proposed, the existing Smoky Canyon Mine, maintenance, administrative, and milling facilities would continue to be used. Electric power for the proposed mining operations would be provided with the existing power lines. However, two segments of existing power lines (**Figure 2.4-1**) are proposed for reroute around the proposed Project.

The 25 kV distribution power line providing power across the northern part of the Project to the tailings ponds would be relocated across the edge of Panel B disturbance. On USFS-administered lands, the 1.2-mile re-routed portion of the line would be contained within existing leases or areas authorized by SUAs. Approximately 0.75-mile of the existing northern power line route would be reclaimed; the remainder of the existing power line would be removed when the East Smoky Panel pit is developed.

The 115 kV Lower Valley Energy transmission line that transects the southern part of the Project would be rerouted approximately 1 mile around the south end of the pit. The rerouted transmission line would occur on a combination of private land, existing leases, and a proposed lease modification area. Since a portion of the rerouted line would occur on NFS lands not on leased lands, a new SUA would be required for that portion of the line (**Figure 2.4-1**). A portion of the existing southern transmission line route would be reclaimed; the remainder of the existing power line would be removed when the East Smoky Panel pit is developed.

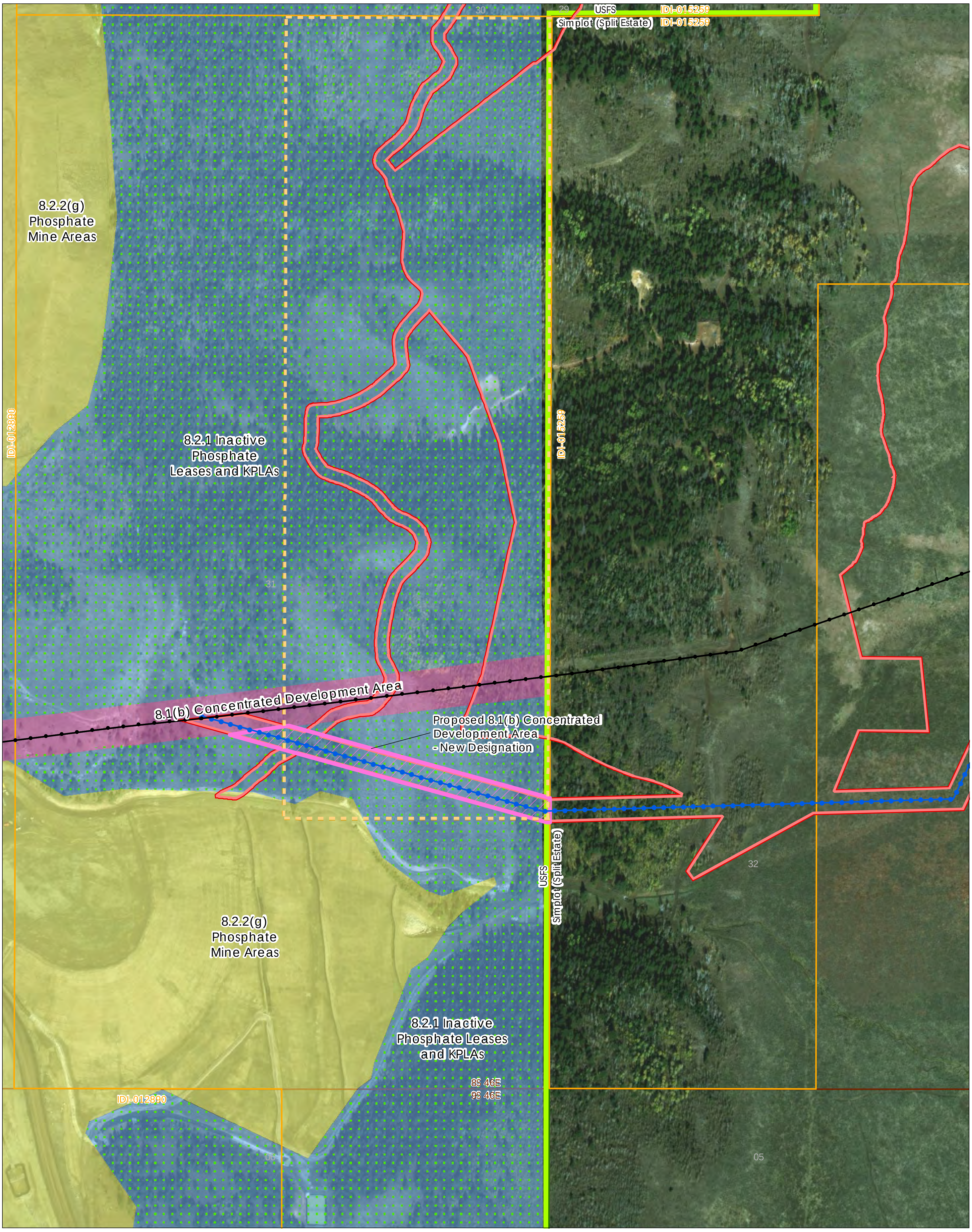
New line segments would be constructed to match the existing infrastructure, and activated prior to decommissioning and removing existing line segments. Construction of the re-routed portions of the lines would result in both new disturbance and redisturbance of previously mined areas, assumed to be the entire width of the needed corridor. Line construction and removal disturbance would consist of overland travel as well as new spur roads, as needed; clearing or trampling of pole sites and pulling and tensioning locations; and augering of new foundation locations. Removal of existing infrastructure would consist of removing poles, spooling line, and trucking pieces off-site. USFS-administered lands containing the portions of the existing lines that would be removed, outside of the Project disturbance, would be reclaimed.

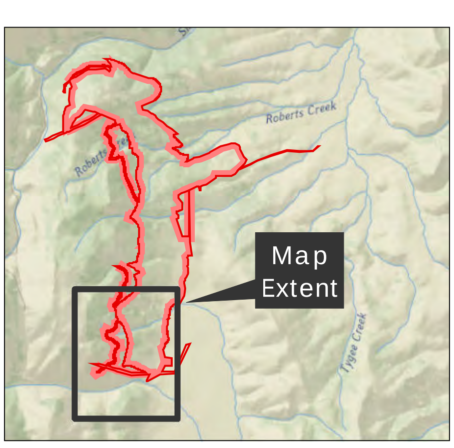
2.4.6 Forest Plan Amendment

The CNF RFP (USFS 2003a) uses management prescriptions to designate planned land uses on the Forest (see **Section 3.11**). The RFP requires that power lines over 66 kV be contained within utility corridors, which are designated by a specific management prescription. The existing Lower Valley Energy 115 kV transmission line crossing the southern part of the Project is contained within an SUA authorized by the CTNF and located within a larger 200-foot wide utility corridor designated in the CNF RFP. This transmission line would be rerouted around the south end of the pit under the Proposed Action where there is no CNF RFP designated utility corridor. An RFP amendment would be required to change the management prescription of the lands contained in the proposed reroute to allow designation of a 200-foot wide utility corridor for the new route and revised SUA for the 115 kV transmission line (**Figure 2.4-3**). 36 CFR 219.13(b)(5) requires the responsible official to determine and assess the specific substantive requirements within 36 CFR 219.8 – 219.11 that are directly related to the plan amendment. The analysis in this document discloses the effects to resources and includes the substantive requirements within 36 CFR 219.8 – 219.11.

2.4.7 SUAs

SUAs are, by definition, located on NFS lands, and this Project would use existing SUAs and require additional new SUAs. There are existing SUAs (**Figure 2.4-1**) in the Project Area that contain the existing northern power line. Under the Proposed Action, a number of Project components would require new SUAs (**Figure 2.4-4**), including run-on and run-off diversion ditches, relocated power lines, roads, and topsoil stockpiles. The relocated power lines would include a 50-foot buffer on either side of the centerline for a 100-foot wide SUA. The ditches would include a 25-foot buffer on either side of the centerline for a 50-foot wide SUA. The remaining components (i.e. haul roads, borrow pit, ponds, topsoil stockpile) would not be buffered but would only include the area of proposed disturbance, thus the proposed SUA areas would total approximately 30.0 acres as detailed in **Table 2.4-1** and shown on **Figure 2.4-4**.





Legend

Existing Overhead Power Line

Overhead Power Line Proposed Re-route

Project Area Boundary

Surface Ownership Boundary

Existing Lease Boundary

Proposed Lease Modification Area

Township Boundary

Section Boundary

USFS CNF RFP Management Prescription

8.1(b) Concentrated Development Area

8.2.1 Inactive Phosphate Leases and KPLAs

8.2.2(g) Phosphate Mine Areas

Previously 5.2(b) Forest Vegetation Management

Proposed 8.1(b) Concentrated Development Area - New Designation

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
5: Project Location: T8S R46E, T9S R46E

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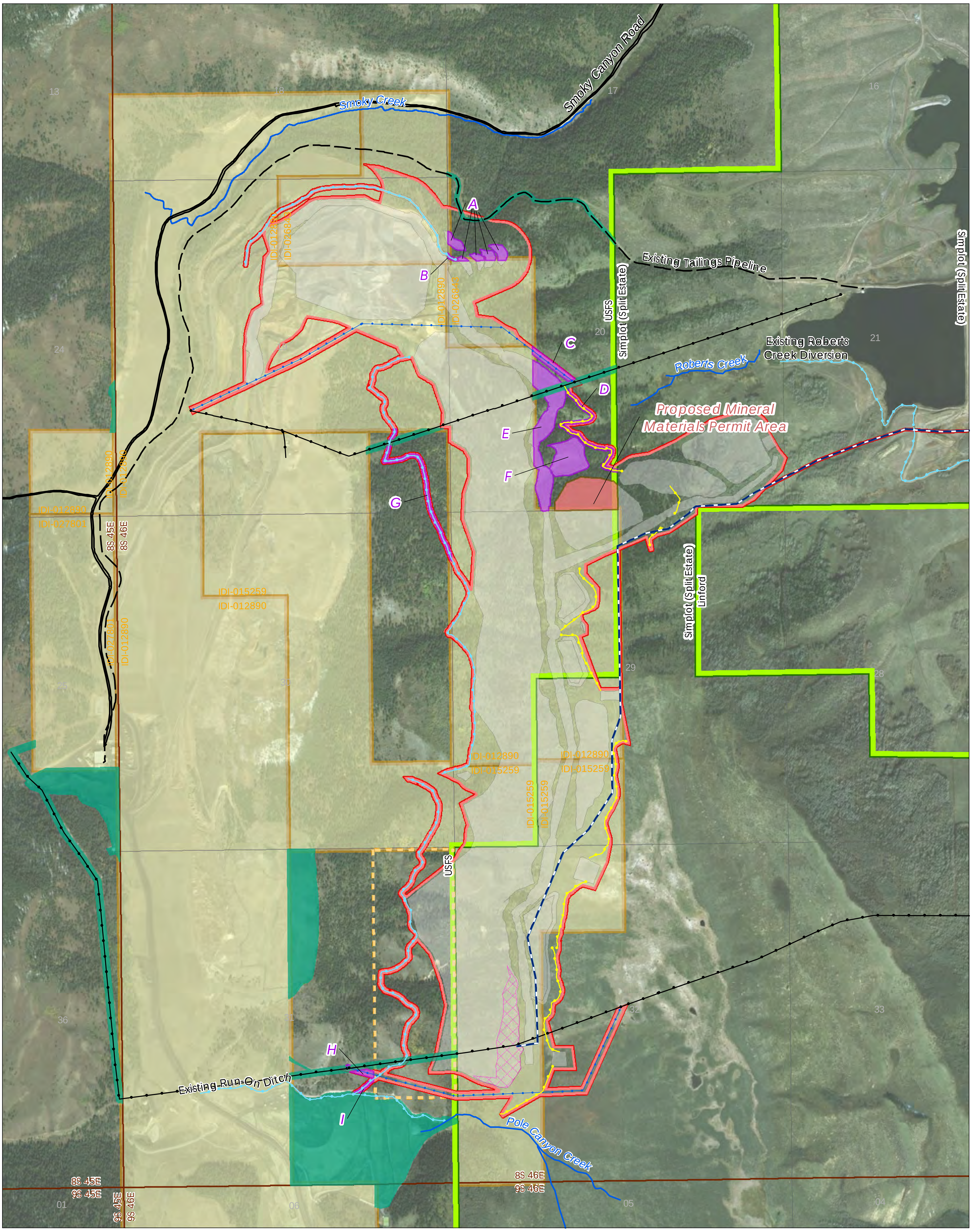
Figure 2.4-3
Proposed CNF Revised Forest Plan Amendment
East Smoky Panel Mine EIS



Legend

- Proposed Dewatering Pipeline
- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Run-On Diversion Ditch
- Run-Off Diversion Ditch
- Existing Tailings Pipeline
- Project Area Boundary
- Mine Components
- Unreclaimed High Wall
- Surface Ownership Boundary
- BLM Lease
- Proposed Lease Modification Area
- Existing Special Use Authorization (SUA)
- Proposed Special Use Authorization (SUA)
- Proposed Mineral Materials Permit Area

Notes
1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E Caribou County, Idaho

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Figure 2.4-4
Proposed and Existing Special Use Authorizations (SUAs)
East Smoky Panel Mine EIS

The locations of these mine components may vary slightly due to on the ground conditions. However, all disturbance would occur within the Project Area boundary.

Table 2.4-1 Acreages of Proposed SUAs

PROPOSED SUA MAP ID*	PRIMARY FEATURE	AREA (ACRES)
A	Stormwater Ponds	3.2
B	Run-on Diversion Ditch	0.2
C	Rerouted Overhead Power Line	1.8
D	Runoff Diversion Ditch	3.0
E	Haul Road	11.7
F	Topsoil Stockpile	6.1
G	Run-on Diversion Ditch	3.0
H	Rerouted Overhead Power Line	0.6
I	Run-on Diversion Ditch	0.4
Total		30.0

*ID number from **Figure 2.4-4**.

2.4.8 Operations and Equipment

If approved, mining is proposed to begin in the East Smoky Panel in 2018 or thereafter. The mine life of the Project would be up to 12 years, depending on different blending scenarios with the ore remaining in the currently permitted Smoky Canyon Mine panels. Concurrent reclamation work is proposed and would continue on both federal and split estate lands for approximately two to three years following completion of mining. While the mining sequence and estimated years that mining would occur in each phase are shown in **Figure 2.4-2** the length of time any phase of the East Smoky Panel is open and being mined may vary from this estimate depending on blending scenarios. The Project would add approximately three years to the overall life of the Smoky Canyon Mine.

The Project would be operated 24-hours per day throughout the year with crews working overlapping shifts. No additional employment beyond that already in place for the Smoky Canyon Mine operations is anticipated for the Proposed Action.

2.4.9 Reclamation Activities

Almost all of the disturbance associated with the Project would be reclaimed at the end of the Project. The ultimate new surface disturbance resulting from the implementation of the Project would total approximately 725 acres, plus 124 acres of redisturbance, although the larger Project Area boundary totals approximately 920 acres (**Figure 2.4-1**) which includes approximately 70 acres that would not be disturbed. However, upon final abandonment, approximately 719 acres or approximately 98 percent of the total new disturbance, in addition to the areas of redisturbance, would be reclaimed. The unreclaimed portion would be all situated on private land owned by Simplot. Reclamation of disturbed areas that are no longer needed for active mining operations would be conducted concurrent with other mining operations, as soon as practicable. Reclamation to return the NFS land to productive and recreation uses following mining and backfilling would include placing a store and release cover over all seleniferous backfill in both the East Smoky Panel and Panel B pits and a topsoil cover over all non-seleniferous material; grading to return disturbed areas to more natural contours; reestablishing drainage patterns; and revegetation. The following reclamation description would apply to the entire Project Area - both the East Smoky Panel and Panel B portion of the Project Area.

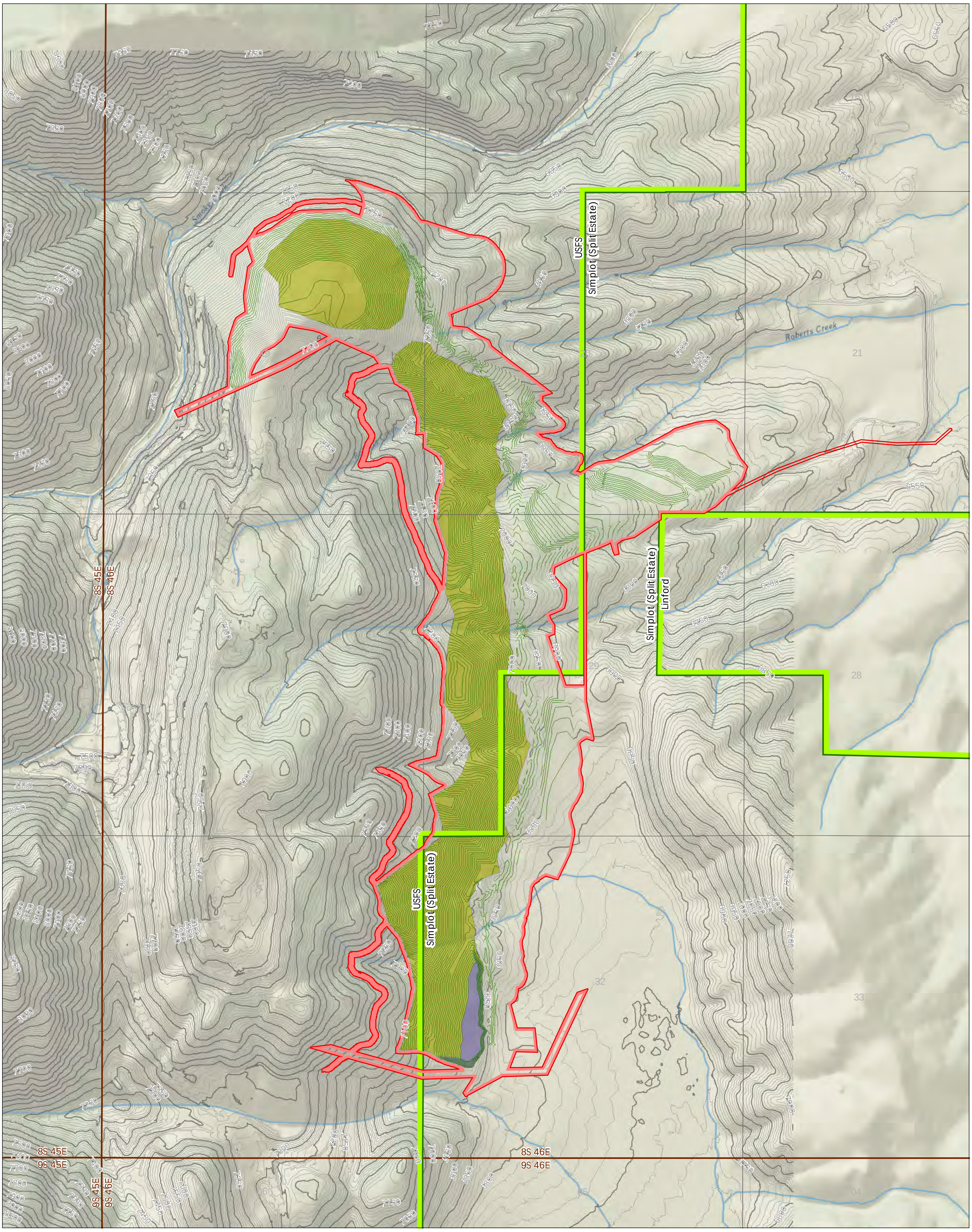
2.4.9.1 Backfilling

All overburden excavated during the course of mining would be backfilled into either the East Smoky Panel pit or the Panel B pit portions of the Project Area. Panel B is currently being mined, and while the reclamation process is initiated concurrent with mining, final reclamation would not be undertaken in the portions of Panel B proposed for revision as a part of this Project until a decision is issued for the Project. Material from the initial mining would be transported to provide additional backfill in the Panel B pit portion of the Project Area. Approximately 15 percent of the Project overburden would be placed in the Panel B pit as backfill to elevate contours closer to pre-mining topography. Approximately 124 acres in leases IDI-012890 and IDI-026843 would be re-disturbed (**Figures 2.4-1** and **2.4-2**). All other overburden excavated during the course of mining would be backfilled into the East Smoky Panel pit. This material would be reclaimed as final configuration contours are reached (**Figure 2.4-5**). It should be noted that the final Project configuration (**Figure 2.4-5**) has been developed based upon the current understanding of the ore body geometry, mining methods, mining rates, and overburden swell parameters. Modifications to the final configuration may also be necessary if strip ratios and other economic factors that drive the considerations used to develop the topography vary significantly from current assumptions. If needed, these would only occur with agency approval through mine plan modifications with applicable NEPA analysis (e.g., DNA, EA).

Additional armor would be added to channels on concave reclamation surface(s). All reclaimed areas would tie into existing contours recreating a similar function of pre-disturbed land. Roads would be reclaimed by rounding off road crests and revegetating the road disturbance. Any road culverts would be removed unless otherwise specified and the natural drainage patterns would be reestablished.

2.4.9.2 Cover System

Under the 2002 ROD, the Panel B pit was to receive a “cap” to prevent reclamation vegetation from accumulating toxic amounts of selenium; the cap would consist of an 8-foot layer of chert and limestone containing low or no amounts of extractable selenium that would be covered with 1 to 3 feet of topsoil growth medium having very low values of extractable selenium (BLM and USFS 2002b). The cap was designed to prevent reclamation vegetation from accumulating toxic amounts of selenium; however, the cap would have been permeable to infiltration of meteoric water from rain and snowmelt, which would facilitate mobilization of selenium in the underlying overburden (BLM and USFS 2002a). As described in **Section 2.2.2**, the permitted chert cap thickness has been reduced from 8 feet to 4 feet.



Legend

- Drainage
- Project Area Boundary
- Township Boundary
- Section Boundary
- Surface Ownership Boundary

Final Configuration Mine Components

- Seleniferous Waste, Geologic Store & Release Cover
- Unreclaimed High Wall Disturbance
- 10 ft Final Reclamation Contours
- 10 ft Existing Contours
- 50 ft Existing Contours

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 2.4-5
Proposed Action Final Configuration and Reclamation Pit Covers
East Smoky Panel Mine EIS

Under the Proposed Action, Simplot is proposing a store and release cover system over all locations in the Project Area receiving seleniferous overburden, which would include the Panel B contour improvement area and almost the entire East Smoky Panel (minus the unreclaimed high wall in the extreme southeastern portion of the pit), for a total of approximately 364 acres. The store and release cover system would consist of approximately two feet of chert, overlain by three feet of Dinwoody and/or Salt Lake Formation and, finally, a topsoil layer estimated at a minimum of six to twelve inches, contingent upon the topsoil availability. Dinwoody and/or Salt Lake Formation material would be obtained from either pit overburden or borrow areas within the Project Area. Should suitable in-pit cover material be used, the material would be stockpiled within the same footprint as the proposed borrow areas (**Figure 2.4-1**).

The store and release cover system is expected to limit the amount of net percolation of meteoric water through the seleniferous overburden by increasing runoff as well as increasing moisture storage in the Dinwoody or Salt Lake Formation layer, making the water available for plant uptake and evapotranspiration. By limiting meteoric water percolation into the overburden, the chances for mobilization of selenium and transport to surrounding areas would be expected to be reduced when compared with the originally approved "cap". Less percolation equates to less water in contact with the selenium-bearing overburden, which in turn equates to lower selenium mobilization and transport. The estimated percolation rates and their derivations are described in **Section 4.5.2.1**.

2.4.9.3 Topsoil Placement

After backfilling and preparing disturbed areas to final reclamation contours, direct-placed or stockpiled topsoil would be used in reclamation as plant growth media. Where practical and economically feasible, topsoil salvage for direct placement would be used on reclaimed areas. Topsoil stockpiles are proposed strategically throughout the mining area (**Figures 2.4-1** and **2.4-2**) for use in reclamation of all disturbed areas.

A minimum of 6 inches of topsoil would be distributed over disturbed areas to prepare for revegetation. The amount of topsoil used would be dependent upon the amount of topsoil salvaged during mining. Should more topsoil be available, the minimum thickness may be increased. Topsoil would be sampled prior to placement to determine the agronomic characteristics and to determine the optimum rate and analysis of fertilizer application; the ultimate goal would be to maximize the recovery and reutilization of topsoil. Topsoil would be graded into place with dozers, graders, or other equipment suitable to this purpose prior to re-vegetation.

2.4.9.4 Revegetation

Revegetation of disturbed areas would be handled in two distinct steps. The first step would be the temporary re-vegetation of areas disturbed by construction. The second step would be permanent re-vegetation of reclaimed areas.

Temporary re-vegetation would occur on cuts and fills around the mine facilities areas, on road fills, and on sediment pond embankments and other areas that would remain disturbed for the life of the Project. The objective would be to provide a self-regenerating cover that is easily established. This cover would be a mixture of grasses and forbs designed solely to stabilize the surface against erosion. USFS-approved seed mixes for species and application rates would be used for temporary re-vegetation on USFS land. Temporary re-vegetation would be completed during the first planting season following completion of construction of a specific area or phase of the Project. Planting would be conducted either in the spring or fall.

The objectives of the permanent re-vegetation of disturbed areas on USFS land are similar to those of the temporary program except that in addition to stabilizing the ground surface, the long-term objective would be a vegetative community suitable to support the post-mining land use of grazing and wildlife habitat, as well as to enhance the evapotranspiration function of the proposed cover system. Long-term revegetation would include a mixture of native grasses and forbs, as well as reforestation of some areas. Seed mixes to be used and re-forestation goals would be determined by the USFS.

The geologic store and release cover would be revegetated with grasses and forbs surrounding "islands of diversity" (defined as native forbs, shrubs, and trees that would be seeded or planted in clusters where they are most likely to establish and where there are no concerns relative to the uptake of selenium). Modifications to the final configuration may also be necessary if strip ratios and other economic factors that drive the considerations used to develop the topography vary significantly from current assumptions. If needed, these would only occur with agency approval through mine plan modifications with applicable NEPA analysis (e.g., Determination of NEPA Adequacy, Environmental Assessment).

The areas to be revegetated would be properly prepared to receive seeds by ripping or scarifying the surface and drilling or broadcasting seed onto the area. All revegetation efforts would be conducted either in the spring or the fall to take advantage of high ground moisture conditions. Permanent revegetation would be conducted during the first planting season following the preparation of an area to reduce the period of time a disturbed area would be exposed to erosional forces. The existing noxious weed control program for Smoky Canyon Mine would be employed at the Project throughout the life of the Project.

Table 2.4-2 provides a list of temporary and permanent revegetation species of grasses and forbs that could potentially be used in the seed mix. The actual seed mix could vary from this conceptual list based on adaptive management strategies (e.g., monitoring finds that the species used do not meet establishment criteria or other species are found to be more adapted to site conditions), seed availability, and cost considerations. In addition, arrowleaf balsamroot could be added to the mix when used in non-seleniferous areas where its deep tap root would not be problematic. A goal of the revegetation would be to establish healthy native bunch grass communities that are structurally diverse and would allow for succession over time.

2.4.9.5 Facility Demobilization and Demolition

The Project operations would utilize existing Smoky Canyon Mine facilities (**Section 2.3.3**). Facilities would eventually be demolished according to previously established and approved permit obligations.

Table 2.4-2 Proposed Seed Mix

SPECIES	LBS/ACRE	LIFE SPAN	EXPECTED PERFORMANCE
Mountain Brome	6	Short-lived	Quick to establish first growth season
Slender Wheatgrass	4	Short-lived	Quick to establish first growth season
Western Wheatgrass	4	Long-lived	Establishes well
Big Bluegrass	0.5	Medium-lived	Small in size; provides benefits of diversity and high forage value, both early in the spring and throughout the summer
Thickspike Wheatgrass	2	Long-lived	Drought, grazing, fire, and cold tolerant
Pubescent Wheatgrass	3.3	Long-lived	Drought tolerant and winter hardy
Basin Wildrye	4	Long-lived	Slow to establish but adds stability
Blue Wildrye	3	Short-lived	Fast developing
Rocky Mountain Fescue	1	Perennial bunchgrass	Resistant to drought and heavy frost; reproduces from seeds and tillers
Orchardgrass	1	Long-lived	Establishes quickly and is high-producing
Lewis Flax	0.5	Perennial forb	Slower to establish but does well and re-seeds itself
Small Burnet	3	Long-lived	Does well
Western Yarrow	0.2	Long-lived	Does well
Showy Goldeneye	0.1	Long-lived	Does well and is not in the Aster genus
White Clover	0.8	Medium-lived	Establishes well
Utah Sweetvetch	1	Medium-lived	Fixes nitrogen
Rocky Mountain Penstemon	0.5	Long-lived	Does well
Sterile Triticale	8	One season	Provides erosion control and organic matter the following spring
Mycorrhizal	10	Enhances water and nutrient uptake	NA

2.4.9.6 Unreclaimed Areas

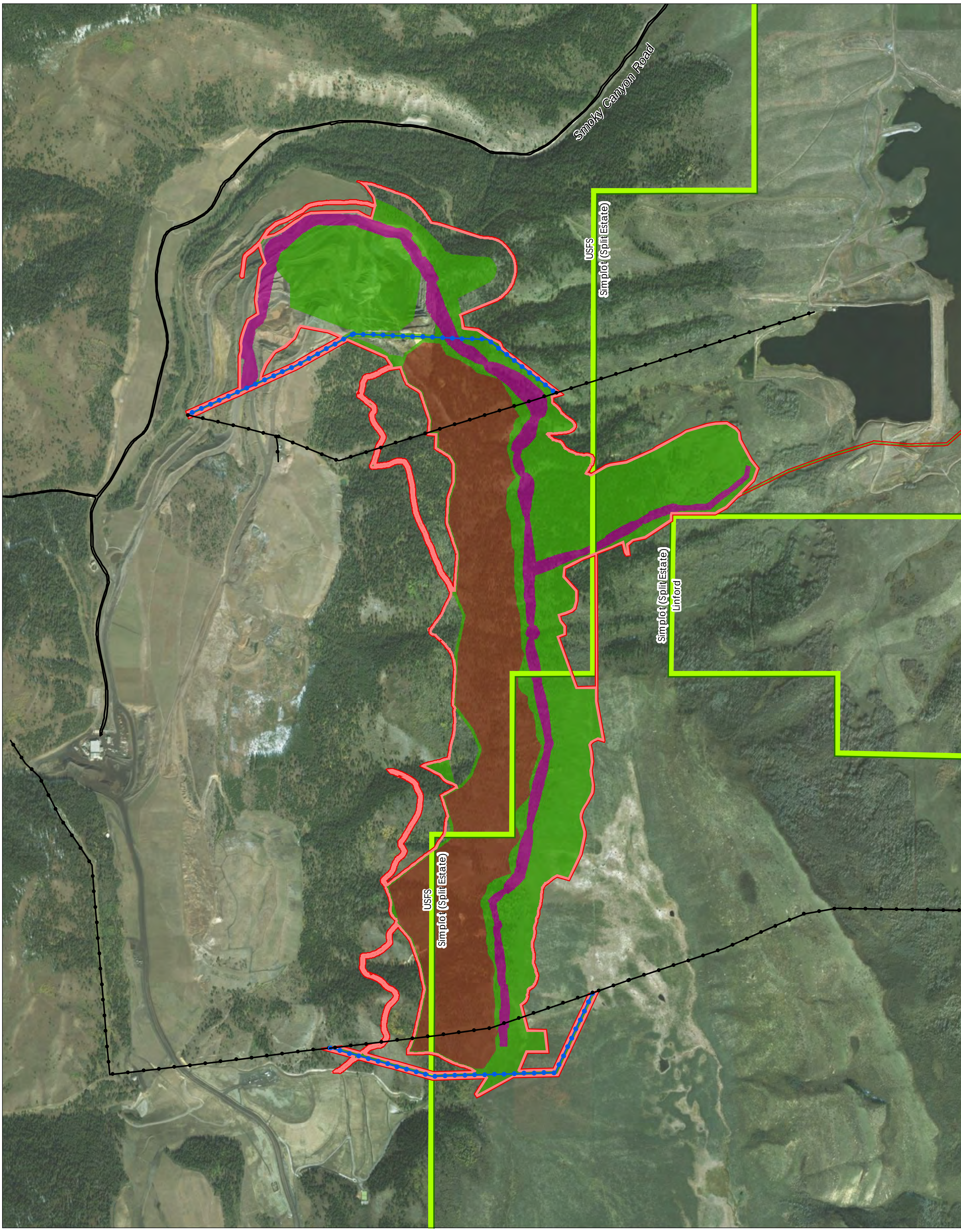
Approximately 12 acres of the East Smoky Panel pit on split estate lands on Lease IDI-015259, mined as a part of Phase 7 of the Project, would not be fully reclaimed (**Figures 2.4-1**, **2.4-2**, and **2.4-5**). Unreclaimed areas would include pit highwalls and stormwater features that would continue to function.

2.4.10 Miscellaneous Disturbance Areas

As shown in detail on **Figure 2.4-1** and described throughout **Section 2.4**, a variety of miscellaneous mine components that include topsoil stockpiles, cover material borrow pit areas, stormwater and sediment ponds, stormwater ditches, power lines, and a dewatering pipeline would be needed as part of the Proposed Action. Some of these miscellaneous components would be in new SUAs as described in **Section 2.4.9** and shown on **Figure 2.4-4**. Others would be on Simplot-owned land. A portion (10.1 acres) of one of the cover material borrow pits would be located on off-lease NFS land adjacent to Lease IDI-012890. This disturbance feature would be permitted under a Mineral Materials Permit and would be addressed through an amendment with IDL, if needed. A free use permit would be issued for material to be used on federal lands and a negotiated sale contract for material used on private lands. The USFS must determine whether and how to authorize the mineral materials permits both on and off lease. To allow for the needed flexibility for these various miscellaneous mine components during development and for ease in impact analysis in **Chapter 4**, the miscellaneous disturbance areas have been combined and as shown on **Figure 2.4-6** grouped together into a single category of disturbance. However, it is unlikely that the entire area covered by the miscellaneous disturbance category would actually be disturbed.

2.4.11 Financial Assurance

Under its regulatory authority and prior to allowing Simplot to start Project ground disturbing activities, the BLM would require Simplot to post an actual cost reclamation performance bond that considers the cost of complying with all permit and lease terms including royalty and reclamation requirements (43 CFR 3504.50). The bond would ensure that adequate funds are available to the federal government to close and reclaim the Project in the event that Simplot is unable or unwilling to fulfill its reclamation responsibilities. This bond amount would be in addition to that already posted for the existing and currently permitted operations at Smoky Canyon Mine. Reclamation performance bonds are calculated according to BLM policy regarding bond requirement and calculation guidance for phosphate mining operations (BLM 2013a). The ROD would describe the methodology to be used to calculate the performance bond amount for the Project. The calculation would cover the maximum reclamation liability during the life of the Project or the period of the bond. The bond for the mine is managed adaptively and can be increased or decreased if or as unforeseen issues arise when it is determined that a change in coverage is appropriate. Periodic review and recalculation of the bond would occur, and any changes incorporated into the reclamation bond instrument, to account for factors such as inflation/deflation of fuel costs, equipment rental rates, wages, and materials. A similar actual-cost bond would also be required by the USFS for areas of Project disturbance permitted by SUAs (36 CFR 251.56(e)).



Legend

- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Road
- Project Area Boundary
- Surface Ownership Boundary

Disturbance Category

- Haul Road
- Miscellaneous Disturbance (see Figure 2.4-1)
- Pit

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1,500 3,000
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1:20,000 (at original document size of 11x17)

N

Figure 2.4-6
Proposed Action Components - Combined

2.4.12 Disturbance Summary

Summaries of the disturbance acreage for the Proposed Action are contained in **Tables 2.4-3** and **2.4-4**.

Table 2.4-3 East Smoky Panel (Proposed Action) and Panel B Disturbance Breakout

PANEL		NEW DISTURBANCE	REDISTURBANCE	TOTAL
Proposed Disturbance within the 920-Acre East Smoky Panel Proposed Project Area Boundary		724.7	124.1	848.8
Panel B – Either within Authorized Disturbance Boundary or Associated Panel B Stormwater Features[1]	Additional Backfill & Miscellaneous	6.8	86.7	93.5
	East Smoky Pit	0	3.7	3.7
	Roads	0	27.3	27.3
	Panel B Subtotal	6.8	117.7	124.5

[1] Includes all proposed disturbance within the existing disturbance boundary, plus the proposed run-on ditch and storm water ponds associated with Panel B.

Table 2.4-4 Proposed Action Disturbance Acreages

AREA		PITS (ACRES)		ROADS (ACRES)		MISC.* (ACRES)		TOTAL (ACRES)	
		FEDERAL	SPLIT ESTATE	FEDERAL	SPLIT ESTATE	FEDERAL	SPLIT ESTATE	FEDERAL	SPLIT ESTATE
Lease IDI-012890	New Disturbance	148.8	7.8	19.8	4.7	69.0	25.5	237.6	38.0
	Re-disturbance	3.7	0	13.2	0	51.1	0	68.0	0
Lease IDI-026843	New Disturbance	0.5	0	6.0	0	22.5	0	29.0	0
	Re-disturbance	0	0	14.1	0	42.0	0	56.1	0
Lease IDI-015259	New Disturbance	28.0	86.5	0	17.6	7	73.7	35.0	177.8
	Re-disturbance	0	0	0	0	0	0	0	0
Disturbance on Lease IDI-015259	New Disturbance	27.1	0	0	0	15.8	0	42.9	0
Modification Area	Re-disturbance	0	0	0	0	0	0	0	0
Proposed USFS SUA Areas	New Disturbance	0	0	11.7	0	36.8 (18.3**)	0	48.5 (30.0**)	0
	Re-disturbance	0	0	0	0	0	0	0	0
Proposed Minerals	New Disturbance	0	0	0	0	10.1	0	10.1	0
Material Area	Re-disturbance	0	0	0	0	0	0	0	0
Split Estate Lands	New Disturbance	0	0	0	8.4	0	97.4	0	105.8
– Off Lease	Re-disturbance	0	0	0	0	0	0	0	0
Disturbance Totals**	Total New Disturbance	204.4	94.3	37.5	30.7	161.2	196.6	403.1	321.6
	Total Re-disturbance	3.7	0	27.3	0	93.1	0	124.1	0
	Sub-Totals – Federal and Split Estate Disturbance	208.1	94.3	64.8	30.7	254.3	196.6	527.2	321.6
Total by Disturbance Type		302.4		95.5		450.9		848.8	

* All areas outside pits and roads; includes Panel B additional backfill, settling ponds and ditches, topsoil stockpiles, borrow areas, dewatering pipeline, and disturbance associated with the power line relocation. Although it is unlikely that the entire area classified as Miscellaneous would ultimately be disturbed, including the entire area as potentially being disturbed would provide the needed flexibility during development of the miscellaneous components and potential future laybacks.

** Actual proposed SUAs based upon disturbance footprint only; see also **Table 2.4-1** for a break-out by feature.

2.5 ENVIRONMENTAL PROTECTION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Simplot would update their existing Comprehensive Environmental Monitoring Program Plan (CEMPP) to include the Project as necessary, to continue providing a level of environmental protection that would meet or exceed applicable regulations. Further, Simplot's M&RP (Simplot 2015) includes the following applicable environmental protection measures (EPMs) (including monitoring), described by resource below. Other EPMs and their sources are also described and are already, or would be, adopted by Simplot.

2.5.1 Cultural Resources (including Paleontological Resources)

Monitoring the protection of any potential cultural and paleontological resources on NFS lands identified through baseline surveys and concurrence with the appropriate agencies would be continued for the Project. 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. (M&RP 2015)

2.5.2 Air Quality

On-site emissions (composed principally of dust emissions from the mining operations) associated with mining the East Smoky Panel pit would be covered by the current air permit held by the Smoky Canyon Mine. Simplot would comply with the permit as required by IDEQ and would apply for any permit amendments, as determined necessary by IDEQ. (M&RP 2015)

Simplot would continue appropriate BMP's to address dust concerns, primarily by watering and/or applying magnesium chloride as appropriate to the haul and access roads as necessary. (M&RP 2015)

2.5.3 Soil

Salvaging topsoil and vegetation growth medium from disturbed areas prior to mining would occur to support long-term reclamation success. Topsoil would be removed and either direct-hauled to re-graded surfaces ready to receive topsoil or placed in topsoil stockpiles for temporary storage. (M&RP 2015)

Reuse of topsoil would follow the selenium guidelines published by the USFS. Environmental staff would inspect areas shortly after they are topsoiled to ensure coverage with topsoil thickness of at least six (6) to twelve (12)-inches. (M&RP 2015)

Stable reclaimed areas would be promoted through the use of stabilization techniques such as: placement of soil on slopes that are 3h:1v or less; scarifying soil surfaces to reduce runoff; seedbed preparation to enhance the germination rate of seeds; incorporation of fertilizer and other methods to enhance successful growth of vegetation; and/or redirection of run-on/run-off. (M&RP 2015)

Low permeability layers of soil or shale in foundations of overburden disposal area slopes would be modified or removed to avoid the perching of water to prevent seeps at the face of these sites. Low permeability horizons in topsoil and subsoil under specific areas of overburden fills would be removed during topsoil stripping. (M&RP 2015)

Soil stockpiles would be protected from erosion by seeding and establishment of short-term vegetation cover. (BLM 2010c)

2.5.4 Vegetation

Reclamation activities (**Section 2.4.11**) are designed to: limit any potential impacts to the environment; re-establish the natural drainage patterns; and return the land to its original pre-mining multiple uses on public land such as recreation, livestock grazing and wildlife habitat. Success would be demonstrated as required on NFS land. (M&RP 2015)

Reclamation of disturbed areas that are no longer needed for active mining operations would be conducted concurrent with other mining operations. Revegetation of disturbed slopes reduces run-off quantity and velocity that would otherwise contribute to runoff volumes. As soon as practicable, disturbed areas would be graded, topsoiled, and reseeded with techniques and with a seed mix that are acceptable to the USFS. (M&RP 2015)

Pit backfilling in East Smoky Panel would allow these areas to be revegetated and support the post-mining land use. (M&RP 2015)

Livestock grazing in reclaimed areas would be controlled until the reclaimed areas have become stabilized and are deemed ready for grazing by Simplot and the USFS. (M&RP 2015)

Timber would be cruised by the USFS and then harvested from proposed disturbance areas as directed by the USFS. Simplot would purchase the timber at the market value appraised at the time of harvest. (USFS Interdisciplinary Team [IDT])

Small brush and slash would be incorporated in the topsoil when it is salvaged. (BLM 2010c)

Seeding would proceed no later than the first fall after earthwork is complete. (BLM 2010c)

In order to control and prevent the spread of noxious weeds, Simplot would comply with its existing noxious weed program (M&RP 2015). Body and undercarriage of all off-road vehicles would be examined and cleaned prior to leaving weed invested areas (BLM 2010c). Only certified weed-free seed, mulch, straw bales would be used (BLM 2010c).

2.5.5 Surface and Groundwater

Simplot would continue to follow BMPs (M&RP 2015) in the CEMPP to minimize and/or prevent impact to water resources for the Project that include:

- Final grading should be completed as soon as possible following overburden disposal to a maximum 3h:1v slope to reduce surface water run-off velocity.

- Haul roads would be graded away from fill slopes, or crowned, so that concentrated flow is not allowed to run along or across and erode the roads. Berms would be maintained to prevent run-off. Appropriately located rolling dips, water bars, and water deflectors may also be used to reduce erosion of the road surface or road base.

- Construction of Fills for Roads and Facilities - Fills, road, or parking areas should be constructed of chert or other low seleniferous material and designed with stable slopes. Slopes with topsoil should have temporary vegetation.

- Man-made accumulations of additional snow on active external overburden areas would be avoided, to the extent practicable, by disposing of snow that is picked up for any purpose in designated areas where the snow and snow melt would not be incorporated into an active overburden disposal facility. Snow disposal areas should be located where snow-melt would flow to sediment control ponds or open pits to prevent sediment being released outside run-off control areas.

- To minimize selenium in runoff, reclamation would include covering seleniferous overburden with a low seleniferous material prior to topsoiling.

- Chert riprap may be placed in areas subject to erosion, such as below culverts, drainage outlets and ditches thereby reducing erosion and sedimentation. Gabion walls made of chert may also be selectively used to protect road fills from erosion by flowing water.

- Drainage and diversion channels would be constructed as necessary to divert run-on water around disturbance areas and collect runoff from disturbed area to route it to settling ponds and other sediment control features. Ditches would be excavated with a berm placed on the downhill side of the ditch and would pass the 100-year, 24-hour storm event without damage or erosion.

- Where a drainage channel must be permanently routed over overburden fills, if it erodes into underlying overburden, any seepage could enter the underlying overburden and potentially leach COPCs. These channels would be designed to be stable without damage for the peak flow from the 100-year, 24-hour storm on top of snowmelt. A clay liner would be installed under the channel or the overburden directly underlying the channel bottom, and chert or other low seleniferous overburden would be placed for a distance of 50 feet on either side of the channel. The channel would be protected from erosion with chert riprap. An HDPE plastic liner could also be used.

- Sediment traps, silt fences, catch basins, and sediment settling ponds would be used to reduce runoff velocity of flowing water sediments settle out in a controlled manner. To the extent possible, these features would not be located on seleniferous overburden.

- Stormwater ponds would primarily be located on the Dinwoody or Salt Lake Formation. They would be designed to contain the runoff and sediment from the 100-year, 24-hour storm event.

- A preventive maintenance program would be implemented to ensure that stormwater control facilities are clean and operating effectively and that the design capacity is maintained. As identified during bi-monthly inspections, ponds may be scheduled for removal of sediments and/or water, earthwork to repair berms, ditches, or outflow structures, etc. Further, should these inspections note that unintended types of maintenance wastes, vehicle fluids, or any other non-storm waters have entered ponds, removal would be scheduled immediately.

- Permanent placement of seleniferous overburden material in perennial channels would be avoided when possible, but crossing drainages with temporary road fills is required to access the mining areas. These crossings would be built from chert and designed so they can be reshaped during reclamation to resemble the surrounding area.

- Ephemeral channels that cross proposed mine disturbance would be collected and diverted in ditches around the active mining area. Permanent placement of seleniferous overburden material in ephemeral drainages would also be avoided to the extent practicable. Road crossings would be built from low seleniferous material and designed so they can be reshaped to resemble the surrounding area.

- Seleniferous overburden would be placed in approved pit backfills and then capped with low seleniferous materials. (For the purpose of proper application of these BMPs, Simplot considers all shale overburden from the stratigraphic interval extending from the Hanging Wall Mudstone to the Fish scale Shale to be seleniferous overburden.)

Simplot would continue the comprehensive ground and surface water monitoring program, expanding the program as needed to adequately cover the Project Area. (M&RP 2015)

Simplot would continue to use baseline surface and groundwater monitoring data as a basis of comparison to document the effectiveness of site specific mitigation measures and BMPs employed during active mining as well as long-term protections of water resources in the Project Area. (M&RP 2015)

Preliminary designs for retention ponds and run-on control ditches have been developed and a comprehensive management plan would be developed contingent upon the final approval of the operations plan. These would also be incorporated into the SWPPP. The stormwater monitoring required by the stormwater permit would occur and Simplot would meet all additional requirements for storm-event-related surface water monitoring. (M&RP 2015)

Simplot would evaluate and update its current SPCC Plan as needed. It would be implemented prior to placement of the petroleum products on-site and would be reviewed every three years, amended as needed, and certified that it has been developed in accordance with good engineering practices and meets applicable standards. (M&RP 2015)

2.5.6 Wildlife and Aquatics

Monitoring and evaluation of the potential effect of the mining operation on wildlife and their habitat on NFS lands would continue. (M&RP 2015)

Any incident involving big game and mining equipment would be reported to Idaho Department of Fish and Game (IDFG). (M&RP 2015)

Long-term monitoring of fisheries and aquatic resources would be done as needed contingent upon mining approval. (M&RP 2015)

Biological surveys for migratory birds, raptors, or other special status bird species would be conducted between March 1 through August 31 in areas planned for disturbance to identify any active nests for bird species. If active nests are discovered during surveys, avoidance plans would be developed as necessary before these areas are disturbed. (USFS IDT; compliance with the Migratory Bird Treaty Act)

Power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching. (BLM 2010c)

2.6 ALTERNATIVES TO THE PROPOSED ACTION

2.6.1 Alternative 1 - Reduced Pit Shell with Soil-only Cover

2.6.1.1 Mining and Overburden

Under Alternative 1, the overall mining operations, mining sequences (Phases 1-7), associated stormwater controls, and other associated miscellaneous disturbances would remain the same as described for the Proposed Action. The general Project Area would also remain the same. However, the ultimate pit shell footprint would be reduced by approximately 78 acres compared to the Proposed Action (**Figure 2.6-1** and **Figure 2.6-2**).

The reduction in area results from the steeper pit wall slopes that would be used under Alternative 1 to reduce mining the cherty shale that contains a high concentration of seleniferous material (**Figure 2.6-3**). A geotechnical study (CNI 2017) determined that these steeper pit wall slope angles would maintain appropriate factors of safety. The specific slope would vary in different geologic formations and structures.

The steeper pit wall slopes would generate less overburden (approximately 8 million BCY less compared to the Proposed Action). Further, no cherty shale material would be encountered with this alternative mining plan, due to the reduced pit footprint, as depicted in **Figure 2.6.3**. Any additional disturbances resulting from unanticipated slope instability requiring potential laybacks are accounted for by the conservatively-sized miscellaneous disturbance areas shown on **Figure 2.6-2**. In order to maximize the tonnage of ore that can be economically and safely recovered with Alternative 1, much of the pit would be mined to a lower elevation (i.e., deeper) than with the Proposed Action. This means that groundwater would likely be intercepted during mining of the lower benches associated with Phases 6 and 7, rather than just during Phase 7 mining as projected under the Proposed Action. If groundwater enters the mine pit, it would be directed to a sump within the pit and pumped to the tailings pond. As under the Proposed Action, the potential dewatering pipe and pump system would be located on Simplot-owned property.

The overburden mined initially would be placed in Panel B, eliminating the need for an external overburden disposal area, which is the same as under the Proposed Action. As with the Proposed Action, not all of the miscellaneous disturbance areas depicted would be likely to be disturbed (**Figure 2.6-2**).

2.6.1.2 Lease Modification and RFP Amendment

The proposed lease modification and RFP amendment described for the Proposed Action would be the same under Alternative 1.

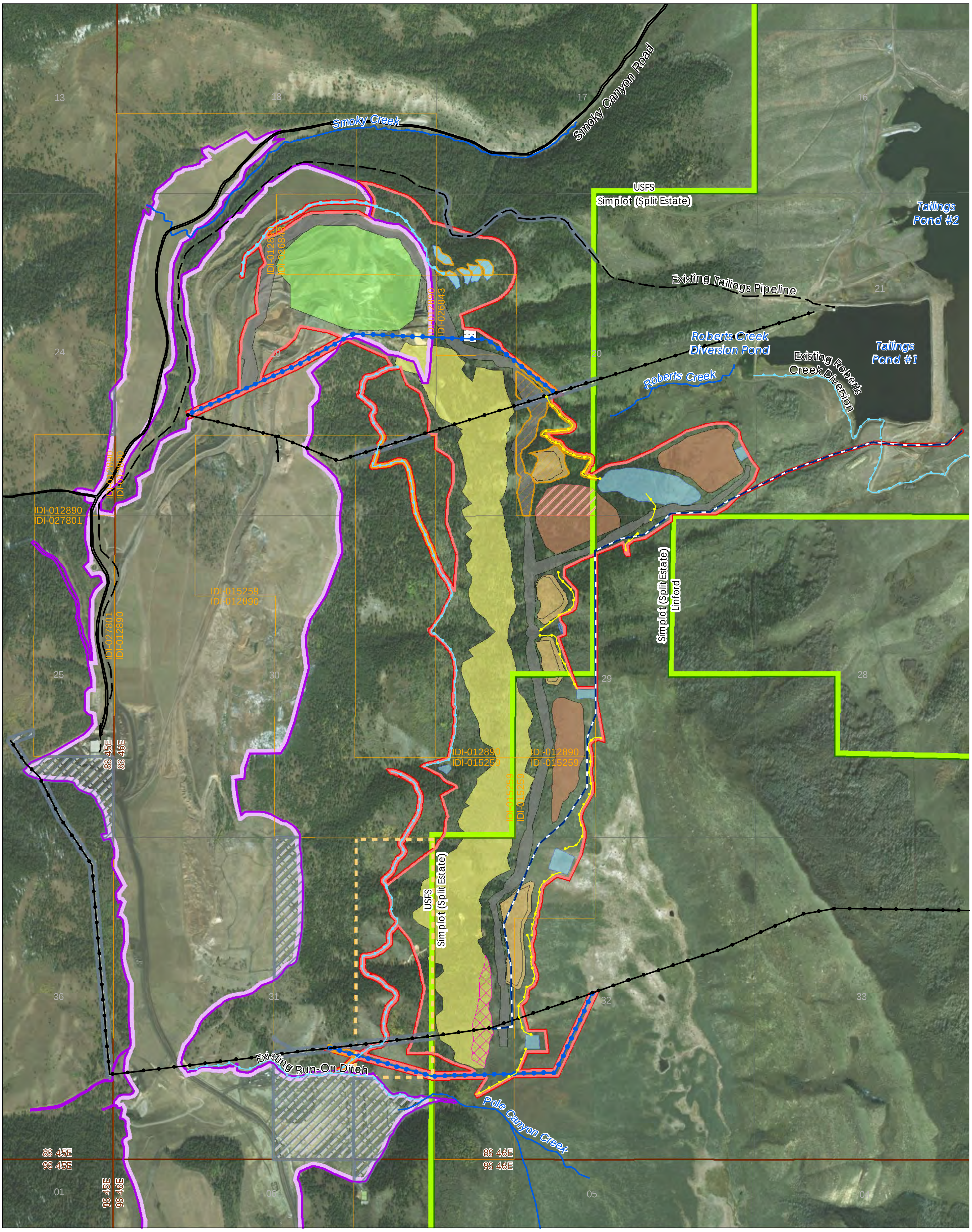
2.6.1.3 SUAs

Under Alternative 1, the proposed SUAs would be the same as described under the Proposed Action (**Figure 2.6-1**).

2.6.1.4 Backfilling and Reclamation

All 224 acres of the reduced East Smoky Panel pit under this alternative would receive a topsoil cover (**Figure 2.6-4**). Not encountering the cherty shale under Alternative 1 would reduce the seleniferous nature of the combined overburden materials, so the Proposed Action's geologic store and release cover would not be needed. However, final reclamation contours for the reduced East Smoky Panel pit would differ only minimally from the Proposed Action (**Figure 2.6-4** and **Figure 2.6-5**). The approximately 9-acre unreclaimed pit highwall area associated with this alternative would generally be situated in the same location as the Proposed Action, though it would be somewhat smaller. The reclamation seed mix for the Proposed Action would be used, in addition to potentially adding some shrub and tree species since the potential for selenium uptake by plant species under Alternative 1 would be greatly reduced.

As described earlier, overburden mined initially would be placed in Panel B, however, unlike for the Proposed Action, the currently approved cover for Panel B would be used under this alternative as described in **Section 2.4.11.2** (**Figure 2.6-4**) because the source term from the Project was much lower than anticipated, thus a more restrictive cover was deemed unnecessary. Further, since Panel B is currently under CERCLA action and ongoing studies and monitoring are continuing, a decision on whether a more restrictive cover will be required would be made under that program.



Legend

- Proposed Dewatering Pipeline
- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Run-On Diversion Ditch
- Run-Off Diversion Ditch
- Existing Tailings Pipeline
- Township Boundary
- Section Boundary
- Project Area Boundary
- Surface Ownership Boundary
- Existing Disturbance Boundary
- Proposed Lease Modification Area
- Existing Lease Boundary
- Existing Special Use Authorization (SUA)
- Proposed Special Use Authorization (SUA)
- Proposed Mineral Materials Permit Area

Mine Components

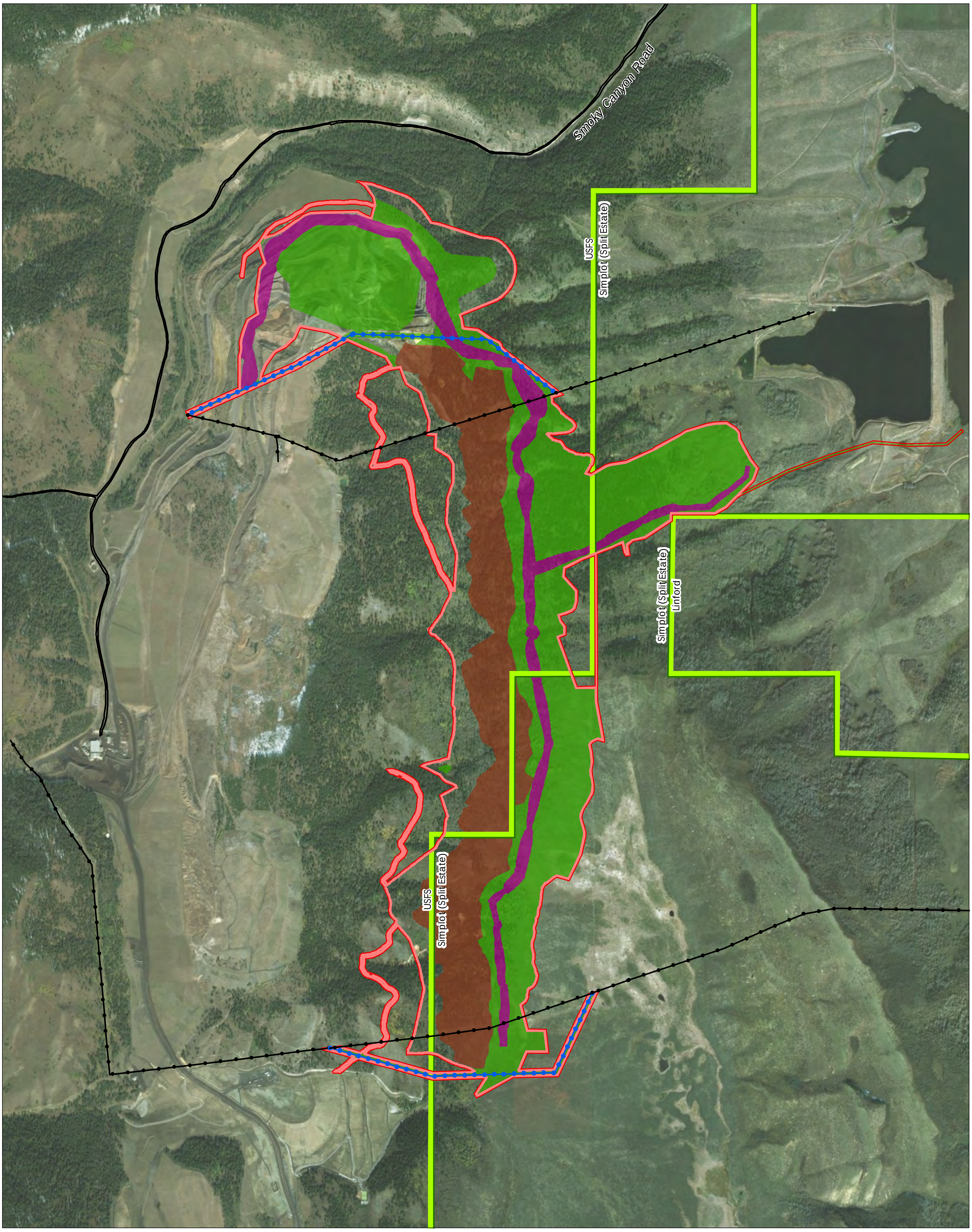
- Haul Road
- Borrow Pit
- Panel B Additional Backfill Area
- Pit
- Stormwater Pond
- Topsoil Stockpile
- Unreclaimed High Wall
- Lube Car

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 1,500 3,000
Feet
1:20,000 (at original document size of 11x17)
N

Figure 2.6-1
Alternative 1 Components
East Smoky Panel Mine EIS



Legend

- Existing Overhead Power Line
- Overhead Power Line Proposed Re-route
- Road
- Project Area Boundary
- Surface Ownership Boundary

Disturbance Category

- Haul Road
- Miscellaneous Disturbance (see Figure 2.6-1)
- Pit

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1,500 3,000
Feet
1:20,000 (at original document size of 11x17)
N

Figure 2.6-2
Alternative 1 Components - Combined
East Smoky Panel Mine EIS

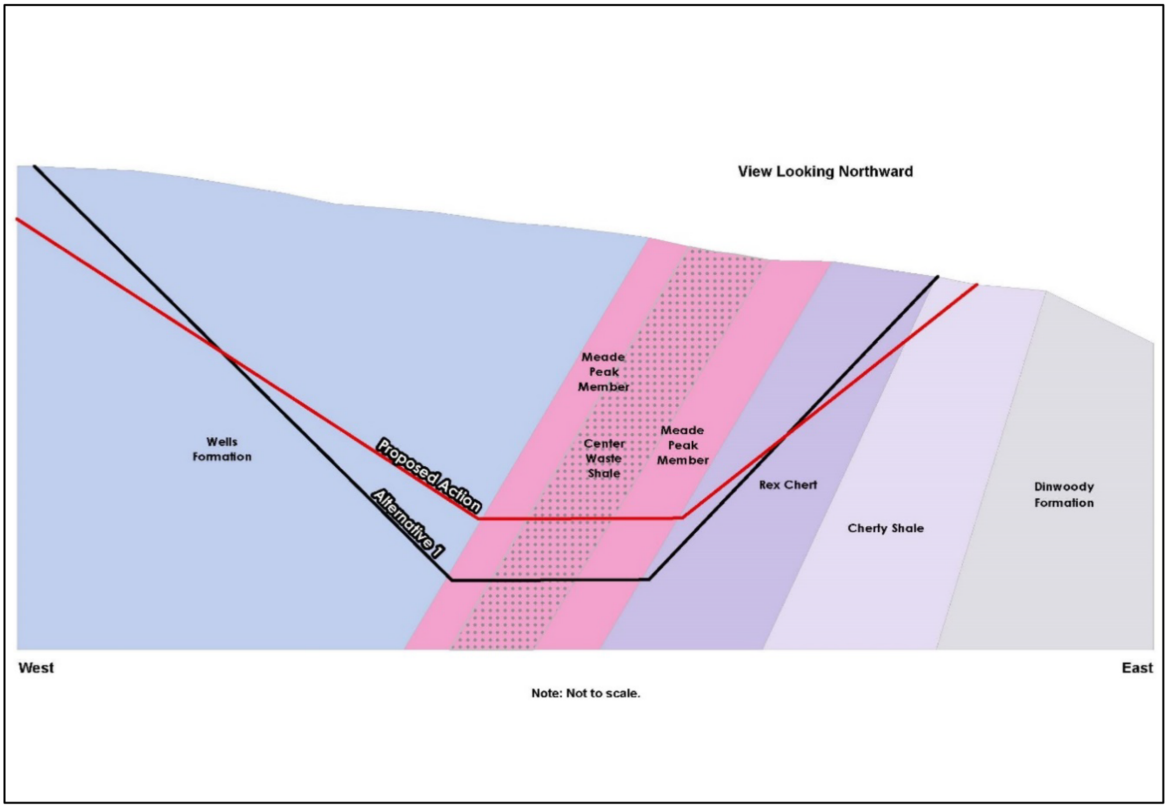
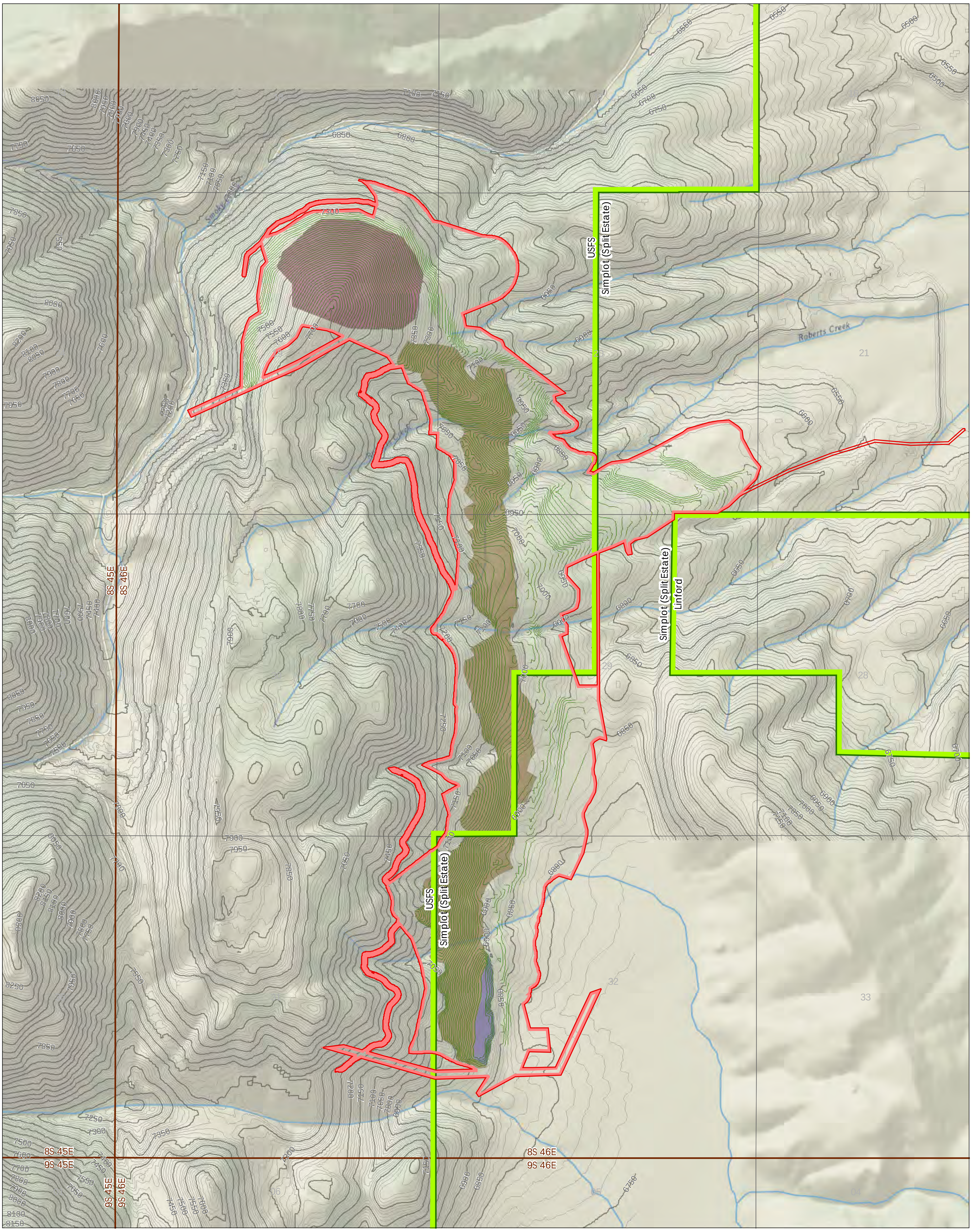


Figure 2.6-3 Idealized Cross Section of Alternative 1 vs. Proposed Action



Legend

- Drainage
- Project Area Boundary
- Township Boundary
- Section Boundary
- Surface Ownership Boundary

Final Configuration Mine Components

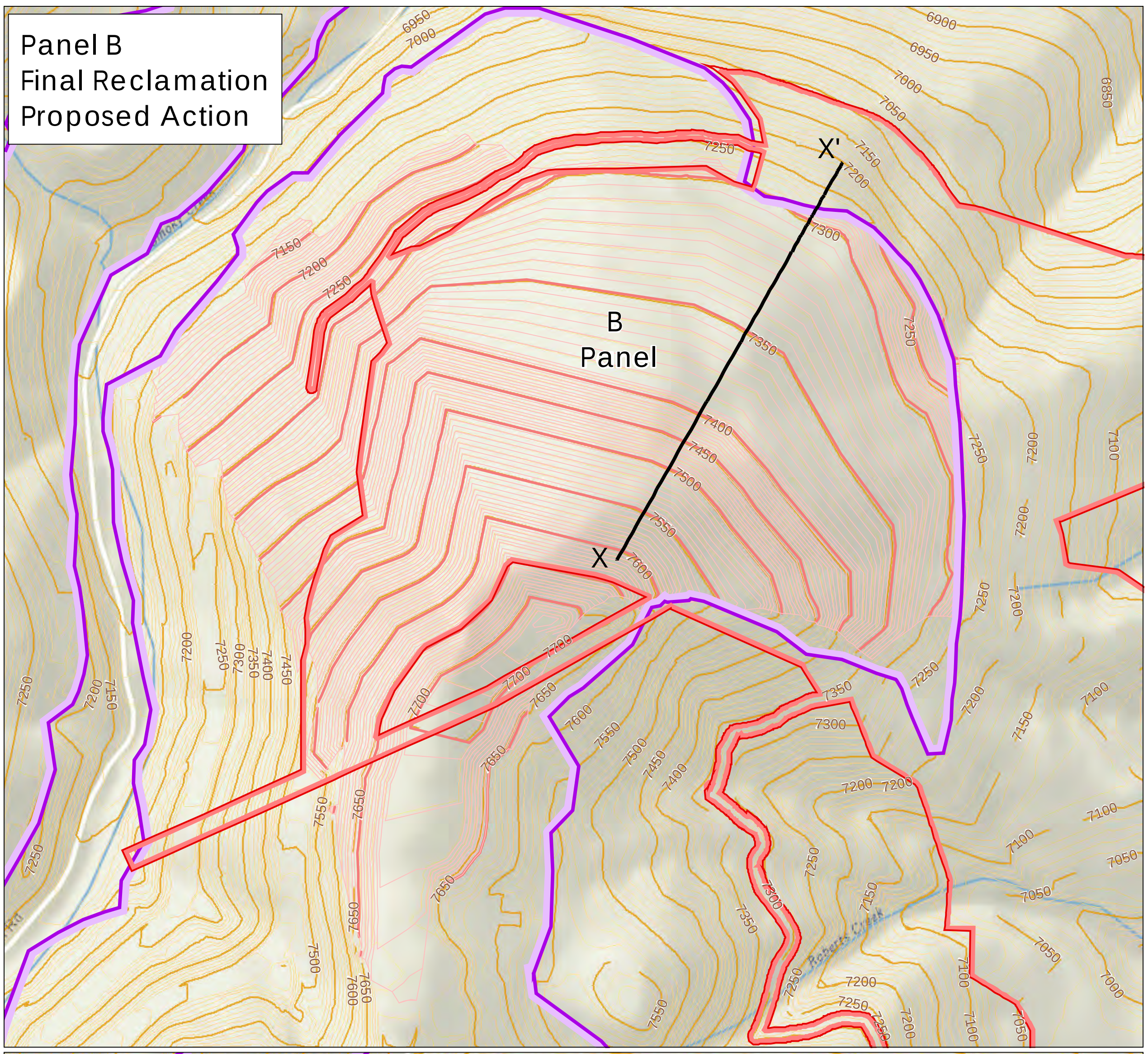
- Currently Approved Chert Cap
- Non-Seleniferous Waste, Topsoil-only Cover
- Unreclaimed High Wall Disturbance

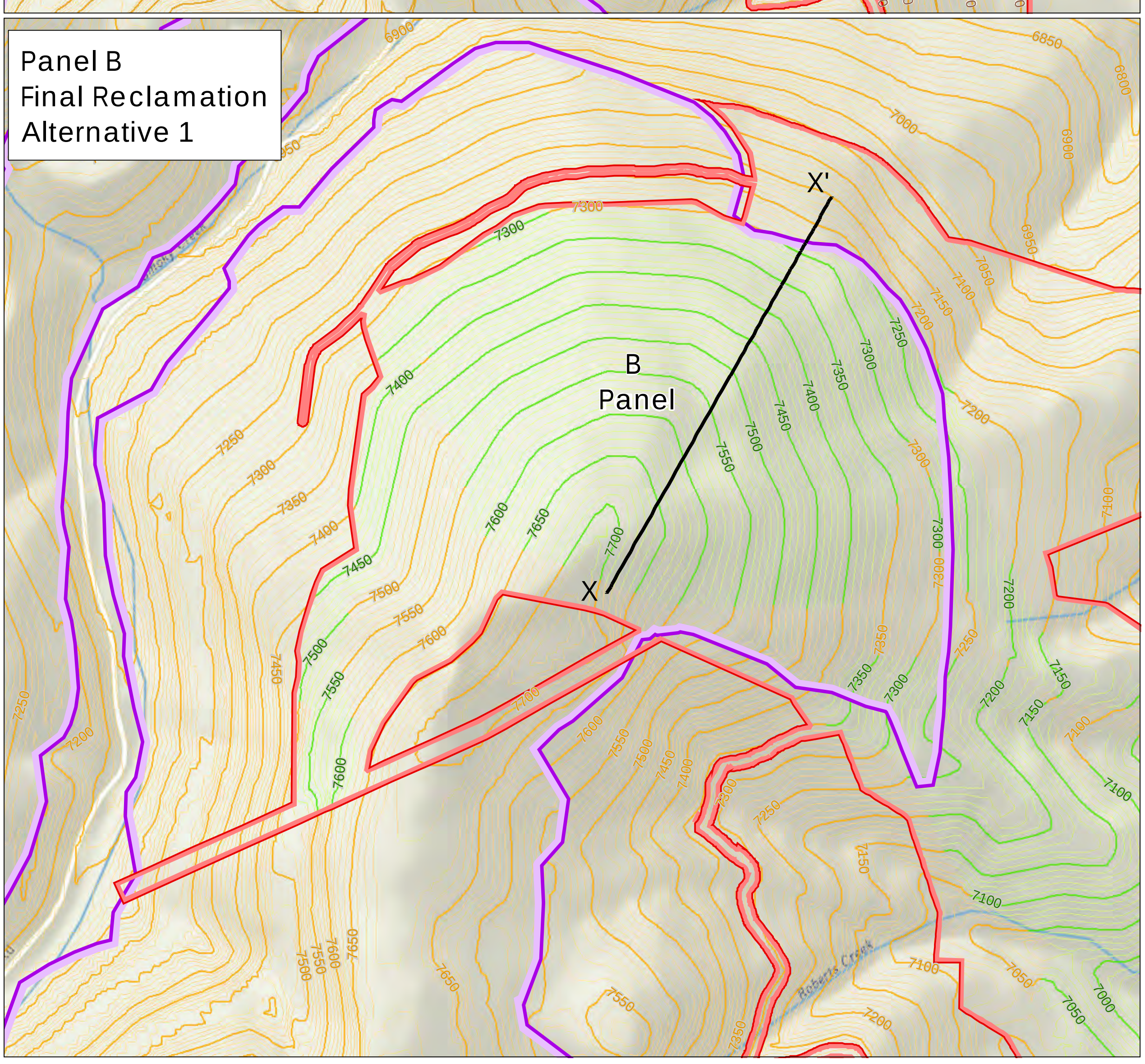
- 10 ft Existing Contour
- 50 ft Existing Contour
- 10 ft Final Reclamation Contour

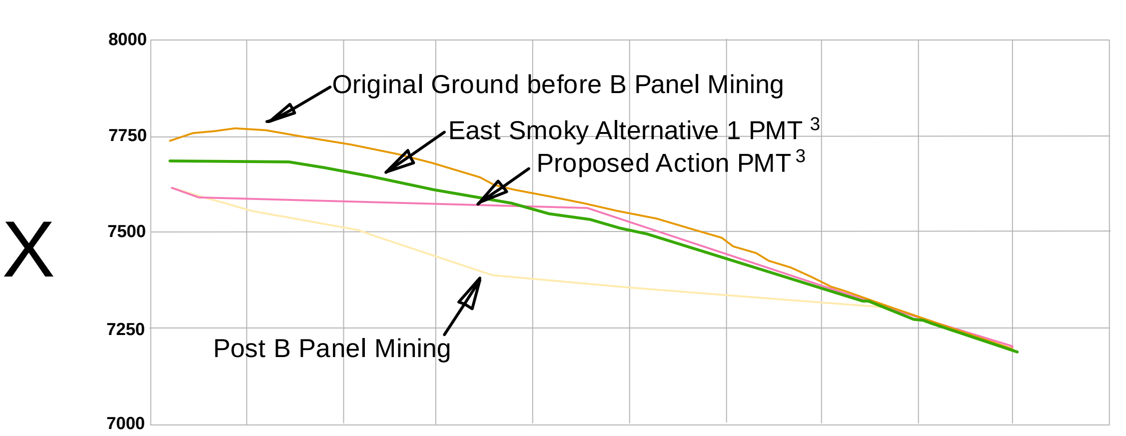
Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1,500 3,000
Feet
1:20,000 (at original document size of 11x17)
N

Figure 2.6-4
Alternative 1 Final Configuration and Reclamation Pit Covers
East Smoky Panel Mine EIS





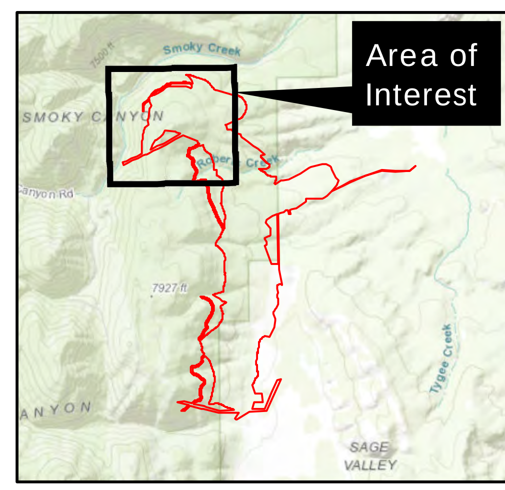


Legend

- Cross Section (X - X')
- Project Area Boundary
- Existing Disturbance Boundary

Final Reclamation Contours

- 10 ft Proposed Action Contours
- 50 ft Proposed Action Contours
- 10 ft Alternative 1 Contours
- 50 ft Alternative 1 Contours
- 10 ft Existing Contours
- 50 ft Existing Contours



Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
3. PMT: Post Mining Topography

0 500 1,000 1,500
Feet
1:10,000 (at original document size of 11x17)

N

Figure 2.6-5
Panel B Final Reclamation Contours
Proposed Action and Alternative 1
East Smoky Panel Mine EIS

2.6.2 No Action Alternative

Under the No Action Alternative, the proposed M&RP for development of the East Smoky Panel Mine area and proposed SUAs would not be approved, existing Federal mineral leases would not be modified, the CNF RFP would not be amended, and mining at other panels of the Smoky Canyon Mine would continue as currently authorized. Mining in Panel B would proceed as currently planned by Simplot and authorized by the BLM. Simplot would retain and be eligible to invoke the mining rights granted in their existing federal leases at another time, with a revised M&RP that meets all regulatory and other established requirements.

2.6.3 Alternatives Eliminated from Detailed Analysis

This section describes alternatives to the Proposed Action for the Project that will not be analyzed in detail in this EIS because they: 1) do not meet the purpose and need so are ineffective; 2) are not technically practical and feasible to implement; 3) are not economically practical and reasonable; 4) would be similar in design to an alternative already analyzed; or 5) would have substantially similar effects to an alternative already analyzed.

2.6.3.1 No Issuance of a Lease Modification

This alternative addresses the public scoping comment to evaluate alternatives that reduce the disturbance footprint of the Project. This alternative would use the same basic mine plan as the Proposed Action, but would limit ore extraction to only those areas within existing lease boundaries; a lease modification would not be issued. This alternative would reduce total disturbance by approximately 9 percent compared to the Proposed Action; however, total ore recovered would be reduced by 14.5 percent compared to the Proposed Action.

Not issuing a lease modification would not be consistent with Simplot's objective for the Project nor BLM's regulations for full recovery of the resource because it would not allow for maximum development of the phosphate resource on leases held by the company. Pit layback would be limited to the existing lease boundary, precluding extraction of phosphate within the current lease boundary.

Not issuing a lease modification would not be technically practical and feasible because the on-lease ore left behind upon conclusion of mining of the East Smoky Panel would be isolated and would not be technically practical or feasible to mine as reclamation may preclude future recovery. Further, not issuing a lease modification would not be economically practical and feasible because the isolated remaining deposit of on-lease ore left behind upon conclusion of mining of the East Smoky Panel would be a quantity that would not be economically recoverable without being mined in conjunction with other off-lease ore. In addition, it is not economically practical to forego recovery of 14.5 percent of the phosphate ore to avoid a 9 percent increase in disturbance. The amount of ore that could be recovered is proportionally higher than the additional disturbance.

Not issuing a lease modification would not be environmentally reasonable because reducing the amount of ore recovered from the East Smoky Panel would only result in the need to mine other leases in the region at an earlier date. Further, there are not any special environmental values, concerns, or potential impacts known in the proposed lease modification area; therefore, recovering ore from this parcel would be less environmentally impactful than future proposals where such environmental values of concern may be more likely to occur.

Because the alternative to not issue a lease modification would not be consistent with Simplot's objectives for the Project, the BLM's regulations for full recovery of the resource, would not be technically or economically practical and feasible, and would not be environmentally reasonable, it was eliminated from further analysis.

2.6.3.2 External Overburden Disposal Area on Private Property

This alternative would involve the development of an off-lease and off-NFS lands seleniferous ODA on adjacent Simplot private property, instead of placing seleniferous overburden in Panel B and the East Smoky Panel, as proposed as a part of the Proposed Action. Development of an external ODA would be consistent with Simplot's objective for the Project; would be technically practical and feasible; and there are no known economic factors associated with the East Smoky Panel that would render this alternative infeasible. However, development of an external ODA would not be environmentally reasonable because additional capacity exists in the Panel B pit (a pit in active development and currently receiving overburden) under Alternative 1 for disposal of additional overburden. Development of external ODA(s) to receive Project overburden would increase the disturbance and seleniferous footprint of the mine unnecessarily. Further, the application of additional overburden to the Panel B disturbed site would be environmentally advantageous by bringing the final topographic configuration of that area closer to the original topography.

In addition, the underlying geology of the areas potentially suitable for an ODA on private property is alluvium and Salt Lake Formation, which could result in seleniferous seeps developing at the boundary of the ODA, causing a potentially long-term surface expression of drainage water that could have high concentrations of COPCs. Topographically it would not be possible to situate this ODA so any drainage would drain back into the mined out panel because the intent behind this alternative would be to place seleniferous overburden on top of areas underlain by relatively impervious Salt Lake Formation clay. In reviewing other adjacent areas that are underlain by the Salt Lake Formation, the topography is too steep to accommodate significant quantities of waste. The slopes of these areas trend down gradient toward Sage Valley alluvial gravels, where any seeps would run into the alluvial gravel rather than into the pit backfill. Because an external ODA on private property would not be environmentally reasonable, this alternative was eliminated from further analysis.

2.6.3.3 Mine Sequencing – South to North

This alternative would involve sequencing mining of the East Smoky Panel from south to north (as opposed to the Proposed Action, which sequences mining from north to south). Upon completion of mining of the East Smoky Panel, a portion of the pit and mine highwall would remain unreclaimed on NFS land since mining would end in the northern portion of the pit all situated on NFS land. This alternative assumes the total unreclaimed acreage would be the same regardless of mining sequence (north to south or south to north). Sequencing mining from south to north would be consistent with Simplot's objective for the Project; and would be equally technically practical and feasible as mining north to south under the Proposed Action by allowing for development of the phosphate resource on leases held by the company. Mining from south to north would require hauling overburden from the very southern end of the proposed East Smoky Panel to Panel B in the early phases of the mine. This would require the full length of the haul road to be constructed in Phase I of the Project, which would result in extremely high costs in the early phases of mining East Smoky Panel. In addition, fully reclaiming Simplot's private property, in the south portion of the pit, would improve the long-term economic value of the property, while the long-term economic value of the NFS lands containing the un-reclaimed portion of the mine would be reduced. There would be no known difference in overall environmental impacts between this alternative and the Proposed Action; the only difference would be the location of the un-reclaimed portion of the mine. Because there would be no overarching technical, economical, or environmental advantage to sequencing mining from south to north as opposed to north to south, and because NFS lands would bear greater long-term adverse impacts of a south or north sequence, this alternative was eliminated from further analysis.

2.6.3.4 Low (No Meade Peak Member Material) Seleniferous Overburden Backfill in the East Smoky Panel

Under this alternative, the lease modification, SUAs, and RFP amendment described for the Proposed Action would apply. The proposed stripping of overburden and mining of phosphate ore in the East Smoky Panel would also be the same as described for the Proposed Action. However, the Project Area would be expanded to include the existing and approved Panel B ODA and the existing access road to the ODA because all overburden from the Meade Peak Member from the East Smoky Panel pit would be placed in the Panel B pit. In order to make room for the East Smoky Panel seleniferous overburden in the Panel B pit, approximately 70 percent of the remaining overburden that is left to be mined from Panel B would be placed in the currently permitted Panel B external ODA, resulting in a bigger footprint for this ODA beyond its current configuration, but not beyond the currently permitted disturbance boundary. The currently approved Panel B RRAs would remain, and in addition a geologic store and release cover would be used atop the seleniferous materials placed in Panel B.

All other overburden (low seleniferous material), not from the Meade Peak Member, would be placed in the East Smoky Panel pit as described under the Proposed Action. The acreage of disturbance in the Project would be the same as the Proposed Action under this alternative, but the seleniferous footprint would be smaller because the seleniferous material removed from the East Smoky Panel would instead be all placed in the Panel B pit.

Based upon preliminary infiltration, geochemical, and groundwater modeling and evaluations, it was determined that this alternative would not have an overall measurable positive effect on resultant groundwater chemistry compared to the Proposed Action due to the low chemical concentrations and associated source terms, thus, this alternative was eliminated from further consideration.

2.6.3.5 No East Smoky Panel Overburden Used to Backfill Panel B

Under this alternative, all overburden from the East Smoky Panel would be used to backfill the East Smoky Panel pit; unlike the Proposed Action or Alternative 1, no overburden would be used to backfill Panel B. This alternative would require that initial overburden removed from the East Smoky Panel be temporarily stored elsewhere and returned to East Smoky Panel for backfill at a later date. Using all East Smoky Panel overburden for the East Smoky Panel pit backfill would be consistent with Simplot's objective for the Project by allowing for development of the phosphate resource on leases held by the company and environmentally it would be indistinguishable from the Proposed Action, with the exception that the contours of the Panel B pit backfill area under the Proposed Action would not be elevated closer to pre-mining topography. It would be technically feasible, although it would not be technically practical as it would require the greatest amount of re-handle of overburden of all alternatives, which would not be practical if other alternatives require less re-handle.

In order to use all East Smoky Panel overburden to backfill the East Smoky Panel pit, the initial overburden stripped from the East Smoky Panel would need to be stored then eventually returned to backfill the East Smoky Panel pit, which would increase the cost of the operation. While this operation would be economically feasible, it would not be economically practical because there is sufficient space to dispose of the overburden in the Panel B pit and avoid incurring the additional cost of rehandling. Since this alternative would not be technically or economically practical, it was not carried forward for detailed analysis in the EIS.

2.6.3.6 Reduced Pit Design to Eliminate Relocation of Utility Corridor/Forest Plan Amendment

This alternative would reduce the southern pit footprint of the East Smoky Panel, eliminating the need to move the existing power line and associated designated utility corridor, which would eliminate the need for a RFP amendment. Reduction of the size of the pit (by approximately 13 acres), and thus the seleniferous footprint and the disturbance area associated with the Project would be environmentally reasonable. However, reducing the size of the East Smoky Panel pit to avoid the power line relocation and RFP amendment would result in the loss of approximately 100,000 tons of ore (a 1.4 percent reduction). This alternative would not be consistent with the purpose and need for the Project because under this alternative Simplot would be prohibited from recovering ore in the southern portion of the Project Area where they hold the lease for the phosphate resource. Reducing the size of the pit footprint to avoid relocating the existing transmission line, utility corridor, and an RFP amendment would be technically practical and feasible. From a safety standpoint if the power line was left in place, by the Mine Safety and Health Administration (MSHA) rules, clearances of at least 18 feet with haulage and excavation equipment is a concern. Generally, a clearance of 40 feet away from an active mining operation is maintained due to moisture in the air (i.e. rain, fog or mist), which pose safety risks to personnel with increased conductivity of the air and reduced visibility conditions. Although there are mitigating methods which add cost, flyrock from blasting also poses risks to transmission line conductors/wires and support structures. The ore under the transmission line and within the clearance areas would not be recovered. Reducing the amount of ore taken from the East Smoky Panel could impact the economic viability of the Project. Because this alternative would not be consistent with the purpose and need for the Project and may not be economically practical and feasible, this alternative was eliminated from further analysis.

2.6.3.7 Not Mining below the Water Table

Currently, the Proposed Action anticipates that mining in the south end of the East Smoky Panel pit would potentially need to occur below the existing water level for a short duration (1 to 2 weeks) of time, thus requiring dewatering of the pit in this area. If actually required, dewatering would consist of a dewatering pipeline that would carry the pit water through a pipeline north to the tailings pond. This alternative would require shallower mining in the south end of the pit, so that the groundwater would not be intercepted and mining would not occur below the existing water level, thus no pit dewatering would be required. This alternative would not be consistent with the purpose and need for the Project because under this alternative Simplot would be prohibited from recovering ore in the southern portion of the Project Area where they hold the lease for the phosphate resource. Under this alternative, they would have to mine shallower in this area, so they would not need to dewater.

Not mining below the existing water table would be technically practical and feasible as dewatering has never occurred or been needed at the Smoky Canyon Mine in the past. Besides not requiring a pipeline to take the pit water to the tailings pond, in which there would be sufficient capacity, there would be no difference environmentally under this alternative compared to the Proposed Action. Although not mining below the water table would eliminate the need and costs associated with dewatering, it would reduce the amount of ore mined and recovered. Reducing the amount of ore taken from the East Smoky Panel could impact the economic viability of the Project. The magnitude of the economic impact would depend on the amount of ore that would not be recovered; however, the amount of ore estimated to be below the water table is estimated to be low.

In summary, not mining below the water table is estimated to result in a small amount of ore being unrecovered. However, that would also mean that, despite the fact that dewatering would be required for the life of the project once groundwater is encountered, because the amount of ore would be minor, the "life" of the project would be short-lived and the amount of water disposed of would be minimal. The alternative appears to be technically not consistent with the purpose and need and not economically practical. But if the estimated water table level is correct, effects would be minimal, likely rendering this alternative essentially the same as the Proposed Action. For these reasons, this alternative was eliminated from detailed analysis in the EIS.

2.6.3.8 Underground Mining

This alternative of using underground mining methods offers the potential benefit of eliminating the development of open pits and the associated overburden disposal issues. However, underground mining of phosphate ore has not been practiced in Southeastern Idaho or northeast Utah since 1976, and there are no underground phosphate mines currently operating in the United States, although one is now being proposed (the Paris Hills Phosphate Project in Bear Lake County, Idaho). Additionally, Simplot's entire operation is set up to conduct surface mining. Underground mining would require outlays of capital for all new machinery. Extensive retraining would be required or new hiring of professional, technical, and labor personnel; the number of personnel would need to increase; and the hazards to mining personnel would be greater in an underground mining situation. The economics of modern open pit mining practices, by using more cost-efficient mining methods and equipment, allows for increased recovery of the phosphate resource compared to underground methods.

In summary, underground mining has its own set of potential impacts that are not shared with open pit methods including:

- Potential long-term subsidence (caving) of ground over the mined out areas,
- Interception of groundwater in underground openings,
- Increased electrical power needs for mine ventilation and other equipment,
- Increased mining costs per ton of ore extracted, and
- Different safety considerations.

Therefore, this alternative was eliminated from further consideration because it is not considered to be economically feasible or practical and did not meet the Purpose and Need for continued economically viable development of federal phosphate resources.

2.6.3.9 Alternative Cover Systems

Preliminary groundwater modeling was used to determine whether alternative mitigative cover systems such as synthetic liners, or compacted clay barrier-type liners would be needed to reduce water quality impacts that are expected to occur from seleniferous overburden. Although synthetic or barrier-type cover systems would have lower infiltration than the covers in the Proposed Action or Alternative 1, such cover systems present challenges including technical construction difficulties, high costs to construct and maintain, and limitations on post-mining multiple uses. Based upon modeling results, the need for alternative cover systems was eliminated from further consideration once it was determined that the relatively simple cover systems of the Proposed Action and Alternative 1 are expected to sufficiently protect groundwater and surface water resources.

2.7 AGENCY PREFERRED ALTERNATIVE

Following their review of the environmental impacts as discussed in the DEIS, the BLM and USFS have identified Alternative 1: Reduced Pit Shell with Soil-only Cover as their Preferred Alternative for this Project because this alternative:

- Reduces the size of the proposed pit and new surface disturbance by approximately 78 acres.
- Increases the amount of overburden proposed to be placed in Panel B, returning the topography in this area back closer to original contours.
- Reduces the amount of unreclaimed highwall by approximately three acres.
- Eliminates mining the cherty shale material which would reduce the seleniferous nature of the combined overburden materials, resulting in a soil-only cover needing to be used.
- Reduces the amount of DSAYs under HEA by approximately 5,500.

The Agency Preferred Alternative would reasonably accomplish the purpose and need for the federal action, while giving consideration to environmental, economic, and technical factors.

2.8 SUMMARY COMPARISON OF ALTERNATIVES

Table 2.8-1 provides a tabular summary and comparison of impacts from the components of the Proposed Action, Alternative 1, and No Action Alternative.

Table 2.8-1 Alternative Comparison and Impact Summary

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Project Component Acreages			
New SUA Acreage	30	30	0
Acreage within Lease Modification	43	9	0
Split Estate Lands – Off lease Acreage New Disturbance	322	314	0
NFS Land Acreage New Disturbance	403	332	0
Total Redisturbance Acreage	124	124	0
Total New Disturbance Acreage	725	647	0
Total Overall Project Disturbance	849	771	0
Geology, Minerals, Topography, and Paleontology			
Geology, Minerals, Topography, and Paleontology	Long term, major, local impact on geology and minerals from removal and rearrangement of geologic materials. Minor, long term, local impact to topography. Negligible impact to paleontological resources.	Similar and/or somewhat improved as Proposed Action.	The East Smoky Panel would not be mined, thus no potential effects to geology, minerals, and paleontology resources would occur. The Panel B pit topography would not be backfilled with overburden from the East Smoky Panel and brought back closer to original topography.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Air Resources			
Air Resources	The intensity of air emission impacts would be minor at the site-specific perspective and negligible at the local and regional perspective from the Proposed Action.	Same as Proposed Action.	The East Smoky Panel would not be mined, thus no air emissions from the Project would occur. Air emissions from ongoing mining activities would continue.
Climate Change			
Climate Change	The overall contribution to climate change would be long term and negligible.	Same as Proposed Action.	The East Smoky Panel would not be mined, thus no impacts to climate change from the Project would occur. Impacts to climate change from ongoing mining activities would continue.
Noise			
Noise	The noise effects would be short-term and negligible or minor at the closest sensitive receptor due to the distance from the mine.	Same as Proposed Action.	The East Smoky Panel would not be mined, thus no noise effects from the Project would occur. Current noise impacts to receptors from ongoing mining activities would continue.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Water Resources			
Water Resources	Groundwater: Negligible impacts to quantity or elevation in the Wells Formation aquifer. Changes in groundwater flow in alluvium and/or Salt Lake Formation across the fault could affect small springs east of the Project Area. Concentrations of manganese, sulfate, TDS, and selenium would be added to groundwater. Of these, only manganese would exceed a groundwater standard (secondary) at any of the four groundwater observation points. Surface Water: There would be some runoff reduction to small streams downgradient of the mine due to stormwater management during operations. There could be long term reduction in Roberts Creek and Tygee Creek flows due to spring disruption, which could affect some water rights. Concentrations of manganese, sulfate, TDS, and selenium that would be added to groundwater would appear at Hoopes Springs, but not at Lower South Fork Sage Creek Springs. Selenium added from the Proposed Action would not exceed the surface water criterion for aquatic life in Hoopes Spring and downstream waters, but when combined with the RI/FS-predicted Year 2050 selenium concentration it would.	Groundwater: Same as Proposed Action except that manganese would exceed the groundwater standard (secondary) by a much lesser amount. Surface Water: Same as the Proposed Action except selenium added from the Proposed Action would not exceed the surface water criterion for aquatic life in Hoopes Spring and downstream waters, but when combined with the RI/FS-predicted Year 2050 selenium concentration it would. The manganese and sulfate contribution to surface waters would be markedly less than under the Proposed Action.	The East Smoky Panel would not be mined, thus no additional effects to water resources from the Project beyond existing conditions would occur. Existing conditions would include continued exceedances of the chronic aquatic life criterion for selenium at Hoopes Spring, Lower Sage Creek, and Crow Creek. The Water Treatment Pilot Plant at Hoopes Spring and South Fork Sage Creek Springs would significantly reduce selenium levels in downstream waters.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Soils			
Soils	Approximately 725 acres of newly impacted soils; 12 acres left unreclaimed. Direct impacts to soils from mining and construction include physical and chemical changes; soil compaction; and decreased soil productivity Impacts would be minor and long-term.	Approximately 652 acres of newly impacted soils; 9 acres left unreclaimed. Besides an approximately 78-acre reduction in direct soil impacts, impacts would be the same as the Proposed Action.	The East Smoky Panel would not be mined, thus no impacts to soil resources from the Project beyond existing conditions would occur.
Vegetation			
Vegetation	Long-term direct impacts on approximately 725 acres due to changing species composition and community structure after reclamation; 12 acres left unreclaimed. Permanent loss of 521.4 acres of aspen or aspen mix and 61.6 acres of conifer habitat. There are no special status plant species in the Study Area. BMPs would be implemented to minimize the potential spread of noxious weed and effects would be short-term and minor.	Long-term direct impacts on approximately 652 acres due to changing species composition and community structure after reclamation; 9 acres left unreclaimed. Permanent loss of 441.7 acres of aspen or aspen mix and 46.9 acres of conifer habitat. There are no special status plant species in the Study Area. Impacts from noxious weeds would be similar to the Proposed Action with approximately 78 acres less of new disturbance, thus slightly minimizing the opportunity for noxious weed establishment.	The East Smoky Panel would not be mined, thus no impacts to vegetation resources from the Project beyond existing conditions would occur.
Wetlands			
Wetlands	No impact.	Same as Proposed Action.	Same as Proposed Action.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Wildlife			
Wildlife	Mortality of individuals due to vehicles, equipment, or continuing use of powerlines: short-term and localized. Disturbance and/or displacement due to human presence, noise, and activity, causing stress, behavior modifications, and/or competition for resources: short- to long-term and generally negligible to moderate impacts. Habitat alteration and forest fragmentation causing species composition changes: long-term. Net debit of 33,551 DSAYS under HEA. Unlikely impact to populations and negligible to minor impacts to individuals or habitat: bald eagle, boreal owl, brewer sparrow, Columbian sharp-tailed grouse, greater sage grouse, flammulated owl, great gray owl, northern goshawk, olive-sided flycatcher, peregrine falcon, prairie falcon, sagebrush sparrow, American three-toed woodpecker, trumpeter swan, willow flycatcher, Uinta chipmunk, gray wolf, Canada lynx; amphibians/reptiles including the Northern leopard frog, common garter snake, and boreal toad; migratory birds in general, and raptors in general. Negligible impacts to wolverine. Minor impacts to bats and upland game birds. Minor to moderate impacts to big game.	Generally, the same intensity and types of impacts as for the Proposed Action although 78 fewer acres impacted so slight reduction in habitat impacts over the Proposed Action. Net debit of 28,063 DSAYS under HEA.	The East Smoky Panel would not be mined, thus no impacts to wildlife resources from the Project beyond existing conditions would occur.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Fisheries & Aquatics			
Fisheries and Aquatics	Impacts to approximately 20.9 acres of AIZs. Indirect impacts to aquatic habitat by streamflow alterations and predicted increases of selenium, manganese, sulfate, and TDS concentrations by a small amount in Hoopes Spring, Sage Creek, and Crow Creek. Impacts to macroinvertebrates and fisheries from selenium increases expected to be negligible to minor.	Same as Proposed Action.	The East Smoky Panel would not be mined, thus no additional effects to fisheries and aquatic resources from the Project beyond existing conditions would occur.
Grazing Management			
Grazing Management	Removal of 594 acres from the Pole Draney Allotment in the short term, (a loss of 5 percent of the acres and Animal Unit Months (AUMs) in the allotment as a whole (minor effect) until reclamation restores the land. This would occur for 19 days per year. Trailing of sheep through the southeastern portion of the allotment would be extremely difficult, if not impossible, resulting in a moderate effect.	Same as the Proposed Action.	The East Smoky Panel would not be mined, thus no impacts to the Pole Draney Allotment would occur. Trailing of sheep through the allotment would occur under existing conditions.
Recreation and Land Use			
Recreation and Land Use	Disturbance and access restrictions on approximately 725 acres of NFS lands and additional access restrictions on nearby 570 acres; negligible to minor and short term.	Disturbance and access restrictions on approximately 650 acres of NFS lands and additional access restrictions on nearby acres; negligible to minor and short term.	The East Smoky Panel would not be mined, thus no impacts to recreation and land use access from the Project beyond existing conditions would occur.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Visual and Aesthetic Resources			
Visual Resources	Negligible to minor and long-term impacts on visual quality depending upon the location and angle of viewers; visual impacts would include contrast, color, and texture changes due to disturbance, disruption, dust, and lighting.	Same as the Proposed Action.	The East Smoky Panel would not be mined, thus no impacts to visual resources from the Project beyond existing conditions would occur. The Panel B pit topography would not be backfilled with overburden from the East Smoky Panel and brought back closer to original topography, thus creating more of a visual impact than under the Proposed Action and Alternative 1.
Cultural Resources			
Cultural Resources	No effect.	No effect.	No effect.
Native American Concerns			
Native American Concerns	No change in land ownership; however, the Project Area would not be available to support Treaty Rights. Temporary and negligible impact to access. No Tribal historical or prehistoric archeological sites, no occurrences of rock art, and no sacred sites have been identified in the Project Area.	Same as the Proposed Action.	The East Smoky Panel would not be mined, thus any existing impacts to Native American Concerns would continue to occur under current conditions.

PROJECT COMPONENT OR RESOURCE	PROPOSED ACTION	ALTERNATIVE 1: REDUCED PIT SHELL WITH SOIL-ONLY COVER	NO ACTION ALTERNATIVE
Transportation			
Transportation	Negligible to minor effects to existing transportation routes.	Same as the Proposed Action.	The East Smoky Panel would not be mined, thus existing transportation routes would continue to exist under current conditions.
Socioeconomics			
Socioeconomics	Extension of employment, earnings, both direct and indirect, for an additional three years, which would be considered beneficial, short-term, and major impacts to socioeconomics.	Same as the Proposed Action.	The East Smoky Panel would not be mined and the Smoky Canyon Mine period of operation, relative to the Project, would be shortened by approximately three years. Closing the Smoky Canyon Mine three years earlier would have short-term, but adverse major impacts to socioeconomics.

CHAPTER 3

AFFECTED ENVIRONMENT

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CHAPTER 3 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environment, including the physical environment, natural environment, and human-made resources and uses, which would be affected by the Proposed Action. Much of the information comes from a series of resource baseline technical reports (TR) that were prepared to support the EIS.

3.1.1 Resource Values and Uses Brought Forward for Analysis

The following resources and uses are brought forward for analysis and are presented in this chapter.

- Geology Minerals, and Paleontology, presented in **Section 3.2**
- Air Resources, presented in **Section 3.3**
- Noise, presented in **Section 3.4**
- Water Resources, presented in **Section 3.5**
- Soils, presented in **Section 3.6**
- Vegetation and Wetlands, presented in **Section 3.7**
- Wildlife Resources, presented in **Section 3.8**
- Fisheries and Aquatics, presented in **Section 3.9**
- Land Use (Grazing and Recreation), Transportation, and Special Designations, presented in **Section 3.10**
- Visual Resources, presented in **Section 3.11**
- Cultural Resources, presented in **Section 3.12**
- Native American Concerns and Treaty Rights Resources, presented in **Section 3.13**
- Social and Economic Resources, presented in **Section 3.14**, and
- Environmental Justice, presented in **Section 3.15**.

3.1.2 General Setting of the Project Area

The Project Area (the area that would be directly impacted by the Project) is located within the large-scale ecological unit called the Webster Ridges & Valleys subsection discussed in the EIS for the CNF RFP (USFS 2003b). The Webster Ridges & Valleys subsection occurs at low-to-high elevations with slopes ranging from 10 to 65 percent. This landscape includes mountainsides, canyons, ridges, and valleys eroded from sedimentary rocks that are folded in generally north-south trending patterns. The elevations in the Project Area range from 6,900 to 8,200 feet AMSL. Generally mountainous terrain with a major north-south axis borders the Project Area. The region is composed of a mix of alpine forest and high sagebrush vegetation.

In general, the climate of the Project Area is typical of Rocky Mountain areas influenced by major topographic features. Nearby mountain ranges (e.g. Snowdrift Mountain and Freeman Ridge) trend primarily north-south and have an impact on local winds, as well as temperature and precipitation patterns in the immediate area. Climate and meteorology are discussed in more detail in **Section 3.3.3**.

3.1.3 Study Area

The Study Area refers to an analysis area, which varies by resource value or use, depending on the geographic extent of the resource or use and the extent of the effects of the Project on a resource or use. In some cases, the Study Area is the Project Area (**Figure 2.3-1**) because that is the extent of the effects of the Project on the resource. The Project Area encompasses some small areas (approximately 70 acres) where disturbances would not occur, but where disturbance surrounds these small areas (**Figures 2.4-1** and **2.4-6**). In other cases, the Study Area is much larger than the Project Area, encompassing larger administrative or natural boundaries, because the effects on the resource extend beyond the Project Area boundary itself. The Study Area for each resource is described in the subsection addressing that resource.

3.2 GEOLOGY, MINERALS, AND PALEONTOLOGY

The Study Area for geology, minerals, and paleontology is the Project Area (**Figure 2.3-1**). The Study Area boundary was developed with the IDT experts and professional judgement. A Geology, Minerals, and Paleontology TR (Stantec 2016a) was prepared for these resources and provides much of the information summarized in the following subsections. One component of geology and minerals that is particularly important for impact analysis is geochemistry, including the potential for acid rock drainage (ARD). This component was addressed in a separate TR (Whetstone 2016), which is summarized in **Section 3.2.3**.

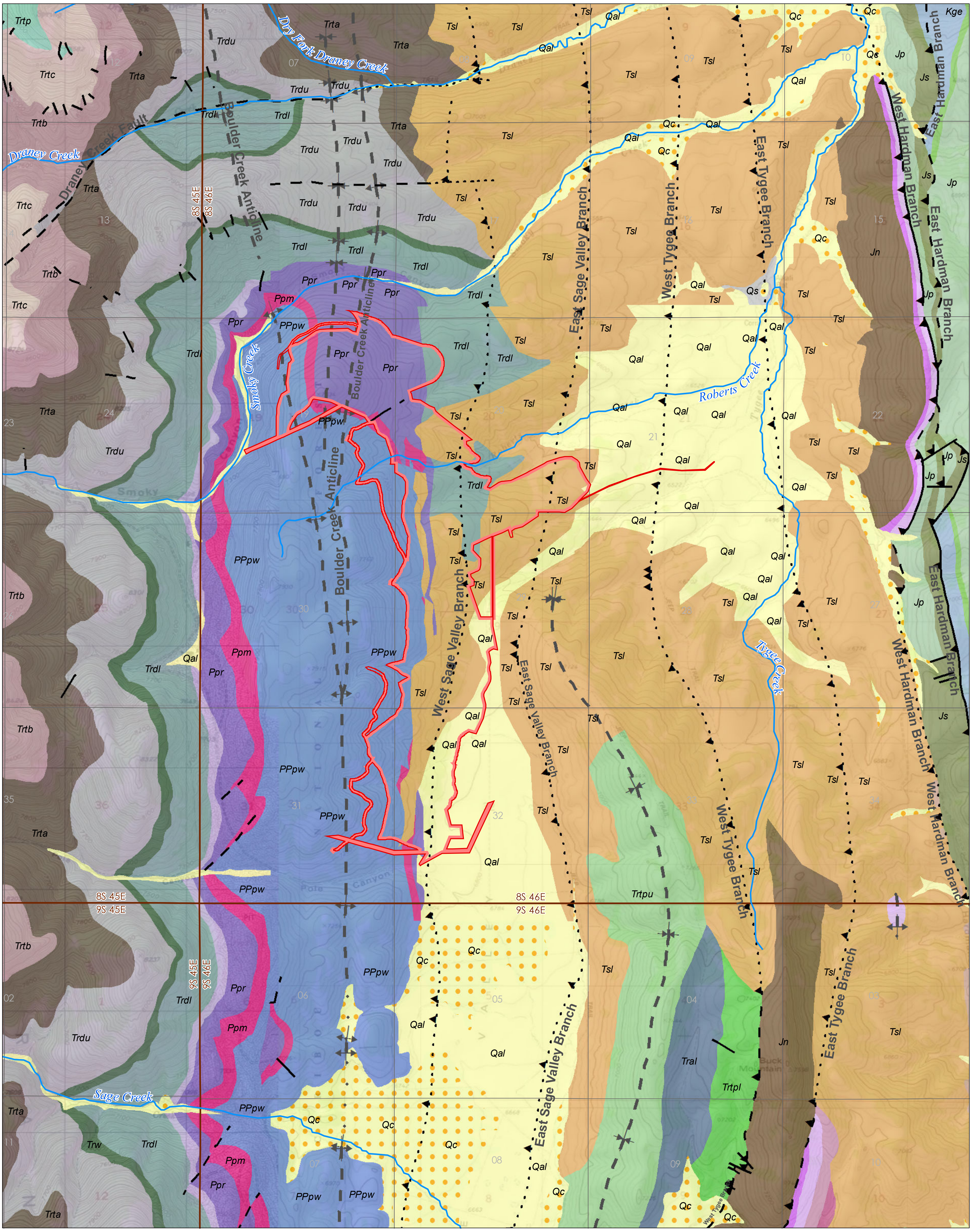
3.2.1 Geology

3.2.1.1 Regional Geologic Setting

The Geology Study Area and surroundings are within the middle Rocky Mountain and Basin and Range physiographic provinces in the central part of the Overthrust Belt. The Overthrust Belt is a major orogenic (mountain-building) zone trending generally north-south through the North American continent. Within the Belt, thrust faults developed parallel to typical anticlinal/synclinal folding, resulting in crustal deformation in a west to east direction. This in turn formed northwest trending ranges and valleys, such as are found near the Study Area.

Marine sedimentary rocks outcrop in the region, dating from the Paleozoic Era to Middle Mesozoic Era. This includes the Permian-age Phosphoria Formation, which forms the western phosphate field and comprises one of the world's largest known reserves of phosphate. Older rock, notably the Pennsylvanian-age Wells Formation, also outcrops in the region, as does younger sedimentary rock (of the Middle Mesozoic to Cenozoic Age) deposited primarily in lacustrine and fluvial environments. Block faulting began as part of the Basin and Range Province about 17 million years ago and continues to affect the region today (BLM and USFS 2000).

The geologic units, the stratigraphy, and the structure described previously, are all represented in the Study Area. Units found in the Study Area are described briefly in **Section 3.2.1.2**; detailed stratigraphic descriptions are provided in Cressman (1964), Montgomery and Cheney (1967), McKelvey et al. (1959), Lowell (1952), and Deiss (1949). **Figure 3.2-1a** shows surface geology and **Figure 3.2-1b** provides the stratigraphic legend.



Legend

Project Area Boundary

Stream/River

Township Boundary

Section Boundary

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 1,600 3,200
Feet
1:33,000 (at original document size of 11x17)

N

Figure 3.2-1a
Surface Geology and Faults
East Smoky Panel Mine EIS

Legend

Quaternary

Qal/Qf - Alluvium

Qc/Qls - Colluvium

Qs - Salt

Tertiary

Tsl - Salt Lake Formation

Jurasic

Jtcr - Twin Creek Limestone - Rich Member

Jtcs - Twin Creek Limestone - Sliderock Member

Jtcgs - Twin Creek Limestone - Gypsum Spring Member

Jn - Nugget sandstone

Triassic

Trtc - Thaynes Formation - C Member

Trdu - Dinwoody Upper Formation

Trtb - Thaynes Formation - B Member

Trta - Thaynes Formation - A Member

Trtp - Thaynes Formation - Portneuf Limestone Member

Trtpl - Thaynes Formation - Portneuf Limestone - Lower

Tral - Thaynes Formation - Lanes tongue of Ankareh Formation

Trtpu - Thaynes Formation - Portneuf Limestone - Upper

Trw - Woodside Formation

Trdl - Dinwoody Lower Formation

Permian

Ppc - Phosphoria Formation - Cherty Shale Member

Ppr - Phosphoria Formation - Rex Chert Member

Ppm - Phosphoria Formation - Meade Peak Member

Pennsylvanian

PPpw - Wells Formation - Upper; PPwu

Geologic Feature

Thrust Fault, Inferred

Thrust Fault, Buried

Fault, Confirmed

Fault, Inferred

Fault, Buried

Anticline, Buried

Anticline, Inferred

Syncline, Inferred

Syncline, Buried

Strike/Dip

Strike/Dip Overturned

Figure 3.2-1b
Local Geology Legend
East Smoky Panel Mine EIS

3.2.1.2 Geologic Units and Stratigraphy

Geologic formations relevant to the Study Area have an approximately 350 million-year age range. The youngest deposits are Quaternary alluvium with an age of 0 - 1.8 million years and the oldest are Pennsylvanian limestones and sandstones associated with the Wells Formation (300 – 320 million years old). Relevant geologic units are described as follows in order of oldest to newest.

Stratigraphy within the Study Area includes a thick sequence of carbonate and clastic sedimentary rocks overlain by younger unconsolidated deposits. Geologic cross sections that cover the Study Area are provided in Appendix A of the Geology, Minerals, and Paleontology TR (Stantec 2016a). The sections reflect an updated interpretation accounting for observations made at the 44 mineral exploration boreholes and nine geotechnical investigation boreholes that were drilled during the summer and fall of 2014 and additional holes later in 2015.

Wells Formation

The Wells Formation is the oldest formation encountered during exploration drilling within the Study Area. This formation contains two members, with the lower member consisting of interbedded limestone and sandy limestone and the upper member consisting of calcareous quartz sandstone with subordinate limestone and chert. The Wells Formation outcrops along the western edge of the Study Area (**Figure 3.2-1a**). This thick (greater than 1,500 feet) formation of sandstone and limestone contains the primary regional aquifer in the Study Area with recharge occurring on the mountain slopes and discharge occurring at lower elevations on the east margin of the Webster Range. Its aquifer characteristics are discussed further in the water resources section (**Section 3.5.1**).

Phosphoria Formation

The Phosphoria Formation conformably overlies the Wells Formation (**Figure 3.2-1b**). The Phosphoria Formation is approximately 400 feet thick and consists of several members, including two of importance within the Study Area (Meade Peak and Rex Chert).

The Meade Peak Member is phosphatic shale and contains the phosphate-bearing ore beds targeted for mining at the existing Smoky Canyon Mine and the proposed East Smoky Panel Mine. It is a thin-bedded, dark brown, carbonaceous unit of phosphatic mudstones and phosphorites. The Meade Peak Member is seldom exposed naturally because it is relatively soft and erodes into swales and topographic lows. Within the Project Area, it outcrops in discontinuous areas (**Figure 3.2-1a**) east and north of the Wells Formation outcrop. The Meade Peak Member can be divided from top to bottom into the Hanging Wall Mudstone, the Hanging Wall Phosphatic Shale, the Hanging Wall Ore Zone, the Middle Shale Wastes or Low Grades, the Footwall Ore Zone and the Footwall Mudstone. A typical description of these units follows from Simplot (2000):

- Hanging Wall Mudstone - consists of 0.5 to 1 foot of cherty nodular greyish black phosphatic rock and 10 to 20 feet of dark brown to black thick bedded carbonaceous mudstone.
- Hanging Wall Phosphatic Shale - consists of 1 to 2 feet of dark brown thin bedded phosphatic mudstone known as the “marker bed” and 3 to 5 feet of dark brown medium bedded carbonaceous mudstone which weathers to light brown.
- Hanging Wall Ore Zone - contains the Upper Rich Bed ore which consists of 1 to 4 feet of greyish brown thin bedded coarsely oolitic phosphate rock, a parting of 1 to 2 feet of light

grey dolomitic limestone which weathers to light brown, the Lower Rich Bed ore which consists of 1 to 4 feet of greyish brown thin bedded coarsely oolitic phosphate rock, a parting of 1 to 2 feet of light grey dolomitic limestone which weathers to light brown, the Buck Shot ore which consists of 2 to 4 feet of greyish brown medium bedded coarsely oolitic to pisolitic phosphate rock and the Hanging Wall Shale which consists of 2 to 8 feet of dark brown to black thin bedded phosphatic shale with concretions.

- Middle Waste Shale - consists of 5 to 15 feet of dark brown to black thin bedded phosphatic mudstone with concretions, 25 to 35 feet of light brown to dark brown medium to thick bedded phosphatic mudstone that contains dolomitic beds, 4 to 8 feet of dark brown thin bedded phosphatic mudstone known as the "E-marker", 40 to 60 feet of light to dark brown medium to thick bedded phosphatic mudstone that contains dolomitic beds, and 5 to 9 feet of dark brown to black thin bedded phosphatic mudstone.
- Footwall Ore Zone - contains the Hot Bed ore which consists of 1 to 5 feet of dark brown to black thin bedded phosphatic shale, a "False Cap" parting of 4 to 12 feet of greyish brown dolomitic limestone with a thin bedded dark brown phosphatic mudstone center weathering to a light brown mudstone, the Upper Footwall Shale ore which consists of 2 to 4 feet of medium to dark brown thin bedded phosphatic shale, a parting of 1 foot of greyish brown weathering to a light brown dolomitic limestone, the Lower Footwall Shale ore which consists of 5 to 8 feet of medium to dark brown thin bedded phosphatic shale, a "Cap Rock" parting of 5 to 8 feet of light grey dolomitic limestone with a thin bedded phosphatic mudstone center weathering to a light brown mudstone and the Main Bed ore which consists of 4 to 5 feet of greyish brown thin to medium bedded coarsely oolitic phosphatic rock.
- Footwall Mudstone - consists of 3 to 5 feet of light to dark brown medium bedded mudstone and 0.5 to 1 foot of greyish black cherty and nodular "Fishscale" phosphate rock.

Studies by Derkey et al. (1984) and Grauch et al. (2004) suggest that alteration within the Meade Peak Member is highly variable and locally gradational. Some locations in the existing Smoky Canyon Mine suggest this type of variation, such as within the Panel F deposit where rocks have been offset along transverse fault structures. For these reasons, alteration characteristics within the Study Area may or may not be similar to those in the adjacent Panel B.

The Rex Chert Member of the Phosphoria Formation overlies the Meade Peak Member. The Rex Chert Member consists of about 150 feet of massive grey and black chert and cherty limestone. Composed of more resistant rock, it tends to readily form outcrops and dip slopes. However, within the Study Area, it is exposed in isolated narrow bands trending north south, as well as in a larger block in the northern portion where mining has not yet occurred (**Figure 3.2-1a**). In the vicinity of the Smoky Canyon Mine, the Rex Chert is variably saturated. It may be limited in its area of saturation, have limited ability to transmit large fluxes of groundwater, and/or be generally separated from the saturated geologic units that would be disturbed during mining. The Rex Chert's aquifer characteristics are discussed further in the water resources section (**Section 3.5.1**).

In other parts of the region, another member of the Phosphoria Formation is found atop the Rex Chert. It is known as the Cherty Shale Member. This member has not been previously logged as a separate unit from the Rex Chert at the Smoky Canyon Mine; however, geochemical classification for the East Smoky Panel indicated variation of the constituents within the Chert and therefore, the

Rex Chert and Cherty Shale were segregated for the geochemical testing for this EIS as two distinct units.

Dinwoody Formation

The Triassic Dinwoody Formation is divided into upper and lower members that together are as much as 1,600 feet thick. It is composed of interbedded, calcareous siltstone, limestone, shale, and clay. The lower member contains more clay and shale beds than the upper member where limestone is more common. It is found on the surface in only a small portion of the Study Area (**Figure 3.2-1a**).

Salt Lake Formation

The Salt Lake Formation is Tertiary in age and crops out at the top of the bedrock section generally in the central and eastern side of the Project Area (**Figure 3.2-1a**). Locally, it is described as about 1,000 feet thick (Derkey et al. 1984). The Salt Lake Formation is composed of clay-rich gray to olive green to brown rhyolite tuff, tuffaceous siltstone, sandstone, and conglomerate with interbedded lacustrine limestone, shale, and marl (Danzl 1982 as cited in Stantec 2016a).

Alluvium

Quaternary-aged alluvium is found in the eastern part of the Study Area along stream channels and lower portions of mountain slopes (**Figure 3.2-1a**). These deposits consist of gravel, sand, silt, and clay. Total thickness is typically less than 10 to 20 feet but can be quite variable.

3.2.1.3 Structural Characteristics

The Study Area's structure is affected by the Boulder Creek Anticline (**Figure 3.2-1a**). This major north-south trending fold was probably formed contemporaneously with thrusting (Connor 1980). The majority of the Study Area is within the east limb of the Boulder Creek Anticline. On the east side of this Anticline, the Phosphoria Formation is steeply eastward dipping (greater than 75 degrees) to overturned (Derkey et al. 1984), which is much steeper than on the west limb where the existing Smoky Canyon Mine ore deposit is located (Derkey et al. 1984).

The West Sage Valley Branch is a major imbricate thrust fault that trends north-south through the Study Area. The cross sections shown in Appendix A of the Geology, Minerals, and Paleontology TR (Stantec 2016a) indicate the complexity of geology within the Study Area resulting from structural characteristics.

3.2.1.4 Seismicity and Geologic Hazards

Seismic design procedures in the U.S. no longer use seismic zones (USGS 2015a), but records of previous seismic events provide historical information for context. Within a 100-kilometer (km) radius of the Study Area, there have been 40 seismic events that exceed 4 on the Richter scale from 1962 (the date of the earliest record in the database) through 2015 (USGS 2015b); four of these had a magnitude of 5 or greater. The highest magnitude event was a 1962 quake reported as 5.9 on the Richter scale, located about 86 km (53 miles) away from the Study Area. The closest >5 magnitude earthquake was 10.4 km (6.5 miles) from the Study Area. It was reported as 5.8 in magnitude and occurred in February 1994 (USGS 2015b). More recently, on September 2, 2017, there was a magnitude 5.3 earthquake about 11 miles east of Soda Springs, Idaho along with numerous other smaller aftershocks in the area during the month.

Factors related to geotechnical stability of highwalls and overburden disposal site slopes have been identified through past operations at the Smoky Canyon Mine. Factors related to stability of highwalls include the type and strength of rock, degree of rock alteration, steepness of the final highwall slope, presence of any groundwater, spacing and orientation of fractures and faults, and blasting practices. Stronger rock which is less fractured and altered would produce more stable highwalls than weaker or more altered or fractured rock. Groundwater discharges from a highwall can also destabilize it. In general, highwalls at Smoky Canyon have proven to be stable over the duration of the mining operations. Simplot has conducted site-specific pit slope stability evaluations for the East Smoky Panel pit, which has resulted in the flexibility to have steeper overall pit slopes than originally proposed. However, these pit slopes would not be steeper than slopes typically constructed at other pits at the Smoky Canyon Mine.

Factors related to the stability of overburden fill slopes include the topography of the surface underlying the overburden pile, stress such as shock loading or overloading, slope heights, reduction of material strength by introduction of water, and the scheduling of reclamation contouring. Flat areas or topographic rises, whether natural or man-made, provide a more stable base for overburden fills and backfills. Shock loading occurs when loaded trucks roll to the crest or edge of the overburden pile or pit backfill. Overloading occurs when too much material is placed on a given area of the overburden pile or pit backfill. This potential for overloading increases as fill heights increase. Introduction of water, snow, mud or ice weakens the overburden material strength, increasing the potential for instability. Slopes left at angle of repose for long periods of time are more likely to experience instability than those that are regraded shortly after construction. Instability of overburden fill slopes at the Smoky Canyon Mine has been related to high fill heights and excess water content due to excess incorporation of snow or snow melt into the material. Mine practices have been modified based on experience to reduce potential for future overburden slope instability.

3.2.2 Mineral Resources

Phosphate ore resources occur primarily as sedimentary marine phosphorites. These phosphate rock minerals are the only significant global sources of phosphorous. In the Phosphoria Formation of southeastern Idaho, these deposits are confined to well-defined, specific stratigraphic horizons. The Western Phosphate Field, primarily in southeast Idaho, contains large phosphate reserves within the CTNF.

3.2.2.1 Phosphate Leasing Program and Description of Existing Rights

Domestic phosphate ore mining rights are granted under a leasing program, in accordance with the Mineral Leasing Act of 1920 (as amended) and applicable regulations. Mineral leases are administered by the BLM. These leases, purchased by mining companies, convey the right to mine and develop phosphate resources within the lease, in accordance with applicable federal, state, and local requirements.

The East Smoky Panel ore reserves occur in federal leases IDI–012890, IDI-026843, and IDI-015259. Simplot therefore has purchased rights to develop the phosphate reserves within these three leases from the federal government, in concurrence with applicable conditions set by the BLM, USFS, and other federal and state agencies and laws.

3.2.2.2 Mineral Economics

Costs associated with mining include: permitting and planning, removal of overburden, mining the ore, transporting ore, and beneficiating and processing the ore into salable products. Because open pit mining of deeper ores requires excavation of a larger pit, the ratio of overburden to ore, or strip ratio, increases with pit depth. As ore depths increase, economic return decreases, and at a certain depth, mining of the phosphate ore becomes uneconomic. The depth at which ore recovery becomes uneconomic is also affected by ore grade, weathering, capital costs, and operational costs specific to the operation. Overall economics of the entire operation are also affected by domestic and global supply and demand of the salable products.

Most phosphate ore, including that produced at the Smoky Canyon Mine, is used in the production of fertilizer, primarily diammonium phosphate (DAP). Fertilizers continue to be important to feed the growing world population because, although demand for food will increase, the area of cultivated land is not expected to increase significantly. For this reason, commercial fertilizers will become increasingly important to meet the nutritional requirements of the world's population (USGS 1999a). World consumption of phosphate in fertilizer is projected to increase from 45.5 million tons in 2016 to 48.9 million tons in 2020 (USGS 2017).

Proximity of proposed operations to existing mining and processing facilities affects mine economics due to capital expenditures and uncertainty of reserves. A large capital expense is necessary to build and staff mining and processing facilities, so the use of existing facilities allows new deposits to be more economically mined. The ability to use existing facilities to mine new deposits is highest when the new deposit is close to these existing facilities. Because the extent of ore within a new deposit is never precisely known until it is mined, there is inherent risk in opening a new deposit. This risk is reduced when the new deposit is close enough to take advantage of existing mining and production facilities so that the capital expenditure of new processing facilities is not necessary.

3.2.3 Geochemistry

A geochemistry study (Whetstone 2016) was undertaken in part to document the chemical and mineralogical characteristics of geologic materials that would be produced or stored by the planned mining operation so that environmental mobility of selenium and other COPCs could be evaluated. Mobility can occur in various ways, including via ARD. ARD is produced when sulfide minerals, mostly pyrite, react with oxygen and water to produce sulfuric acid and other soluble ions. ARD can be neutralized by a number of reactions involving carbonate and basic silicate minerals (Morin and Hutt 1994). Neutralization reactions involving carbonate minerals occur more rapidly than those involving basic silicate minerals and are generally dominant.

As a general rule, the potential for the release of trace metals is driven by the stability of the host mineral rather than by the total concentration of the element, thus weathering behavior is important. When sulfidic waste rock is exposed to oxygen and water in a waste dump, oxidation occurs and trace metals may be released into soil or water. The weathering of pyrite and sphalerite releases soluble iron, zinc, and sulfate, and possibly other metals that may occur as impurities in the mineral. The oxidation of sulfide minerals also produces acidity and can result in the formation of ARD.

Oxidation and reduction affect the environmental mobility of selenium (reduced forms of selenium have relatively low environmental mobility in water compared to its oxidized forms). Metal mobility in water is typically a function of redox conditions and pH with most metals being more soluble and mobile under oxidizing conditions at low pH. At near-neutral pH, most metals have less solubility and mobility in the environment. As with selenium, the mobility of trace metals and other constituents of concern may be affected by precipitation, sorption, complexation with organic or other compounds, and biologically mediated reduction or oxidation.

These and other characteristics of geologic materials in the Study Area were studied through petrographic analysis, elemental distribution determination, acid-base accounting (ABA), whole-rock elemental analysis, Synthetic Precipitation Leaching Procedure (SPLP) tests, and column leaching, all of which are discussed by Whetstone (2016).

ABA analyses provide data to characterize the distribution of sulfur species and organic carbon. Selenium is the element of primary environmental concern in the Southeast Idaho Phosphate District and is known to be associated with sulfide minerals and organic matter in waste rock (Perkins and Foster 2004 as cited in Stantec 2016a). At the East Smoky Panel, selenium occurs as an oxide mineral, a native element, and in association with iron oxide mineral(s) in the planned overburden (Whetstone 2016). ABA analyses also provide data to evaluate potential ARD formation by East Smoky Panel overburden.

The Meade Peak Member was one focus of the geochemistry study; it is a mixture of phosphorite and brown to black shale. These shales contain metals associated with sulfide minerals as well as high concentrations of organic carbon and selenium. Upper, middle, and lower Meade Peak units were analyzed separately. Other Study Area geologic units were also studied during various aspects of the geochemistry study.

Historically, ARD has not been identified as a problem in the Southeast Idaho Phosphate District and past testing suggests that Meade Peak materials are not likely to generate ARD at the Smoky Canyon Mine. The potential for ARD formation by overburden from the East Smoky Panel was evaluated by comparing the acid generating potential (AGP) of the material to the acid neutralizing potential (ANP) of the material. BLM guidelines (1996) recommend that the potential for ARD formation be evaluated based on the ratio of ANP to AGP. Samples with ANP:AGP ratios greater than 3 are considered to have low potential to produce ARD. Samples with ANP:AGP ratios of less than 1 are considered to have high potential to produce ARD. Review of the ANP:AGP ratios for 77 composite samples representing all of the geochemical testing units in the Study Area indicate that all units have low potential to generate acidic drainage (Whetstone 2016). The calculated average ratios range from 7.9 to 903 with rocks from the Wells Formation (903) and Grandeur Tongue (855) having the highest values. The Dinwoody Formation (7.9) and Cherty Shale (21.5) have the lowest average ratios, but exceed the BLM criterion of 3 by factors of 2.6 and 5.7, respectively. Only 3 of the 77 tested samples had ANP:AGP ratios less than 3; two were from the Cherty Shale (0.28 and 1.8), the other was from the Meade Peak Middle (2.1). Testing details and more results are provided in Whetstone (2016).

ABA data were also evaluated using EPA guidelines (1994) based on the calculation of net neutralizing potential (NNP). NNP is calculated by subtracting AGP from ANP. Materials with NNP values greater than 20 tons calcium carbonate per kiloton (t $CaCO_3$/kt) are considered to have low potential to generate ARD. Materials with NNP values less than -20 t $CaCO_3$/kt are considered to have high potential to generate ARD. The average NNP values for the tested materials ranged from 26 to 881 indicating low potential to produce ARD consistent with the evaluation performed using the BLM methodology (Whetstone 2016).

The propensity for the geologic materials to produce leachate and the quality of that leachate are also relevant geochemistry analyses. SPLP tests were run and leachates were compared to potentially applicable water quality standards to provide a screening-level analysis of constituents that may leach from overburden and ore at levels of regulatory concern. As described in the geochemistry report (Whetstone 2016), a number of SPLP leachates had concentrations of aluminum, cadmium, chromium, iron, manganese, and selenium that were greater than potentially applicable water quality standards. Additionally, nickel, thallium, and zinc concentrations were greater than water quality standards in fewer leachates. Column leaching tests were also run on selected combined samples. These tests and their results are presented in Whetstone (2016). Results drove the development of COPCs for this Project, which include total dissolved solids (TDS), sulfate, cadmium, copper, iron, manganese, nickel, selenium, thallium, uranium, and zinc.

3.2.4 Paleontological Resources

Sedimentary rocks of southeastern Idaho have paleontological resources consisting of vertebrate, invertebrate, and paleobotanical fossils including fish and shark remains. Fossils in the Smoky Canyon Mine area are not restricted to the Study Area or southeastern Idaho. They are found throughout the region wherever the same formations exist (Stantec 2016a).

The Paleozoic and Triassic-age bedrock units are generally fossiliferous. Fossils in the Wells Formation were described by G. H. Girty (Mansfield 1927) as predominantly consisting of bryozoa and brachiopods with wide distribution (BLM and USFS 2000).

The Phosphoria Formation, named for Phosphoria Gulch near Georgetown, is one of the most fossiliferous of the Idaho Pennsylvanian and Permian Formations (BLM 2010d). The Meade Peak Member of the Phosphoria Formation contains abundant pelecypods, gastropods, and brachiopods, as well as ammonites, nautiloids, crinoids, bryozoa, and sponge spicules. The base of the Meade Peak Member contains a thin marker bed identified as the fishscale bed, which reportedly contains some fossil fish and shark fragments (BLM and USFS 1992). Heliocoprion fossils are found in the basal fishscale bed, and other units in the Meade Peak member. The Rex Chert Member of the Phosphoria Formation contains brachiopods, crinoid fragments, and sponge spicules (Mansfield 1927; BLM and USFS 2000).

The Salt Lake Formation (in combination with the Starlight Formation, which is not present in the Study Area) includes documented occurrences of plants, invertebrates, horses, camels, mastodons, fish, reptiles, birds, amphibians, carnivores, and other small mammals (BLM 2010d).

Unconsolidated valley fill sediments in southeastern Idaho have yielded Ice Age and older mammals including mammoths, mastodons, horses, bison, camels, ground sloths, carnivores, rodents, and other animals. These are from lake, stream, and/or windblown deposits and consist of clay, silt, ash, sand, and gravel (BLM and USFS 2000).

The Potential Fossil Yield Classification (PFYC) System (BLM 2007b) classifies geologic units as to the relevant abundance of vertebrate fossils or scientifically significant invertebrate or plant fossil. The Pinedale, Wyoming, BLM office (BLM 2008b) has analyzed the Wells, Phosphoria, Dinwoody, and Salt Lake formations and classified each of these as (probable) Class 3 in the PFYC scale. Class 3 is considered as moderate or unknown, where “fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential” (BLM 2007b).

The BLM's Pocatello Field Office has a goal "to provide for the identifying, protecting, and managing paleontological resources for future preservation, interpretation, and scientific uses" (BLM 2012). The BLM Manual Section 8270, Paleontological Resource Management (BLM 1998) is intended, in part, to "ensure that proposed land uses, initiated or authorized by BLM, do not inadvertently damage or destroy important paleontological resources on public lands".

3.3 AIR RESOURCES

The Study Area for air quality includes the Project Area and the general airshed (or the geographic area within which air may be confined) within which Project emissions would be released. The Study Area boundary was developed with the IDT experts and professional judgement. The airshed is approximately bounded on the west by the Diamond Creek drainage, on the east by the Highway 89 Corridor, to the north by approximately the Stump Creek drainage, and to the south by approximately the Crow Creek drainage. The airshed encompasses the greater mine region and the downwind or easterly topography.

The Study Area was developed utilizing regional meteorological and topographic information. Regional weather data, wind patterns, topographic data, and air basin boundaries were analyzed to determine the likely region of impact for emissions released from the Project. This immediate region of impact was used to define the final air quality baseline Study Area.

3.3.1 Ambient Air Quality

Criteria air pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter less than or equal in diameter to 10 microns and 2.5 microns (PM_{10} and $PM_{2.5}$), ozone (O_3), and nitrogen dioxide (NO_2). The EPA has established the National Ambient Air Quality Standards (NAAQS) for these pollutants; the NAAQS are allowable concentration limits applied at the public access boundary. For criteria pollutants, Idaho has adopted these standards into the Rules for the Control of Air Pollution in Idaho. The NAAQS (EPA 2016a) are shown in **Table 3.3-1**.

Table 3.3-1 National Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	CONCENTRATION	STATISTICAL FORMAT
Carbon Monoxide (CO)	8-hour	9 ppm	Not to be exceeded more than once per year
	1-hour	35 ppm	
Lead (Pb)	Rolling 3-Month Average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)	Annual	53 ppb	Annual mean
	1-hour	100 ppb	3-year average of the annual 98th percentile highest daily 1-hour concentrations
Particulate Matter (PM_{10})	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Particulate Matter ($PM_{2.5}$)	Annual	12.0 µg/m^3	Annual mean, averaged over 3 years
	24-hour	35 µg/m^3	3-year average of the annual 98th percentile highest daily average concentrations

POLLUTANT	AVERAGING TIME	CONCENTRATION	STATISTICAL FORMAT
Ozone (O_3)	8-hour	0.070 ppm	3-year average of the annual fourth-highest daily 8-hour concentrations
Sulfur Dioxide (SO_2)	1-hour	75 ppb	3-year average of the annual 99th percentile highest daily 1-hour concentrations
	3-hour	0.5 ppm	Not to be exceeded more than once per year

µg/m^3 = micrograms (one-millionth of a gram) per cubic meter
ppm = parts per million
ppb = parts per billion
PM_{10} = Particulate Matter 10 microns
$PM_{2.5}$ = Particulate Matter 2.5 microns

3.3.1.1 IDEQ Air Quality Monitoring Data Summary

The IDEQ has an established air quality monitoring network to monitor criteria pollutant concentrations throughout the State of Idaho. The nearest IDEQ monitoring station to the East Smoky Panel Mine Project is in Soda Springs, Idaho. This station monitors and records SO_2 data. A monitoring station located in Pocatello, Idaho measures PM_{10}, $PM_{2.5}$, and SO_2 concentrations. NO_2 data was gathered from the Boulder, Wyoming station. Each of the monitoring stations are in regions outside of the air quality Study Area for the Project, but those sites represent a worst-case assessment of regional air quality due to their location relative to local industrial sources of emissions. Note that the nearest and most representative CO monitor is the Yellowstone National Park – Old Faithful site. Ozone data was evaluated at Craters of the Moon National Monument and Grand Teton Nation Park.

The State of Idaho also issues annual reports to inform the public of air quality throughout Idaho; these reports summarize regional air quality while presenting air monitoring results for six criteria air pollutants. The most recent summary available at the time the Air Resources TR (Stantec 2016b) was prepared is the 2013 Air Quality Monitoring Data Summary (IDEQ 2015b). In addition, data from 2014 through 2016 were evaluated for the regional monitors described above.

As stated in **Table 3.3-1**, NO_2 standards are both 1-hr and annual. The 98% percentile for years 2014 - 2016 was 14.2 parts per billion (ppb), 11.6 ppb, and 9.6 ppb, respectively. A 3-year average from 2014-2016 is 11.8 ppb, which is less than 12% of the national standard. Annual NO_2 is determined by establishing the mean value for each year. During 2014 -2016, the annual mean varied between 1.10 ppb to 2.07 ppb. The standard is 53 ppb.

As mentioned previously, the closest IDEQ PM_{10} and $PM_{2.5}$ monitoring site to the Project Area is in Pocatello, Idaho, approximately 70 linear miles away. Three-year rolling average data for 2016, representing the average of 2014, 2015, and 2016, shows PM_{10} concentrations well under the NAAQS. The second-high value for each year was obtained and averaged to represent a "not to exceed more than once per year" scenario. The average 2nd high over the three years was 75.3 µg/m^3, which is just over 50% of the 150 µg/m^3 standard. Please also note that a three-year average of the 1st high values is 83.7 µg/m^3. Each value was measured at the Pocatello Garret & Gould (G&G) monitor.

$PM_{2.5}$ is primarily measured using two different methods in Idaho, the federal reference method and the Tapered Element Oscillating Method (TEOM). The three-year annual average $PM_{2.5}$ concentration measured at the Ballard Road monitor site near Fort Hall, Idaho (the G&G site was not active between 2014 and 2016, thus this site was used) between 2014 and 2016 was 7.13 $\mu g/m^3$. The annual standard is 12.0 $\mu g/m^3$. The 24-hr $PM_{2.5}$ standard is defined by a three-year running average of the 98th percentile concentrations. The NAAQS is 35.0 $\mu g/m^3$. The 98^{th} percentile three-year average between 2014 through 2016 at the Ballard Road site was 18.8 $\mu g/m^3$.

The Idaho Air Monitoring Network Plan has a nearby site in Soda Springs, 15 miles southwest of the Study Area, located next to the P4 Processing Plant. This monitoring site has provided 1-hour continuous SO_2 data since 2002. Initially, the monitoring objective was to assess SO_2 NAAQS for industrial impacts from a nearby source in Caribou County (IDEQ 2012a). Soda Springs has historically been affected by industrial SO_2.

Consequently, a major project to desulfurize flue gas from the source was implemented in 2001, and SO_2 emissions dropped to well below the annual, 24-hour, and 3-hour NAAQS. In 2002, one SO_2 monitor was shut down, and a site located near a phosphorous plant became the primary monitoring location. The objective was then changed from population-based monitoring to hot-spot monitoring. From 2007 through 2009, the short-term SO_2 concentrations remained well below the level of the three old SO_2 NAAQS and the new 1-hour SO_2 NAAQS of 75 parts per billion (ppb; IDEQ 2010). The only remaining primary NAAQS standard is the 1-hr standard. The 3-hr is a secondary standard, which reflects more of an environmental health standard rather than the human health impacts expressed by primary standards. Most recent 1-hr monitoring data from Soda Springs demonstrates compliance with the 99^{th} percentile of the daily maximum averaged over three years. From 2014-2016 the 99^{th} percentile 1-hr concentration ranges from 22.8 to 31.9 ppb, which is well below the standard of 75 ppb.

The nearest CO monitors to the Study Area can be found at Old Faithful in Yellowstone National Park. The CO national standards are 1-hr and 8-hr averaging periods. Both standards are a not to be exceeded more than once per year, or the second high as the design value. Data from 2014 through 2016, 1-hr second high concentrations range from 0.667 ppm to 0.998 ppm, which is well below the 35-ppm standard. Similarly, the 8-hr standard second high value ranges from 0.4 ppm to 0.6 ppm; also, well below the 9-ppm standard.

The Craters of the Moon National Monument and Grand Teton National Park ozone data was obtained in 2014-2016. The ozone standard is 0.070 ppm (70 ppb) as an annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years. Craters data for the 4^{th} high 8-hr design value average over 2014-2016 is 0.060 ppm. Grand Teton is also 0.060 ppm averaged over 2014-2016.

All criteria pollutants demonstrate that regional monitors are compliant with all applicable NAAQS.

3.3.1.2 Class I Areas

Class I areas typically include wilderness areas and National Parks. Within 300 km (184 miles) of the Project Area, the federal Mandatory Class I areas include:

- Jarbidge Wilderness
- Craters of the Moon National Monument

- Sawtooth Wilderness
- Red Rock Lakes Wilderness
- Teton Wilderness
- Grand Teton National Park
- Yellowstone National Park
- North Absaroka Wilderness
- Washakie Wilderness
- Fitzpatrick Wilderness
- Bridger Wilderness

Publicly available data and associated reports for each Class I area were reviewed as part of the Air Resources TR (Stantec 2016b). Air Quality Related Values (AQRVs), like deposition and visibility, are typically monitored at all Class I areas and are helpful in visibility and dispersion modeling analyses. The 2010 Federal Land Air Managers (FLAG) indicates that visibility impact evaluations are recommended when any Class I area is located with 50 km of a project site. If a source is outside the 50 km radius then a Q/D initial screening test is applied, where Q is the concentration and D is the distance. The nearest Class I Area to the Project is Grand Teton National Park at approximately 70 miles (112.7 km). However, FLAG also states that sources located greater than 50 km from any Class I Area that emits less than 500 tons per year (tpy) of NO_x and SO_2 combined or more than 100 km that emit less than 1,000 tpy of NO_x and SO_2 combined would not be considered to cause or contribute to visibility impairment (USFS et al. 2010). As discussed in Chapter 2, the lifetime of the Proposed Action is a minimum of 3 years and up to 12 years and given projected lifetime emissions (793 tpy maximum), further visibility assessments are not required.

3.3.1.3 Smoky Canyon Mine

The Smoky Canyon Mine has an air quality permit issued by the IDEQ. This air permit was originally issued in the early 1980s and was recently revised in 2012 (IDEQ 2012b). The existing air permit applies to the mine and milling operations and the associated sources of regulated emissions. As part of the permit, Simplot maintains and implements a Fugitive Dust Control Plan that presents good operating practices to control emissions from the mine and mill operations.

In 2014 through early 2015, Simplot implemented a one-year Prevention of Significant Deterioration (PSD) pre-construction monitoring program at the Smoky Canyon Mine and reported the monitoring results to IDEQ (RTP Environmental Associates, Inc. 2015). The program was designed to help support future air permitting activities at the mine and other locations. The ambient air quality monitoring equipment was located north of Tailings Pond #1 and west of Tailings Pond #2 (see **Figure 1.1-1**). The criteria pollutants NO_2, SO_2, CO, ozone, PM_{10}, and $PM_{2.5}$ were monitored using methods and data quality objectives sufficient to obtain PSD-quality data. An overall summary of the air quality data available at the time the Air Resources TR (Stantec 2016b) was prepared is presented in **Table 3.3-2**. RTP Environmental Associates, Inc. compared the data to several other sites in the general area. They concluded that: (1) there was good agreement with other background sites they examined; and (2) the Smoky Canyon data are generally representative of background concentrations in the region (RTP Environmental Associates, Inc. 2015). Further, all measured concentrations were less than the corresponding NAAQS. The Annual Monitoring Data Report (RTP Environmental Associates, Inc. 2015) provides information on data quality control and quality assurance, as well as detailed data tables and statistics.

Table 3.3-2 Summary of Smoky Canyon Air Quality Monitoring Results

POLLUTANT	AVERAGING TIME	SMOKY CANYON MEASURED CONCENTRATIONS	NAAQS CONCENTRATION
CO (ppm)	1-hour	0.8	35
NO_2 (ppb)	1-hour, Daily Maximum, 98th Percentile	25.3	100
PM_{10} (µg/m^3)	24-hour Highest	48	150
	24-hour Second Highest	35	
$PM_{2.5}$ (µg/m^3)	98th Percentile, 24-hr	9.4	35
	Annual Average	5.1	12
O_3 (ppb)	8-hour	56	70
SO_2 (ppb)	1-hour, Daily Maximum, 99th Percentile	28	75

3.3.2 Air Emissions

3.3.2.1 Stationary Sources

State air quality permits for sources that reside within approximately 50 km (31 miles) of the Project were reviewed for emissions data. **Table 3.3-3** shows the permitted stationary sources, along with the associated permitted emissions limits. Most of the sources are located near Soda Springs, more than 40 km (25 miles) away. Based on winds and meteorological factors, these sources are expected to have little impact on the Project Area.

Table 3.3-3 Stationary Source Permitted Emission Limits (Tons Per Year)

FACILITY	PM_{10}	$PM_{2.5}$	NO_X	SO_2	VOC	CO	HAP
NuWest Conda Phosphate Operations (2011)	80.6	---	152	736	5.78	100.8	3.25
NuWest Rasmussen Ridge Mine (2015)	3.39	3.39	82.05	0.16	26.49	23.38	0.45
P4 Production Blackfoot Bridge Mine (2010)	124.61	---	51.98	7.11	---	103.5	---
P4 Production Soda Springs Facility (2015)	823	---	3,905	2,073	0	19,600	19.93
Soda Springs Phosphate (2006)	22	---	5.4	0.03	0.3	1.1	0
Northwest Pipeline – Soda Springs (2011)	16.7	---	1708	0.4	74.7	231	49.5
Tronox, LLC (2006)	2.37	---	0.74	0.63	0.06	1.09	2.37

NO_x = nitrogen oxides
VOC = volatile organic compounds
HAP = hazardous air pollutant

3.3.2.2 National Emissions Inventory

The EPA's National Emission Inventory (NEI) database contains information about sources that emit criteria air pollutants and their precursors, and hazardous air pollutants. The database includes estimates of annual air pollutant emissions from point, nonpoint, and mobile sources in the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. The EPA collects information about sources and releases an updated version of the NEI database generally every three years; however, the latest update is the 2011 NEI. Data from the 2011 NEI was downloaded from the EPA (EPA n.d.) for Caribou County, Idaho. Annual criteria pollutant emissions reported in the 2011 NEI are 3,683 tpy NOx, 15,850 tpy CO, 6,212 tpy PM_{10}, 1,503 tpy $PM_{2.5}$, 1,503 tpy SO_2, and 978 tpy VOC.

3.3.3 Climatology and Meteorology

Extensive surface and upper air data surrounding the Project Area were analyzed to develop an assessment of regional climatology and meteorological conditions. The resulting assessment is presented in the following subsections.

3.3.3.1 Climatology

Idaho lies entirely west of the Continental Divide, which forms its boundary for some distance westward from Yellowstone National Park. The northern part of the State averages lower in elevation than the much larger central and southern portions, where numerous mountain ranges form barriers to the free flow of air from all points of the compass. In the north, the main barrier is the rugged chain of Bitterroot Mountains forming much of the boundary between Idaho and Montana. The extreme range of elevation in the State is from 738 feet at the confluence of the Clearwater and Snake Rivers to 12,655 feet at Mt. Borah in Custer County. Comprising rugged mountain ranges, canyons, high grassy valleys, arid plains, and fertile lowlands, the State reflects in its topography and vegetation a wide range of climates. Located some 300 miles from the Pacific Ocean, Idaho is, nevertheless, influenced by maritime air transported eastward on the prevailing westerly winds. Particularly in winter, the maritime influence is noticeable in the greater average cloudiness, greater frequency of precipitation, and mean temperatures than those at the same latitude and altitude in midcontinent. This maritime influence is most notable in the northern part of the State, where the air arrives via the Columbia River Gorge with a greater burden of moisture than at lower latitudes. Eastern Idaho's climate has a more continental character than the west and north, a fact quite evident not only in the somewhat greater range between winter and summer temperatures, but also in the reversal of the wet winter, dry summer pattern (WRCC 2016a).

To a large extent, the source of moisture for precipitation in Idaho is the Pacific Ocean. In summer, there are some exceptions to this when moisture-laden air is brought in from the south at high levels to produce thunderstorm activity. The source of this moisture from the south is the Gulf of Mexico and Caribbean region. The area's semi-arid climate is the result of the Cascade and Sierra Nevada Mountains to the west and the Bitterroot and Rocky Mountains to the north, which effectively block large scale intrusion of Pacific moisture. Summer monsoonal moisture intrusions are infrequent and significantly modified by the arid Great Basin of Utah and Nevada. The Rocky and Bitterroot Mountains form the headwaters of the Snake River and receive copious amounts of winter snow. The Webster Range that surrounds the Project Area lies at a slightly lower elevation than either of these other ranges and as a result receives less overall snowfall.

During winter, synoptically organized storms typically move through the region resulting in cold outbreaks and can produce storm snowfall accumulations of two feet or more. Cloudy and unsettled weather is common during the winter with measurable precipitation occurring on about one third of the days.

Spring months are normally wet and windy with periods of high winds that may persist for days at a time. Weather conditions fluctuate quickly during the spring. Afternoon temperatures in the 30- to 40-degree F range, with precipitation in the form of rain or snow may occur interspersed with periods of sunny skies and afternoon temperatures in the 50- to 60-degree F range. Thunderstorms are not uncommon and are usually accompanied by rain showers and occasional snow. Low elevation snow pack usually melts quickly during the spring, but high elevation snow pack can persist into June or later.

Although snowmelt may take a month or more in the Project Area, summer weather may begin suddenly with a rapid change to warm and dry weather. Though daytime temperatures are usually warm by June, chilly nights can persist throughout the summer. Showers and/or thunderstorms are common from late spring through summer with an increased frequency surrounding regional high terrain. These storms often produce localized precipitation. Thunderstorms are seldom severe and tornadoes occur infrequently in the area. Long periods of excessively hot weather in July and August are very uncommon. Afternoon temperatures often rise to 80 degrees F, however low humidity usually results in overnight temperatures in the 50-degree F range, or even cooler. Depending on elevation, the average growing season is around 100 days, extending from June to September.

Autumn ushers in cooler weather with daytime highs generally in the 60-degree F range in early fall dipping into the mid-30-degree F range by mid-November with generally dry conditions. Autumn storms are usually very fast moving, and seldom persist for more than a few days. The first cold wave with highs less than 20 degrees F and lows around 0 degrees F or lower may arrive anytime between late November and late December.

The nearest location with a long-term climatological data record is Soda Springs, Idaho, which lies approximately 21 miles southwest of the site and approximately 1,600 vertical feet lower in elevation than the Project Area. While regionally representative, the information from the Soda Springs climatology data can be assumed to differ slightly from that at the Project Area. The influence of surface elevation would likely result in slightly lower temperatures and higher amounts of precipitation at the Project Area. **Table 3.3-4** depicts the average climatological variables for Soda Springs calculated over a period of 34 years from 1978 to 2012. All data were collected at the Soda Springs Airport and are based on the following percentage of total possible data collected: Maximum Temperature: 89.9%, Minimum Temperature: 89.7%, Precipitation: 89.3%, Snowfall: 87.8%, and Snow Depth: 79.7%.

Table 3.3-4 Average Soda Springs Climate Data from 1978 to 2012

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Average Maximum Temperature (degrees F)	30.3	32.8	42.0	54.3	63.8	74.0	84.7	83.1	72.6	58.7	41.9	31.4	55.8
Average Minimum Temperature (degrees F)	8.6	10.1	19.0	26.5	33.7	39.6	45.0	43.9	35.7	26.7	18.8	9.5	26.4
Average Total Precipitation (inches)	1.21	1.09	1.33	1.39	2.20	1.41	1.07	1.22	1.16	1.26	1.17	1.11	15.62
Average Total Snow Fall (inches)	11.7	8.6	7.3	3.7	0.5	0.1	0	0	0	0.9	6.7	10.6	50.0
Average Snow Depth (inches)	10	11	5	0	0	0	0	0	0	0	1	5	3

Source: Soda Springs WRCC 2016b

3.3.3.2 Meteorological Characterization

Meteorological conditions represent short-term variation in climatology. As a result, in order to provide a representative meteorological review for the region, meteorological data from the last 5 years for the region were reviewed. Surface meteorological data is available from approximately 10 locations in a 25-mile radius surrounding the Project Area, depending on season and year. Although the data were reviewed from each regional surface meteorological site, two sites were selected to primarily characterize the Project Area. The sites selected were the Georgetown Summit site, operated by the Idaho Department of Transportation, and the Slug Creek Divide site, operated by the National Water and Climate Center's Snow Telemetry (SNOTEL) network. Further, the aforementioned PSD-preconstruction air monitoring program (RTP Environmental Associates, Inc. 2015) collected a year of meteorological data at Smoky Canyon from January 10, 2014 through January 9, 2015. Those data were also used to characterize the Project Area.

The Georgetown Summit site is located 18 miles southwest of the Project Area at an elevation of 6,283 feet AMSL, approximately 700 feet lower in elevation than the Project Area. The Georgetown Summit site provides data for surface temperature and dew point as well as wind speed, gust speed, and direction.

The Slug Creek Divide SNOTEL site is located 12 miles southwest of the Project Area at an elevation of 7,225 feet AMSL, approximately 300 feet higher than the Project Area. The Slug Creek SNOTEL site provides data for surface temperature, liquid precipitation, and snow depth. Regional meteorological conditions were assessed based on temperature ranges and extremes, wind speed and direction assessments, and total precipitation and snowpack.

The RTP Environmental Associates, Inc. data were collected from a 10-meter meteorological tower and a Sodar. The tower is in a 0.3-mile wide valley associated with Smoky Creek, with ridges approximately 500 feet higher than the valley floor. The valley is oriented north-south at the location of the tower and the main mine facilities are located nearby. Wind speed (10-meter and Sodar 50-meter), wind direction (10-meter and Sodar 50-meter), air temperature, delta temperature, and solar radiation were monitored using methods and data quality objectives sufficient for use in dispersion modeling efforts.

Wind Speed and Direction

Hourly average wind speed and direction data for the Georgetown Summit Site were reviewed for the last 5 years. Annualized plots were developed to analyze wind speed and direction from the data. The annual aggregate data is presented in the Air Resources TR (Stantec 2016b). It indicates that wind directions have a strong tendency toward northwest/southeast directionality and that speeds varied widely but tended to be strongest from the south and northwest. These findings are consistent with the terrain channeling effects that occur in regions such as the Project Area with topography that run in a generally north-south direction. In combination with the tendency for synoptic weather features that move in from the northwest, these results would be consistent with those likely to occur at the Project Area.

The local, one-year data set (RTP Environmental Associates, Inc. 2015) at the Smoky Canyon Mine also reflected wind flow patterns that were strongly influenced by terrain. The data, summarized in the Air Resources TR (Stantec 2016b), indicated that patterns are complex and vary as a function of height. On average, wind speeds averaged 1 to 2 meters per second, due to blocking of synoptic flows by nearby hills and ridges.

Temperatures

Temperature data from the two public surface meteorological sites demonstrate a typical annual temperature cycle with monthly high and low temperatures that mirror the average monthly temperatures found in **Table 3.3-4**. The one-year Smoky Canyon record showed a similar mirroring (RTP Environmental Associates, Inc. 2015). Maximum annual high temperatures occurred each year during July or August, while the minimum annual low temperature occurred at various dates through the December to February timeframe. At Smoky Canyon, the maximum annual temperature of 84 degrees F occurred on July 23, 2014, and the minimum annual temperature of -4.2 degrees F occurred on January 28, 2014 (RTP Environmental Associates, Inc. 2015). Maximum and minimum annual temperature extremes at the other two sites are included in **Table 3.3-5**.

Table 3.3-5 Maximum and Minimum Annual Temperatures at the Slug Creek Divide and Georgetown Summit Sites

	SLUG CREEK DIVIDE					GEORGETOWN SUMMIT				
Year	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Maximum Temperature (degrees F)	85	87	89	87	87	90	91	90	90	92
Minimum Temperature (degrees F)	-16	-21	-3	-20	-15	-20	-6	-17	-14	-7

Source: MESOWEST data cited in Stantec 2016b

RTP Environmental Associates, Inc. also analyzed solar radiation and delta temperatures collected at the Smoky Canyon Mine during the one-year study. Delta temperatures represent the 10-meter measurement minus the 2-meter measurement, and reflect surface cooling and heating throughout the day. According to their analysis, the maximum solar radiation followed the expected seasonal pattern, as did the monthly minimum and maximum delta temperatures (RTP Environmental Associates, Inc. 2015). Temperature, delta temperature, and solar radiation data and statistics, as well as information on data quality control and quality assurance, are provided in the Annual Monitoring Data Report (RTP Environmental Associates, Inc. 2015).

Total Precipitation and Snowpack

Total precipitation and snowpack were analyzed at the Slug Creek Divide SNOTEL Site. The SNOTEL site approximates the snow pack and precipitation characteristics of the Project Area. The snowpack depths are measured based on calendar year and represent the maximum snow pack depths that occurred throughout the year listed. The precipitation data are annual totals based on the snow water year, which runs from October through September of the following year. The totals for the site are tabulated in **Table 3.3-6**.

Table 3.3-6 Maximum Snowpack Depth and Total Precipitation at Slug Creek Divide Site

	SLUG CREEK DIVIDE					SLUG CREEK DIVIDE				
	2011	2012	2013	2014	2015	10/2005 to 09/2006	10/2006 to 09/2007	10/2007 to 9/2008	10/2008 to 09/2009	10/2009 to 09/2010
Maximum Snowpack (inches)	58.6	57.7	56.8	60.1	53.0					
Total Precipitation (inches)						35.4	27.5	32.3	40.9	28.2

Source: MESOWEST SNOTEL data cited in Stantec 2016b

3.3.4 Greenhouse Gas Emissions and Climate Change

Absorbed short wave incoming energy and outgoing longer wavelengths radiating energy back to space affect the earth's temperature. Much of the thermal radiation emitted by the land and ocean is absorbed by the atmosphere, including clouds, and reradiated back to earth. This is called the greenhouse effect. The earth's greenhouse effect warms the surface of the planet. Without the natural greenhouse effect, the average temperature at earth's surface would be approximately 60 degrees F colder. The greenhouse effect creates a climate on earth that is conducive to life. Therefore, the greenhouse effect is a natural process, upon which life on earth depends.

The two primary gases in the atmosphere responsible for the greenhouse effect are water vapor and CO_2. Methane, nitrous oxide, O_3, and several other gases present in the atmosphere in small amounts also contribute to the greenhouse effect. Taken together, these are referred to as GHGs. In addition to reflecting the sun's energy back into space, GHGs also control the amount of heat radiated by the earth that is trapped beneath the atmosphere. Fluctuations in GHGs in the atmosphere are partially responsible for variances in the earth's climate along with other influences. The concentrations of these gases in the atmosphere are affected by complex natural systems that tend to either emit or sequester these gases. Anthropogenic influences and emissions also affect the prevalence of these gases in the atmosphere, particularly CO_2, which has been emitted in relatively large and growing quantities since the dawn of the Industrial Revolution when coal and later petroleum were burned for energy.

Water vapor is the most potent and abundant GHG in the earth's atmosphere. However, its concentration is controlled primarily by the rate of evaporation from the oceans and transpiration from plants, rather than by human activities, and water vapor molecules only remain in the atmosphere for a few days on average. Thus, changes in water vapor are considered a feedback that amplifies the warming induced by other climate forces.

The concentration of CO_2 in the atmosphere has been the main focus of scientific investigation with regard to anthropogenic effects on the earth's climate, largely because CO_2 is the second highest concentration of GHG in the atmosphere behind water vapor. However, other atmospheric components lend themselves to anthropogenic influence including aerosols, methane, nitrous oxide, and halocarbons. On December 7, 2009, the EPA signed two distinct findings regarding GHGs under Section 202(a) of the Clean Air Act (CAA) as defined by the Supreme Court in 2007 (*Massachusetts v. EPA*, 549 U.S. 497). The first, an "endangerment" finding, determines that GHGs are a threat to human health and welfare; the second, a "cause or contribute" finding, determines that the combined emissions of GHGs from motor vehicles contribute to the GHG pollution that threatens public health and welfare. The findings themselves do not impose any requirements on industry or other entities.

In addition to regulatory implications, GHG emissions may have an influence on the global climate system. Working Group II of the Intergovernmental Panel on Climate Change (IPCC) (Field et al. 2014) drew the following key conclusions about the potential effects of climate change in North America:

- With regard to changes in snow, ice, and frozen ground (including permafrost), there is high confidence that glaciers will shrink across western and northern North America.
- Based on growing evidence, there is high confidence that increased and earlier peak flow is occurring in many glacier and snow-fed rivers, and lakes are warming in many regions.

- There is medium confidence, that increased wildfire activity, frequency and duration is occurring beyond changes due to land use and fire management practices.
- Based on satellite observations since the early 1980s, there is high confidence that there has been a trend in many regions toward earlier 'greening' of vegetation in the spring linked to longer thermal growing seasons due to recent warming.
- There is high confidence, that changes in migration and survival of salmon in the Pacific Northwest are occurring due to warming trends.

Although GHG emissions and climate change variables (Global Mean Temperature, Radiative Balance, etc.) may co-vary, it remains very difficult to assess causality in these large scale ecological systems. As a result, baseline studies can only confidently express the existing climate conditions, the available scientific information, and the total magnitude of project related emissions.

3.4 NOISE

The Study Area for noise includes the Project Area and surroundings (**Figure 3.4-1**) that were determined to be potentially impacted by the Project. The Study Area boundary was developed with the IDT experts and professional judgement. It focuses on the region east of the western boundary of the existing Smoky Canyon Mine Lease Area. It extends west along the entire western boundary of the existing Smoky Canyon Mine lease, east to Buck Mountain, north to the existing Smoky Canyon Road and south to Crow Creek Road. A Noise TR was prepared to assess noise conditions within the Study Area (Stantec 2016c).

3.4.1 Legal Requirements and Guidelines

The Federal Noise Control Act of 1972 established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. Neither the BLM (Pocatello 2012 ARMP [BLM 2012]) or the USFS (2003 RFP [USFS 2003a]) have direct regulations, standards/guidelines, or ordinances in regard to noise from this Project. Occupational Safety and Health Administration (OSHA) regulations would not be applicable to the Project; however, OSHA methodology was used in the data collection process for the Noise Study. Further, EPA identifies outdoor noise limits to protect against effects on public health and welfare.

3.4.2 Noise Effects

To properly assess the noise resources for any area, an explanation of noise effects, consideration of the topography, climate, flora, and current ambient noise is required. The affected environment for noise impacts is usually limited to a distance of 2,640 feet from the source based on current wildlife studies (Fletcher 1980). However, if residential housing has the potential to be impacted, the affected environment includes the distance from the source of the noise to the residence but generally not beyond 1,000 feet.

The basic equations for determining noise attenuation at a receiver location, Downwind octave-band sound pressure (LfT[DW]), consider the point sound source, directivity correction, and octave-band attenuation, as defined and discussed in the Noise TR (Stantec 2016c).

3.4.3 Noise Attributes

Noise is an unwanted sound occurrence. A noise's attributes (pitch, loudness, repetitiveness, vibration, variation, duration, and the inability to control the source) determine how it affects a receptor. The study of noise involves three important characterizing parameters: pressure, power, and intensity. The power of an oscillating sound wave is composed of kinetic and potential energies. The intensity of a sound wave is defined as the average rate at which power is transmitted per cross-sectional area in the direction of travel. Noise versus sound is a subjective measurement, thus a receptor's reaction to sound is a poor measurement of noise.

3.4.4 Noise Measurements

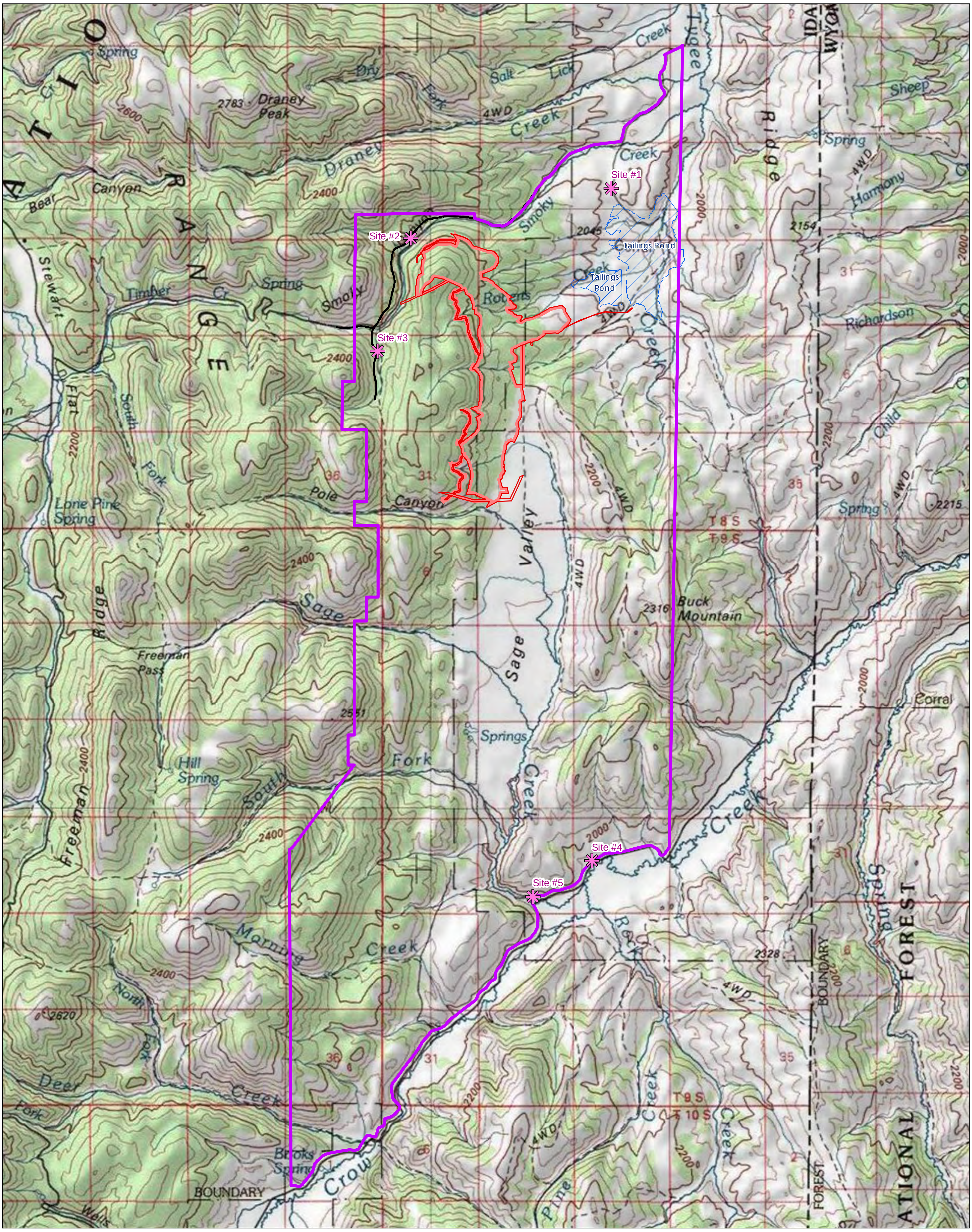
The unit of sound level measurement (i.e., volume) is the decibel (dB), expressed as dBA (decibel-A weighted). Sound measurements in dBA give greater emphasis to sound at the mid- and high-frequency levels, which are more discernible to humans. The dB is a logarithmic measurement; thus, the sound energy increases by a factor of 10 for every 10 dBA increase. A 3 dBA change in noise levels is considered barely perceptible, while a 5 dBA change is typically perceptible to most people.

Sound transmission is improved with higher temperature, lower humidity, and in the direction the wind is blowing, and is dampened significantly by any intervening terrain or physical barriers.

EPA identifies outdoor noise limits to protect against effects on public health and welfare by equivalent sound level (Leq), which is an average measure over a given time. Outdoor limits of 55 dBA Leq have been identified by EPA as desirable to protect against speech interference and sleep disturbance for residential areas and areas with educational and healthcare facilities.

According to EPA Office of Noise Abatement and Control (1981a), locations are generally acceptable to most people if they are exposed to outdoor noise levels of 67 dBA Leq or less, potentially unacceptable if they are exposed to levels of 67 to 75 dBA Leq, and unacceptable if exposed to levels of 75 dBA Leq or greater.

Generally, natural noise levels are up to 35 dBA in rural areas away from communities and roads. Within a rural community, the man-made noise level ranges from 45 dBA to 52 dBA. The day-night sound level (Ldn) in residential areas should not exceed 55 dBA to protect against activity interference and annoyance. **Table 3.4-1** presents typical sound levels in dBA and subjective descriptions associated with various noise sources.



Legend

- Project Area
- Existing Tailings Pond
- Noise Monitoring Site
- Noise Study Area

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.4-1
Noise Monitoring Sites
East Smoky Panel Mine EIS

Table 3.4-1 Sound Levels Associated with Ordinary Noise Sources

NOISE SOURCE	NOISE LEVEL	SUBJECTIVE DESCRIPTION
Commercial Jet Take-Off	120 dBA	Deafening
Road Construction Jackhammer	100 dBA	Deafening
Busy Urban Street	90 dBA	Very loud
Standard for Hearing Protection 8-Hour Exposure Permissible Exposure Limit (Mine Safety and Health Administration [MSHA]) Action Level within Active Mining Facilities	90 dBA 85 dBA	Very loud Loud – to very loud
Construction Equipment at 50 feet	80-75 dBA	Loud
Freeway Traffic at 50 feet	70 dBA	Loud
Noise Mitigation Level for Residential Areas Federal Housing Administration (FHA)	67 dBA	Loud
Normal Conversation at 6 feet	60 dBA	Moderate
Noise Mitigation Level for Undisturbed Lands (FHA)	57 dBA	Moderate
Typical Office (interior)	50 dBA	Moderate
Typical Residential (interior)	30 dBA	Faint

Source: Federal Highway Administration Highway Construction Noise Handbook (FHWA 2006)

The average noise level, expressed as dBA Leq, is often used to characterize ongoing operations or longer-term impact analyses. The maximum dBA level (dBA Lmax) is used to document the highest intensity, short-term noise level. Regular public exposure to noise levels averaging over 67 dBA L_{eq} are considered impacts that require mitigation consideration. Maximum public exposure less than moderate levels defined are considered minor.

3.4.5 Noise Data Baseline Study

The baseline collection of noise data included the direct measurement of sound data at five monitoring locations throughout the Study Area (**Figure 3.4-1**). The exact noise locations were selected based on a siting analysis, proximity to noise sources, and sensitive noise receptors in the Study Area, as described in the Noise TR (Stantec 2016c). Areas determined to be sensitive to noise impacts are points along Smoky Canyon Road and Crow Creek Road where the public could either have access to the general Study Area and/or could potentially hear Project-related noise. The locations were selected based on representativeness and public accessibility. Collectively, the data from the five monitoring sites is representative of the sound environment within the Study Area. The approximate location of each monitoring site is listed in **Table 3.4-2** and shown on **Figure 3.4-1**.

Table 3.4-2 Monitoring Locations

LOCATION	LATITUDE	LONGITUDE	DATUM	ELEVATION AMSL (FEET)
Site #1	42.72721° N	-111.08548° W	WGS84	6,500
Site #2	42.71960° N	-111.12641° W	WGS84	7,026
Site #3	42.70260° N	-111.13313° W	WGS84	7,026
Site #4	42.62592° N	-111.08931° W	WGS84	6,409
Site #5	42.62050° N	-111.10127° W	WGS84	6,448

The noise study required one day of monitoring, during which the monitor was deployed during daytime hours at each of the five chosen locations for a period of 15 minutes, and then re-deployed during nighttime hours at those locations for an additional period of 15 minutes.

3.4.6 Baseline Noise Study Results

Noise monitoring values at the five monitoring locations are shown in **Table 3.4-3**. Values ranged from a minimum A-weighted sound level (dBA Lmin) of 25.9 dBA to a maximum A-weighted sound level (Lmax) of 66.6 dBA. Measured Lmax, Lmin, and calculated L_{eq} levels for each location are summarized in **Table 3.4-3**. Based on the monitoring results, this noise data can be used to estimate ambient baseline noise levels for the Study Area.

Table 3.4-3 Noise Monitoring Results (dBA)

LOCATION	RUN TIME	LMAX (dBA)	LMIN (dBA)	LEQ (dBA)
Site #1 - Daytime	15 minutes	59.4	27.4	29.7
Site #1 - Nighttime	15 minutes	52.7	26.4	37.6
Site #2 - Daytime	15 minutes	65.4	29.1	36.3
Site #2 - Nighttime	15 minutes	66.3	25.9	27.6
Site #3 - Daytime	15 minutes	66.6	38.6	44.7
Site #3 - Nighttime	15 minutes	52.7	26.4	37.6
Site #4 - Daytime	15 minutes	59.4	27.4	29.7
Site #4 - Nighttime	15 minutes	43.8	31.4	35.8
Site #5 - Daytime	15 minutes	42.1	30.8	32.3
Site #5 - Nighttime	15 minutes	52.7	26.4	37.6

3.5 WATER RESOURCES

The Water Resources Baseline Study Area is shown in **Figure 3.5-1** and includes the entire topographically defined watershed areas associated with the Tygee Creek and Sage Creek drainage basins, along with a reach of Crow Creek (from its confluence with Sage Creek downstream to the Wyoming border). The Study Area boundary was developed with the IDT experts and professional judgement. These two basins encompass the existing Smoky Canyon Mine, the proposed East Smoky Panel Project, and downstream surface waters that may, or may not, be impacted by the proposed East Smoky Panel Project. Further, within a portion of the Study Area, a RI/FS (Formation Environmental, LLC 2014), as implemented under CERCLA, is being conducted to address existing environmental contamination issues at the Smoky Canyon Mine. The East Smoky Panel disturbances would occur within the same watersheds studied under the RI/FS. Thus, the RI/FS is also relevant to this EIS.

The following subsections describe baseline water resources conditions within the Study Area, with groundwater discussed first, followed by surface water. Springs are surface expressions of groundwater; they are primarily in the last subsection, which discusses groundwater/surface water interactions. Water resources information presented here focuses on baseline data collected specifically for the Project (i.e., reported in the Water Resources TR [Stantec 2016d and 2017a]), as well as Project-specific groundwater modeling. Aquatic habitat-related stream characteristics are discussed in **Section 3.9.2**.

3.5.1 Groundwater

Groundwater monitoring wells across the East Smoky Project Area were completed in the Triassic Dinwoody Formation, Permian Phosphoria Formation (Rex Chert Member), and Pennsylvanian Wells Formation. These monitoring wells and other existing wells (including some completed in Quaternary Alluvial deposits and Tertiary Salt Lake Formation) in and near the Study Area – were monitored to glean information on groundwater elevations (**Figures 3.5-2** through **3.5-4**), aquifer characteristics, and groundwater quality. The information was also used in groundwater modeling conducted for the Project.

Four primary groundwater systems have been identified within the Study Area for groundwater flow within the geologic units comprising the Meade Thrust Allochthon (Muller and Mayo, 1983; Mayo et al. 1985; Mayo and Associates 2016; HGG 2016a), including:

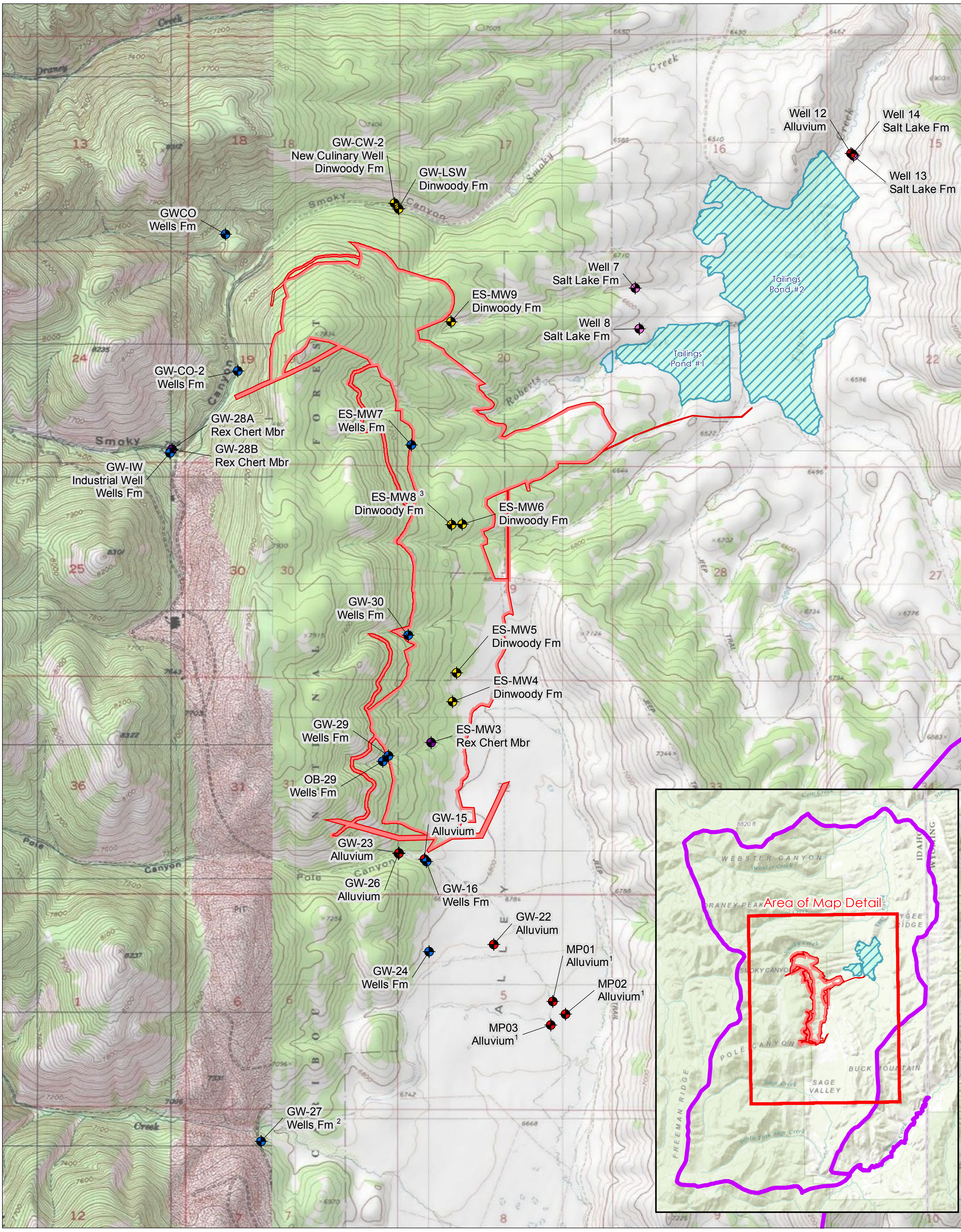
- Quaternary Alluvium;
- Tertiary Salt Lake Formation;
- Triassic Dinwoody and Thaynes Formations (referred to as Dinwoody or Tier 1 by Mayo 2016, HGG 2016a); and
- Pennsylvanian Wells Formation (referred to as Wells or Tier 2 by Mayo 2016, HGG 2016a), with recharge areas extending beyond the Study Area (**Figure 3.5-5**).

Two wells were drilled within the Rex Chert Member of the Phosphoria Formation (ES-MW4 and MW-28A); however, this geologic unit has low permeability and the availability of groundwater is limited so it is not discussed further herein. **Figure 3.5-1** provides the locations of monitoring wells sampled during the water resources baseline study as defined by the geologic formation. Well locations were chosen based upon land ownership, topographic constraints, existing disturbances, presence of special status species, presence of cultural resources, road access, presence of exploration drill holes, stratigraphy, faults, and anticipated depth to various aquifers.

The uppermost groundwater system consists of Quaternary alluvial and colluvium deposits. The Alluvium groundwater system consists of groundwater flow in unconsolidated silts, sands, and gravels. Within the Study Area, it exists mainly along stream channels (e.g., Tygee Creek), upstream of the tailings dams, and in Sage Valley. The Alluvium exists mainly on the east side of the West Sage Valley Fault except in the southern portion of the Study Area, where it is found on both sides of the fault. The fault does not create a barrier to groundwater flow in the shallow alluvial groundwater system, as indicated by groundwater elevations trending eastward, across the fault within the alluvial system (**Figure 3.5-2**). The shallow alluvial deposits are considered to be a distinct groundwater system, separate from the Salt Lake Formation (HGG 2018). Recharge is from precipitation/natural recharge and locally is extremely dependent on-stream infiltration from Pole Canyon Creek. To mitigate selenium effects from the Pole Canyon ODA, stream infiltration and recharge has been artificially modified in the lower Pole Canyon Area. First, Pole Canyon streamflows are collected in a pipeline upstream of the ODA and discharged downstream of the ODA to the alluvium of Sage Valley. Second, flows in Pole Canyon upstream of the ODA, but which cannot be captured by the pipeline, are captured in an infiltration basin and discharged to the Wells Formation, thus avoiding the ODA, which is a source of the selenium contributions.

The Tertiary Salt Lake Formation consists of fresh water lacustrine and alluvial deposits, and groundwater flow in limestones, tuffs, and conglomerates comprise the groundwater system. Groundwater in the Salt Lake Formation generally receives water from stream infiltration and direct recharge from precipitation where it outcrops primarily on the east side of the West Sage Valley Fault (Note that groundwater data is only available for two wells installed in the Salt Lake Formation, Wells 7 and 8; therefore, a groundwater flow map for this unit is not provided.). The fault creates a barrier to groundwater flow, resulting in a separation in hydraulic systems on either side of the fault. Therefore, groundwater in the Salt Lake Formation is considered to be distinct from the Alluvial groundwater system (HGG 2018).

The underlying two groundwater systems (Tier 1 or Dinwoody and Tier 2 or Wells) are defined by the low conductivity Phosphoria Formation of Permian age, which separates them. In the Study Area, the Dinwoody groundwater system, stratigraphically below the Salt Lake Formation, consists primarily of groundwater flow in fractured siltstone, limestone, and shale of the Triassic Dinwoody and Thaynes Formations. The lowermost groundwater system (Tier 2 or Wells) in the Study Area consists primarily of groundwater flow in fractured sandstone, limestone, and dolomite comprising the Pennsylvanian Wells Formation. The Phosphoria Formation (consisting of the Rex Chert Member and the Meade Peak Member in the Project Area) forms the lower boundary of the Dinwoody groundwater system and the upper boundary of the Wells groundwater system. Under natural conditions, the lower permeability of the Phosphoria Formation generally prohibits flow between the two systems and acts as a confining layer between them (Ralston 1979; Mayo and Associates 2016). Groundwater flow within the Dinwoody groundwater system is isolated from the other groundwater systems and is generally controlled by fractures/bedding planes. It is present within a few hundred feet of the ground surface and is typically under unconfined aquifer conditions; however, heterogeneous characteristics of the system may create perched conditions locally. Recharge is via precipitation to outcrops of the Dinwoody Formation and other Mesozoic outcrop areas (**Figure 3.5-3**) and discharge is along bedding and thrust splay surfaces (Mayo 2016).



Legend

- Project Area Boundary
- Water Resources Baseline Study Area
- Existing Tailings Pond
- Roberts Creek Diversion Pond

Existing Wells

- Alluvium
- Dinwoody Formation (Fm)
- Rex Chert Member (Mbr)
- Salt Lake Formation (Fm)
- Wells Formation (Fm)

Notes

1: Sampled under EIS frequency and protocols, but for RI/FS analytes
2: Monitored under EIS SAP in Fall 2014 only; supported by data from other monitoring programs
3: Temporary borehole decommissioned in Fall 2015
4. Coordinate System: NAD 1983 UTM Zone 12N
5. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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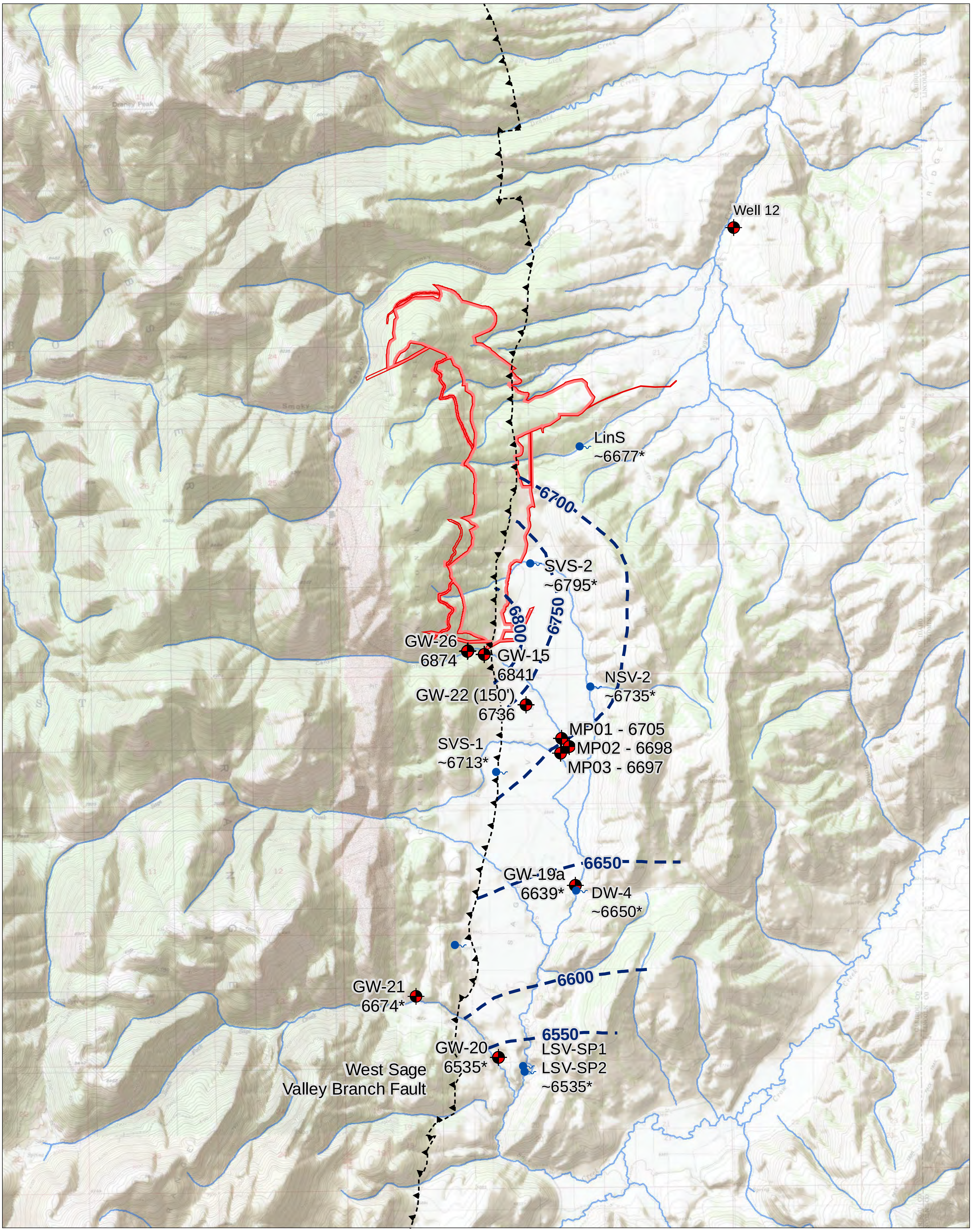
Figure 3.5-1
Water Resources Baseline Study Area and Groundwater Monitoring Sites East Smoky Panel Mine EIS



Legend

Spring / Seep (feet, msl)

Alluvial Monitoring Well Location and Mean Groundwater Elevation (feet, msl)

West Sage Valley Branch Fault

Groundwater Elevation Contour (feet, msl)

Project Area Boundary

Streams

0 2,000 4,000
Feet
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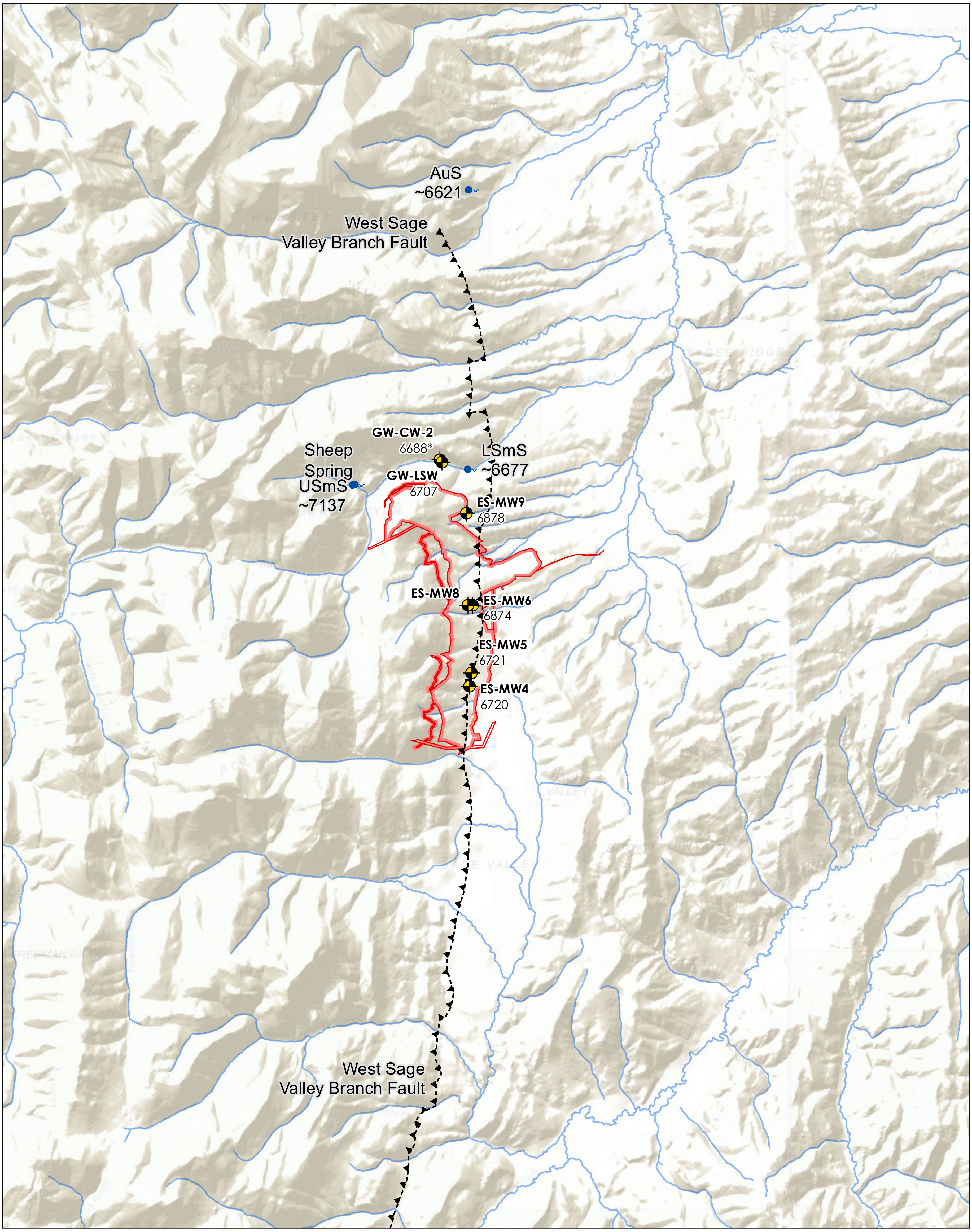
N

Notes
1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
Sources: Esri, USGS, NOAA
3: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho
4. Figure originally created by HGG. Modified by Stantec for EIS formatting.
5. Mean groundwater and spring elevations calculated from depth to water measurements collected November 2014 - November 2016, except for data marked with with "*". These data were based on values reported in HGG 2016.
6. Groundwater and spring elevations rounded to the nearest foot.
7. No data available if not shown at an individual well location.

Figure 3.5-2
Mean Groundwater and Spring Elevation Contours Alluvium
East Smoky Panel Mine EIS
November 2014 - November 2016



Legend

Dinwoody Monitoring Well Location & Mean Groundwater Elevation (feet, msl)

West Sage Valley Branch Fault

Project Area Boundary

0 2,750 5,500
Feet
1:66,000 (at original document size of 11x17)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, USGS, NOAA

3. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

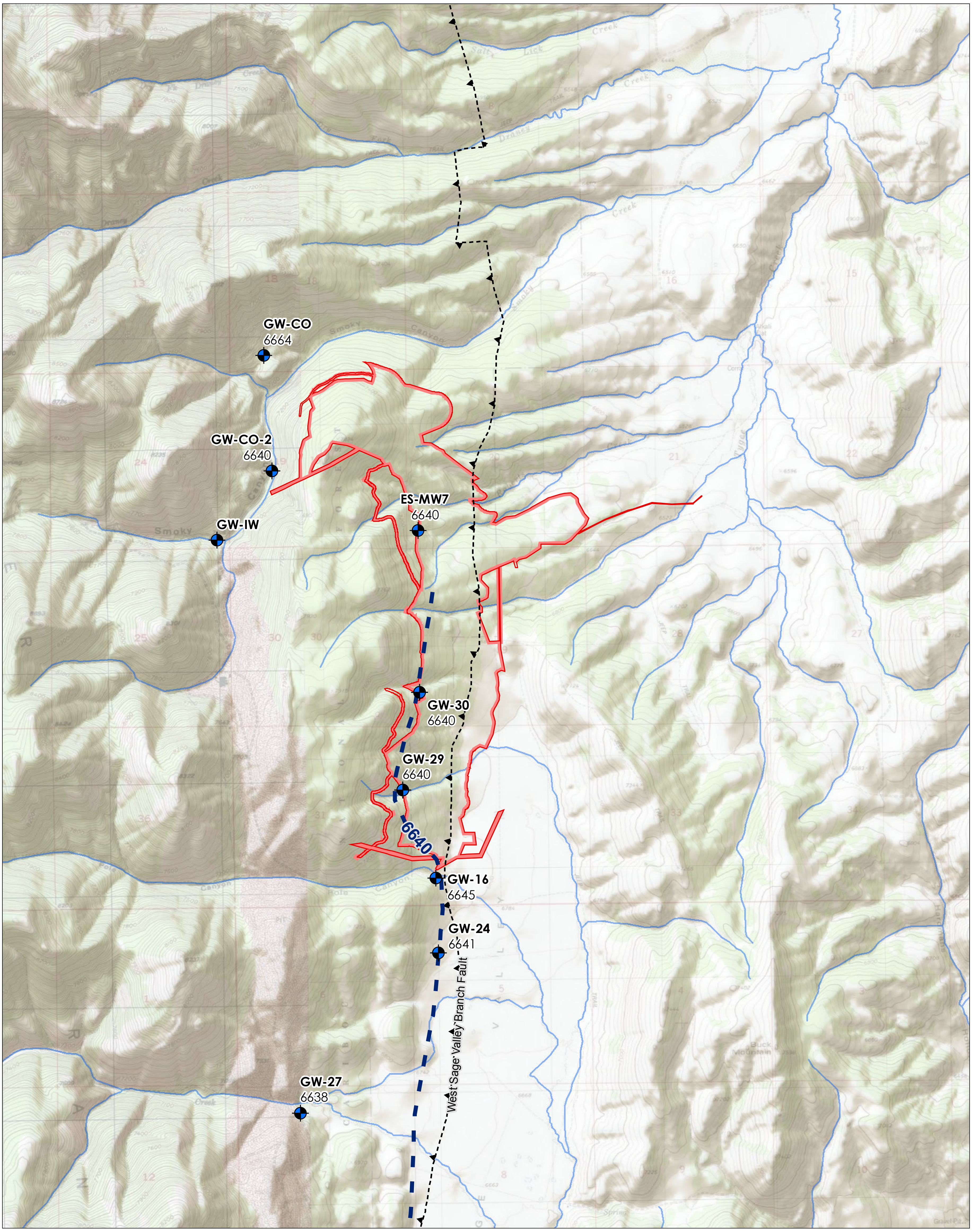
4. Figure originally created by HGG. Modified by Stantec for EIS formatting.

5. Mean groundwater elevations calculated from depth to water measurements collected November 2014 - November 2016, except for data marked with with "*". These data were based on values reported in HGG 2016.

6. Groundwater elevations rounded to the nearest foot.

7. No data available if not shown at an individual well location.

Figure 3.5-3
Mean Groundwater and Spring Elevation
Dinwoody Formation
East Smoky Panel Mine EIS
November 2014 - November 2016



Legend

- Wells Formation Monitoring Well Location and Groundwater Elevation (feet, msl)
- Groundwater Elevation Contour (feet, msl)
- Thrust Fault
- Streams
- Project Area Boundary

0 1,500 3,000
Feet
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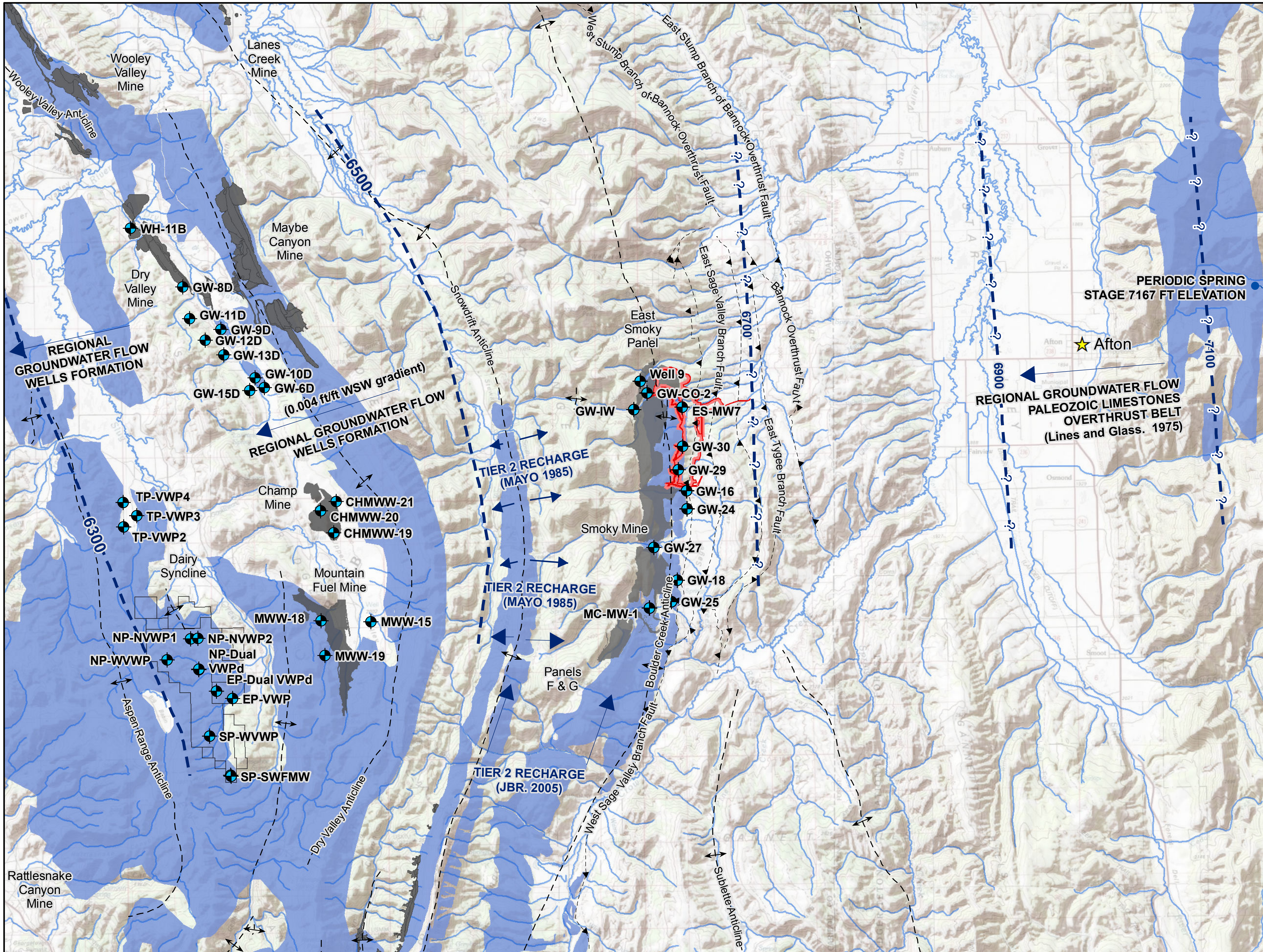
Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
Sources: Esri, USGS, NOAA
3: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho
4. Figure originally created by HGG. Modified by Stantec for EIS formatting.
5. Mean groundwater and spring elevations calculated from depth to water measurements collected November 2014 - November 2016, except for data marked with with "*". These data were based on values reported in HGG 2016.
6. Groundwater and spring elevations rounded to the nearest foot.
7. No data available if not shown at an individual well location.

Figure 3.5-4
Mean Groundwater and Spring Elevation Contours Wells Formation East Smoky Panel Mine EIS November 2014 - November 2016



Legend

- Spring
- Regional Wells Formation Wells
- Tier 2 Recharge
- Groundwater Elevation in Paleozoic Limestones (? denotes inferred groundwater contour)
- Anticline
- Thrust Fault
- Project Area Boundary
- City
- Phosphate Mines
- Streams
- Regional Outcrop (Wells/Brazer)

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed Sources: Esri, USGS, NOAA
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E Caribou County, Idaho
5. Figure originally created by HGG. Modified by Stantec for EIS formatting.

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Figure 3.5-5

Regional Groundwater Flow and Recharge Areas, Wells Formation and Paleozoic Limestones East Smoky Panel Mine EIS

Groundwater flow within the Wells groundwater system is restricted to strata below the Phosphoria Formation and is also controlled by fracture/bedding plane characteristics with discharges typically occurring along fault planes (Mayo 2016). Groundwater recharge to the Wells Formation typically occurs via direct precipitation/snowmelt to Wells Formation outcrops of the Snowdrift Anticline to the west of the Project Area and outcrops of the Boulder Creek Anticline within and south of the Study Area, including the Pole Canyon area (HGG 2016a, **Figure 3.5-4**). Groundwater flows eastward from these outcrop areas toward the West Sage Valley Thrust Fault where it encounters the highly permeable fault damage zone and discharges at the Hoopes Spring complex and Lower South Fork Sage Creek Springs, which represent the primary discharge points for Wells Formation groundwater encountered in the Project Area (HGG 2016a). Other springs (South Fork Sage Creek Springs) and base flow to gaining streams on the east side of the Boulder Creek Anticline are also sources of discharge, as well as groundwater pumping at the industrial well (GW-IW) (500 gallons per minute [gpm]).

Based on regional groundwater elevation data, recharge to the Wells Formation groundwater system within the Project Area may also occur in Paleozoic outcrop areas to the east of the Study Area near Afton, Wyoming along the Salt River Range or via upwelling from a deeper regional groundwater system (HGG 2016a) (**Figure 3.5-5**).

3.5.1.1 Elevation and Gradient

For the Alluvial system, groundwater to the south and southeast of the Project Area (no well data are available within the Project Area) is typically found at depths of about 3 to 23 feet below ground surface (bgs); groundwater depths in the Salt Lake Formation wells are slightly deeper and range from about 9 to 35 feet bgs. Mean groundwater elevations for the Alluvial and Salt Lake Formation wells were calculated based on data collected between November 2014 through July 2016 or based on data presented in HGG 2016a. As shown on **Figure 3.5-2**, mean groundwater elevations in the Salt Lake Formation based on data collected in wells located to the northeast of the Project Area range from 6,524 feet AMSL at Well 8 to 6,545 feet AMSL at Well 7 (updated survey data are not available for Wells 12, 13, and 14). Data indicate that groundwater in the Alluvial system flows horizontally with topography/dip to the east and south in Sage Valley from the vicinity of Pole Canyon toward Hoopes Spring. Horizontal groundwater gradients in the Alluvial system are approximately 0.02 feet/feet. Based on limited data (Wells 7 and 8 and spring elevations at LinS and ESS) and groundwater modeling simulations (HGG 2016b), groundwater flow in the Salt Lake Formation is thought to also generally follow geologic dip and topography. The groundwater modeling results (HGG 2016b) also indicate that the Salt Lake Formation and Alluvial system due east of Pole Canyon within Sage Valley are not hydraulically connected, indicating that groundwater leaving Pole Canyon will likely follow the flow pathway of the Alluvial system rather than mixing with the Salt Lake Formation system.

As shown on **Figure 3.5-6**, below seasonal groundwater trends are observed in the Alluvial system wells indicating the strong influence from recharge via precipitation. Seasonal high groundwater levels in the Alluvial and Salt Lake Formation are typically observed in spring (May) and seasonal lows in fall (November) with seasonal fluctuations ranging from less than a foot at Salt Lake Formation Well 14 to the north of the Study Area and about 10 feet at Alluvial well GW-15 just south of the Project Area.

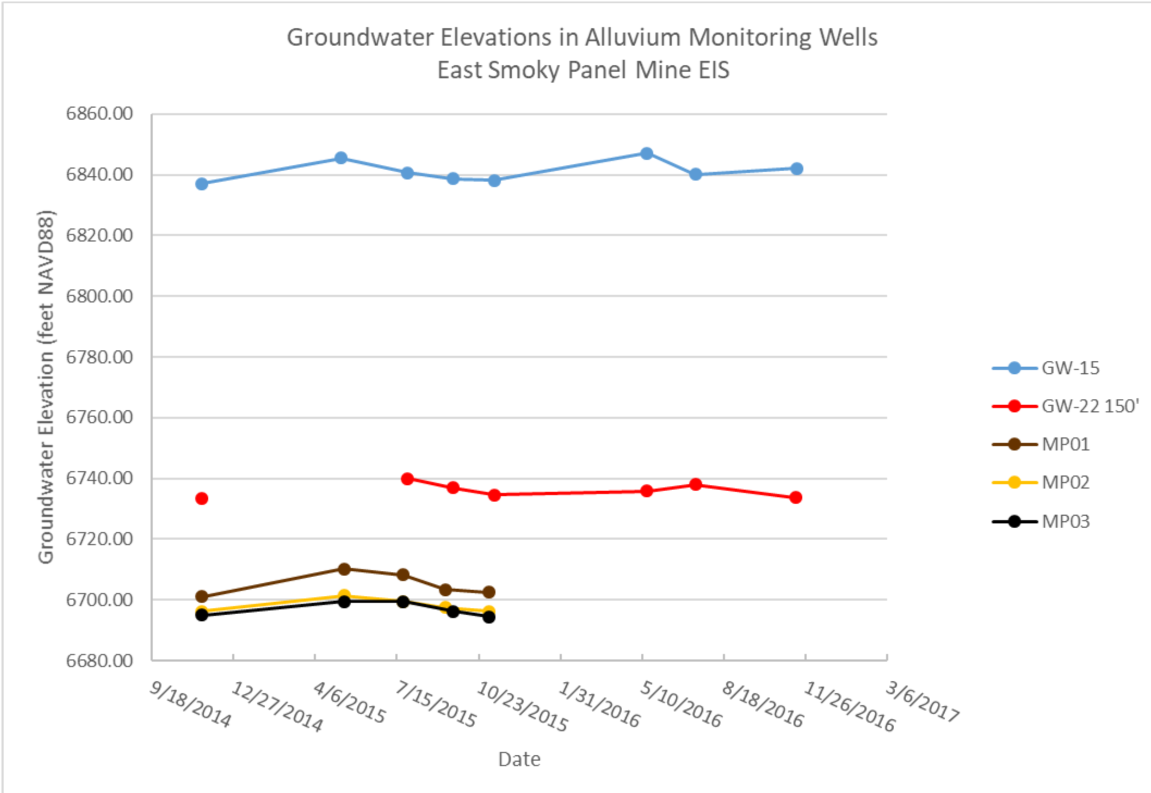


Figure 3.5-6 Groundwater Elevations in Alluvium Monitoring Wells

Groundwater in the Dinwoody system is typically found at depths approximately 33 to 105 feet bgs at the northern portion of the Study Area and from 140 to 276 feet bgs in the central and southern portion of the Study Area, based on data collected between November 2014 and July 2016. Mean groundwater elevations in the Dinwoody Formation range from 6,688 feet, AMSL at GW-CW-2 just north of the Project Area boundary to 6,878 feet AMSL at well ES-MW9 in the central portion of the Study Area (**Figure 3.5-3**). The Dinwoody system monitoring wells in and near the Project Area are located approximately along a cross-gradient north-south trending line and the difference in the groundwater elevations are minimal, inhibiting determination of groundwater flow direction. As shown on **Figures 3.5-7** and **3.5-8**, groundwater fluctuations in the Dinwoody system fluctuate seasonally, with seasonal highs occurring in the summer months (July-August) and seasonal lows occurring in the spring (March-April). For wells located in the north-central portion of the Project Area (ES-MW6) and to the north of the Project Area (ES-MW9), seasonal fluctuations appear to be more pronounced and likely indicate more direct connection to precipitation in these areas. Additionally, groundwater elevations at these wells are about 140 to 150 feet higher than those in the south-central portion of the Project Area (ES-MW4 and ES-MW5), with fluctuations ranging from about 3 feet at the southernmost wells to more than 14 feet at well ES-MW6.

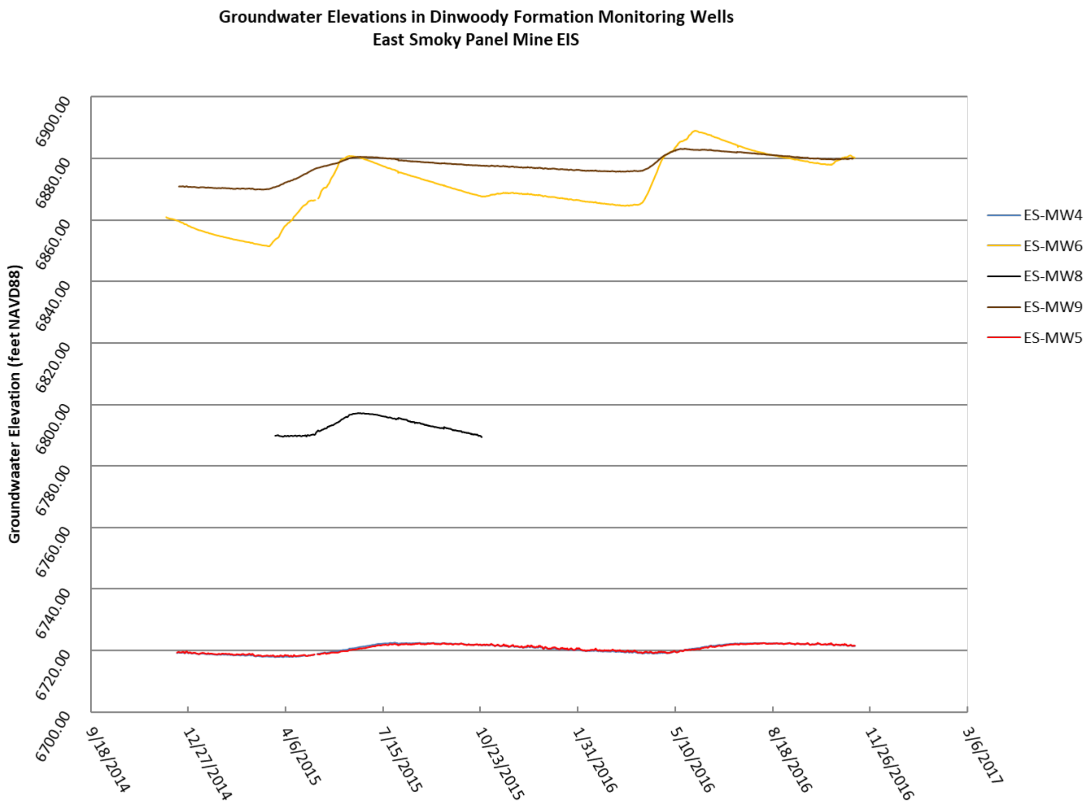


Figure 3.5-7 Groundwater Elevations in Dinwoody Formation Monitoring Wells

For the Wells Formation, groundwater is observed at depths ranging from about 151 to 576 feet bgs, with depths increasing to the north across and near the Project Area, based on data collected between November 2014 and July 2016. Mean groundwater elevations in the Wells Formation monitoring wells located within and near the Project Area range from about 6,639 to 6,640 feet, AMSL with little variability in groundwater elevations outside of the Project Area (**Figure 3.5-4**). Groundwater elevations in Wells Formation wells GW-16 and GW-24, located near Pole Canyon, have historically been slightly greater than in Wells Formation wells located immediately to the north and south of this area. Pole Canyon is a known Wells Formation recharge zone for surface water inflows, which accounts for the localized elevated water levels (HGG 2016a). Groundwater elevations are generally slightly less at well GW-29 located in the southern portion of the Project Area, than those in the north-central (ES-MW7) and south-central (GW-30) portions of the Project Area. Similar to the Dinwoody Formation wells, the Wells Formation wells are located approximately along a cross-gradient north-south trending line and the difference in the groundwater elevations are minimal, inhibiting determination of groundwater flow direction. As shown on **Figure 3.5-9**, similar to the Dinwoody Formation system, groundwater fluctuations in the Wells Formation wells fluctuate seasonally, with seasonal highs occurring in the summer months (July-August) and seasonal lows occurring in the spring (March-April). Seasonal fluctuations are about four feet across the Project Area.

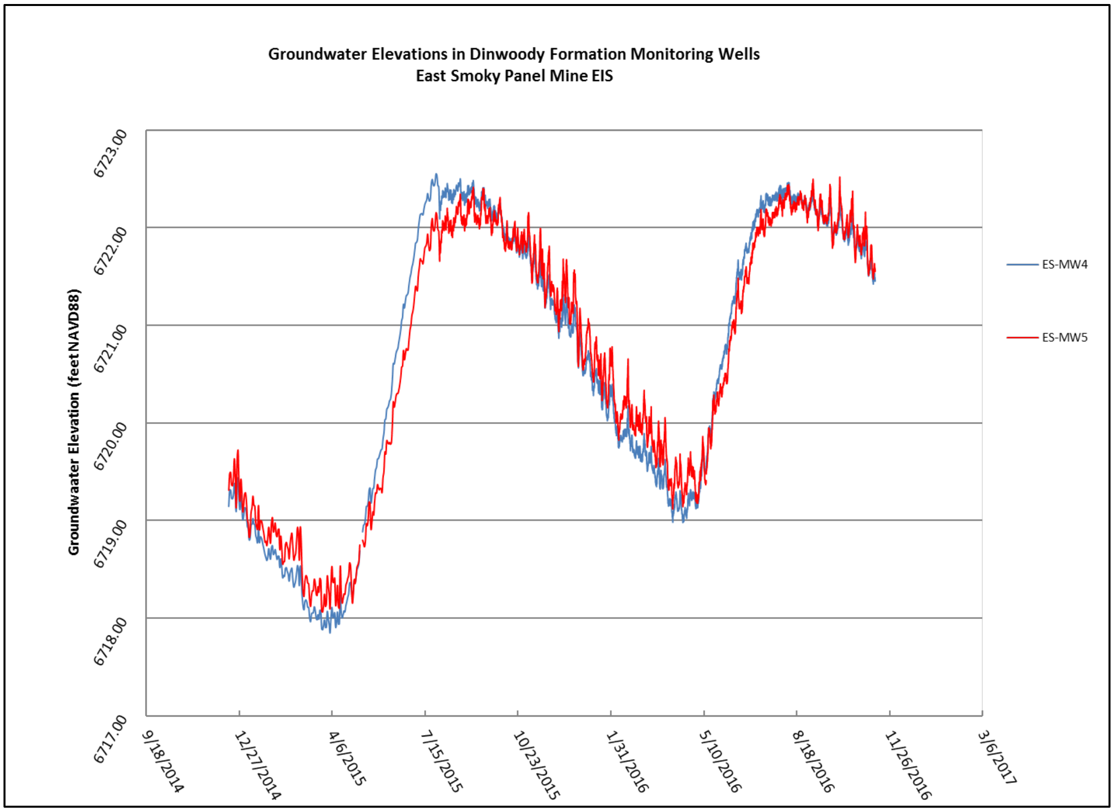


Figure 3.5-8 Groundwater Elevations in Dinwoody Formation Monitoring Wells – Zoom

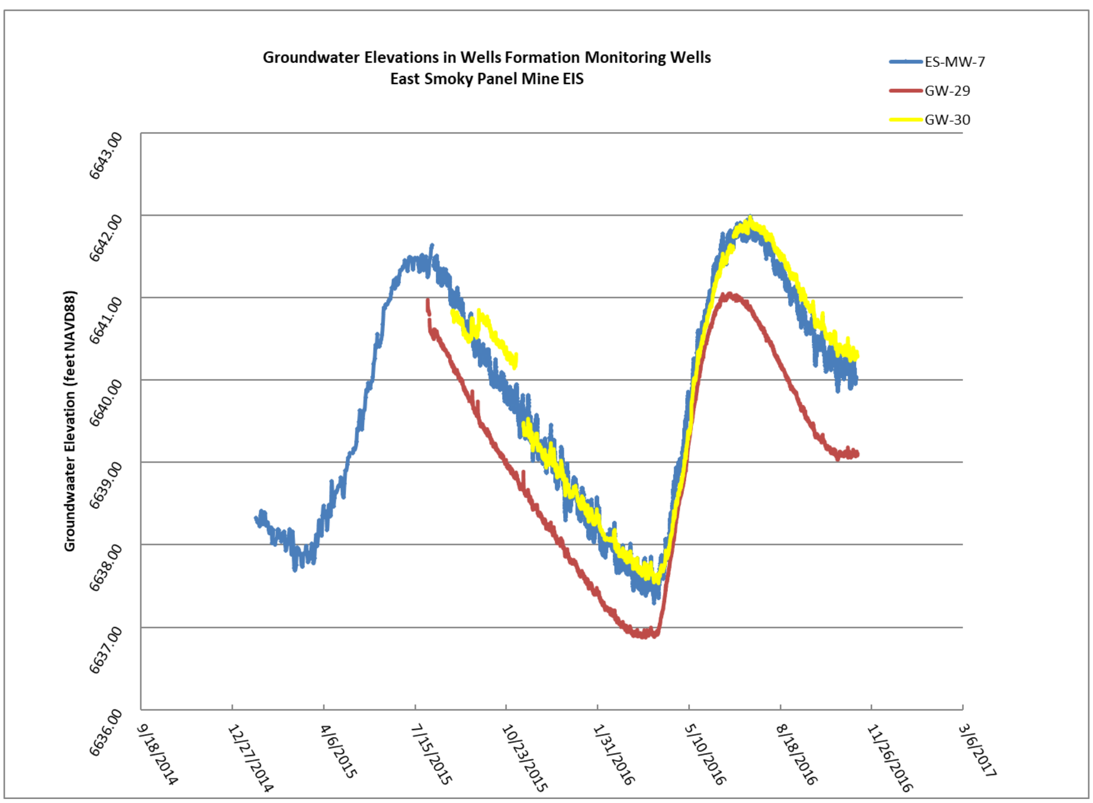


Figure 3.5-9 Groundwater Elevations in Wells Formation Monitoring Wells

3.5.1.2 Groundwater Quality

Groundwater quality samples have been collected from wells installed in each of the groundwater systems discussed above, as well as one well in the Rex Chert. Monitoring well locations and the corresponding aquifer systems are shown on **Figure 3.5-1**. Groundwater samples were collected during eight events between November 2014 and November 2016 at most wells. Groundwater analyses included:

- Metals (total and dissolved): Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium (dissolved only), Chromium, Cobalt, Copper, Iron, Lead, Magnesium (dissolved only), Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium (dissolved only), Thallium, Uranium, Vanadium, and Zinc
- Total alkalinity as calcium carbonate ($CaCO^3$)
- Bicarbonate as $CaCO^3$
- Carbonate as $CaCO^3$
- Chloride
- Hardness
- Hydroxide
- Nitrate+Nitrite
- Sulfate as SO_4
- TDS
- Total Organic Carbon (TOC)
- Total Suspended Solids (TSS)

Water quality parameters measured in the field during each event included: pH, conductivity, temperature, turbidity, and dissolved oxygen.

The collected data indicate that groundwater at many of the monitoring sites is typed as calcium-bicarbonate (Stantec 2016a). These compositions are consistent with dissolution of carbonate minerals containing variable amounts of gypsum (Mayo 2016). Exceptions to this include the following: calcium/magnesium bicarbonate (monitoring wells ES-MW5, ES-MW6, ES-MW7, GW-CO-2, and GW-CW-2 and temporary borehole ES-MW8), calcium chloride (monitoring Well 12), sodium chloride (monitoring Well 13 and monitoring Well 14), and calcium sulfate (monitoring wells GW-16 and GW-26). In addition, while groundwater collected from monitoring well GW-29 was calcium-bicarbonate type for four of the monitoring events, the spring 2015 groundwater sample was notably different with a magnesium-bicarbonate type among other differences. The high chloride content in Wells 12, 13, and 14 are likely related to the location of these wells near the toe of the tailings impoundment #2 (Mayo 2016). A single sample collected at the GW-27 observation point for groundwater modeling was also calcium-bicarbonate and had a TDS concentration of 352 milligrams per liter (mg/L).

Sulfate is another major ion that is found in varying concentrations in the groundwater data set. Sulfate concentrations ranged from 2.14 mg/L (at ES-MW5) to 1,230 mg/L (at GW-26). TDS ranged from 104 mg/L (at ES-MW5) to 23,600 mg/L (at Well 14), with most sites being less than approximately 350 mg/L. Wells immediately downgradient topographically of the TP2 dam (Well 12, Well 13, and Well 14) and a well completed in alluvium near the mouth of Pole Canyon (GW-26) had elevated TDS ranging from a low of 775 mg/L (GW-26) to the previously noted high of 23,600 mg/L (Well 14). Sulfate concentration at GW-27, as measured by a single sample collected during the baseline study at that location, was 26 mg/L.

Dissolved aluminum, antimony, arsenic, beryllium, cadmium, cobalt, lead, mercury, silver, and thallium, were typically present at concentrations less than the laboratory's reporting limit in the groundwater samples. Other trace metals were more often present at concentrations greater than the laboratory's reporting limit in samples collected at some of the groundwater sites.

Total selenium concentrations in groundwater samples ranged from less than the method detection limit (MDL) up to 5.93 mg/L. The highest total selenium concentration of 5.93 mg/L was from a sample collected at GW-26, an Alluvium system well located slightly south of the Project Area boundary. Other samples from that monitoring well also had elevated selenium, with the average being 3.88 mg/L (range 1.16-5.93 mg/L). These results are an order of magnitude higher than total selenium results reported in any of the other groundwater samples collected during the baseline study. There appears to be a strong correlation between elevated sulfate concentrations and total selenium concentrations at GW-29 (a Wells Formation completion) and other Wells Formation and Alluvium monitoring wells in the vicinity of Pole Canyon (i.e. GW-15, GW-16, GW-22, GW-26, MP01, MP02, and MP03), and these elevated sulfate and selenium concentrations are likely associated with previous mining activities. Selenium concentration at GW-27, as measured by a single sample collected during the baseline study at that location, was 0.0104 mg/L.

Dissolved manganese concentrations in groundwater samples ranged from less than the MDL up to 2.24 mg/L. The latter result was from a sample collected at MP01, which is a shallow temporary piezometer. At GW-27, the single sample collected during the baseline study had a dissolved manganese concentration of 0.004 mg/L. At GW-IW, dissolved manganese concentration ranged from < 0.00091 to 0.0035 mg/L and averaged 0.002 mg/L for the eight samples. GW-27 and GW-IW are locations that serve as observation points for the groundwater fate and transport modeling.

Groundwater data were compared to primary and secondary groundwater standards at IDAPA 58.01.11. Selenium was the main constituent that exceeded the primary standard (0.05 mg/L) in groundwater samples. Groundwater samples collected from GW-15, GW-16, GW-22 (98'), and GW-26 had dissolved selenium concentrations greater than the 0.05 mg/L primary standard in every monitoring event. Several monitoring wells (GW-22 (150'), MP01, MP02, and MP03) had concentrations greater than the dissolved selenium standard in one or more of the monitoring events. Mean selenium concentrations for the four groundwater systems (Alluvium/Salt Lake Formation, Dinwoody Formation, and Wells Formation) are illustrated on **Figures 3.5-10**, **3.5-11**, and **3.5-12**, respectively. As shown, the locations where the mean groundwater concentrations exceed the primary standard are focused in Alluvium wells (GW-15, GW-22, GW-26, MP-02) and one Wells Formation well (GW-16) near and south of the Project Area.

Dissolved antimony in the November 2016 sample collected at GS-LSW exceeded the 0.006 mg/L primary standard. The reported result was 0.016 mg/L, which was well above the other sample results (primarily less than the MDL of 0.00019 mg/L) at this location in previous events.

Secondary groundwater standards for aluminum (0.2 mg/L), iron (0.3 mg/L), manganese (0.05 mg/L), chloride (250 mg/L), sulfate (250 mg/L), and TDS (500 mg/L) were also exceeded in some groundwater samples. The dissolved aluminum standard was exceeded in one of the samples collected at Well 14. The dissolved iron standard was exceeded in all the groundwater samples collected from ES-MW3, and in one or more of the groundwater samples collected from ES-MW7, GW-29, GW-CO-2, Well 12, and Well 14. The dissolved secondary manganese standard was exceeded in all the groundwater samples collected from ES-MW3 (ranged from 0.181 to 0.593 mg/L), MP01 (ranged from 0.725 mg/L to 2.24 mg/L), MP02 (ranged from 0.414 to 1.86 mg/L), MP03 (ranged from 0.171 to 0.646 mg/L), Well 12 (ranged from 0.787 to 1.35 mg/L), Well 13 (ranged from 0.261 to 0.386 mg/L), Well 14 (ranged from 0.236 to 1.57 mg/L), and temporary borehole ES-MW8 (0.0812 to 0.144 mg/L). In addition, the dissolved secondary manganese standard was exceeded in one or more of the groundwater samples collected from ES-MW4 (mean 0.14 mg/L), ES-MW5 (mean 0.03 mg/L), ES-MW6 (mean 0.07 mg/L), ES-MW7 (mean 0.14 mg/L), GW-29 (mean 0.03 mg/L), and GW-CO-2 (mean 0.051 mg/L). The chloride standard was exceeded in all the groundwater samples collected from Wells 12, 13, and 14. The secondary sulfate standard was exceeded in all the groundwater samples collected from GW-26, and in three groundwater samples collected from Well 14. Lastly, TDS was greater than the 500 mg/L standard in all the groundwater samples collected from GW-16, GW-26, Well 12, Well 13, and Well 14. As stated above, all of the groundwater standards for which exceedances are described in this paragraph are secondary standards. Secondary groundwater standards are generally based on aesthetics, unlike primary groundwater standards, which are based on protection of human health.

3.5.2 Surface Water

The Study Area for water resources is primarily in two drainage basins: Tygee Creek basin (Hydrologic Unit Code [HUC] #170401050204) to the north and Sage Creek basin (HUC #170401050103) to the south (**Figure 3.5-13**). Several area streams in these watersheds originate on and drain the eastern slope of the Webster Range passing through the ridge formed by the Boulder Creek Anticline and into Sage Valley to the east. Existing Simplot mine disturbances west of the Project Area have disrupted the up-gradient natural surface water patterns of some of these streams. Both Tygee Creek and Sage Creek are tributary to the Salt River via Stump Creek and Crow Creek, respectively. The reach of Crow Creek that is within the Study Area is in HUC #170401050102. The Salt River is part of the Columbia River system.

Spring, Webster Canyon, Salt Lick, and Draney creeks are tributaries to lower Tygee Creek and are located north of the existing mine disturbances (**Figure 3.5-13**). Smoky Creek is located to the south of Draney Creek. Smoky Creek flows northeast, joining with Tygee Creek approximately two miles downstream from the mouth of Smoky Canyon. Roberts Creek, located in the central portion of the Study Area, is located east of the existing Panels B and C and east of the Project Area. This creek is also tributary to Tygee Creek. Both the Smoky and Roberts creek watersheds (with drainage areas of 6.6 and 2.5 square miles, respectively) have been disturbed by mining and/or would be disturbed by the Project. Water in Tygee Creek joins Stump Creek and eventually enters the Salt River Valley about 10 miles distant.

Other streams within the Study Area that cross the anticline to the south of Roberts Creek are: Pole Canyon Creek, Sage Creek, and South Fork Sage Creek. Pole, Sage, and South Fork Sage creeks all flow to Sage Valley. These tributary streams have been affected by past and/or existing mining activities. Sage Creek is the mainstem for these tributaries. It drains a 23.7 square mile watershed and flows south to Crow Creek. Crow Creek flows northeastward into the Salt River Valley.

3.5.2.1 Watershed Conditions

The CTNF RFP EIS (USFS 2003b) notes that the EPA and USGS assessed the Salt River watershed (4th scale HUC) overall with the best possible rating of "1" on their 1 to 5 Index of Watershed Indicators (IWI). The rating indicates that the basin has "low vulnerability to additional stressors such as pollutant loadings" according to the IWI description. This does not mean that individual HUC 6 subwatersheds (e.g., the Study Area's Tygee Creek or Sage Creek basins) within the Salt River watershed would also have a "1" rating. Nor does it indicate that the Salt River watershed or its subwatersheds could accept any level or type of additional disturbance or stressor.

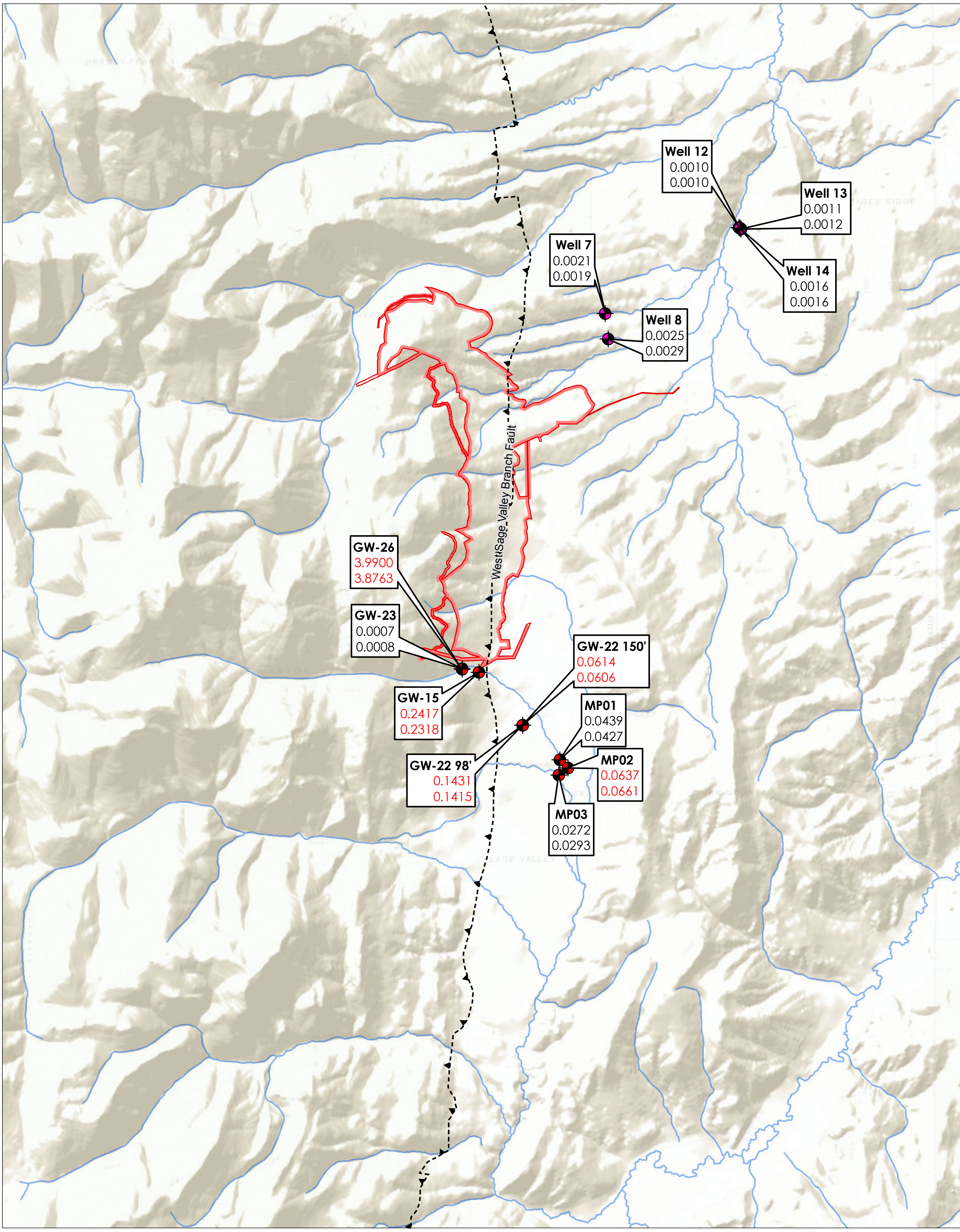
More recently, the USFS has expanded on the IWI by conducting a Watershed Condition Framework (WCF) analysis (USFS 2017a). The WCF inventoried 6th level HUCs including the two comprising the Study Area. The potential WCF classifications are: functioning properly, functioning at risk, or impaired; they are derived by individually rating 12 watershed condition indicators. Both the Sage Creek and Tygee Creek HUCs are classed as impaired (USFS 2017a). They are the only watersheds rated as impaired in the Salt River drainage. (Note that this WCF impairment classification is different from IDEQ's designation of a waterbody's impairment of beneficial uses, which is described in **Section 3.5.2.3.**) In addition to the classification system, the WCF intends to identify priority watersheds and prepare Watershed Restoration Action Plans.

To date, neither the Sage Creek HUC nor the Tygee Creek HUC have had a priority identified or a Plan prepared, according to the WCF website (USFS 2017a).

The RFP (USFS 2003a) states that no more than 30 percent of the NFS lands component of a watershed or subwatershed should be in a hydrologically disturbed condition (defined in the RFP as "Changes in natural canopy cover (vegetation removal) or a change in surface soil characteristics, such as compaction, that may alter natural streamflow quantities and character") at any one time. **Table 3.5-1** provides the total acres and NFS land acres within the Tygee and Sage creeks 6th level HUC watersheds, and the acreage and percentage currently disturbed within the NFS land component of the HUC. As shown, neither of these NFS-defined watersheds currently exceed the 30 percent hydrologic disturbance cutoff.

Table 3.5-1 Hydrologically Disturbed Areas

WATER-SHED	HUC #	TOTAL AREA (ACRES)	HUC AREA ON NFS LANDS (ACRES)	CURRENT DISTURBED ACRES	PERCENT OF TOTAL HUC CURRENTLY DISTURBED	CURRENT DISTURBED ACRES ON NFS LANDS	PERCENT OF HUC CURRENTLY DISTURBED ON NFS LANDS
Tygee Creek	170401050204	24,284	13,012	3,276	13.5	1,117	8.6
Sage Creek	170401050103	15,149	10,617	2,122	14	2,043	19.2



Legend

- Alluvial Monitoring Well Location
- Salt Lake Formation Monitoring Well Location
- West Sage Valley Branch Fault
- Project Area Boundary
- Streams

MP03 = **Well Location ID**
0.0272 = Dissolved Selenium, mg/L
0.0293 = Total Selenium, mg/L

Red values denotes concentration exceeding Idaho Administrative Procedures Act (IDAPA) 58.01.11 Primary Constituent Standard for Selenium (0.05 mg/L)

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, USGS, NOAA

3: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

4. Figure originally created by HGG. Modified by Stantec for EIS formatting.

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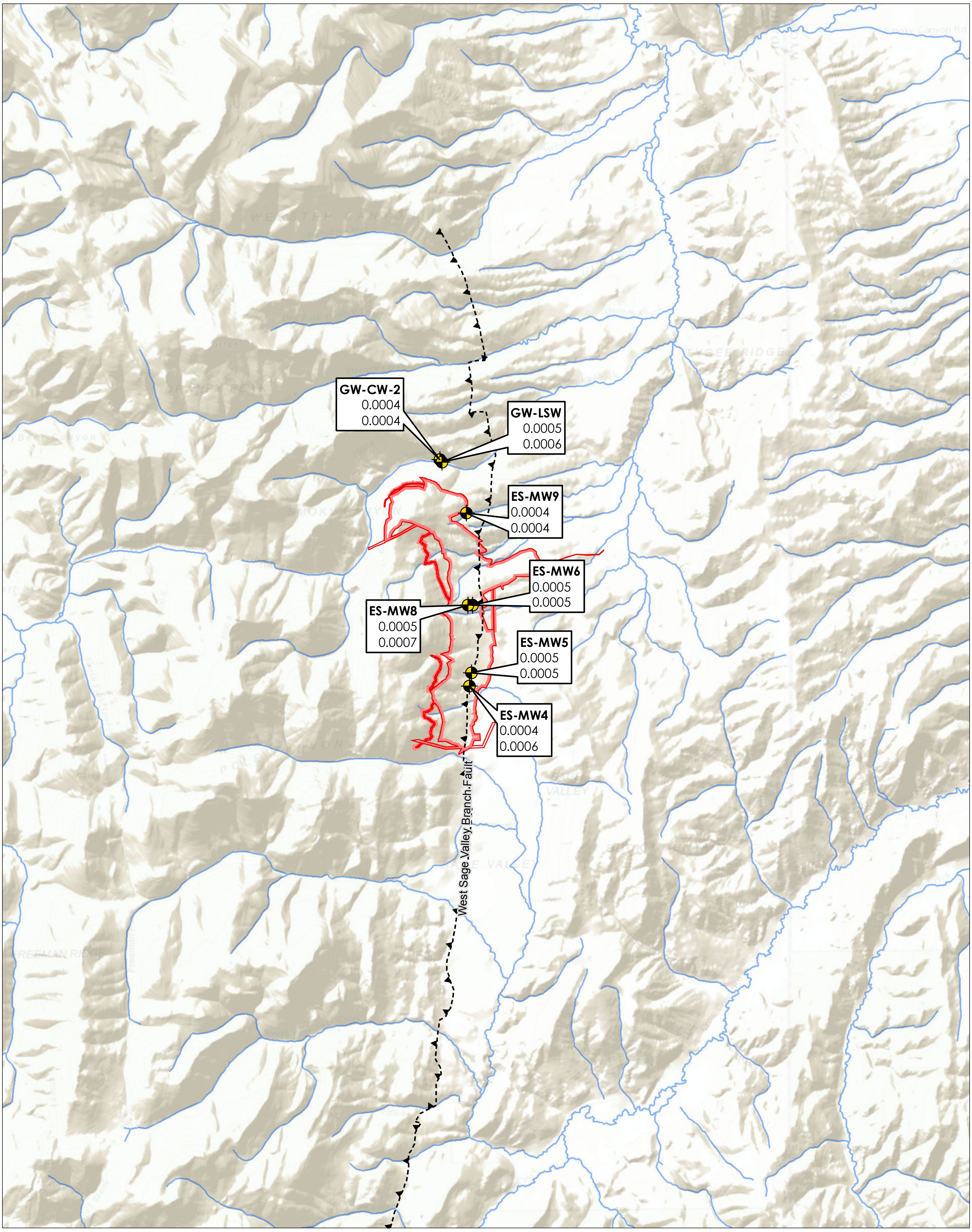
Figure 3.5-10

Mean Dissolved and Total Selenium Concentrations in Groundwater
Salt Lake Formation and Alluvium
East Smoky Panel Mine EIS



Legend

- Dinwoody Monitoring Well Location
- West Sage Valley Branch Fault
- Project Area Boundary

MP03	= **Well Location ID**
0.0272	= Dissolved Selenium, mg/L
0.0293	= Total Selenium, mg/L

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, USGS, NOAA

3. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

4. Figure originally created by HGG. Modified by Stantec for EIS formatting.

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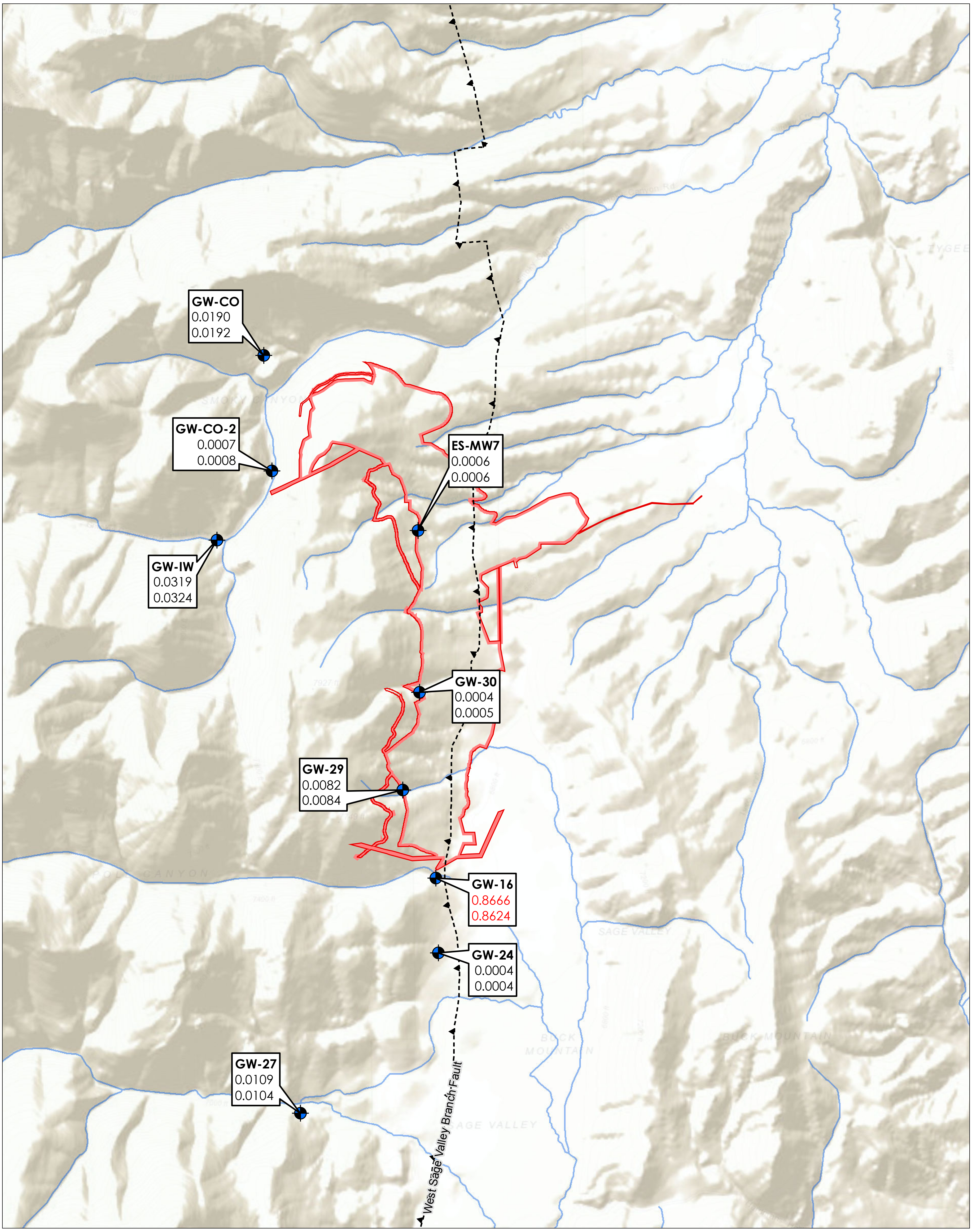
Figure 3.5-11
Mean Dissolved and Total Selenium Concentrations in Groundwater Dinwoody Formation East Smoky Panel Mine EIS



Legend

Wells Formation Monitoring Well Location

Thrust Fault

Streams

Project Area Boundary

MP03 = **Well Location ID**
0.0272 = Dissolved Selenium, mg/L
0.0293 = Total Selenium, mg/L

Red values denotes concentration exceeding Idaho Administrative Procedures Act (IDAPA) 58.01.11 Primary Constituent Standard for Selenium (0.05 mg/L)

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, USGS, NOAA

3: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

4: Figure originally created by HGG. Modified by Stantec for EIS formatting.

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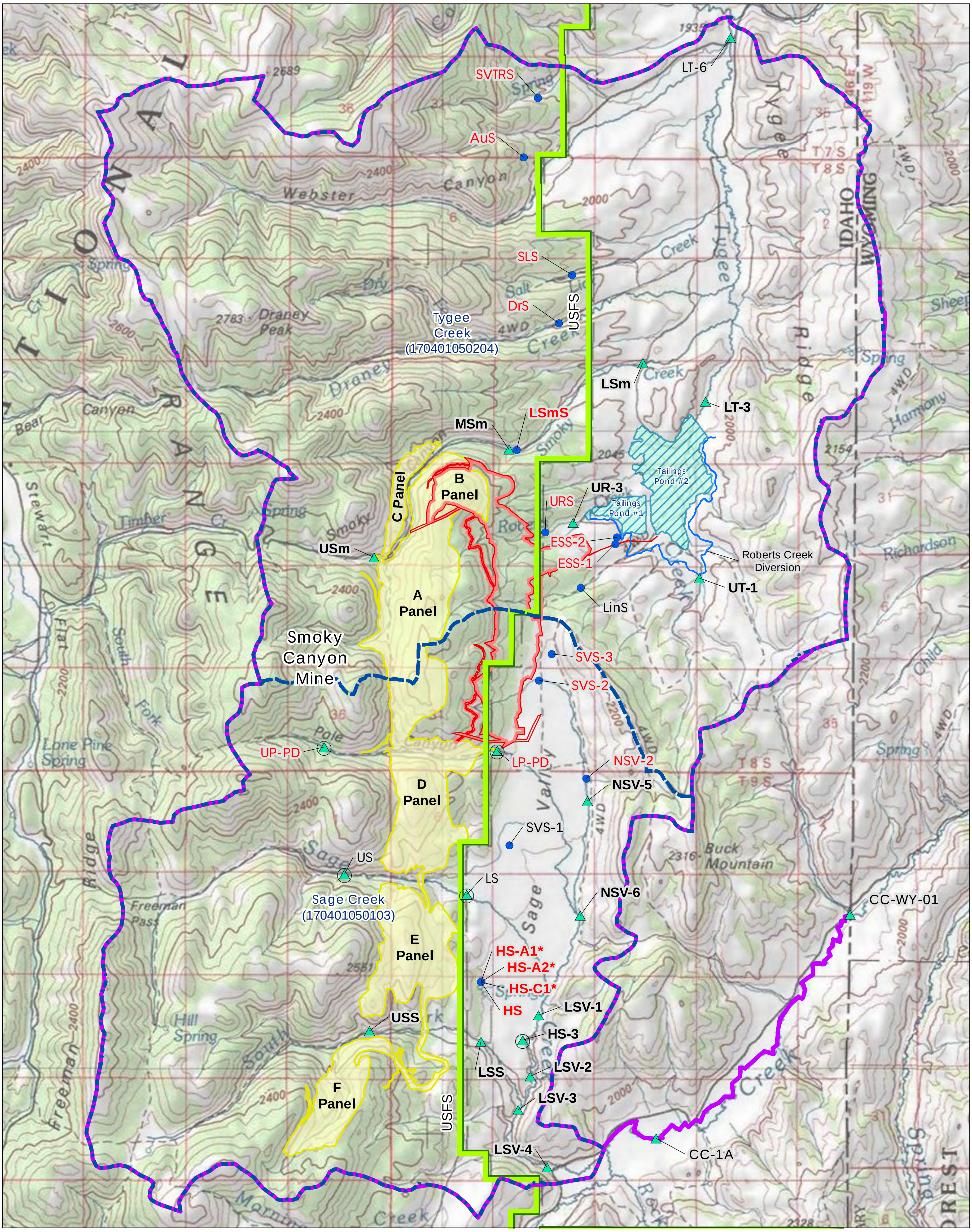
Figure 3.5-12
Mean Dissolved and Total Selenium Concentrations in Groundwater
Wells Formation
East Smoky Panel Mine EIS



Legend

Project Area Boundary	Spring Monitoring Site
Existing Disturbance Area	Stream Channel Monitoring Site
Existing Tailings Pond	Stream Channel Monitoring Site - Monitored under EIS SAP in Fall 2014 only
Water Resources Study Area	ESS-1 Fall 2014 Isotope Sampling
Surface Ownership Boundary	* Isotope Samples Only
Hydrologic Unit Code (HUC) Boundary	

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Copyright:© 2013 National Geographic Society, i-cubed
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.5-13
HUC 6 Watersheds and Surface Water Monitoring Sites
East Smoky Panel Mine EIS

3.5.2.2 Streamflows

Seven stream sites within the Tygee Creek watershed were monitored to establish the current baseline condition. Flow measurements at Upper Smoky Creek (USm) ranged from 0.27 cubic feet per second (cfs) to 1.6 cfs, but the creek became dry or had very low (unmeasurable) flows by the time it reached Middle Smoky Creek (MSm) about 1.5 miles downstream. Immediately downstream from MSm, however, the stream is fed by the spring known as Lower Smoky Spring (LSmS). Flows then increased towards the mouth of Lower Smoky Creek (LSm), as reflected by flow measurements. LSmS flows ranged from 0.10 cfs in November 2015 and November 2016 to 0.39 cfs in both May and July 2016. LSm flows ranged from 0.66 cfs in September 2015 to 2.1 cfs in May 2015.

Roberts Creek (at UR-3) flows ranged from 0.10 to 0.33 cfs.

Tygee Creek is measured at three locations. Furthest upstream (above the tailings pond), UT-1 could not be measured but an estimate of 0.2-0.3 cfs was reported in September 2015. Immediately downstream of the tailings pond at LT-3, flows ranged from 0.22 cfs in November 2014 to 1.84 cfs in May 2016. The mouth of Tygee Creek (LT-6) had measured flows ranging from 12.4 cfs in November 2015 to 21.6 cfs in May 2016. **Figure 3.5-14** shows the seasonal variation in LT-3 and LT-6 flows, which highlights the difference in flow rates between the two sites due to contributions from other tributaries in the lower watershed.

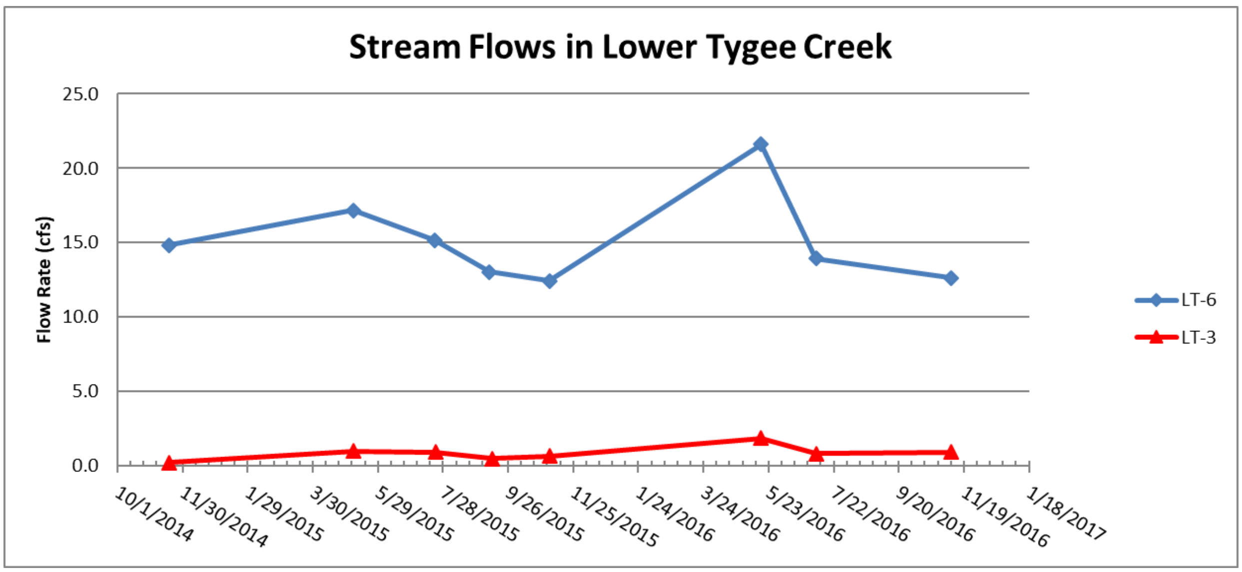


Figure 3.5-14 Stream Flows in Lower Tygee Creek

Numerous stream channel sites within the Sage Creek watershed were also monitored, including several in Sage Valley. NSV-5 is located upstream of the mouth of Pole Canyon Creek and NSV-6 is located downstream of it. NSV-5 had water (or was frozen solid in the case of the November 2014 event) during all monitoring events, but flow was such that it could only be measured in July 2015, when it was reported at 0.07 cfs. At NSV-6, flows were measured during most monitoring events, and ranged from 0.14 to 3.7 cfs. In November 2014, this site was frozen solid and in May 2015 flows were too diffuse to measure. In lower Sage Valley, there are four stream sites. LSV-1 is located downstream of the confluence with Sage Creek, but upstream of the confluence with the

Hoopes Spring discharge channel. LSV-2 is located downstream of that confluence, but upstream of the South Sage Creek confluence. LSV-3 is located downstream of the confluence with South Sage Creek and LSV-4 is located at the mouth of Sage Creek. Flows at these four sites are shown in **Figure 3.5-15**, which depicts similar seasonal variation among the sites and increasing flows in a downstream direction between LSV-1 and LSV-3, but little difference between LSV-3 and LSV-4.

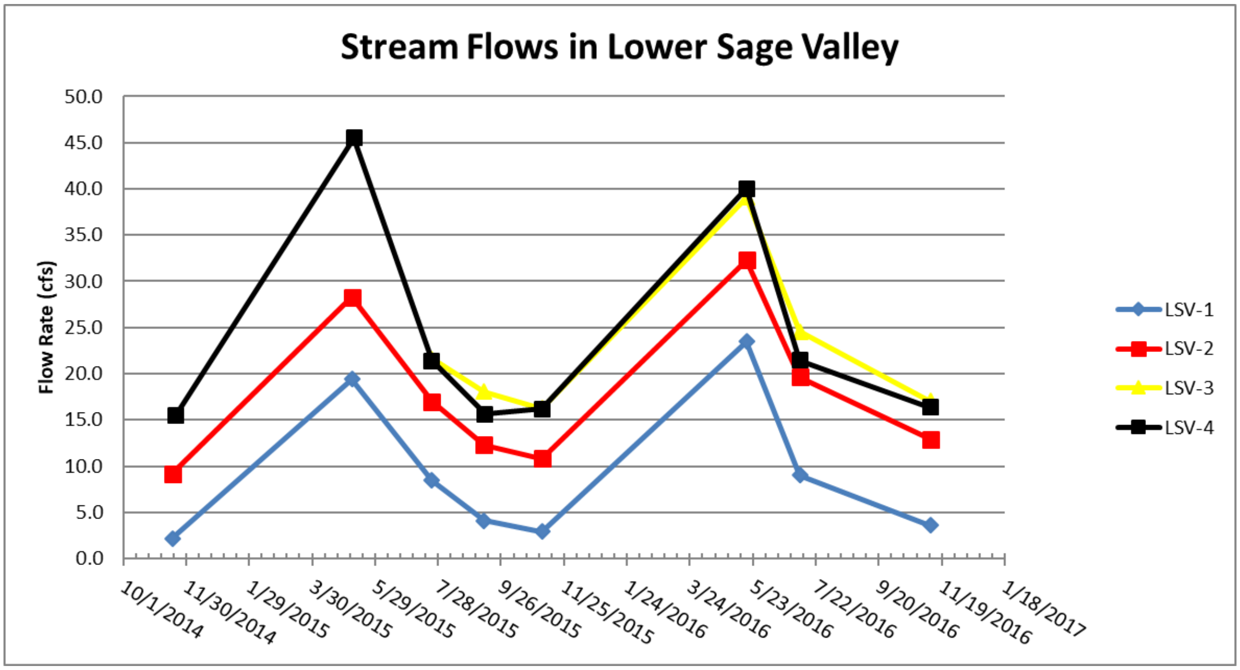


Figure 3.5-15 Stream Flows in Lower Sage Valley

The streams that are tributary to Sage Valley from the west (Pole Canyon, Sage, and South Sage creeks) were monitored in November 2014. Further, they have been monitored extensively under other Simplot programs. In each stream, two sites – one upstream of existing mining disturbances and one downstream – have been monitored. Additionally, HS-3 is a channel site that collects discharges from all of the Hoopes Spring complex sources; it was flowing at 8.0 cfs in November 2014 and 9.0 cfs in July 2015. In November 2014, flows were similar between the upstream Pole Canyon site (UP-PD measured at 0.10 cfs) and the downstream (LP-PD measured at 0.09 cfs) site. In Sage Creek in November 2014, the upstream site (US) was measured at 3.1 cfs, and was flowing but not measured at the downstream site (LS) because it was frozen. South Sage Creek was also monitored in November 2014, as well as throughout the Study Area. The upstream site (USS) was dry in November 2014, but the downstream site (LSS) had a measured flow of 6.1 cfs. USS had flow (but measurements could not be made) in May and July, and was dry in September and November. Flows at LSS ranged from 5.4 cfs in November 2015 to 9.0 cfs in May 2015.

Two of the baseline monitoring sites are located in Crow Creek. CC-1A is downstream of the confluence with Sage Creek and CC-WY-01 is a few miles further downstream at the Idaho-Wyoming border. As shown in **Figure 3.5-16**, the two Crow Creek sites have similar flow rates and variability; LSV-4 flows are shown for comparison.

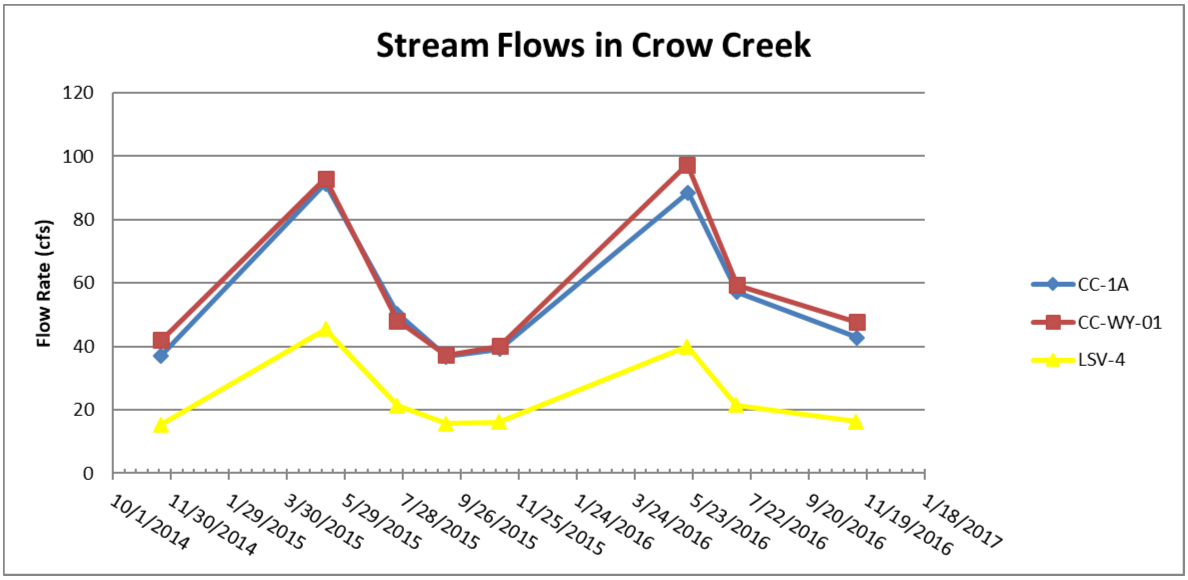


Figure 3.5-16 Stream Flows in Crow Creek

3.5.2.3 Surface Water Quality

The surface water samples are generally typed as calcium-bicarbonate, although a few are technically of a mixed type with calcium representing slightly less than 50 percent of the major cations. Sulfate is another major ion that is found in varying concentrations in the data set (**Figure 3.5-17**). Generally, as these box and whisker plots indicate, sulfate levels are fairly consistent at a given site, but vary more across the Study Area. Specifically, some sites such as alluvial springs (e.g., ESS-1, ESS-2) consistently had sulfate concentrations of 5 mg/L or less, while other sites (e.g., URS, UR-3) had sulfate concentrations an order of magnitude higher, ranging from about 50 to 80 mg/L. Upper Tygee Creek (UT-1) had sulfate concentrations around 7-8 mg/L, but at its mouth (LT-6) Tygee Creek sulfate concentrations ranged from 57 to 87 mg/L. These sulfate variations among sites likely reflect variations in geology. Additionally, elevated sulfate can also be associated with mining impacts, such as at Hoopes Spring (HS), where concentrations ranged from 56 to 67 mg/L.

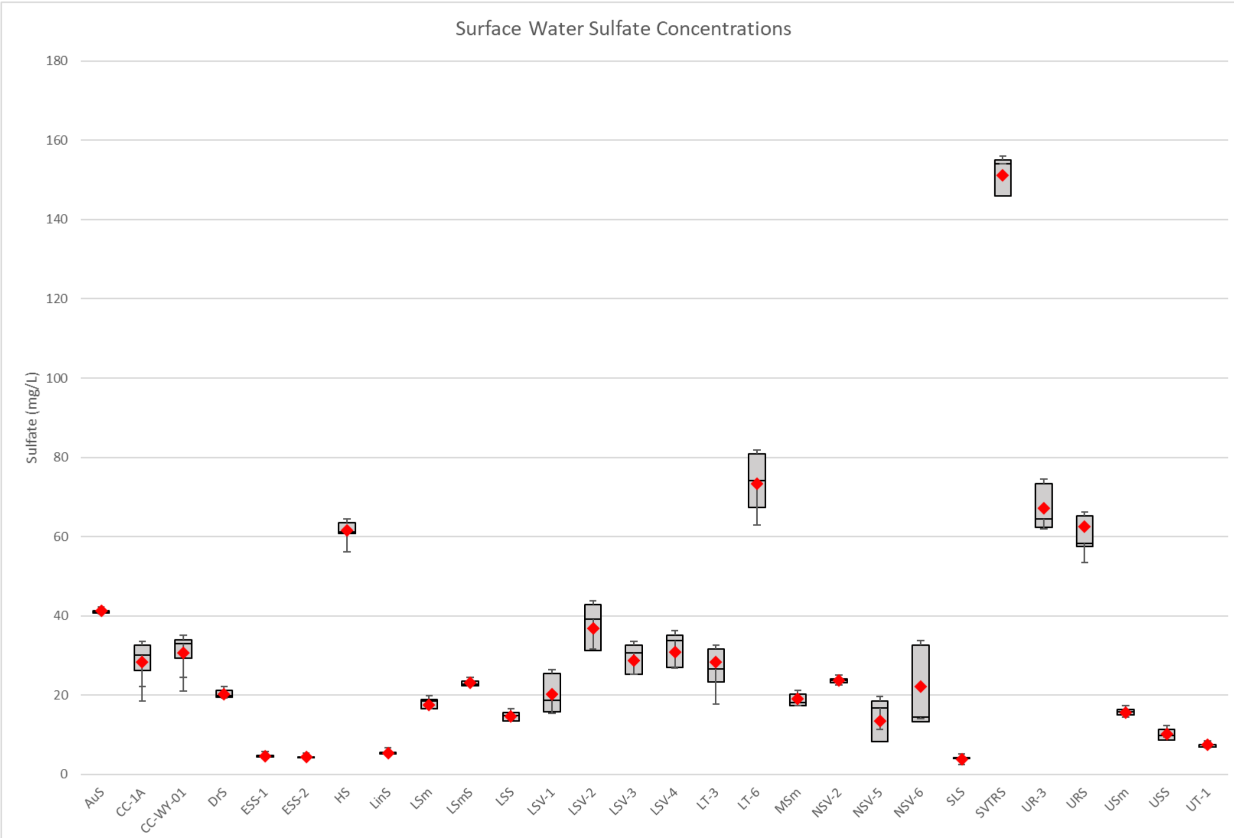


Figure 3.5-17 Sulfate Concentrations in Surface Waters

TDS ranged from 116 mg/L to 514 mg/L. **Table 3.5-2** shows TDS data for the sites that were sampled in all eight events, along with the average for each event. As shown, there is not a lot of seasonal variation in these results.

Table 3.5-2 Total Dissolved Solids (mg/L) – Surface Water

SITE	NOV-DEC 2014	MAY 2015	JULY 2015	SEPT 2015	NOV 2015	MAY 2016	JULY 2016	NOV 2016	AVERAGE FOR SITE
CC-1A	304	301	290	268	328	278	292	331	299
CC-WY-01	330	326	306	285	354	315	321	335	322
ESS-1	234	258	262	236	267	260	252	257	253
ESS-2	235	253	266	250	253	256	255	266	254
HS	284	298	312	298	304	303	304	305	301
LSmS	222	250	247	230	277	264	257	256	250
LSS	237	216	212	211	222	191	218	226	217
LSV-1	246	224	212	202	243	210	198	244	222
LSV-2	239	228	239	221	280	229	251	262	244
LSV-4	242	231	239	232	258	221	245	242	239
LT-3	450	312	316	181	349	297	297	356	320

SITE	NOV-DEC 2014	MAY 2015	JULY 2015	SEPT 2015	NOV 2015	MAY 2016	JULY 2016	NOV 2016	AVERAGE FOR SITE
LT-6	419	404	349	367	514	373	317	406	394
NSV-2	255	223	215	214	235	228	230	219	227
UR-3	376	349	365	310	341	332	351	357	348
URS	321	325	317	309	350	324	328	361	329
USm	243	223	220	221	217	211	191	244	221
Average for Event	290	276	273	252	300	268	269	292	

Dissolved aluminum, antimony, arsenic, beryllium, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, thallium, and zinc were typically present at concentrations less than the laboratory's reporting limit in the surface water samples. Barium, iron, manganese, molybdenum, selenium, uranium, and vanadium were more often present at concentrations greater than the laboratory's reporting limit in samples collected at some or all the surface water sites. Generally, these concentrations were found to be well under the regulatory standards with which they were compared, with the exception of selenium, as discussed further, as follows.

IDEQ has developed water quality standards for Idaho streams based upon beneficial uses. Beneficial uses and water quality standards are codified in IDAPA 58.01.02. Beneficial uses of cold water aquatic life and primary or secondary contact recreation are applicable to the streams within the Study Area. Specifically, as undesignated waters, these streams come under IDAPA 58.01.02.101.01, which presumes that those uses are appropriate unless and until other information and rulemaking changes their designation.

For several metals (i.e. cadmium, chromium III, copper, lead, nickel, silver, and zinc), the aquatic life standards are based upon the water's hardness because their toxicity is reduced as hardness increases. Further, aquatic life standards are divided into an acute or Criterion Maximum Concentration (CMC) and a chronic or Criterion Continuous Concentration (CCC) standard.

Every two years, IDEQ assesses the status of surface waters in regard to whether water quality is sufficient such that beneficial uses are met. EPA has approval authority over the assessment, which is contained within what is known as the 305(b) Integrated Report. The most recent approved Integrated Report is the 2014 version, which EPA approved in June 2017. This report (IDEQ 2017a) details whether stream segments fully support appropriate beneficial uses, and if not, whether a TMDL has been prepared. **Table 3.5-3** summarizes information from the Integrated Report for the streams within the Study Area.

Relatedly, also in 2017 IDEQ finalized a subbasin assessment and TMDL for the Salt River Subbasin (HUC 17040105), in which the Study Area streams occur (IDEQ 2017b). TMDLs were developed for *Escherichia coli* (*E. coli*) and sediment/siltation, but not for selenium (due to CERCLA precedence). Further, a wasteload allocation (WLA) for TSS for Smoky Canyon Mine stormwater was developed between the draft and final versions of the TMDL and is reported in a supplement (IDEQ 2017c). A target of 44.5 mg/L TSS was used as the basis for the Smoky Canyon Mine WLA (IDEQ 2017b). The result of the WLA is an allowable load that varies by month, from 18.4 pounds per day in October to 824.9 pounds per day in May (IDEQ 2017c).

The subbasin assessment also made certain recommendations for changes to the next Integrated Report. Notably, Roberts Creek (ID17040105SK007_02g) was recommended to be delisted for combined biota/habitat bioassessments and instead be reported as "unassessed" (IDEQ 2017b).

Table 3.5-3 Study Area Streams and 2014 Integrated Report Assessment

ASSESSMENT UNIT	UNIT NAME	MILES	ONE OR MORE BENEFICIAL USES NOT SUPPORTED DUE TO THE LISTED PARAMETER
ID17040105SK008_04	Crow Creek - Deer Creek to border	10.43	Selenium, *E. coli*, sediment/siltation
ID17040105SK009_02a	Upper Sage Creek	5.18	Full support for all assessed uses
ID17040105SK009_02c	North Fork Sage Creek	12.43	Selenium
ID17040105SK009_03	Sage Creek	1.81	Combined biota/habitat bioassessments
ID17040105SK009_02d	Pole Canyon Creek	3.62	Selenium
ID17040105SK009_03	Sage Creek - confluence with North Fork Sage Creek to mouth	3.22	Selenium
ID17040105SK009_02e	South Fork Sage Creek	7.95	Selenium, combined biota/habitat bioassessments
ID17040105SK007_02c	Smoky Creek	10.79	*E. coli*, physical substrate habitat alterations, sediment/siltation
ID17040105SK007_03	Tygee Creek, source to mouth (downstream of Roberts Creek)	5.98	Low flow alterations, physical substrate habitat alterations, and sediment/siltation
ID17040105SK007_02d	Upper Tygee Creek, minus Roberts Creek (Tygee Creek)	18.64	Full support for all assessed uses
ID17040105SK007_02g	Roberts Creek (including tributaries)	5.58	Combined biota/habitat bioassessments
ID17040105SK007_02b	Draney Creek (downstream of USFS boundary) to mouth & N tributary	3.43	Not assessed
ID17040105SK007_02f	Draney Creek (upstream of USFS boundary and N tributary)	6.86	*E. coli*, physical substrate habitat alterations, sediment/siltation
ID17040105SK007_02	Salt Lick (in Tygee Creek AU) source to mouth	16.13	Not assessed
ID17040105SK007_02e	Upper Webster Creek (& includes trout resort tributary), both to USFS boundary	9.17	Full support for all assessed uses
ID17040105SK007_02a	Webster Creek (downstream of USFS boundary to mouth	2.48	Not assessed

Surface water monitoring results were compared to the most stringent of Idaho cold water aquatic life standards, Idaho standards for domestic water supplies, or EPA's primary or secondary drinking water Maximum Contaminant Level (MCLs). The latter two are not necessarily applicable to the sites monitored, but are simply used to provide a point of comparison to the results. The surface water data set generally met these water quality standards. Exceptions included the elevated total selenium concentrations at several sites that exceeded both chronic and acute aquatic life standards of 0.005 mg/L and 0.020 mg/L, respectively (**Table 3.5-4**). In addition, EPA's secondary drinking water MCLs of 0.05 mg/L for aluminum, manganese, and selenium were exceeded in a few samples at various sites. EPA's secondary drinking water MCL of 500 mg/L for TDS was exceeded in one sample.

Table 3.5-4 Selenium Exceedances in Surface Water

Site ID	Site Name	Date	Total Selenium Concentration (mg/L)
CC-1A	Crow Creek Below Sage Creek	11/20/2014	0.0226
		05/09/2015	0.011
		07/22/2015	0.016
		09/11/2015	0.021
		11/05/2015	0.02
		05/18/2016	0.012
		07/08/2016	0.016
		11/09/2016	0.02
CC-WY-01	Crow Creek at Wyoming Border	11/20/2014	0.0215
		05/09/2015	0.01
		07/22/2015	0.015
		09/11/2015	0.02
		11/05/2015	0.018
		05/19/2016	0.0097
		07/08/2016	0.015
		11/09/2016	0.018
HS	Hoopes Spring	11/17/2014	0.108
		05/07/2015	0.134
		07/22/2015	0.116
		09/10/2015	0.114
		11/04/2015	0.11
		05/17/2016	0.121
		07/07/2016	0.119
		11/08/2016	0.121
HS-3	Hoopes Spring Creek at mouth	11/17/2014	0.0938

Site ID	Site Name	Date	Total Selenium Concentration (mg/L)
LSS	Lower South Fork Sage Creek	11/17/2014	0.021
		05/07/2015	0.015
		07/22/2015	0.019
		09/10/2015	0.019
		11/04/2015	0.018
		05/17/2016	0.013
		07/07/2016	0.02
		11/08/2016	0.02
LSV-2	Lower Sage Creek below Hoopes Spring	11/17/2014	0.0739
		05/07/2015	0.029
		07/22/2015	0.047
		09/10/2015	0.066
		11/04/2015	0.065
		05/17/2016	0.028
		07/07/2016	0.048
		11/08/2016	0.064
LSV-3	Lower Sage Creek below South Fork Sage Creek	05/09/2015	0.024
		07/22/2015	0.038
		09/11/2015	0.051
		11/04/2015	0.044
		05/17/2016	0.026
		07/07/2016	0.039
		11/08/2016	0.046
LSV-4	Lower Sage Creek above Bridge for Main Crow Creek Road	11/20/2014	0.0508
		05/09/2015	0.023
		07/22/2015	0.039
		09/11/2015	0.05
		11/04/2015	0.047
		05/17/2016	0.025
		07/07/2016	0.042
		11/08/2016	0.048

Based upon the total selenium concentrations, as shown in the table, Crow Creek remains affected by selenium releases from the Smoky Canyon Mine.

3.5.3 Springs and Groundwater/Surface Water Interactions

Based upon the current understanding and interpretation of geology and aquifer characteristics, springs within the Study Area are associated with the Thaynes, Wells, Dinwoody, and Salt Lake formations, and Quaternary Alluvium. Specifically, SVTRS and AuS are considered to be associated with the Thaynes Formation; HS is considered to be associated with the Wells Formation; and LSmS is associated with the Dinwoody Formation. URS, ESS-1, ESS-2, and LinS are likely associated with either the Salt Lake Formation or with alluvium, and SVS-1, SVS-2, SVS-3, NSV-2, DrS, and SLS are likely associated with alluvium. Within the Study Area and surrounding region, surface water and groundwater are notably interrelated: springs and diffuse groundwater discharge provide flow to support perennial and intermittent streams; in turn, those streams also provide recharge to aquifers in other formations as they lose flow downstream.

Lower Smoky Creek is fed by the spring known as Lower Smoky Spring (LSmS), which issues immediately downstream from MSm. LSmS flows ranged from 0.10 cfs in November 2015 to 0.34 cfs in July 2015.

Within the Roberts Creek area, ESS-1 and ESS-2 appear to be perennial based upon the five monitored events, but flow could only be measured during the May 2015 sampling event, when it was 0.10 and 0.09 cfs, respectively. URS is the spring at the head of Roberts Creek. Its flows were never able to be measured.

The other four springs in the Tygee Creek basin that were monitored had much lower flows. NSV-2 is a small spring that appeared to have water year-round, but flow could only be measured during the November 2014 event, when it was reported at 0.07 cfs. The RI identified SVS-1, SVS-2, and SVS-3 as alluvial spring areas but no flow was found during that investigation. While SVS-1 was visited during each of the baseline study sampling events in 2014 and 2015, there was not only never any flow or sign of water, the site itself (or areas nearby) did not appear to have any characteristics of a spring or seep. SVS-2 and SVS-3 were dry during all sampling events except the May 2015 one, when flows could not be measured. Of these four springs, only NSV-2 appears to contribute directly to surface flow in Sage Valley.

Within the Sage Creek watershed, the Hoopes Spring complex is one of the most notable springs, as it is relatively large and has been contaminated by selenium from past mining. It is part of the previously mentioned CERCLA investigation. While it has numerous points of issuance, the baseline study monitored HS, which is one of the largest points of the complex's discharge. A flow rate could only be measured at HS during the November 2014 sampling event, when a rate of 2.1 cfs was reported; subsequent remediation work resulted in flows being piped.

As with stream channel sites, the monitored springs in the Study Area are generally typed as calcium-bicarbonate. Sulfate was found in varying concentrations in springs (**Figure 3.5-17**): generally consistent at a given site, but varying across the area. Specifically, some sites such as alluvial springs (e.g., ESS-1and ESS-2) consistently had sulfate concentrations of less than 5 mg/L, while other sites (e.g., URS) had sulfate concentrations an order of magnitude higher, ranging from about 40 to 80 mg/L. These sulfate variations among sites likely reflect variations in geology, as do TDS variations (**Table 3.5-2**). Additionally, elevated sulfate can also be associated with mining impacts, such as at Hoopes Spring, where concentrations ranged from 56 to 64 mg/L.

Trace metals concentrations in springs were similar to those reported for stream channel sites. As previously noted, Hoopes Spring contains elevated selenium concentrations due to past mining impacts. Over the five sampling events reported herein, total selenium ranged from 0.108 to 0.134 mg/L.

3.5.4 Streambed Sediments

Streambed sediments were sampled at six surface water monitoring sites in September 2015. The six sites were located on Smoky Creek (LSm), Roberts Creek (UR-3), North Sage Creek (NSV-6), Hoopes Spring channel (HS-3), and Lower Sage Creek (LSV-4 and LSV-1). **Table 3.5-5** provides the results, which all indicate selenium concentrations greater than the benchmark screening value of 2 milligrams per kilogram (mg/kg) that was used in the RI/FS. However, this screening value does not indicate a regulatory threshold.

Table 3.5-5 Streambed Sediment Data

SITE	SELENIUM CONCENTRATION, SEPTEMBER 2015 (MG/KG DRY)
LSm	4.7
UR-3	8.1
UR-3 (duplicate)	7.0
LSV-4	13.4
LSV-1	4.2
HS-3	42.6
NSV-6	10.3

3.5.5 Water Rights and Water Uses

As discussed in the Water Resources TR (Stantec 2016d), a total of 15 active water rights were identified within the Smoky Creek, Roberts Creek, and Pole Canyon watersheds (a portion of the Water Resources Baseline Study Area). Their water right number, diversion rate, beneficial use, and owner were reported in Stantec (2016d).

Three of the aforementioned 15 active water rights are associated with groundwater. All three of these groundwater rights are for industrial use, are owned by Simplot, and are associated with the Smoky Canyon Mine (Stantec 2016d). In addition, the Water Resources TR researched wells located within the Water Resources Baseline Study Area that were not found during water rights search. A total of 25 wells were found, 20 of which were installed by Simplot and five of which were installed by other entities. Nineteen of these wells are described as monitoring or test wells, four wells are described as domestic wells, one well is described as a domestic/stock well, and one well does not have a specific recorded use. All of the domestic or domestic/stock wells are located at least 3 miles to the northeast and upgradient of the Project Area. The Water Resources TR (Stantec 2016d) provides details on all 25 wells.

Twelve of these 15 active water rights are associated with surface water rights from springs or creeks. Beneficial uses of these 12 surface water rights include industrial use, stockwater, and irrigation (Stantec 2016d). Water right owners included Simplot (2), USFS (5), and private individuals (5). In closest proximity to the Project are Simplot's Roberts Creek (#24-20005A) and Pole Canyon (#24-4078) industrial rights; USFS's Smoky Creek stockwater rights (#24-10097, #24-10098); and a private entity's stockwatering right at LinS, (also known as the Linford Spring [#24-7183]).

3.6 SOILS

The Study Area for soils is the Project Area surrounded by a small buffer except on the northwest side where it is within the existing mine disturbance area and no buffer was assigned (**Figure 3.6-1**). The Study Area boundary was developed with the IDT experts and professional judgement. This area is appropriate because soil impacts would not have the potential to extend beyond it. The Study Area includes the east facing mountain slope at the north end of Sage Valley and the south end of the Tygee Creek valley, as well as portions of the adjacent valleys. It is in Major Land Resource Area 43B (Soil Survey Staff 2006). The Study Area was previously mapped by two broad Order 3 soil surveys. The *Soil Survey of the Caribou National Forest* (USDA 1990) covers the western or national forest portion of the Study Area. The *Soil Survey of the Star Valley Area, Wyoming-Idaho* (Ravenholt et al. 1976) covers the eastern private ownership portion of the Study Area. The soils baseline report (Stantec 2015b) reported on these surveys. In addition, a more detailed Order 2 soil survey was completed as part of the baseline study. That information is also provided in the baseline report (Stantec 2015b) and summarized as follows.

3.6.1 Regional Setting

The Project Area is located in the middle Rocky Mountain Physiographic Province of southeastern Idaho. Much of the province is made up of interior basins. Mountains rise steeply from the semiarid sagebrush-covered plains or agricultural valleys. The mountains are generally well covered with vegetation and the higher elevations support conifer forests on the north and east facing slopes (USDA 1990).

The annual water losses through evaporation exceed the annual water gains from precipitation (USDA 1990). Vegetation distribution is controlled mostly by altitude, latitude, direction of prevailing winds, and slope exposure.

Parent materials for the soils are derived from Wells and Phosphoria formations. The limestones of the Wells Formation are characterized by some outcrops and steep breaks in rugged side slopes. The Dinwoody Formation consists of siltstones and sandstones that have weathered into long smooth slopes. The Phosphoria Formation, which contains the phosphatic ore, underlies the upper concave slopes. The Rex Chert Member of the Phosphoria Formation is prominent as cobbles and gravels in the soil profile and as major outcroppings forming the ridge crest.

The soil temperature regime ranges from frigid in the sagebrush areas to cryic in the conifer and aspen stands. Recent soil temperature studies by the Natural Resources Conservation Service (NRCS) in Caribou County, Idaho have determined that mountain big sagebrush areas are frigid up to approximately 8,000 feet elevation where these areas become cryic and are typically dominated by alpine sagebrush (Stantec 2015b).

Conifer and aspen stands were determined to be cryic by the temperature studies (Stantec 2015b).

The Study Area contains two soil moisture regimes**.** Sagebrush areas have a xeric soil moisture regime that is typical of eastern Idaho and northern Utah. Conifer and aspen stands have an udic soil moisture regime. Elevation and aspect are determining features of these two moisture regimes.

Xeric areas have moist winters and springs with drier summers (WRCC 2015). Udic areas receive deep snowfall and brief intense mountain thunderstorms are common in the summer (Soil Survey Staff 2006). Late summer and early fall are the driest part of the year (Stantec 2015b).

3.6.2 Order 2 Survey Procedures

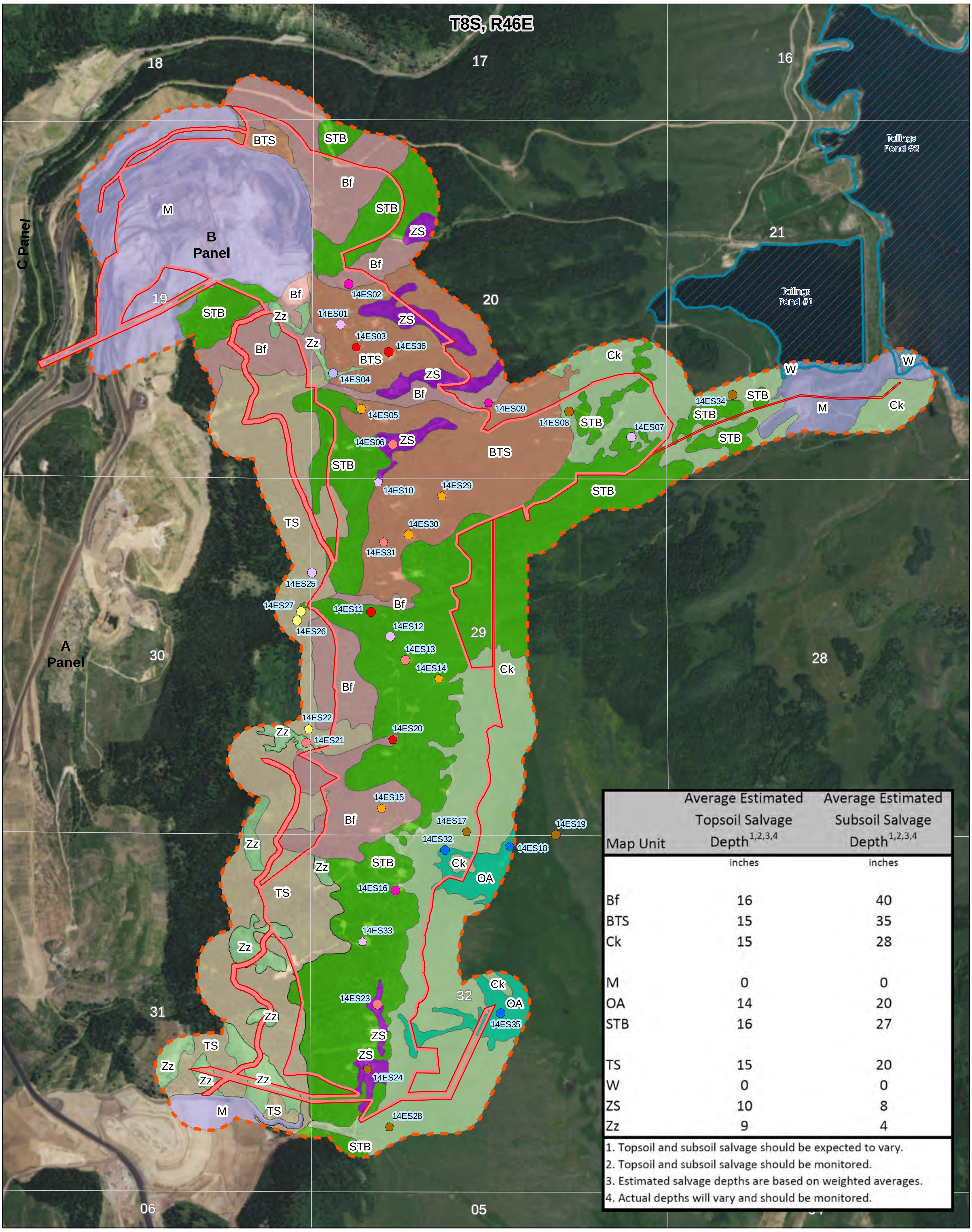
The soil survey was made in accordance with the guidelines for an Order 2 soil survey as detailed in the *Soil Survey Manual* (Soil Survey Staff 1993). Soil profiles were classified to the family level using *Keys to Soil Taxonomy, Twelfth Edition* (Soil Survey Staff 2014a) based on the field descriptions and laboratory analysis of representative soil profiles. Soil family names were selected from soil series established in Idaho, with naming priority based on Official Soil Series Descriptions (Soil Survey Staff 2015).

Thirty-five soil profiles and one miscellaneous landform (rock outcrop) were described using the *Field Guide for Describing and Sampling Soils* (Schoeneberger et al. 2012) and samples were collected from each soil horizon from each soil profile for laboratory analysis.

Soil profile descriptions were completed for each sample location. Soil colors were evaluated as described in the soils baseline report (Stantec 2015b). Soil *Pedon Description Forms* were completed for each soil pit using the methods detailed in the *Field Book for Describing and Sampling Soils*, version 3.0 (Schoeneberger et al. 2012; Stantec 2015b).

The geomorphic setting for each soil profile location was determined using the *Geomorphic Description System* (Soil Survey Staff 2008).

Soil sample locations were coded by the year that the sample was collected (2014). For example, soil sample location 14ES11 was the 11th soil description location collected in the East Smoky (ES) Study Area in 2014 (14).



Map Unit	Average Estimated Topsoil Salvage Depth[1,2,3,4]	Average Estimated Subsoil Salvage Depth[1,2,3,4]
	inches	inches
Bf	16	40
BTS	15	35
Ck	15	28
M	0	0
OA	14	20
STB	16	27
TS	15	20
W	0	0
ZS	10	8
Zz	9	4

1. Topsoil and subsoil salvage should be expected to vary.
2. Topsoil and subsoil salvage should be monitored.
3. Estimated salvage depths are based on weighted averages.
4. Actual depths will vary and should be monitored.

Legend

- Project Area Boundary
- Tailings Ponds
- Extended Soil Survey Area

Soil Family

- Beaverdam
- Beaverdam similar
- Buffork
- Buffork similar
- Rock Outcrop
- Skelter
- Skelter similar
- Swede
- Swede similar
- Tahquats
- Tahquats similar
- Targhee
- Targhee similar
- Zimmer
- Zimmer similar
- ZZZ
- ZZZ similar

Soil Map Units

- Bf Buffork silt loam, 18-40%
- BTS Beaverdam-Tahquats-Swede complex, 2-18%
- Ck Skelter silty loam, 3-12%
- M Mine areas
- OA ZZZ family loam, 1-3%
- STB Swede-Tahquats-Buffork complex, 4-25%
- TS Targhee-Swede complex, 15-60%
- W Water
- ZS Zimmer loam, 8-35%
- Zz Zimmer gravelly loam, 35-60%

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.25 0.5
Miles
1:18,000 (at original document size of 11x17)
N

Figure 3.6-1
Order 2 Soil Survey Map Units and Soil Profile Locations
East Smoky Panel Mine EIS

3.6.3 Mapped Soil Unit Characteristics

Profile descriptions, laboratory analysis results, and complete soil map unit data for each sample site are presented in the soils baseline report (Stantec 2015b). **Table 3.6-1** provides a summary of the soil map units, identifying the classification, properties, and characteristics of the soils, and their total composition within the Study Area. Soils in the Study Area are classified to the soil family level (**Section 3.6.4**) in accordance with *Keys to Soil Taxonomy* (Soil Survey Staff 2014a).

Soils in the Study Area were delineated by eight soil map units and two miscellaneous landform units. The soil map units consist of three consociations and five complexes. Consociations are dominated by a single major soil family. Complexes in the Study Area consist of two or three major soil types that could not be separated at the scale of mapping used for the soil survey. Delineations of the soil map units are shown in **Figure 3.6-1**. The composition of each soil map unit in the Study Area is detailed in **Table 3.6-1**.

Table 3.6-1 Composition of Order 2 Soil Map Units in the East Smoky Panel Study Area

MAP SYMBOL	PERCENT	FAMILY	TAXONOMIC CLASSIFICATION[1,2]	VEG TYPE[3]	TYPIFYING PROFILE
Bf – Acres in Study Area = 187.1	Buffork family silt loam, 18 to 40 percent slopes				
	75	Buffork	Alfic Argicryolls fine-loamy, mixed, super	LP	14ES02
	10	Beaverdam	Vertic Argicryolls fine, smectitic	MCA	
	10	Swede	Typic Argicryolls fine-loamy, mix, super	LP	
	5	Tahquats	Typic Argicryolls loamy-skeletal, mix, super	MCA	
BTS – Acres in Study Area = 203.6	Beaverdam - Tahquats - Swede families complex, 2 to 18 percent slopes				
	55	Beaverdam	Vertic Argicryolls fine, smectitic	MCA	14ES05
	20	Tahquats	Typic Argicryolls loamy-skeletal, mixed, super	MCA	14ES36
	15	Swede	Typic Argicryolls fine-loamy, mixed, super	MCA	14ES01
	5	Skelter	Ultic Argixerolls fine-loamy, mix, super, frigid	Sage	
	5	Zimmer	Lithic Ultic Haploxerolls loamy, mix, super, frig	Shrub	
Ck – Acres in Study Area = 278.6	Skelter family silty loam, 3 to 12 percent slopes				
	75	Skelter	Ultic Argixerolls fine-loamy, mixed, super, frig	Sage	14ES34
	10	Skelter*	Pachic Ultic Argixeroll fi-loamy, mix, super, frig	Sage	14ES17
	10	Swede	Typic Argicryolls fine-loamy, mixed, super	Aspen	
	5	ZZZ	Oxyaquic Argixeroll fi-loamy, mix, super, frig	WM	

MAP SYMBOL	PERCENT	FAMILY	TAXONOMIC CLASSIFICATION[1,2]	VEG TYPE[3]	TYPIFYING PROFILE
M – Acres in Study Area = 250.4	Mine Disturbances				
OA – Acres in Study Area = 32.6	ZZZ family silt loam, 1 to 3 percent slopes				
	90	ZZZ	Oxyaquic Argixerolls fi-loamy, mix, super, frig	WM	14ES35
	10	Skelter	Ultic Argixerolls fine-loamy, mixed, super, frig	Sage	
STB – Acres in Study Area = 434.9	Swede – Tahquats - Buffork families complex, 4 to 25 percent slopes				
	50	Swede	Typic Argicryolls fine-loamy, mixed, super	LP	14ES12
	20	Tahquats	Typic Argicryolls loamy-skeletal, mixed, super	MCA	14ES11
	15	Buffork	Alfic Argicryolls fine-loamy, mixed, superactive	MCA	14ES16
	10	Zimmer	Lithic Ultic Haploxerolls loamy, mix, super, frig	Shrub	14ES13
	5	Swede*	Eutric Haplocryalfs fine-loamy, mixed, super	LP	14ES33
TS – Acres in Study Area = 244.2	Targhee - Swede families complex, 15 to 60 percent slopes				
	45	Targhee	Typic Haplocryepts loamy-skel, mixed, super	Aspen	14ES26
	30	Swede	Typic Argicryolls fine-loamy, mixed, super	MCA	14ES25
	10	Tahquats	Typic Argicryolls loamy-skeletal, mixed, super	MCA	
	10	Skelter	Ultic Argixerolls fine-loamy, mixed, super, frig	Sage	
	5	Rock Outcrop			
ZS – Acres in Study Area = 39.3	Zimmer loam family, 8 to 35 percent slopes				
	75	Zimmer	Lithic Ultic Haploxerolls loamy, mix, super, frig	Shrub	14ES23
	10	Skelter	Ultic Argixerolls fine-loamy, mixed, super, frig	Sage	14ES24
	10	Swede	Typic Argicryolls fine-loamy, mixed, super	MCA	
	5	Tahquats	Typic Argicryolls loamy-skeletal, mixed, super	MCA	

MAP SYMBOL	PERCENT	FAMILY	TAXONOMIC CLASSIFICATION[1,2]	VEG TYPE[3]	TYPIFYING PROFILE
Zz – Acres in Study Area = 50.3	Zimmer family gravelly loam, 35 to 60 percent slopes				
	80	Zimmer	Lithic Ultic Haploxerolls loamy, mix, super, frig	Shrub	14ES21
	5	Skelter	Ultic Argixerolls fine-loamy, mixed, super, frig	Sage	
	5	Targhee	Typic Haplocryepts loamy-skel, mixed, super	MCA	
	5	Swede	Typic Argicryolls fine-loamy, mixed, super	MCA	
	5	Rock Outcrop			14ES04
W - Acres in Study Area = 5.3	Water Bodies				

1. Taxonomic classification based on Keys to Soil Taxonomy, Twelfth Edition (Soil Survey Staff 2014a).
2. Taxonomic abbreviations: fi-loamy = fine-loamy; frig = frigid; mix = mixed; skel = skeletal; super = superactive.
3. Vegetation Types: Aspen = quaking aspen; LP=lodgepole pine; MCA = mixed conifer and aspen; Shrub=mountain shrub; Sage=mountain big sagebrush; and WM=wet meadow.

* Similar soil.

The following map unit descriptions for the Order 2 survey are based on field observations, traverses across the landscapes, soil profile descriptions, laboratory analysis of soil samples, and local geology (Conner 1980 and Stantec 2016a).

3.6.3.1 Bf Buffork family silt loam, 18 to 40 percent slopes

The Bf map unit is located on moderately steep to steep mountain sideslopes. Map unit Bf is the transition between the lower conifer and aspen slopes (map units BTS and STB) and the steeper upper elevation conifer and aspen slopes (map unit TS). These soils formed in slope wash, colluvium, and residuum from sandstone, limestone, shale, and chert. This map unit consists of 75 percent Buffork family soils. Also included in this map unit are 10 percent Beaverdam family soils, 10 percent Swede family soils, 5 percent Tahquats family soils, and other similar soils.

Buffork family soils are medium textured, have a dark surface (mollic epipedon), have albic materials (albic or glossic horizon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES02 is representative of Buffork family soils in map unit Bf. Vegetation on Buffork family soils in map unit Bf includes lodgepole pine, Douglas fir, aspen, mountain snowberry, fescue, and needlegrass.

This map unit is of moderate extent and comprises approximately 10 percent (187.1 acres) of the Study Area.

3.6.3.2 BTS Beaverdam - Tahquats - Swede families complex, 2 to 18 percent slopes

The BTS map unit is located on gently sloping to moderately steep mountain sideslopes. Map unit BTS is the mid elevation conifer and aspen slopes in the northern portion of the Study Area. These soils formed in slope wash and colluvium from sandstone, limestone, and chert. This map unit consists of 55 percent Beaverdam family soils, 20 percent Tahquats family soils, and 15 percent Swede family soils. Also included in this map unit are 5 percent Skelter family soils, 5 percent Zimmer family soils, and other similar soils.

Beaverdam family soils are fine textured, have a dark surface (mollic epipedon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES05 is representative of Beaverdam family soils in map unit BTS. Vegetation on Beaverdam family soils in map unit BTS includes Douglas fir, lodgepole pine, aspen, and snowberry.

Tahquats family soils are medium textured, have a dark surface (mollic epipedon), have an accumulation of illuvial clay (argillic horizon), and have greater than 35 percent rock fragments in the control section. These soils are cryic. Soil profile 14ES36 is representative of Tahquats family soils in map unit BTS. Vegetation on Tahquats family soils in map unit BTS includes Douglas fir and aspen.

Swede family soils are medium textured, have a dark surface (mollic epipedon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES01 is representative of Swede family soils in map unit BTS. Vegetation on Swede family soils in map unit BTS includes lodgepole pine, aspen, snowberry, Oregon grape, needlegrass, and wild strawberry.

This map unit is of moderate extent and comprises approximately 12 percent (203.6 acres) of the Study Area.

3.6.3.3 Ck Skelter family silty loam, 3 to 12 percent slopes

The Ck map unit is located on gently to strongly sloping hillslopes and mountain footslopes. These soils formed in mixed alluvium from chert, sandstone, and shale. Map unit Ck is the warmer transition zone between the moist valley floor (map unit OA) and the conifer and aspen covered upper slopes. This map unit consists of 75 percent Skelter family soils. Also included in this map unit are 10 percent pachic (thick mollic surface) soils similar to Skelter family soils, 10 percent Swede family soils, and 5 percent ZZZ family soils, and other similar soils.

Skelter family soils are medium textured, have a dark surface (mollic epipedon) and have an accumulation of illuvial clay (argillic horizon). These soils are frigid. Soil profile 14ES34 is representative of Skelter family soils in map unit Ck. Vegetation on Skelter family soils in map unit Ck includes mountain big sagebrush, snowberry, Columbia needlegrass, bluegrass, Basin wildrye, wild strawberry, and sticky geranium.

This map unit is the second most extensive and comprises approximately 18 percent (278.6 acres) of the Study Area.

3.6.3.4 OA ZZZ family silt loam complex, 1 to 3 percent slopes

The OA map unit is located on the nearly level valley floor in Sage Valley. These soils formed in mixed alluvium from sandstone, shale, chert, and limestone. This map unit consists of 90 percent ZZZ family soils. Also included in this map unit are 10 percent Skelter family soils, and other similar soils. Small potholes fed by either groundwater or surface runoff are also present in this map unit, but comprise less than 5 percent.

ZZZ family soils are medium textured, have a dark surface (mollic epipedon), have an accumulation of illuvial clay (argillic horizon), and a seasonal water table within 40 inches (100 centimeters [cm]) of the soil surface. These soils are frigid. Soil profile 14ES35 is representative of ZZZ family soils in map unit OA. Vegetation on ZZZ family soils in map unit OA includes timothy, silver sage, lupine, Columbia needlegrass, bluegrass, and elk thistle.

This map unit is of limited extent and comprises approximately 2 percent (32.6 acres) of the Study Area.

3.6.3.5 STB Swede – Tahquats - Buffork families complex, 4 to 25 percent slopes

The STB map unit is located on strongly sloping to moderately steep mountain sideslopes and hillslopes. Map unit STB is the transition between the lower elevation sagebrush soils (map unit C) and the steeper upper elevation soils (map units Bf, TS, and ZS). These soils formed in slope alluvium, colluvium, and residuum from sandstone, shale, and chert. This map unit consists of 50 percent Swede family soils, 20 percent Tahquats family soils, and 15 percent Buffork family soils. Also included in this map unit are 10 percent Zimmer family soils, 5 percent soils similar to Swede family (lacking a mollic epipedon) and other similar soils.

Swede family soils are medium textured, have a dark surface (mollic epipedon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES12 is representative of Swede family soils in map unit STB. Vegetation on Swede family soils in map unit STB includes lodgepole pine, aspen, Columbia needlegrass, bluegrass, brome grass, snowberry, sticky geranium, and arnica.

Tahquats family soils are medium textured, have a dark surface (mollic epipedon), have an accumulation of illuvial clay (argillic horizon), and have greater than 35 percent rock fragments in the control section. These soils are cryic. Soil profile 14ES11 is representative of Tahquats family soils in map unit STB. Vegetation on Tahquats family soils in map unit STB includes subalpine fir, lodgepole pine, quaking, snowberry, pinegrass, bluegrass, sticky geranium, and wild strawberry.

Buffork family soils are medium textured, have a dark surface (mollic epipedon), have albic materials (albic or glassic horizon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES16 is representative of Buffork family soils in map unit STB. Native vegetation on Buffork family soils in map unit STB consists of lodgepole pine, Douglas fir, quaking aspen, mountain snowberry, fescue, and needlegrass.

This map unit is the most extensive and comprises approximately 26 percent (434.9 acres) of the Study Area.

3.6.3.6 TS Targhee - Swede families complex, 15 to 60 percent slopes

The TS map unit is located on moderately steep to steep mountain sideslopes. Map unit TS occurs on easterly to northerly upper elevation slopes in an alternating pattern with map unit Zz on very steep southerly slopes. These soils formed in residuum and colluvium from sandstone. This map unit consists of 45 percent Targhee family soils and 30 percent Swede family soils. Also included in this map unit are 10 percent Tahquats family soils, 10 percent Skelter family soils, 5 percent rock outcrop, and other similar soils.

Targhee family soils are coarse-textured, have a cambic horizon, and greater than 35 percent rock fragments in the control section. These soils are cryic. Soil profile 14ES26 is representative of Targhee family soils in map unit TS. Vegetation on Targhee family soils in map unit TS includes aspen, Douglas fir, lodgepole pine, snowberry, elderberry, bluegrass, Columbia needlegrass, sticky geranium, lupine, and Indian paintbrush.

Swede family soils are medium textured, have a dark surface (mollic epipedon), and have an accumulation of illuvial clay (argillic horizon). These soils are cryic. Soil profile 14ES25 is representative of Swede family soils in map unit TS. Vegetation on Swede family soils in map unit TS includes Douglas fir, aspen, snowberry, Columbia needlegrass, Oregon grape, sticky geranium, and arnica.

This map unit is of moderate extent and comprises approximately 14 percent (244.2 acres) of the Study Area.

3.6.3.7 ZS Zimmer loam family, 8 to 35 percent slopes

The ZS map unit is located on strongly sloping to steep mountain footslopes, hillslopes, and structural benches. Map unit ZS comprises approximately the mid elevation shrub and rock outcrop areas. These soils formed in residuum and slope alluvium from chert and shale. This map unit consists of 75 percent Zimmer family soils. Also included in this map unit are 10 percent Skelter family soils, 10 percent Swede family soils, 5 percent Tahquats family soils, and other similar soils.

Zimmer family soils in map unit ZS are medium textured, have a dark surface (mollic epipedon), and are shallow to bedrock. These soils are frigid. Soil profile 14ES23 is representative of Zimmer family soils in map unit ZS. Fractured chert is at 12 inches (31 centimeters [cm]) in the representative soil profile. Vegetation on Zimmer family soils in map unit ZS includes snowberry, mountain big sagebrush, arrowleaf balsamroot, fescue, bluegrass, and buckwheat.

Depth to bedrock is *Limiting* (shallow soils) to *Somewhat Limiting* (moderately deep soils) for topsoil salvage in map unit ZS.

This map unit is of limited extent and comprises approximately 2 percent (39.3 acres) of the Study Area.

3.6.3.8 Zz Zimmer family gravelly loam, 35 to 60 percent slopes

The Zz map unit is located on steep to very steep mountain sideslopes. Map unit Zz occurs on southerly upper elevation slopes in an alternating pattern with map unit TS on the easterly and northerly slopes. These soils formed in residuum from limestone sandstone. This map unit consists of 80 percent Zimmer family soils. Also included in this map unit are 5 percent Skelter family soils, 5 percent Targhee family soils, 5 percent Swede family soils, 5 percent rock outcrop, and other similar soils.

Zimmer family soils are medium textured, have a dark surface (mollic epipedon), and are shallow to bedrock. These soils are frigid. Soil profile 14ES21 is representative of Zimmer family soils in map unit Zz. Decomposing sandstone bedrock is at 10 inches and hard sandstone is at 17 inches in the representative soil profile. Vegetation on Zimmer family soils in map unit Zz includes antelope bitterbrush, mountain big sagebrush, arrowleaf balsamroot, Oregon grape, and buckwheat.

Steep to very steep slopes and shallow depth to bedrock is *Limiting* to topsoil salvage in map unit Zz.

This map unit is of limited extent and comprises approximately 3 percent (50.3 acres) of the Study Area.

3.6.3.9 Miscellaneous Landforms

M Mine Disturbances
The northern end of the Study Area is currently being mined. This map unit also includes topsoil and subsoil stockpiles near the tailings ponds.

This map unit is moderately extensive and comprises approximately 14 percent (250.4 acres) of the Study Area.

W Water Bodies
This map unit consists of the tailings ponds in the northeastern portion of the Study Area.

This map unit is of very limited extent and comprises approximately 0.3 percent (5.2 acres) of the Study Area.

3.6.4 Soil Families

Soils in the Study Area were classified to the taxonomic family using the *Keys to Soil Taxonomy, Twelfth Edition* (Soil Survey Staff 2014a). Eight distinct soil families were identified in the Study Area. Soil family names were selected from soil series established in Idaho. The priority for soil family name (Soil Survey Staff 2015) selection was based on the following criteria:

- Soil family name was established in Caribou County, Idaho.
- Soil family name was previously used in the Order 3 *Soil Survey of the Caribou National Forest* (USDA 1990) as part of the soil survey.
- Soil family name was established in Idaho.
- Soil family name was established in an adjacent county in Wyoming.

The taxonomic classification of each soil profile described in the Study Area is listed in **Table 3.6-2**. Asterisked soils are those that were selected for laboratory analysis.

Table 3.6-2 Soil Family and Taxonomic Classification

SOIL PROFILE	SOIL FAMILY	TAXONOMIC CLASSIFICATION[1]	VEGETATION[2]
14ES01	Swede	Typic Argicryolls fine-loamy, mixed, superactive	MCA
14ES02*	Buffork	Alfic Argicryolls fine-loamy, mixed, superactive	MCA
14ES03	Tahquats similar	Pachic Argicryolls loamy-skeletal, mixed, superactive	MCA
14ES04	Rock Outcrop	Rock outcrop	
14ES05*	Beaverdam	Vertic Argicryolls fine, smectitic	LP
14ES06*	Zimmer	Lithic Ultic Haploxerolls loamy, mixed, superactive, frigid	Shrub
14ES07*	Swede	Typic Argicryolls fine-loamy, mixed, superactive	Aspen/shrub
14ES08	Skelter	Ultic Argixerolls fine-loamy, mixed, superactive, frigid	Sage
14ES09*	Buffork similar	Pachic Argicryolls fine-loamy, mixed, superactive	LP

SOIL PROFILE	SOIL FAMILY	TAXONOMIC CLASSIFICATION[1]	VEGETATION[2]
14ES10*	Swede similar	Typic Haplocryolls fine-loamy, mix, superactive	Aspen/grass
14ES11	Tahquats	Typic Argicryolls loamy-skeletal, mixed, superactive	MC/aspen
14ES12*	Swede	Typic Argicryolls fine-loamy, mixed, superactive	LP/aspen
14ES13*	Zimmer	Lithic Ultic Haploxerolls loamy, mixed, superactive, frigid	Shrub
14ES14	Beaverdam similar	Vertic Haplocryalfs fine, smectitic	MCA
14ES15*	Beaverdam similar	Vertic Haplocryalfs clayey-skeletal, smectitic	Aspen/shrub
14ES16*	Buffork	Alfic Argicryolls fine-loamy, mixed, superactive	LP/aspen
14ES17*	Skelter similar	Pachic Ultic Argixerolls fine-loamy, mixed, super, frigid	Sage
14ES18*	ZZZ similar	Oxyaquic Haploxerolls fine-loamy, mixed, super, frigid	WM
14ES19	Skelter	Ultic Argixerolls fine-loamy, mixed, superactive, frigid	Sage
14ES20	Tahquats similar	Typic Palecryolls loamy-skeletal, mixed, superactive	LP/aspen
14ES21*	Zimmer	Lithic Ultic Haploxerolls loamy, mixed, superactive, frigid	Shrub
14ES22*	Targhee similar	Typic Haplocryolls loamy-skeletal, mixed, superactive	Aspen/grass
14ES23*	Zimmer	Lithic Ultic Haploxerolls loamy, mixed, superactive, frigid	Shrub
14ES24	Skelter similar	Ultic Haploxeralfs fine-loamy, mixed, superactive, frigid	Sage
14ES25	Swede	Typic Argicryolls fine-loamy, mixed, superactive	MCA
14ES26*	Targhee	Typic Haplocryepts loamy-skeletal, mixed, superactive	MC
14ES27	Targhee	Typic Haplocryepts loamy-skeletal, mixed, superactive	MC
14ES28*	Skelter similar	Ultic Haploxeralfs fine-loamy, mixed, superactive, frigid	Sage
14ES29*	Beaverdam similar	Vertic Haplocryalfs fine, smectitic	MCA
14ES30	Beaverdam	Vertic Argicryolls fine, smectitic	MCA
14ES31	Zimmer similar	Lithic Haplocryolls loamy, mixed, superactive	MCA
14ES32	ZZZ	Oxyaquic Argixerolls fine-loamy, mixed, superactive, frigid	WM
14ES33*	Swede similar	Eutric Haplocryalfs fine-loamy, mixed, superactive	LP/aspen
14ES34*	Skelter	Ultic Argixerolls fine-loamy, mixed, superactive, frigid	Sage
14ES35*	ZZZ	Oxyaquic Argixerolls fine-loamy, mixed, superactive, frigid	Silver sage
14ES36*	Tahquats	Typic Argicryolls loamy-skeletal, mixed, superactive	MCA

1. Taxonomic classification based on Keys to Soil Taxonomy, Twelfth Edition (Soil Survey Staff 2014a).
2. Vegetation Types: Aspen = quaking aspen; LP=lodgepole; MC = mixed conifer; MCA = mixed conifer and aspen; Shrub=mountain shrub; Sage=mountain big sagebrush; and WM=wet meadow.

* Profile submitted for laboratory analysis.

3.6.4.1 Beaverdam Family

Vertic Argicryolls fine, smectitic

Beaverdam family soils are characterized by a dark surface (mollic), an accumulation of illuvial clay (argillic horizon), and 35 or more percent clay in the control section (upper 50 cm of argillic horizon). There are less than 35 percent rock fragments in the control section.

These soils occur on gently sloping to steep foothills and mountain sideslopes in the northern part of the Study Area.

Soil pH of less than 5.5 and clay content of 40 percent or greater are *Limiting* features in the Beaverdam family subsoil.

Vertical cracking was observed between soil peds in the argillic horizons of the Beaverdam family soils. The width of the cracks ranged from 5 to 10 millimeters (0.2 to 0.4 inches). This soil profile feature takes taxonomic precedence over other characteristics, such as pachic (thick mollic surface) and alfic (albic materials in subsurface), which were observed in some Beaverdam soil profiles in the Study Area (Soil Survey Staff 2014a).

Native vegetation on Beaverdam family soils consists of Douglas fir, lodgepole pine, aspen, snowberry, Columbia needlegrass, fescue, Oregon grape, and wild strawberry.

The Beaverdam soil series was established in Bannock County, Idaho (Soil Survey Staff 2015). These soils were mapped in the *Soil Survey of the Caribou National Forest* (USDA 1990).

3.6.4.2 Buffork Family

Alfic Argicryolls fine-loamy, mixed, superactive

Buffork family soils have a dark surface (mollic epipedon), an albic or glossic horizon, and an accumulation of illuvial clay (argillic horizon). The control section has 18 to 34 percent clay and less than 35 percent rock fragments. Gravels and channers are the dominant rock fragment size.

The representative soil profile has an albic horizon above the argillic horizon.

Native vegetation on Buffork family soils includes lodgepole pine, Douglas fir, quaking aspen, mountain snowberry, mountain brome, and sticky geranium.

The Buffork soil series was established in Teton County, Wyoming.

3.6.4.3 Skelter Family

Ultic Argixerolls fine-loamy, mixed, superactive, frigid

Skelter family soils are characterized by a dark surface (mollic) and an accumulation of illuvial clay in the subsurface (argillic horizon). The control section has 24 to 34 percent clay and less than 35 percent rock fragments. Gravels are the dominant rock fragment size.

These soils occur on strongly sloping sagebrush footslopes in Sage Valley and upper Tygee Valley.

Soil pH is *Somewhat Limiting* in some portions of the Skelter family soil profiles. The surface (0 to 14 cm) of the representative profile has a soil pH of 5.4, which is considered *Limiting* by the updated reclamation material guideline (Soil Survey Staff 2014b).

Skelter family soils have base saturation of less than 75 percent in at least one horizon between 10 and 30 inches (25 and 75 cm) below the mineral soil surface. In soil profiles 14ES17 and 14ES28 the base saturation was less than 75 percent throughout the soil profile.

The soil below the control section can be very to extremely gravelly or cobbly in some Skelter family profiles.

Native vegetation on Skelter family soils consists of mountain big sagebrush, snowberry, Columbia needlegrass, bluegrass, fescue, basin wildrye, wild strawberry, buckwheat, yarrow, lupine, and sticky geranium. Scattered Utah serviceberry is also present on these soils.

The Skelter soil series was established in Gooding County, Idaho (Soil Survey Staff 2015).

3.6.4.4 Swede Family

Typic Argicryolls fine-loamy, mixed, superactive

Swede family soils have a dark surface (mollic epipedon) and an accumulation of illuvial clay (argillic horizon) in the subsurface. The control section has 18 to 34 percent clay and less than 35 percent rock fragments. Gravels are the dominant rock fragment size. Some soil profiles have greater than 35 percent rock fragments below the control section.

Stone content increases below the control section in some Swede family profiles.

The percent clay increases below the control section in some Swede family profiles.

These soils are on strongly sloping to very steep mountain sideslopes.

Native vegetation on Swede family soils consists of Douglas fir, lodgepole pine, aspen, bromegrass, needlegrass, fescue, snowberry, chokecherry, lupine, wild strawberry, buckwheat, sticky geranium, arnica, and Oregon grape.

The Swede soil series was established in Valley County, Idaho (Soil Survey Staff 2015). These soils were mapped in the *Soil Survey of the Caribou National Forest* (USDA 1990).

3.6.4.5 Tahquats Family

Typic Argicryolls loamy-skeletal, mixed, superactive

Tahquats family soils have a dark surface (mollic epipedon) and an accumulation of illuvial clay (argillic horizon) in the subsurface. The control section has 28 to 34 percent clay and greater than 50 percent rock fragments. Gravels are the dominant rock fragment size, but cobbles and stones are also present.

The percent clay increases below the control section in some Tahquats family profiles.

These soils are on strongly sloping mountain sideslopes.

Native vegetation on Tahquats family soils consists of Douglas fir, subalpine fir, lodgepole pine, aspen, snowberry, bluegrass, pinegrass, wild strawberry, and sticky geranium.

The Tahquats soil series was established in Caribou County, Idaho (Soil Survey Staff 2015).

3.6.4.6 Targhee Family

Typic Haplocryepts loamy-skeletal, mixed, superactive

Targhee family soils have a base saturation of greater than 50 percent. Profile development in these soils is limited to cambic horizons, which Targhee family soils. The particle size control section has less than 18 percent clay and greater than 35 percent rock fragments. Gravels and channers are the dominant rock fragment size.

They are on steep to very steep mountain sideslopes.

Soil pH was 5.3 below a depth of 15 cm (6 inches) in the representative soil profile. Soil pH of less than 5.5 is considered Limiting by the updated guideline for reclamation material (Soil Survey Staff 2014b). Soil pH should be monitored on Targhee family soils during topsoil salvage operations. Blending of the Limiting soil pH material with Somewhat Limiting and Not Limiting topsoil during salvage operations could help mitigate this limitation.

Targhee family soils are typically moderately deep (20 to 40 inches or 50 to 100 cm) to sandstone.

Native vegetation on Targhee family soils consists of aspen, Douglas fir, lodgepole pine, elderberry, arnica, snowberry, lupine, Indian paintbrush, bluegrass, and Columbia needlegrass.

The Targhee soil series was established in Fremont County, Idaho (Soil Survey Staff 2015). These soils were mapped in the Soil Survey of the Caribou National Forest (USDA 1990).

3.6.4.7 Zimmer Family

Lithic Ultic Haploxerolls loamy, mixed, superactive, frigid

Zimmer family soils are characterized by shallow depth (less than 50 cm or 20 inches) to bedrock and a dark surface (mollic). Base saturation ranges from 47.4 to 67.7 percent in the Zimmer profiles submitted for laboratory analysis. Cambic horizons were identified in some profiles. Soil profiles submitted for analysis contained 15 to 21 percent clay in the control section and less than 35 percent rock fragments.

They are on steep to very steep mountain sideslopes.

Soil pH was 5.3 in the representative soil profile for Zimmer family soils. Soil pH less than 5.5 is considered Limiting by the updated guideline for reclamation material (Soil Survey Staff 2014b). Soil pH should be monitored on Targhee family soils during topsoil salvage operations. Blending of the Limiting soil pH material with Somewhat Limiting and Not Limiting topsoil during salvage operations could help mitigate this limitation.

Native vegetation on Zimmer family soils consists of snowberry, mountain big sagebrush, arrowleaf balsamroot, fescue, bluegrass, buckwheat, and Oregon grape.

The Zimmer soil series was established in Boise County, Idaho (Soil Survey Staff 2015).

3.6.4.8 ZZZ Family

Oxyaquic Argixerolls fine-loamy, mixed, superactive, frigid

ZZZ family soils are characterized by a seasonal high-water table, a dark surface (mollic epipedon), and an accumulation of illuvial clay (argillic horizon) in the subsurface. These soils occur in the nearly level concave depressions and drainages in Sage Valley. ZZZ family soils are of limited extent in the Study Area.

The depth to redox mottles ranges from 28 to 68 cm (11 to 27 inches) below the mineral soil surface in ZZZ family soils and similar soils. Redox mottles indicate the presence of a high-water table at some point in time. Based on the physiographic setting and observed field conditions it is assumed that "...in normal years the soil is saturated with water within 100 cm (40 inches) of the mineral soil surface..." (Soil Survey Staff 2014a) long enough to meet the taxonomic requirements of the oxyaquic subgroup.

Small depressions with surface water were observed in areas where ZZZ family soils were described.

The presence of cobbles or stones in the subsoil of ZZZ family soil profiles limited hand digging to a depth of 74 to 102 cm (29 to 40 inches).

The ZZZ family soils appeared to have been disturbed at some time and planted with timothy. Bluegrass, rushes, lupine, Columbia needlegrass, elk thistle, and sticky geranium were also observed on the ZZZ family soils. Silver sage was observed growing along the interface between ZZZ family soils and the drier Skelter family soils.

No soil series have been established in this soil family. The term ZZZ was coined for identifying this soil family in the Study Area.

3.6.5 Determination of Reclamation Suitability

The CTNF has adopted an updated version of the National Soil Information System (NASIS) interpretation guideline "ENG: Construction Materials; Reclamation" to determine suitability of topsoil and subsoil for use as reclamation growth media (Soil Survey Staff 2014b). The update involved raising the lower pH limit from 4.0 up to 5.5 and lowering the upper limit from 8.5 down to 8.4 (Soil Survey Staff 2014b). Parameters and limits for the updated "ENG: Construction Materials; Reclamation" interpretation guideline are listed in **Table 3.6-3**.

Table 3.6-3 Parameters and Rating Ranges for Determining Topsoil and Subsoil Suitability Based on ENG: Construction Materials; Reclamation

REASON	PROPERTY	LIMITING	SOMEWHAT LIMITING	NOT LIMITING
Too Clayey[1]	Clay %	≥ 40%	> 30% to < 40%	≤ 30%
Cobble Content[2]	Cobble by % weight	> 50%	> 25% to ≤ 50%	≤ 25%
	Cobble by % volume	> 35%	>16% to ≤35%	≤16%
Stone Content[3]	Stone by % weight	> 15%	>5% to ≤15%	≤5%
	Stone by % volume	> 10%	>3% to ≤10%	≤3%
Carbonate Content[4]	Calcium Carbonate Equivalent	≥ 40%	> 15% to ¸40%	≤ 15%
Sodium Content[5]	Sodium Adsorption Ration (SAR)	> 13	> 4 to ≤ 13	≤ 4
Water Erosion[6]	K factor	> 0.7	> 0.35 to < 0.7	≤ 0.35
Low Organic Matter[7]	Organic Matter %	0	> 0 to < 1%	≥ 1%

REASON	PROPERTY	LIMITING	SOMEWHAT LIMITING	NOT LIMITING
Too Alkaline[8]	Soil pH (1:1 water)	> 8.4		≤ 8.0
Too Acid[9]	Soil pH (1:1 water)	< 5.5	≥ 5.5 to < 6.0	≥ 6.0
Salinity[10]	ECe (mmhos/cm)	> 16	≤ 8 to ≥ 16	< 8
Too Sandy[11]	#4sieve minus #200 sieve	≥ 85%	> 70% to < 85%	≤ 70%
Wind Erosion[12]	Wind Erodibility Group	"1" and "2"	Not applicable	All others
Droughty[13]	Available Water Capacity (AWC) cm/cm	≤ 0.05	> 0.05 to < 0.10	≥ 0.10
Depth to Bedrock	Depth (RV) to bedrock, cm	< 50	≥ 50 to < 100	≥ 100
Depth to Cemented Pan	Depth (RV) to Cemented Pan, cm	< 50	≥ 50 to < 100	≥ 100

Procedure for feature determination:

1. Clay percent thickest layer in depth 0 to 100 cm.
2. Weighted average by weight coarse fragments 3 to 10 inches in size in upper72 inches of soil profile or above a restrictive layer.
3. Weighted average by weight coarse fragments > 10 inches in size in upper72 inches of soil profile or above a restrictive layer.
4. Soil layer with maximum calcium carbonate equivalent.
5. Highest sodium adsorption ratio for horizons in depth range of 0 to 20 inches (0 to 50cm).
6. Soil layer with maximum K factor within a depth of 40 inches (100 cm).
7. Weighted average organic matter content of sampled soil profile.
8. Maximum soil pH (1:1 water) of any soil layer.
9. Minimum soil pH (1:1 water) of any soil layer. Low pH values below 40 inches (100 cm) are not as restrictive as those above 100 cm.
10. Highest salinity (ECe = electrical conductivity in milliMhos per centimeter [mmhos/cm]) for all layers.
11. Percent clay and #4 sieve #200 sieves of the thickest layer within 40 inches (100 cm) of the soil surface or above a cemented restrictive feature.
12. Wind erodibility group.
13. Sum of AWC Layer Thickness summed through the last soil layer or to a cemented layer, then divided by depth of soil to obtain weighted average AWC. AWC adjusted for rock fragment content.

The following suitability discussions for native soils in the Study Area are based on profile descriptions, laboratory analysis data, and the interpretation guideline recommended by the CTNF (Soil Survey Staff 2014b).

3.6.5.1 Too Clayey

Clayey soils are a *Limiting* feature in the Study Area for Beaverdam soils. These soils have a fine particle-size class. Clay ranges from 43 to 45 percent from 10 to 40 inches (24 to 103 cm) in the representative soil profile for the Beaverdam family. The overlying topsoil in Beaverdam family soils ranges from 18 to 22 percent clay and the subsoil has 23 percent clay in the representative soil profile. The weighted average clay is 40 percent in the subsoil of the representative Beaverdam soil profile (10 to 51 inches or 24 to 122 cm). Beaverdam subsoil should not be salvaged for use as topsoil based on the percent clay.

Percent clay in the Tahquats family increases to 40 percent below 45 inches (115 cm) in the representative soil profile. The effect of clay in the lower subsoil of some Tahquats profile could be mitigated by blending with less clayey materials during the salvage and stockpiling process.

3.6.5.2 Cobble Content

Cobbles are not a limiting feature for soils in the Study Area. The maximum weighted average cobble content was 12.3 percent by volume. Cobbles are not considered limiting until the weighted average for the soil profile is greater than 35 percent by volume.

3.6.5.3 Stone Content

Stones are not a limiting feature for soils in the Study Area. The maximum weighted average stone content was 8.7 percent by volume. Stones are not considered limiting until the weighted average for the soil profile is greater than 10 percent by volume.

3.6.5.4 Carbonate Content

Carbonate content is not a limiting feature for soils in the Study Area. The maximum calcium carbonate equivalent for any horizon was 4.8 percent for soil samples submitted for laboratory analysis. Carbonate content is not considered limiting until the calcium carbonate equivalent is greater than or equal to 40 percent.

3.6.5.5 Sodium Content

Sodium content is not a limiting feature for soils in the Study Area. The maximum sodium adsorption ratio (SAR) for any soil horizon submitted for laboratory analysis was 2.85. Sodium content is not considered limiting until the SAR is greater than 13.

3.6.5.6 Water Erosion

Water erosion is not a limiting feature for soils in the Study Area based on K factors calculated for soil samples submitted for laboratory analysis. Some horizons in Skelter, Swede, Targhee, and ZZZ families are *Somewhat Limiting* for water erosion based on the calculated K factors.

3.6.5.7 Low Organic Matter

Low organic matter is not a limiting feature for soils in the Study Area when profile weighted averages are used to determine reclamation suitability. Weighted averages are an estimate of what the resulting organic matter percent may be after blending of topsoil and subsoil during salvage and stockpiling operations.

The weighted average organic matter content was used to determine the suitability of soils in the Study Area. The surface and subsurface of most profiles are high in organic matter, while most subsoil has organic matter contents of less than two percent and some less than one percent. Even though the surface organic horizons (Oi and Oe) horizons were not included in the weighted average calculations, all of the profiles submitted for laboratory analysis have a weighted average organic matter content of 1.20 to 9.27 percent.

3.6.5.8 Too Alkaline

Alkalinity is not a limiting feature for soils in the Study Area. The maximum measured soil pH (1:1 water) for soil samples submitted for laboratory analysis was 7.5.

3.6.5.9 Too Acid

Soil pH (1:1 water) ranged from 5.2 to 7.5 in the soil samples submitted for laboratory analysis.

Soil pH (1:1 water) was identified as being in the range of 5.2 to 5.4 in ten soil samples submitted for analysis. Soil pH is considered to be *Too Acid* and *Limiting* for reclamation materials when the soil pH is less than 5.5. These ten soil samples were for horizons distributed among Beaverdam (below 42 cm), Skelter (surface 14 to 22 cm), Targhee (subsoil below 15 cm), Zimmer, and ZZZ (full profile) soil families. The horizons with *Limiting* soil pH apply only to specific soil profiles and not to any specific soil family. The number of soil samples with pH (1:1 water) below 5.5 comprises only 13 percent of all samples submitted for analysis.

Five soil samples had paste pH of less than 5.5. Two of these five samples were in the group with pH (1:1 water) less than 5.5.

Soil pH should be monitored during topsoil salvage operations. Blending of the *Limiting* soil pH material with *Somewhat Limiting* and *Not Limiting* topsoil or subsoil during salvage operations could help mitigate this limitation.

3.6.5.10 Salinity

Salinity is not a limiting feature for soils in the Study Area. The maximum electrical conductivity (ECe) measured in soil samples submitted for laboratory analysis was 1.51 deciSiemens per meter (dS/m, or milliMhos per centimeter [mmhos/cm]).

3.6.5.11 Too Sandy

Soils in the Study Area are dominated by loamy and clayey textures. Loam, clay loam, and clay are the dominant soil textures in the Study Area. The amount of sand ranged from 14 to 62 percent. The statistical mean for sand is 31 percent and the median value is 28 percent. Blending of localized pockets of coarse textured soils with loamy and clayey soils during the salvage, stockpiling, and placement processes can help mitigate the effects of sandy soils.

3.6.5.12 Wind Erosion

Soil textures of soil samples submitted for laboratory analysis does not include any of the textures listed for wind erodibility groups 1 and 2. Wind erodibility is not a limiting feature of soils in the Study Area based on the soil samples submitted for analysis and field textures.

Wind erodibility groups are based on soil texture. Group 1 consists of very fine sand, fine sand, sand, or coarse sand textures. Wind erodibility group 2 consists of loamy very fine sand, loamy fine sand, loamy sand, and loamy coarse sand; very fine sandy loam and silt loam with less than 5 percent clay and 25 percent or less very fine sand (Stantec 2015b).

3.6.5.13 Droughty

Droughty soil conditions are not a limiting feature for soils in the Study Area. Available water capacities (AWC) for soil profiles submitted for laboratory analysis do *not* have AWC weighted averages less than the *Not Limiting* threshold of 0.10 cm per cm. This determination is based on AWC that was adjusted for rock fragment content.

The statistical mean AWC is 0.17 cm/cm and the median AWC is 0.19 cm/cm for soil profiles submitted for laboratory analysis. These statistics are based on the weighted soil profile averages for AWC adjusted for rock fragment content.

3.6.5.14 Depth to Bedrock

Depth to bedrock is *Limiting* in the Zimmer family (lithic). Bedrock depth is *Somewhat Limiting* in the Beaverdam family, Skelter family, Swede family, and Targhee family in profiles that are moderately deep (20 to 40 inches or 50 to 100 cm) to shale, chert, or sandstone.

The limiting feature of shallow and moderately deep soils that would affect reclamation is the reduced amount of topsoil and subsoil that can be salvaged. This would subsequently reduce the amount of topsoil and subsoil available for reclamation.

3.6.5.15 Depth to Cemented Pan

No cemented pans were identified in the Study Area.

3.6.5.16 Selenium

Total selenium concentrations ranged from non-detectable (less than 0.02 mg/kg) up to a maximum reported concentration of 12.8 mg/kg. The maximum *Total* selenium value was detected in soil profile 14ES10 (62 to 106 cm).

Plant available and ammonium bicarbonate-diethylenetriaminepentaacetic acid (*ABDTPA*) extractable selenium analyses were run on all the Study Area soil samples submitted for laboratory analysis.

One soil sample (14ES22 2 to 20 cm) had an analysis result of 0.27 mg/kg in the *Plant Available* test with. *Total* selenium in this same sample was non-detectable (<2.2 mg/kg). *ABDTPA* extractable selenium for this sample was non-detectable (<0.16 mg/kg). The ABDTPA detection limit was higher for this sample because the sample was much lighter than the other soil samples and adjustments were made to the amount of sample analyzed (Stantec 2015b). The lighter weight of this surface soil sample is likely attributable to the 20.9 percent organic matter which could also be a contributing factor for the *Plant Available* selenium value.

Based on the results of the laboratory analysis for total and extractable, it appears that selenium is not a limiting feature for naturally developed in-situ soils in the Study Area. Blending of soil materials during the salvage, stockpiling, and placement process would help mitigate potential selenium issues.

3.6.5.17 Topsoil and Subsoil Salvage Depths

Estimated topsoil and subsoil salvage were determined for each major soil family identified in the Study Area. The criteria listed in **Table 3.6-3** were the basis for determining whether material should be salvaged as topsoil or subsoil, even though all suitable material would be salvaged and not separated nor distinguished between topsoil or subsoil.

The primary parameters which determined whether material was classified as topsoil or subsoil in the Study Area are:

- Depth to where the percent organic matters decreases substantially (typically less than one percent) based on either the laboratory analysis or soil color, if lab data was not available;

- Changes in the percent clay;
- Limiting soil pH (1:1 water); and,
- Depth to bedrock.

The characteristics of each soil profile was evaluated on an individual basis, the average estimated salvage depths were determined for each soil family. Soils listed as similar to a family were included in the soil family estimates. Estimated topsoil and subsoil salvage depths were determined for each soil map unit based on the weighted averages for the map unit components. Actual salvage depths would vary across the landscape.

Table 3.6-4 lists the estimated average topsoil and subsoil salvage depths by soil family.

Table 3.6-5 lists the estimated average topsoil and subsoil salvage depths for each soil map unit.

In order to minimize the inclusion of materials with *Limiting* soil pH (less than 5.5) within suitable topsoil or subsoil material, blending of low pH materials with suitable soils during the salvage, stockpiling, and placement operations would help mitigate this limiting soil feature.

Table 3.6-4 Estimated Average Topsoil and Subsoil Salvage Depths for Soil Families in the East Smoky Panel Study Area

SOIL FAMILY[1]	ESTIMATED AVERAGE TOPSOIL SALVAGE DEPTH[2] (CM)	ESTIMATED AVERAGE SUBSOIL SALVAGE DEPTH[2] (CM)	ESTIMATED AVERAGE TOPSOIL SALVAGE DEPTH[2] (IN)	ESTIMATED AVERAGE SUBSOIL SALVAGE DEPTH[2] (IN)
Beaverdam	34	100[3]	13	40[3]
Buffork	41	108	16	43
Skelter	37	72	14	28
Swede	44	59	17	23
Tahquats	47	103	18	40
Targhee	39	33	15	13
Zimmer	20	3	8	1
ZZZ	36	50	14	20

1. Similar soils were included in the estimates for each family.
2. Actual salvage depths would vary across the landscape and should be monitored during salvage operations.
3. Although subsoil is present, it would not be salvaged, if feasible, due to high clay content (**Section 3.6.5.1**).

3.6.6 Reclamation

Salvaged topsoil and subsoil can either be directly placed on reclamation surfaces or stockpiled for later placement.

Table 3.6-5 Estimated Average Topsoil and Subsoil Salvage Depths for Soil Map Units Based on Weighted Averages

MAP UNIT SYMBOL	AVERAGE ESTIMATED TOPSOIL SALVAGE DEPTH[1,2] (CM)	AVERAGE ESTIMATED SUBSOIL SALVAGE DEPTH[1,2] (CM)	AVERAGE ESTIMATED TOPSOIL SALVAGE DEPTH[1,2] (IN)	AVERAGE ESTIMATED SUBSOIL SALVAGE DEPTH[1,2] (IN)
Bf	Buffork family silt loam, 18 to 40 percent slopes			
	41	102	16	40[3]
BTS	Beaverdam - Tahquats - Swede families complex, 2 to 18 percent slopes			
	37	88	15	35
Ck	Skelter family silty loam, 3 to 12 percent slopes			
	37	70	15	28
OA	ZZZ family loam complex, 1 to 3 percent slopes			
	36	52	14	20
STB	Swede - Tahquats – Buffork families complex, 4 to 25 percent slopes			
	42	70	16	27
TS	Targhee - Swede families complex, 15 to 60 percent slopes			
	39	50	15	20
ZS	Zimmer loam family, 8 to 35 percent slopes			
	26	21	10	8
Zz	Zimmer family gravelly loam, 35 to 60 percent slopes			
	22	11	9	4
M				
	0	0	0	0
W	Water Bodies			
	0	0	0	0

[1] Estimated average map unit salvage depths are based on weighted averages of components. The estimated soil family average was used for each map unit component.

[2] Estimated average map unit salvage depths are for planning purposes. Actual salvage depths should be expected to vary.

[3] Although subsoil is present, it would not be salvaged, if feasible, due to high clay content (**Section 3.6.5.1**).

3.7 VEGETATION AND WETLANDS

3.7.1 Study Area

The vegetation and wetland resources Study Area includes all Project disturbance areas plus a 0.25-mile buffer extending outward from the edge of proposed disturbance, with slight modifications as a 0.25-mile buffer was not needed near existing/past mine disturbance (**Figure 3.7-1**). The Study Area boundary was developed with the IDT experts and professional judgement.

3.7.2 GIS Vegetation Data Verification

A total of 12 different vegetation cover types were identified in the Study Area using CTNF geographic information system (GIS) vegetation data that was field verified by Stantec (2017b). The vegetative cover types identified are shown in **Table 3.7-1**.

Table 3.7-1 Vegetation Types Mapped in the Study Area

VEGETATION TYPE	TOTAL ACRES	PERCENT OF TOTAL VEGETATION ACRES
Forested Sites		
Aspen	140.0	6
Aspen/Conifer	639.5	26
Aspen Dry	207.8	9
Douglas-fir	61.4	3
Dry Aspen/Conifer	190.0	8
Dry Conifer Mix	41.8	2
Lodgepole Pine	18.4	<1
Mixed Conifer	251.8	10
Non-Forested Sites		
Grass/Forb	176.7	7
Mountain Brush	251.1	10
Riparian Shrub	12.0	<1
Sagebrush	428.3	18
Total	**2,418.8**	**100**

3.7.3 Vegetation Community Mapping and Strata Evaluation

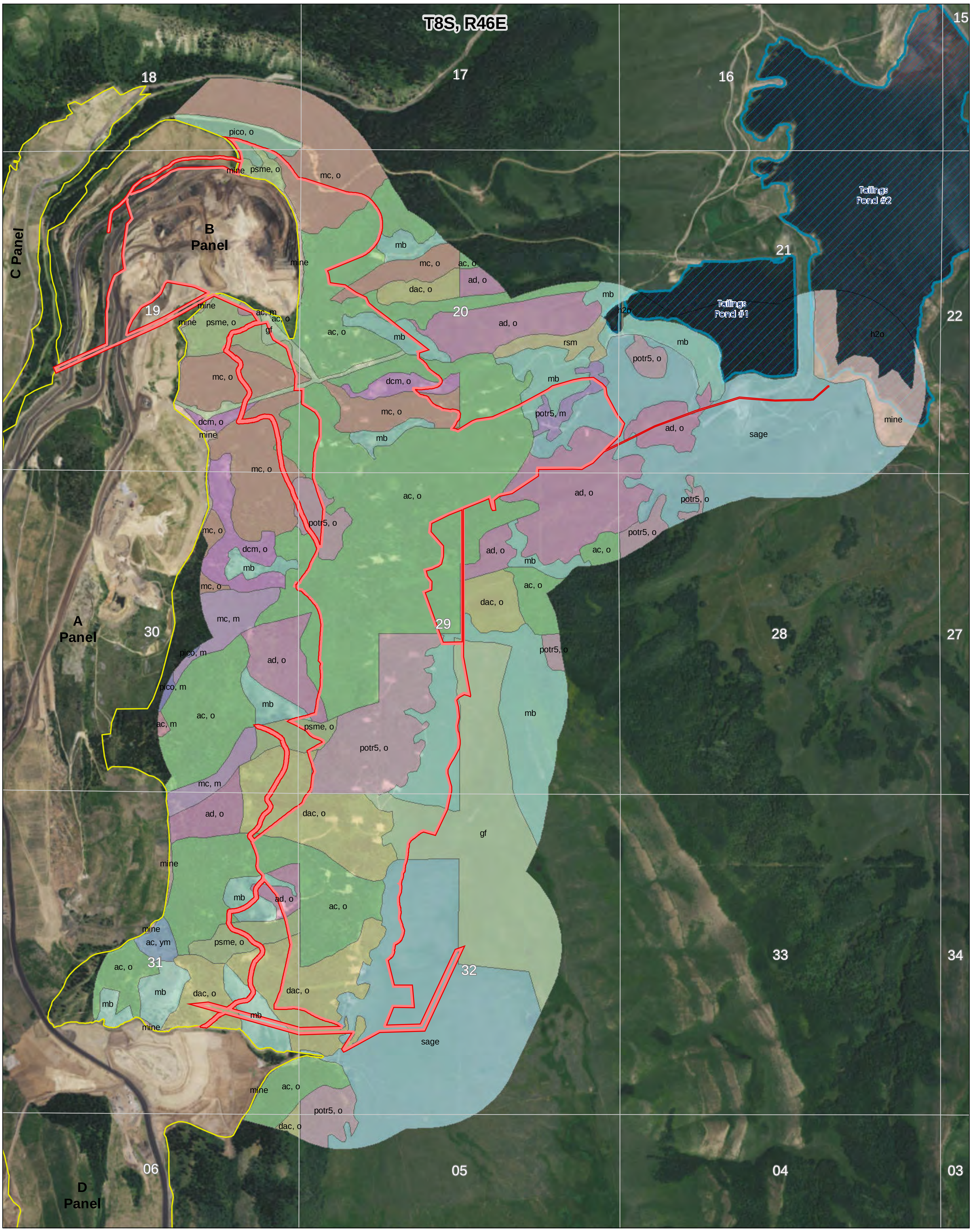
The CTNF GIS vegetation data was supplemented with field data for various vegetation data attributes including: Society of American Foresters forest cover (SAF) type, vegetation type (VT), and the Forest Structural Stage (FSS) (Stantec 2017b). In addition, a combination of vegetation type and structural stage (i.e., o = old, m = mature, and ym = young/mature) was used to stratify the affected vegetation types, as shown on **Figure 3.7-1**. The old (o) and mature (m) strata were evaluated to determine the potential to meet the USFS Intermountain Region (Region 4) old growth definitions, as outlined in Stantec (2017b). A brief description of each of the cover types follows.

3.7.3.1 Aspen

There are about 140 acres of aspen vegetation type (**Photo 3.7-1**) in the Study Area, which represents 12 percent of the vegetated area (**Table 3.7-1**). Aspen (*Populus tremuloides*) is common in both the montane and subalpine zones of the Study Area. On the eastern-facing side of the range, aspen stands occur on all aspects and in drainages and ravines, alternating with north-facing mixed conifer occurring on mid-elevation and high elevation slopes. The dominant understory shrub in aspen communities is mountain snowberry (*Symphoricarpos albus*), although chokecherry (*Prunus virginiana*), mountain box-laurel (*Pachistima myrsinities*), several Ericaceae family shrub members (whortleberry and others), rose (*Rosa* spp.), and currant/gooseberry (*Ribes* spp.) form important understory components as well.

Photo 3.7-1 Typical Aspen Vegetation Type in the Study Area

The aspen vegetation type was stratified into two strata, old aspen and mature aspen. The old aspen stratum represents 93 percent of the aspen vegetation type and the mature aspen represents seven percent.



Legend

Project Area Boundary

Existing Disturbance Area

Tailings Ponds

Vegetation Strata

Aspen (potr5), m

Aspen (potr5), o

Aspen Conifer (ac), m

Aspen Conifer (ac), o

Aspen Conifer (ac), ym

Aspen Dry (ad), o

Douglas-fir (psme), o

Dry Aspen Conifer (dac), o

Dry Conifer Mix (dcm), o

Grass/Forbs (gf)

Lodgepole pine (pico), m

Lodgepole pine (pico), o

Mine (mine)

Mixed Conifer (mc), m

Mixed Conifer (mc), o

Mountain Brush (mb)

Riparian Shrub (rsm)

Sage (sage)

Water (h2o)

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.25 0.5
Miles
1:20,000 (at original document size of 11x17)
N

Figure 3.7-1
Vegetation and Structure Stage within the Project Area
East Smoky Panel Mine EIS

3.7.3.2 Aspen-Conifer

There are approximately 640 acres of aspen-conifer vegetation type (**Photo 3.7-2**) in the Study Area, which represents 26 percent of the vegetated area (**Table 3.7-1**). This is the most common vegetation type within the Study Area. In these areas, aspen and conifers grade without sharp, discernable boundaries and are often interspersed among otherwise contiguous aspen or conifer. Dominant canopy species within this cover type include aspen, Douglas-fir (*Pseudotsuga menziesii*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*). Common understory species include mountain snowberry, meadow-rue (*Thalictrum fendleri*), sticky geranium (*Geranium viscosissimum*), and pinegrass (*Calamagrostis rubescens*). In many aspen stands, conifer encroachment is a natural pattern, which may be occurring at unnatural levels due to fire suppression (BLM 2010d).

The aspen-conifer vegetation type was stratified into two strata, old aspen-conifer and young/mature aspen-conifer. The old aspen-conifer stratum represents 82 percent of the aspen-conifer vegetation type and the young/mature aspen-conifer stratum represents 18 percent.

Photo 3.7-2 Typical Aspen Conifer Vegetation Type in the Study Area

3.7.3.3 Aspen-Dry

There are approximately 208 acres of aspen-dry vegetation type (**Photo 3.7-3**) in the Study Area, which represents nine percent of the vegetated area (**Table 3.7-1**). These stands are dominated by aspen that serves as a climax species or as the long-term stable species for the site. These stands appear to have aspen as a climax species due to the poor site quality; conifer is not capable of growing on these sites except in favorable micro sites (Beck 2011). The aspen-dry vegetation type was stratified into one strata, old aspen-dry.

Photo 3.7-3 Typical Aspen Dry Vegetation Type in the Study Area

3.7.3.4 Douglas-Fir

There are approximately 61 acres of Douglas-fir vegetation type (**Photo 3.7-4**) in the Study Area, which represents three percent of the vegetated area (**Table 3.7-1**). Douglas-fir represents the majority of the basal area within these stands. However, other conifer species may be present but will generally represent less than 33 percent of the basal area as a group (Beck 2011). Some aspen trees may be present but represent less than 15 percent of the basal area (Beck 2011). The Douglas-fir vegetation type was stratified into one strata, old Douglas-fir.

Photo 3.7-4 Typical Douglas-fir Vegetation Type in the Study Area

3.7.3.5 Dry Aspen-Conifer

There are approximately 190 acres of dry aspen-conifer vegetation type (**Photo 3.7-5**) in the Study Area, which represents eight percent of the vegetated area (**Table 3.7-1**). These forest stands rarely have more than 50 percent canopy cover; with aspen and conifer each representing at least 15 percent of the basal area (Beck 2011). The most common conifer species present is Douglas-fir, but lodgepole pine or subalpine fir may also be present. Aspen on these sites tends to be small in stature and growing in patches. The dry aspen-conifer vegetation type was stratified into one strata, old dry aspen-conifer.

Photo 3.7-5 Typical Dry Aspen Conifer Vegetation Type in the Study Area

3.7.3.6 Dry Conifer Mix

There are approximately 42 acres of dry conifer mix vegetation type (**Photo 3.7-6**) in the Study Area, which represents two percent of the vegetated area (**Table 3.7-1**). These stands rarely have more than 50 percent canopy cover due to harsh site conditions, the dominate species is often Douglas-fir, limber pine, lodgepole pine, or sub-alpine fir as a dominate or co-dominate (Beck 2011). Aspen may be present in this type, but will usually be in small patches and represent less than 15 percent of the canopy. The dry conifer mix vegetation type was stratified into one strata, old dry conifer mix.

Photo 3.7-6 Typical Dry Conifer Mix Vegetation Type in the Study Area

3.7.3.7 Lodgepole Pine

There are approximately 18 acres of lodgepole pine vegetation type (**Photo 3.7-7**) in the Study Area, which represents less than one percent of the vegetated area (**Table 3.7-1**). These are stands where lodgepole pine represents the clear majority of the basal area (Beck 2011). Other conifer species may be present but represent less than 33 percent of the total basal area of the stand. Aspen may be present but represents less than 15 percent of the basal area. The lodgepole pine vegetation type was stratified into one strata, old lodgepole pine.

Photo 3.7-7 Typical Lodgepole Pine Vegetation Type in the Study Area

3.7.3.8 Mixed Conifer

There are approximately 252 acres of mixed conifer vegetation type (**Photo 3.7-8**) in the Study Area, which represents 10 percent of the vegetated area (**Table 3.7-1**). This type occurs in the higher elevation areas with northern aspects, where there is sufficient moisture to support conifer species that include subalpine fir, lodgepole pine, and Douglas-fir on the upper reaches of the Study Area (above 7,000 feet), and in shady canyons where snowmelt would linger longer in the spring. The lack of Engelmann spruce (*Picea engelmannii*) occurrences seems related to the upper elevation limits in the Study Area remaining below the spruce zone. Subalpine fir dominates the second and third-growth mixed stands where the slopes are shady and at the highest elevations on northern-northeast aspects. Lodgepole pine dominates in stands that are more open and co-dominates in mid-elevation areas where less moisture occurs. Most of the lodgepole pine sites occupy gentle slopes that are relatively cool and generally dry. Topography is variable, but moderate to steep slopes predominate.

On open aspects, the mixed conifer community is dominated by lodgepole pine, with Douglas-fir, and subalpine fir occasionally interspersed within lodgepole pine stands. Kinnikinnick (*Arctostaphylos uva-ursi*) grows thickly at the edge of both mixed conifer and aspen communities, especially in the old clearcuts. In the mixed conifer stands, the most significant shrubs are snowberry; serviceberry (*Amelanchier alnifolia*); chokeberry (*Prunus virginiana*) on open, exposed slopes; and elderberry (*Sambucus racemosa*). Kinnikinnick and pipsissewa (*Chimaphila umbellata*) become the most dominant understory shrubs in the densest, shadiest mixed conifer stands.

A sweeping high carpet of grouse whortleberry (*Vaccinium scoparium*) typifies the undergrowth in some stands. Small amounts of common yarrow (*Achillea millefolium*), fireweed (*Epilobium angustifolium*), hawkweed (*Hieracium* spp.), Ross' sedge (*Carex rossii*), Wheeler's bluegrass (*Poa nervosa*), spike trisetum (*Trisetum spicatum*), and conspicuous heartleaf arnica (*Arnica cordifolia*) are represented throughout the mixed conifer habitat type. Dwarf blueberry (*Vaccinium caespitosum*) and either mountain box-laurel or creeping Oregon grape (*Mahonia repens*) are often present also, depending on the amount of light and soil. Pinegrass (*Calamagrostis rubescens*) is the most common understory grass in almost all of the stands. In subalpine fir-dominated sites, the undergrowth is principally herbaceous with *Osmorhiza* spp. as a dominant forb. Other most frequently encountered forbs include common yarrow, nettleleaf horsemint (*Agastache urticifolia*), Colorado columbine (*Aquilegia coerulea*), Engelmann's aster (*Eucephalus engelmannii*), sawtooth groundsel ragwort (*Senecio serra*), and meadow-rue. Heartleaf arnica, fireweed, wild strawberry (*Fragaria virginiana*), northern bedstraw (*Galium boreale*), Potentilla spp., wintergreen (*Pyrola secunda*), and Tuber starwort (*Stellaria jamesiana*). In areas that have been disturbed by livestock, Sweet pea (*Lathyrus* spp.), western coneflower (*Rudbeckia occidentalis*), and Tuber starwort are often abundant. Various graminoids are common, such as blue wildrye (*Elymus glaucus*), fringed brome (*Bromus ciliatus*), Wheeler's bluegrass, bluebunch wheatgrass (*Pseudoroegneria spicata*), spike trisetum, and species of *Bromus*, and *Carex*.

Adjacent, warmer sites are usually mixed with aspen-dominated stands having essentially similar undergrowths. Snowberry becomes increasingly important on drier sites, many of which appear to be "stable". The gooseberry species, (*Ribes* spp.), are often present, and vary in importance in the shrub component of the stands depending on slope, aspect, and percent canopy cover of the conifer overstory. Rocky Mountain maple (*Acer glabrum*) occurs infrequently on open, sunny slopes in association with the mixed conifer stands, often in association with Douglas-fir. Undergrowth typically includes small amounts of common yarrow, heartleaf arnica, fireweed, wild strawberry, northern bedstraw, cinquefoil, wintergreen, and Tuber starwort as herbaceous species.

The mixed conifer vegetation type was stratified into two strata, old mixed conifer and mature mixed conifer. The old mixed conifer stratum represents 86 percent of the mixed conifer vegetation type and the mature mixed conifer represents 14 percent.

Photo 3.7-8 Typical Mixed Conifer Vegetation Type in the Study Area

3.7.3.9 Grass/Forb

There are approximately 177 acres of grass/forb vegetation type (**Photo 3.7-9**) in the Study Area, which represents seven percent of the vegetated area (**Table 3.7-1**). This type occurs mainly in the flats of Sage Valley and typically in the lowest elevations of the Study Area. Smooth brome (*Bromus inermis*) is dominant in the flats of Sage Valley.

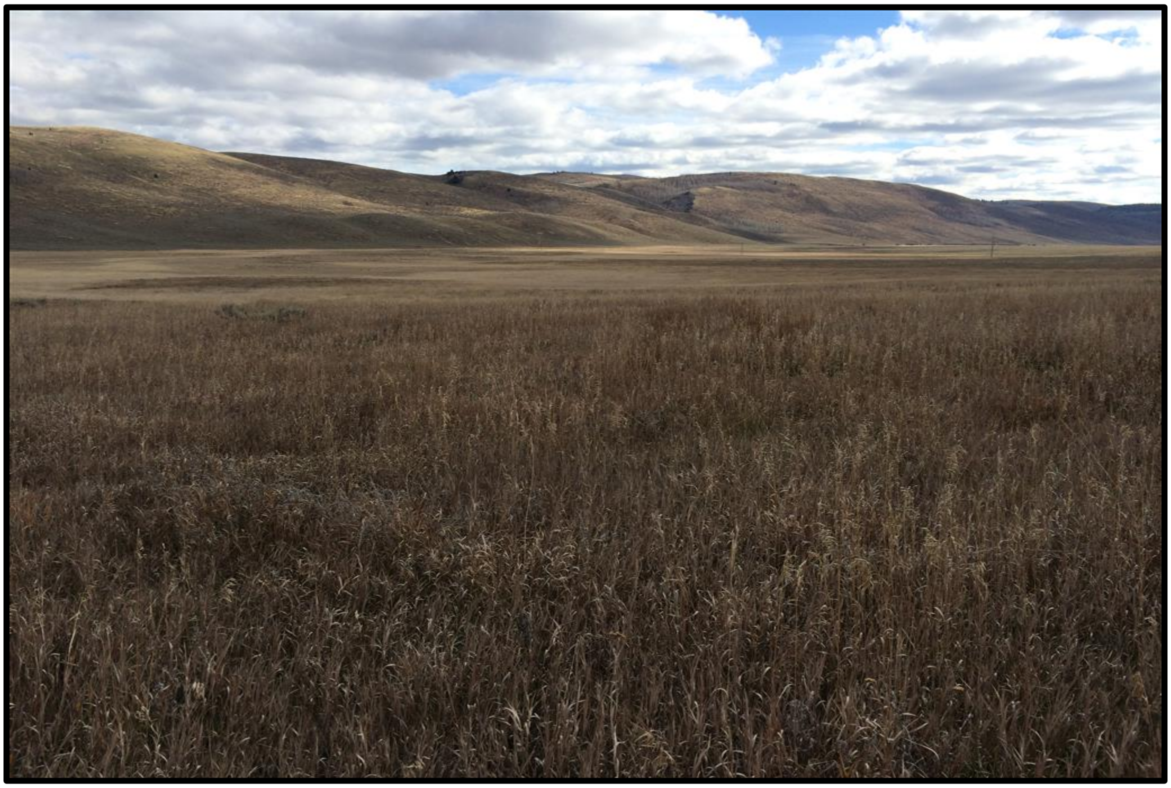


Photo 3.7-9 Typical Grass/Forb Vegetation Type in the Study Area

3.7.3.10 Mountain Brush

There are approximately 251 acres of mountain brush vegetation type (**Photo 3.7-10**) in the Study Area, which represents 10 percent of the vegetated area (**Table 3.7-1**). On southeast-facing, mid-elevation slopes, with favorable soils and moisture, mountain brush communities are composed of snowberry, chokecherry, bitterbrush (*Purshia tridentata*), serviceberry, buckbrush or snowbrush (*Ceanothus velutinus*), mountain box-laurel, ninebark (*Physocarpus malvaceus),* and sagebrush (*Artemisia spp*.). Rocky Mountain maple form both discrete communities as well as in a mosaic with sagebrush communities, replacing sagebrush communities as elevation climbs in the Study Area, forming a less dominant community type that occurs infrequently between the lower sagebrush and higher aspen/mixed conifer communities.

In some areas, the mountain brush species previously listed form transition zones between sagebrush-grasslands and aspen/mixed conifer stands; however, in some of the more mesic sites with presumably better soils, the mountain brush species form distinct, discreet communities between sage and aspen stands. Parsnipflower buckwheat (*Eriogonum heracleoides*) occurs as a minor component in the sagebrush/grass community but dominates the mountain brush herbaceous component. Creeping Oregon grape grows both within the mountain brush community and near edges and within aspen/conifer stands as an understory cover. Perennial grasses including: wildrye (*Elymus spp*.), mountain brome (*Bromus carinatus*), fringed brome, and wheatgrasses (*Pseudoroegneria* and *Pascopyrum* spp.) and basin wildrye (*Leymus cinereus)* exist as the dominant species within the grass-forb stratum of the mountain brush community.

Photo 3.7-10 Typical Mountain Brush Vegetation Type in the Study Area

3.7.3.11 Riparian Shrub

A small riparian shrub community (**Photo 3.7-11**), comprising approximately 12 acres and representing less than one percent of the Study Area, is dominated with low willows, gray alder *(Alnus incana*), and other shrub species and is associated with the Roberts Creek drainage. The small patch of riparian shrub vegetation type is found within the Study Area, but outside and to the east of the area proposed for disturbance.

Photo 3.7-11 Typical Riparian Shrub Vegetation Type Found in the Study Area

3.7.3.12 Sagebrush Vegetation Type

There are approximately 428 acres of sagebrush vegetation type (**Photo 3.7-12**) in the Study Area, which represents 18 percent of the vegetated area (**Table 3.7-1**). Bitterbrush grows interspersed with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) on more favorable, mesic sites. In general, mountain big sagebrush dominates the upland sagebrush vegetation type, with silver sagebrush *(Artemisia cana ssp*. *viscidula*) and threetip sagebrush (*Artemisia tripartita*) occurring less frequently. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is another shrub encountered in the sagebrush communities. Herbaceous species found commonly in the sagebrush communities include: mule-ears (*Wyethia amplexicaulis*), sticky geranium, yarrow, lupine (*Lupinus spp*.), groundsel/tall ragwort, and arrowleaf balsamroot (*Balsamorhiza sagittata*). Perennial grasses occur interspersed throughout the sagebrush communities, including: wheatgrasses (*Agropyron* spp., *Thinopyrum* spp.), brome (*Bromus* spp.), needlegrasses (*Stipa spp*.), and Idaho fescue, with annual grasses (e.g. *Poa spp*.) forming a minor component.

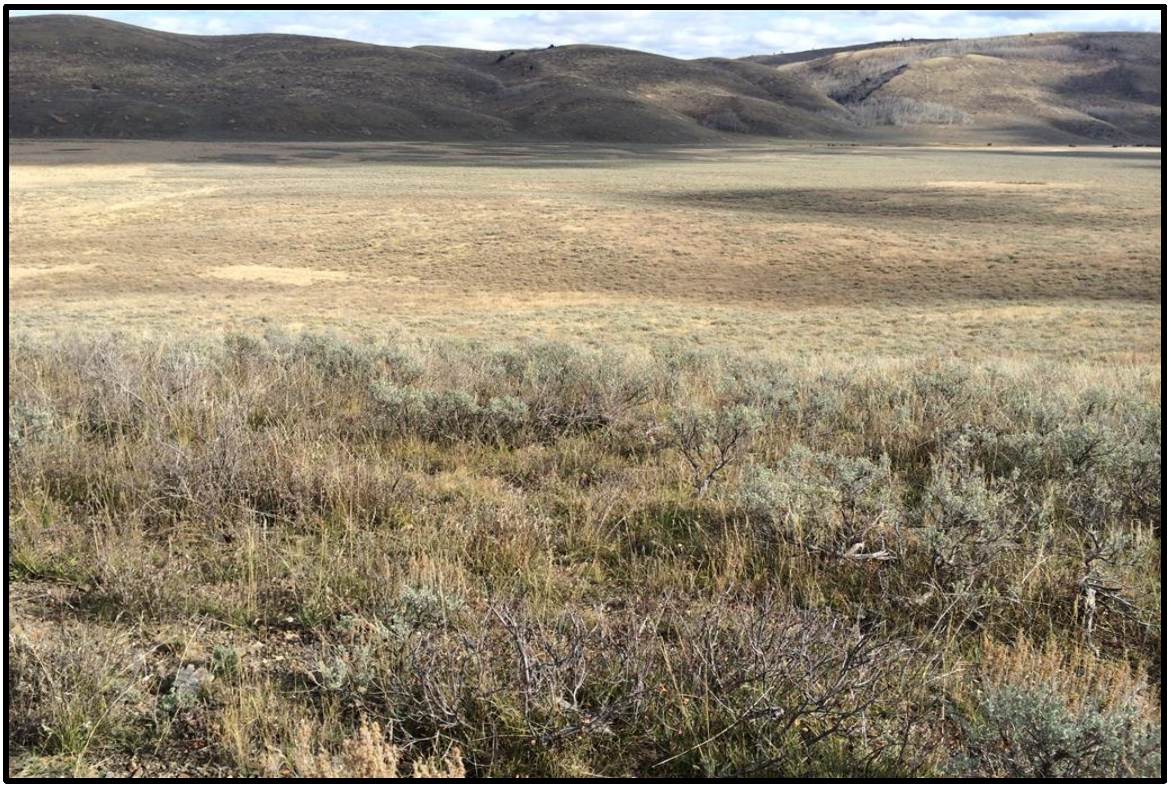


Photo 3.7-12 Typical Sagebrush Vegetation Type in the Study Area

3.7.4 Wetlands

There were no wetlands identified within the areas proposed for disturbance, with the exception of where a proposed dewatering pipeline could be located, adjacent to the existing tailings ponds and associated with the Roberts Creek Diversion. However, since the dewatering pipeline, if needed, would only be laid across the top of wetlands in this area, no delineations or functional assessments were conducted or deemed necessary. Thus, wetlands are not addressed in **Chapter 4**.

3.7.5 Riparian Vegetation

The only area of riparian vegetation was the aforementioned riparian shrub vegetation type. It was located outside of the proposed disturbance area and no riparian habitat would be affected. Thus, riparian vegetation is not addressed in **Chapter 4**.

3.7.6 Threatened, Endangered, and Sensitive Plants

An initial review determined that there are no plant species listed as threatened, endangered, candidate, or proposed under the Endangered Species Act (ESA) that are known to occur in Caribou County (USFWS 2015). However, Ute Ladies'-tresses (*Spiranthes diluvialis*) has the potential to occur in Caribou County (USFWS 2015). While it has the potential to occur along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams or other stable wetland and seep areas, no such habitat exists within the Study Area. Thus, species-specific surveys were not needed.

There are four plant species listed as sensitive for the CTNF, and another six species are on the CTNF "Forest Watch" list of rare plants. **Table 3.7-2** lists these species, the habitat where each species is known to occur, and their potential to occur in the Study Area.

Table 3.7-2 Forest Service Sensitive and "Forest Watch" Plant Species on the CTNF

SCIENTIFIC NAME	COMMON NAME	KNOWN HABITAT	POTENTIAL TO OCCUR IN STUDY AREA
Forest Service Sensitive Plant Species			
Astragalus jejunus var. jejunus	Starveling milkvetch	Shale of the Twin Creek Limestone Formation (Mancuso and Moseley 1990)	Unlikely
Lesquerella paysonii	Payson's bladderpod	Ridges and high peaks of the Snake River Range above the Snake River; also on Caribou Mountain (Moseley 1996)	Unlikely
Pinus albicaulis	Whitebark pine	Occurs in subalpine and timberline zones associated with limber pine, subalpine fir, and/or lodgepole pine ranging from 7,300 to 10,500 feet in elevation (Fryer 2002)	Unlikely
Penstemon compactus	Cache beardtongue	High elevation limestone substrates, on bedrock, outcrops, or cliff bands ranging from 8,800 to 9,300 feet in elevation (Moseley and Mancuso 1990)	Unlikely
Forest Service Watch Plant Species			
Asplenium septentrionale	Grass-like spleenwort	Generally found in cracks and crevices of rock outcrops and large boulders at elevations of 2,000-10,000 feet within mixed conifer forest (Tetra Tech 2013)	Unlikely
Asplenium tricomanes-ramosum	Green spleenwort	Moist limestone or other basic substrates at high elevations (Moseley and Mancuso 1990)	Very Unlikely
Carex idahoa	Idaho sedge	Low, level wetland transition zones within the Blackfoot River watershed (Tetra Tech 2013)	No
Ericameria discoidea var. winwardii	Winward's goldenbush	Only on barren Twin Creek Limestone outcrops on the Montpelier Ranger District (Tetra Tech 2013)	No
Musineon lineare	Rydberg's musineon	Ledges and crevices on near-vertical outcrops between 8,200 and 9,000 feet in elevation (Moseley and Mancuso 1990; Mancuso 2003)	No
Salicornia rubra	Red glasswort	Low elevation flats; prefers basic, saline soils (Tetra Tech 2013)	No

As shown in **Table 3.7-2**, the potential for any of these plant species to occur within the Study Area was determined to be extremely low. This potential was further evaluated through a review of existing literature and confirmed via consultation with the CTNF botanist. It was determined that habitat for sensitive or "Forest Watch" species did not exist within the Study Area, so no formal surveys were conducted. However, an informal inventory was conducted while other vegetation data were being collected. No special status plant species were observed within the Study Area.

3.7.7 Culturally Significant Plants to the Shoshone – Bannock Tribes

The Culturally Significant Plants Database for the Shoshone – Bannock Tribes (Environmental Waste Management Program [EWMP] 2014) was reviewed and an informal inventory was conducted while other vegetation data were being collected. Thirty-five out of the 238 species listed in the database were observed within the Study Area while conducting detailed forest and vegetation data collection (**Table 3.7-3**).

Table 3.7-3 Culturally Significant Plants to the Shoshone-Bannock Tribes Observed Within the Study Area

PLANT SPECIES
Trees
Aspen – *Populus tremuloides*
Douglas fir – *Pseudotsuga menziesii*
Lodgepole pine – *Pinus contorta*
Maple – *Acer* spp.
Serviceberry – *Amelanchier alnifolia*
Subalpine fir – *Abies lasiocarpa*
Shrubs
Buckbrush – *Ceanothus velutinus*
Chokecherry – *Prunus virginiana*
Elderberry (red) – *Sambucus racemosa*
Honeysuckle – *Lonicera species*
Kinnikinnick – *Arctostaphylos uva-ursi*
Oregon grape – *Berberis repens*
Russet buffalo berry – *Shepherdia Canadensis*
Sagebrush (big) – *Artemisia tridentata*
Snowberry – *Symphoricarpos* spp.
Wax or bear currant – *Ribes cereum*
Wild carrot – *Perideridia* spp.
Wild currant - *Ribes aureum*
Wild raspberry – *Rubus* spp.
Wild rose – *Rosa* spp.
Yarrow – *Achillea millefolium*

PLANT SPECIES
Forbs
Cinquefoil – *Potentilla* spp.
False Solomon seal – *Maianthemum* spp.
Fireweed – *Chamerion angustifolium*
Larkspur – *Delphinium* spp.
Lupines – *Lupinus* spp.
Meadow rue – *Thalictrum* species
Phlox – *Phlox longifolia*
Rocky Mountain Helianthella – *Helianthella uniflora*
Sweet anise – *Osmorhiza occidentalis*
Sweet cicely – *Osmorhiza* spp.
Tansy mustard – *Descurainia pinnata*
Thistle – *Cirsium* spp.
Grasses
Grasses (non-species specific)
Basin wildrye – *Leymus cinereus*

3.7.8 Noxious Weeds

In Idaho, a weed is designated noxious when it is considered by a governmental agency to be injurious to public health, agriculture, recreation, wildlife, or property. Noxious weed regulations are covered by Title 22, Chapter 24, Idaho Code, Noxious Weeds Law. Some general characteristics of noxious weeds are their ability to spread rapidly, reproduce in high numbers, and crowd out native plants. Noxious weeds also tend to be very difficult to control.

The director of the Idaho State Department of Agriculture makes the legal designation of noxious. The director considers the counsel of the Noxious Weed Advisory Board in the designation of noxious species. Currently, the department uses the following criteria for designation of a noxious weed:

- It must be present in but not native to Idaho.
- It must be potentially more harmful than beneficial to Idaho.
- Eradication must be economically and physically feasible.
- The potential adverse impact of the weed must exceed the cost of control.

As described in the Vegetation and Wetland Resources TR (Stantec 2017b), the Idaho noxious weed list currently has 67 species on it, with 12 of those known to occur within Caribou County (**Table 3.7-4**).

Table 3.7-4 Noxious Weeds Documented in Caribou County

COMMON NAME	SCIENTIFIC NAME
Black henbane	*Hyoscyamus niger*
Canada thistle	*Cirsium arvense*
Dalmatian toadflax	*Linaria dalmatica* ssp. *dalmatica*
Houndstongue	*Cynoglossum officinale*
Leafy spurge	*Euphorbia esula*
Musk thistle	*Carduus nutans*
Purple loosestrife	*Lythrum salicaria*
Russian knapweed	*Acroptilon repens*
Scotch cottonthistle	*Onopordum acanthium*
Spotted knapweed	*Centaurea maculosa*
Whitetop (hoary cress)	*Cardaria draba*
Yellow toadflax	*Linaria vulgaris*

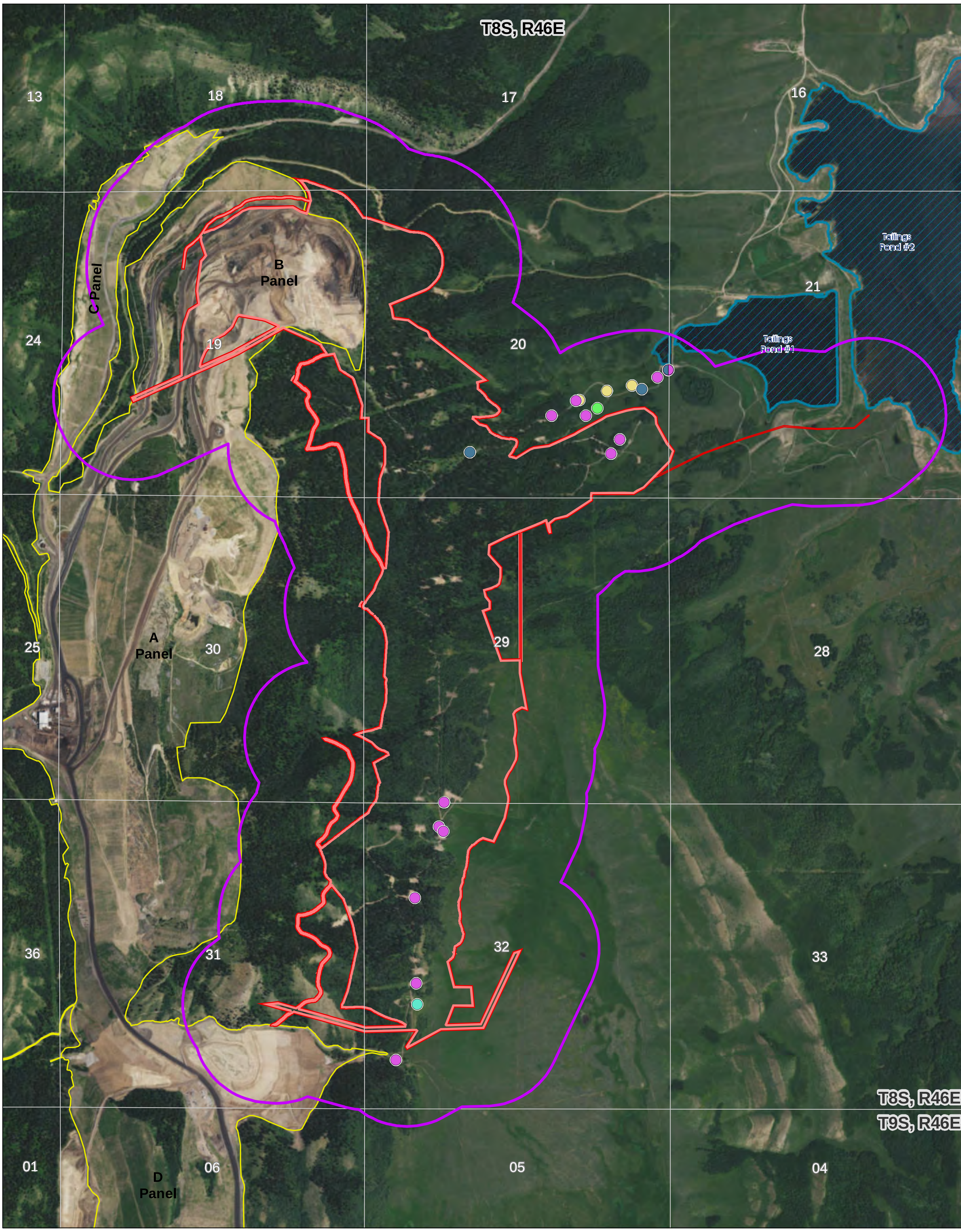
Source: http://www.cariboucounty.us/departments/315/WeedList.aspx

Noxious weeds were noted and populations mapped during other vegetation surveys conducted in the vegetation Study Area. Weed survey efforts were concentrated along existing and new exploration access roads, as the majority of noxious weeds were found along them. Five species were found: Canada thistle, scotch thistle, musk thistle, hoary cress, and spotted knapweed (**Figure 3.7-2**). Musk thistle was the most dominant species along various roads within the Study Area. Although many of the populations had been sprayed, new individuals were still growing. Hoary cress was found in small populations near roadways in damp soils. Spotted knapweed was observed on new disturbances along cut banks. No extensive areas of noxious weed infestations were observed in the Study Area.

Further, there may be other invasive species that have not been designated as noxious. While not all invasive species may be designated as noxious, the NFS uses the same standards and guidelines for both noxious weeds and invasive species, thus the term noxious as used here should be considered to apply to invasive species as well. Invasive species that are not considered noxious weeds were not addressed in the Vegetation TR.

3.7.9 Old Growth

The 2003 CNF Revised Forest Plan has a standard that states that each 5th code HUC shall be at least 20 percent mature and old forested age classes (including old growth). It also states that 15% of the forested acres in each 5th code HUC should be actively managed to attain old growth characteristics. The Study Area is within two 5th code HUCs: Middle Salt River (HUC 1704010502 – approximately 130,560 acres) and the Upper Salt River (HUC 1704010501 – approximately 224,000 acres). Based on a review of the existing CTNF vegetation GIS coverage in these watersheds, over 90% (97% and 94%, respectively) of the forested vegetation is in mature or old age structural classes. Based upon the extremely high percentages of existing forested vegetation within the Study Area that are in mature or old age structural classes, an in-depth old-growth stand evaluation was deemed unnecessary for the entire watershed. Rather, for an initial assessment of the Study Area, the strata sampling data was used to determine if any strata could meet the USFS Intermountain Region (Region 4) old growth definitions.



Legend

- Project Area Boundary
- Existing Disturbance Area
- Tailings Ponds
- Vegetation Study Area

Noxious Weed Location

- Canada Thistle (Cirsium arvense)
- Hoary Cress (Cardaria draba)
- Musk Thistle (Carduus nutans)
- Canada Thistle/Musk Thistle
- Scotch Thistle (Onopodum acanthium)
- Spotted Knapweed (Centaurea stoebe subsp. micanthos)

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.7-2
Observations of Noxious Weeds in the Vegetation Study Area
East Smoky Panel Mine EIS

For the strata sampling, four randomly located plots were sampled within the 11 identified forest strata listed in **Table 3.7-1** (44 plots) according to methodology described in Stantec (2017b). Each stratum was evaluated by calculating the average trees per acre (TPA) from the plot data using standard equations for variable and fixed radius plots. Although there are various characteristics of old growth forests, average TPA, diameter at breast height (DBH), and average age from each stratum was compared to the "required minimums" described in the Characteristics of Old-Growth Forests in the Intermountain Region (Hamilton 1993 as cited in Stantec 2017b) and shown in **Table 3.7-5**.

Table 3.7-5 Characteristics of Old-growth Forests in the Intermountain Region

FOREST TYPE	MAIN CANOPY – REQUIRED MINIMUMS[1]			VARIATION IN DIAMETER (6-INCH CLASSES)	CANOPY LAYERS (NUMBER)	SNAGS PER ACRE
	DBH	TPA	Age			
Quaking Aspen						
Dry areas	≥12	10	100	≥2	N/A	2
Moist areas	≥12	20	100	≥2	N/A	2
Interior Douglas-fir						
High productivity	≥24	≥15	≥200	≥2	≥2	≥1
Low productivity	≥18	≥10	≥200	≥2	≥2	0-3
Lodgepole pine						
All forest types	≥11	≥25	≥140	≥2	≥2	5
Englemann spruce-Subalpine fir						
Warm/moist areas	≥24	≥25	≥220	≥2	≥2	≥2
Cold/dry areas	≥15	≥15	≥150	≥2	≥2	2-4
Alpine Transition area	≥12	≥10	≥150	≥2	≥2	Few

Source: Hamilton (1993). [1] I.e., a dry area aspen stand much have at least 10 TPA that are over 12 inches DBH and be over 100 years old to meet minimum requirements as old growth. DBA=Diameter at breast height. TPA=Trees per acre

Data from the forest strata sampling used in the old growth evaluation is available in Stantec (2017b). Although most of the strata did not meet the Region 4 old growth definitions, the "old aspen" stratum had a high potential to have stands that did meet the definitions for old growth aspen. The average in the "old aspen" stratum was 30 TPA for trees greater than 12 inches DBH (average DBH of 12.8 inches), with an average age of 110 years (Region 4 definitions for aspen are 20 TPA for trees greater than 12 inches DBH that average more than 100 years in age). In addition, the "old mixed conifer" strata had some "large" "old" trees, but not enough of them to meet the definitions, but it was possible that the stratum had individual stands that would meet old-growth definitions.

Because the "old aspen" stratum met the Region 4 old-growth definitions and the "old mixed conifer" stratum had the potential for stands that could meet the definitions, additional sampling was conducted in 2017 by CTNF employees trained and familiar with Region 4 old-growth and with USFS stand exam protocols. An experienced forester (over 25-years' experience) walked through stands within the "old aspen" and "old mixed conifer" strata. Although it appeared, based on experience, that none of the stands would meet the Region 4 old-growth definitions, four stands were selected for stand exams (Beck 2017). The stand exams confirmed that none of the stands met the Region 4 old-growth definitions. The stand exams revealed that there are old, even very old trees within the Study Area, but that there are not enough to meet the Region 4 old-growth criteria (Beck 2017). This is mostly due to the mixed severity fire regime historically present in the Study Area; stands with this type of natural disturbance regime rarely would meet Region 4 old-growth definitions (Beck 2017).

3.8 WILDLIFE RESOURCES

This section presents information on the wildlife resources present within the Study Area, which was defined as the Project Area and a 0.5-mile buffer surrounding the Project Area, excluding any active mining areas (**Figure 3.8-1**). The Study Area boundary was developed with the IDT experts and professional judgement. This area was chosen because 0.5 miles away from the Project Area is considered an adequate buffer within where impacts could be extended based upon general wildlife travel distances. The information presented is summarized from the Wildlife Resources TR (Stantec 2016e) and based on: 1) a review of existing data, and 2) wildlife surveys that were conducted in the Study Area in 2014 and 2015. The information presented focuses on occurrence documentation of any species listed as Threatened, Endangered, Proposed, or Candidate (TEPC) by the U.S. Fish and Wildlife Service (USFWS); as well as a description of the quantity and quality of potential habitat for other special status species (species listed as Sensitive by the State, BLM, or USFS), and other wildlife species of interest.

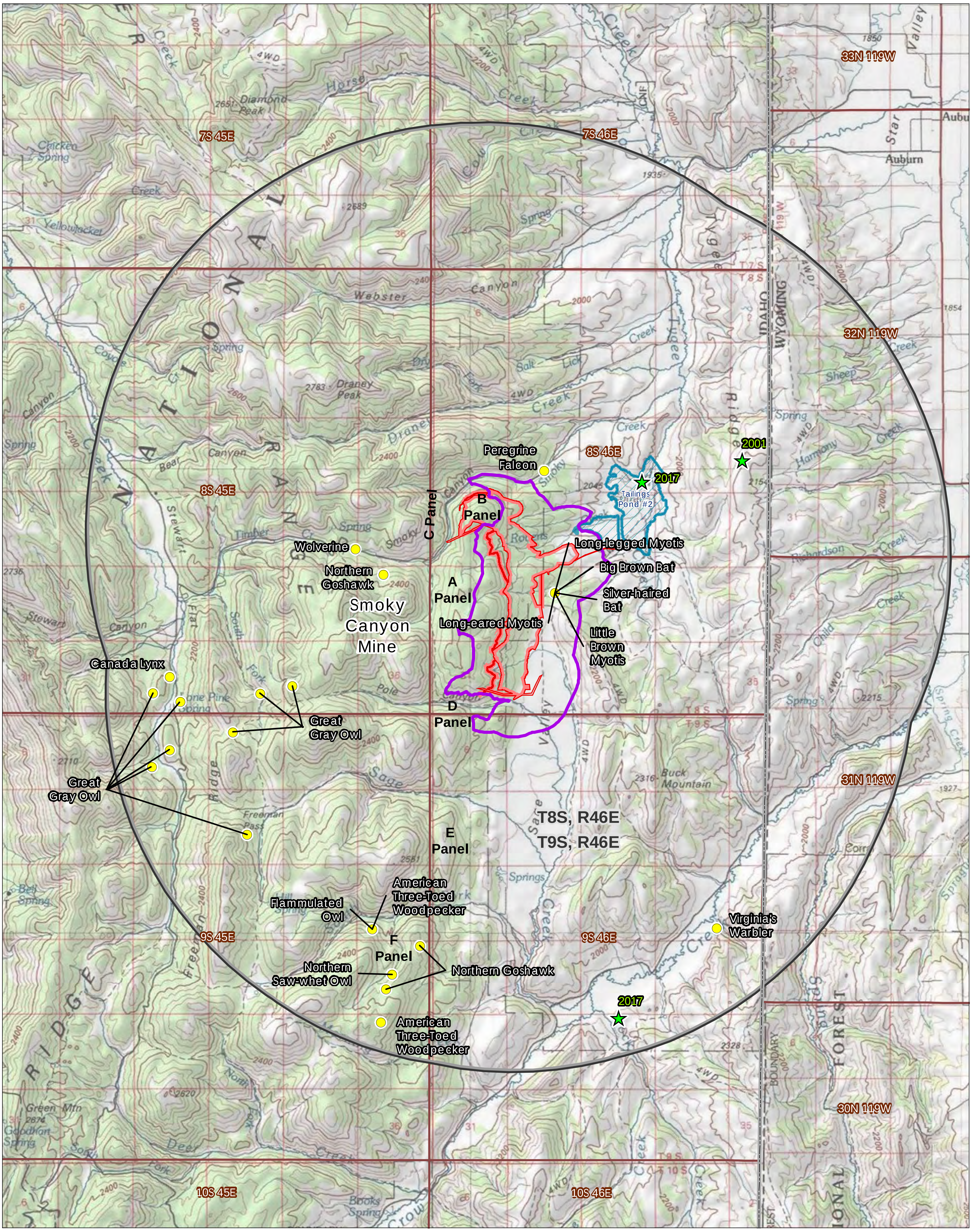
3.8.1 General Habitat and Vegetation

The dominant habitat types within the Study Area are forested and sagebrush communities (Maxim 2000a as cited in Stantec 2016e; ICFWRU 2000; Homer 1998, and **Section 3.7**). Forested areas include Douglas-fir (*Pseudotsuga Menziesii*), lodgepole pine (*Pinus contorta*), and subalpine fir (*Abies lasiocarpa*), as well as quaking aspen (*Populus tremuloides*) and aspen/conifer mixes. Sagebrush habitats are dominated by mountain big sagebrush (*Artemisia tridentata vaseyana*) and grasses. The Study Area also contains mixed brush communities, as well as some limited wetland and meadow areas, associated with Roberts Creek, Sage Valley, and the tailings pond area.

Within the Study Area, there is one approximately two-acre pond created to divert Roberts Creek around the tailings ponds. Immediately outside the Study Area are the two tailings ponds, approximately 70 and 300 acres in size. The tailings ponds are managed by Simplot as to not attract wildlife by reducing shoreline vegetation and habitat (Stantec 2016e).

3.8.2 Special Status Species

Special status species with the potential to occur in the Study Area are listed in **Table 3.8-1** along with their State, federal, BLM, and USFS status and whether they were detected during the wildlife resources baseline study. **Figure 3.8-1** shows the location of any Idaho Fish and Wildlife System (IFWIS) records of special status species observations within five miles of the Study Area. Detailed information on the life history, distribution, and presence within or near the Study Area is presented within subsections following the table, grouped by animal type (e.g., birds, mammals, amphibians). Federal and State rankings are based on the categories described as follows (note that



Legend

- Special Status Species Records
- Sage Grouse Leks (last count date)
- Project Area Boundary
- Tailings Ponds
- 5- Mile Study Area Buffer
- Study Area (includes 1/2-mile buffer, modified to exclude existing disturbance)

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.8-1
Idaho Department of Fish and Game Fish and Wildlife Information System Data
East Smoky Panel Mine EIS

Table 3.8-1 Special Status Species and their Presence in/near the Study Area

COMMON NAME	SCIENTIFIC NAME	STATUS				OCCURRENCE	
		IDAHO[1]	USFWS	BLM	USFS[2]	STUDY AREA	NEAR THE STUDY AREA (WITHIN 5 MILES)
Birds							
Bald eagle	*Haliaeetus leucocephalus*	S3B S4N		Type 2	S	**PRESENT**	**PRESENT**, winter roost 5 miles south, 1 incidental observation near tailings pond area
Boreal owl	*Aegolius funereus*	S2			S	**PRESENT**	**PRESENT**
Brewer's sparrow	*Spizella breweri*	S3B		Type 2		**PRESENT**	**PRESENT**
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	S3		Type 2	S	Not detected	No records
Flammulated owl	*Otus flammeolus*	S3B		Type 2	S	**PRESENT**	**PRESENT**
Great gray owl	*Strix nebulosa*	S3			S	**PRESENT**	**PRESENT**
Greater sage-grouse	*Centrocercus urophasianus*	S4		Type 2	S	Not detected	**PRESENT** – grouse observed near dairy farm located approximately two miles north of Study Area
Harlequin duck	*Histrionicus*	S1B			S	Not detected	No records
Northern goshawk	*Accipiter gentiles*	S4		Type 2	S	**PRESENT**	**PRESENT**
Olive-sided flycatcher	*Contopus borealis*	S3B		Type 2		Not detected	Assumed **PRESENT**
Peregrine falcon	*Falco peregrines anatum*	S1B			S	Not detected	**PRESENT** – observation made 0.5 miles outside Study Area
Prairie falcon	*Falco mexicanus*	S4B S4N				Not detected	No records
Sagebrush sparrow	*Amphispiza nevadensis*	S3B		Type 2		Not detected	Assumed **PRESENT**
American three-toed woodpecker	*Picoides dorsalis*	S2			S	**PRESENT**	**PRESENT**
Trumpeter swan	*Cygnus buccinator*	S1B S2N		Type 2	S	Not detected	**PRESENT** – confirmed occupied winter habitat 3.5 miles south of Study Area
Willow flycatcher	*Empidonax trailii*	S5B		Type 2		Not detected	Assumed **PRESENT**

COMMON NAME	SCIENTIFIC NAME	STATUS				OCCURRENCE	
		IDAHO[1]	USFWS	BLM	USFS[2]	STUDY AREA	NEAR THE STUDY AREA (WITHIN 5 MILES)
Mammals							
Gray wolf	*Canis lupus*	S1		Type 2	S	**PRESENT**	**PRESENT**
Canada lynx	*Lynx Canadensis*	S1	T			Not detected	Some records in region, rare
Pygmy rabbit	*Brachylagus idahoensis*	S2		Type 2	S	Not detected	No records
Spotted bat	*Euderma maculatum*	S3			S	Not detected	No records
Townsend's big-eared bat	*Corynorhinus townsendii*	S3		Type 2	S	Not detected	No records
Uinta chipmunk	*Tamias umbrinus*	S1				Not detected	Assumed present
North American wolverine	*Gulo luscus*	S2		Type 2	S	Not detected	Some records in region, rare
Amphibians and Reptiles							
Boreal toad	*Bufo boreas* (southeast Idaho population)	N/A		Type 2	S	Not detected	**PRESENT** – tadpoles observed approximately 4 miles southwest of the Study Area, no adults observed
Columbia spotted frog	*Rana luteiventris*	S4			S	Not detected	Range does not overlap with Study Area
Common garter snake	*Thamnophis sirtalis*	S3				Not detected	Assumed **PRESENT**
Northern leopard frog	*Rana pipens*	S2		Type 2		Not detected	Assumed **PRESENT**

Notes:
1. Idaho Department of Fish and Game ([IDFG] 2013a)
2. USFS 2003b

in 2015 Idaho BLM consolidated their special status species list into just two categories for animals; for additional information see BLM Instructional Memorandum No. ID-2015-009, Change 1). Only BLM-sensitive species that have the potential to occur in the Study Area are included.

Idaho

- S1 – Critically Imperiled: at high risk because of extreme rarity (often five or fewer occurrences), rapidly declining numbers, or other factors that make it particularly vulnerable to range-wide extinction or extirpation.
- S2 – Imperiled: at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to range-wide extinction or extirpation.
- S3 – Vulnerable: at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to range-wide extinction or extirpation.
- S4 – Apparently secure: uncommon but not rare; some cause for long–term concern due to declines or other factors.
- S5 – Secure: common, widespread, and abundant.
- B – Breeding: conservation status refers to the breeding population of the species.
- N – Nonbreeding: conservation status refers to the non–breeding population of the species.

USFWS

- E – Endangered: species in danger of extinction throughout all or a significant portion of its range.
- T – Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- XN – Experimental/Nonessential Population: a population (including its offspring) of a listed species designated by rule published in the Federal Register (FR) that is wholly separate geographically from other populations of the same species.
- C – Candidate Species.

BLM

- Type 1 – federally listed Threatened or Endangered Species, Experimental Essential populations, and designated Critical Habitat.
- Type 2 – Idaho BLM Sensitive Species, including USFWS Proposed and Candidate species, ESA species delisted during the past 5 years, and ESA Experimental Non-essential populations.

USFS

- S – Sensitive: animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

3.8.3 Birds

The Study Area provides habitat for a wide variety of birds and numerous raptors, passerines, and other migratory birds were incidentally observed in the Study Area (**Table 3.8-2**). Migratory bird and raptor surveys were conducted on several occasions in areas within the Study Area and other incidental observations were made in conjunction other surveys and site visits.

Table 3.8-2 Birds Species and/or Their Signs Observed in the Study Area in 2014 and 2015

COMMON NAME	SCIENTIFIC NAME
American goldfinch	*Spinus tristis*
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
Bald eagle	*Haliaeetus leucocephalus*
Belted kingfisher	*Megaceryle alcyon*
Black-capped chickadee	*Poecile atricapillus*
Black-headed grosbeak	*Pheucticus melanocephalus*
Black-throated gray warbler	*Setophaga nigrescens*
Brewer's sparrow	*Spizella breweri*
Broad-tailed hummingbird	*Selasphorus platycercus*
Brown-headed cowbird	*Molothrus ater*
Canada goose	*Branta canadensis*
Chipping sparrow	*Spizella passerina*
Clark's nutcracker	*Nucifraga columbiana*
Common raven	*Corvus corax*
Common yellowthroat	*Geothlypis trichas*
Cordilleran flycatcher	*Empidonax occidentalis*
Dark-eyed junco	*Junco hyemalis*
Dusky flycatcher	*Empidonax oberholseri*
Franklin's gull	*Leucophaeus pipixcan*
Gadwell	*Anas strepera*
Golden eagle	*Aquila chrysaetos*
Great gray owl	*Strix nebulosa*
Gray jay	*Perisoreus canadensis*
Great-horned owl	*Bubo virginianus*
Hairy woodpecker	*Picoides villosus*
Hammond's flycatcher	*Empidonax hammondii*
Hermit thrush	*Catharus guttatus*
House wren	*Troglodytes aedon*
Mallard	*Anas platyrhynchos*
Mountain chickadee	*Poecile gambeli*

COMMON NAME	SCIENTIFIC NAME
Mourning dove	*Zenaida macroura*
Northern flicker	*Colaptes auratus*
Northern goshawk	*Accipter gentilis*
Northern harrier	*Circus cyaneus*
Northern saw-whet owl	*Aegolius acadicus*
Orange-crowned warbler	*Vermivora celata*
Peregrine falcon	*Falco peregrinus*
Pine siskin	*Carduelis pinus*
Red-breasted nuthatch	*Sitta canadensis*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked duck	*Aythya collaris*
Ruby-crowned kinglet	*Regulus calendula*
Ruffed grouse	*Bonasa umbellus*
Sandhill crane	*Grus canadensis*
Spotted sandpiper	*Actitis macularius*
Spotted towhee	*Pipilo maculatus*
Sora	*Porzana carolina*
Steller's jay	*Cyanocitta stelleri*
Townsend's solitaire	*Myadestes townsendi*
Tree swallow	*Tachycineta bicolor*
Turkey vulture	*Cathartes aura*
Vesper sparrow	*Pooecetes gramineus*
Warbling vireo	*Vireo gilvus*
Western tanager	*Piranga ludoviciana*
Western wood-pewee	*Contopus sordidulus*
White-crowned sparrow	*Zonotrichia leucophrys*
Wilson's snipe	*Gallinago delicata*
Yellow warbler	*Setophaga petechia*
Yellow-rumped warbler	*Dendroica coronata*

3.8.3.1 Upland Game Birds

Species of upland game birds known to occur in the Study Area include the ruffed grouse and dusky grouse. The greater sage-grouse and Columbian sharp-tailed grouse are discussed in **Section 3.8.3.4**. The ruffed grouse was observed incidentally during surveys for special status species in 2014 and the dusky grouse has the potential to occur. Both species are typically found in or near aspen groves.

3.8.3.2 Migratory Birds

A variety of migratory birds are found on the CTNF, and many species are expected in the Study Area. Migratory birds are protected by the Migratory Bird Treaty Act of 1918 (MBTA), which prohibits the "take" of any migratory bird (16 U.S.C. 703-712). In January 2001, Executive Order 13186 required some federal agencies, including the USFS, to develop a MOU with the USFWS to promote the recommendations of various migratory bird programs and conservation considerations. The USFS developed a MOU with USFWS in 2008 (USFS 2008b) and BLM in 2010 (BLM 2010e). In the USFS MOU, the USFS agreed to work collaboratively with USFWS and other agencies to reduce the take of migratory birds. This includes using the NEPA process to evaluate effects on migratory birds, evaluate and balance long-term benefits of projects against any short- or long-term adverse effects, pursue opportunities to restore or enhance habitats within a project area, and consider approaches for identifying and minimizing incidental take of migratory birds.

Coordinated implementation plans at the regional and state levels can be used to assist federal agencies with implementation of the MOU. In 1995, the Intermountain West Joint Venture (IWJV) adopted an Implementation Plan to provide a framework for implementing the North American Waterfowl Management Plan in Idaho and other states of the Intermountain West; the plan has since been updated (IWJV 2005). Director's Order 146, which indicated that joint ventures should "deliver the full spectrum of bird conservation," was issued on 12 September 2002 by the USFWS.

The Partners in Flight organization began in 1988 as a coordinated, nationwide effort to document and reverse apparent declines in neotropical migratory birds and was later expanded to include all nongame land birds. In 2000, 243 species of breeding birds were documented as occurring in Idaho, including 119 species of neotropical migrants (Ritter 2000). In Idaho riparian, isolated wetlands (i.e., not associated with rivers), sagebrush, and aspen woodlands are high priority habitats for migratory birds (Ritter 2000; IWJV 2005).

Aspen woodlands make up over 50 percent of the vegetation communities within the Study Area, while riparian and isolated wetlands represent less than one percent.

3.8.3.3 Raptor Nests

During a variety of surveys and searches of the Study Area, 13 raptor nests have been identified (**Figure 3.8-2**). Verified stick nests of great gray owl and red-tailed hawk, along with nest cavities for the American kestrel, were discovered. The remaining stick nests were classified as unknown since no raptors were ever observed in these nests.

3.8.3.4 Special Status Species

Bald Eagle

The bald eagle is a Forest-Sensitive species (USFS 2003b). In Idaho, breeding bald eagles are classified as "Vulnerable" (S3) and non-breeding bald eagles are classified as "Apparently Secure" (S4; IDFG 2013a). Bald eagles are a BLM Type 2 species. As reflected in the Federal Register (FR), the bald eagle was removed from the Endangered Species List (as Threatened) on July 9, 2007 in the continental United States (72 FR 37345). At the time of delisting, the USFWS estimated that the bald eagle population in the continental United States increased to 9,789 breeding pairs from 487 breeding pairs in 1963. Bald eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c).

During breeding season, bald eagles nest in tall trees and cliffs near water in areas that support an adequate food supply of fish, waterfowl, rabbits, and carrion. Significant populations of bald eagle winter in Idaho and Wyoming near open water habitats and will use communal roosting sites as shelter (BLM 2003 as cited in Stantec 2016e; USFWS 2009). In Wyoming and Idaho, winter roost sites are found in riparian and upland forests, often on north-facing slopes (Stalmaster 1987 as cited in Stantec 2016e).

In Idaho, there were 188 occupied breeding pairs of bald eagles in 2009 (Stantec 2016e). However, as of 2006, there were no occupied bald eagle nests within the Study Area (Sallabanks 2006). Known nest sites closest to the Study Area include along the Snake River and Palisades Reservoir (north of the Study Area), along the Blackfoot River (west of the Study Area; Sallabanks 2006), and near Thayne, Wyoming (east of the Study Area; USFS 2003b). In addition to nest sites, there are four known winter roost sites within the CTNF; the closest is Crow Creek, which is just to the south of the Study Area. The USFS and others have monitored the Crow Creek wintering eagle populations; counts of bald eagles have ranged from zero to two (USFS 2012, 2013, 2014; JBR 2013). One bald eagle was observed near the tailings ponds (adjacent to the east side of the Study Area) during surveys (**Table 3.8-1**). However, the tailings ponds do not support suitable fish populations or open water habitat during the winter and nesting or roosting is not expected.

Boreal owl

The boreal owl is a Forest-Sensitive species. In Idaho, boreal owls are classified as "Imperiled" (S2). In the Rocky Mountains, boreal owls are typically found year-round in subalpine forest habitats characterized by subalpine fir or Engelmann spruce (*Picea engelmannii*) (Hayward 1994). In Idaho, boreal owl nesting sites are concentrated in mixed-conifer and aspen forests. Nests are infrequently in spruce-fir forest and none have been found in lodgepole pine forests. Boreal owls may use other habitat types for foraging and during non-breeding seasons. All of the CTNF has been characterized as potential boreal owl habitat (USFS 2003b).

The Study Area contains suitable habitat in mature forest stands and boreal owls may occur year-round. There is one record of a boreal owl from nearby Smoky Canyon in May 1999 (USFS 2003b; IDFG 2014a). Boreal owl surveys were conducted during three efforts in March and April 2014 (Stantec 2016e). Fifteen call stations were surveyed during each effort, as described in the Wildlife Resources TR. Additional owl calling stations were also added during surveys conducted for the Panel B, B2 layback expansion area that occurred within the Study Area for the East Smoky Panel Project in March 2015. No boreal owl responses were detected during any of these surveys.

However, boreal owl vocalizations were detected during northern goshawk listening surveys in April (**Figure 3.8-2**; Stantec 2016e).

Brewer's sparrow

The Brewer's sparrow is a BLM Type 2 species and in Idaho, the species is classified as "Vulnerable" (S3). Brewer's sparrows are sagebrush obligates and are highly associated with sagebrush shrublands that have abundant, scattered shrubs and short grass (Hansley and Beauvais 2004, Ritter 2000). Brewer's sparrows breed in high densities and where they occur, they tend to be the most abundant bird species. In Idaho, Brewer's sparrows select taller shrubs with dense cover as breeding habitat (Paige and Ritter 1999). Brewer's sparrows were observed in the Study Area (**Table 3.8-1**).

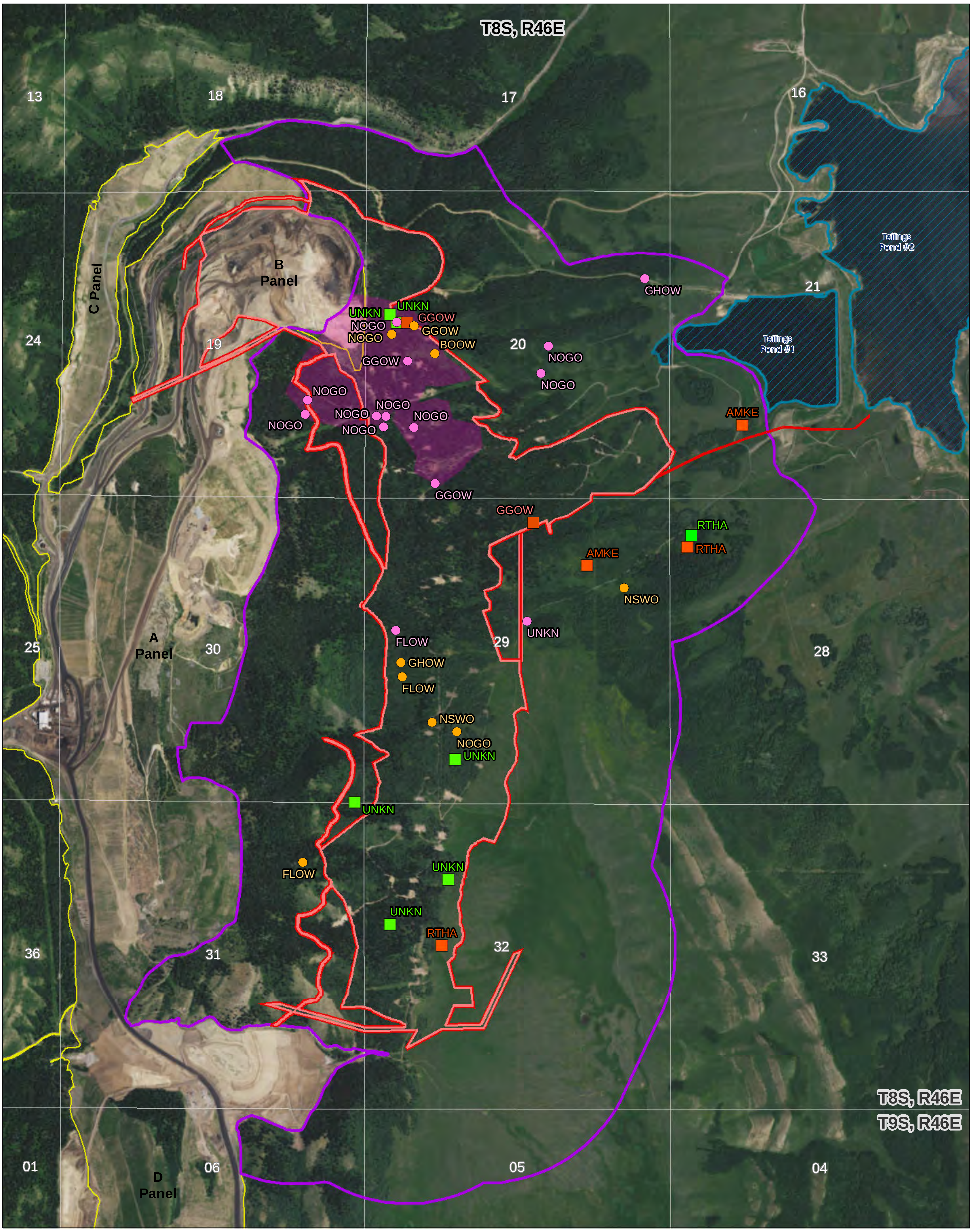
Columbian sharp-tailed grouse
The Columbian sharp-tailed grouse is a Forest-Sensitive species. In Idaho, Columbian sharp-tailed grouse are classified as "Vulnerable" (S3). The Columbian sharp-tailed grouse is a BLM Type 2 species. The USFWS found listing not warranted for the sharp-tailed grouse in 2006 (71 FR 7167318).

Columbian sharp-tailed grouse occur in habitats generally characterized by dense herbaceous cover and a mixture of shrubs (IDFG 2005a). Habitat requirements in winter are narrower and often within riparian or deciduous hardwood shrub stands. In southeast Idaho, Columbian sharp-tailed grouse are reasonably widespread in shrub and grass habitats adjacent to or in mountainous foothills. No leks have been documented on the CTNF, although several occur adjacent to the forest (USFS 2003b). Elevations on the CTNF are relatively high for suitable spring, summer, and fall habitat for Columbian sharp-tailed grouse. However, suitable winter habitat (i.e., aspen, chokecherry [*Prunus spp.*], serviceberry [*Amelanchier spp.*]) is present.

There are no records of Columbia sharp-tailed grouse within 10 miles of the Study Area (IDFG 2014a). Within the Study Area, Sage Valley may provide suitable winter habitat; however, no records of Columbia sharp-tailed grouse are known and no observations were made within the Study Area (**Table 3.8-1**).

Flammulated owl
The flammulated owl is a Forest-Sensitive species. In Idaho, breeding flammulated owls are classified as "Vulnerable" (S3). The flammulated owl is a BLM Type 2 species. Flammulated owls are small, secretive cavity-nesting owls and feed exclusively on insects (McCallum 1994). Flammulated owls occur in habitats with open forest structure with areas of dense foliage and with high abundance or diversity of insect prey. Suitable nesting habitats contain mature ponderosa pine (*Pinus ponderosa*) and Douglas-fir forests with snags used as nest sites. Flammulated owls occupy warm microclimates within mid-elevation conifer woodland habitats, either in response to prey availability or thermoregulation.

The Study Area contains suitable habitat in mature forest stands and flammulated owls are known to occur in the region of the Study Area (IDFG 2014a; USFS 2003b; JBR 2013). Flammulated owl surveys were conducted during three efforts in April and May 2014 (Stantec 2016e). Fifteen call stations were surveyed during each effort. Flammulated owl call stations were the same locations as the great gray owl and boreal owl survey locations. Flammulated owls were audibly detected at multiple sites. One possible flammulated owl vocalization was detected prior to initiation of broadcast calls on the southern end of the Study Area (**Figure 3.8-2**) in April, with a flammulated owl heard to the far north of the same survey location in May. A flammulated owl was also heard prior to initiation of broadcast calls near the center of the Study Area (**Figure 3.8-2**). It was presumed to be the same bird. Flammulated owls were audibly detected during survey efforts in May at in similar locations. No nest sites were ever discovered.



Legend

- Project Area Boundary
- Existing Disturbance Area
- Tailings Ponds
- Special Status Species Study Area (Disturbance 0.5-mile Buffer modified to exclude existing disturbance)
- Extensive Nest Search Area

Raptor Nest

- Active
- Inactive

Raptor Observation

- Seen
- Heard

Species Code
AMKE - American Kestrel
BOOW - Boreal Owl
FLOW - Flammulated Owl
GGOW - Great Gray Owl
GHOW - Great Horned Owl
NOGO - Northern Goshawk
NSWO - Northern Saw-whet owl
RTHA - Red-tailed Hawk
UNKN - Unknown Raptor

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.25 0.5
Miles
1:21,000 (at original document size of 11x17)
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Figure 3.8-2
Raptor and Owl Observations and Nests in the Study Area
East Smoky Panel Mine EIS

Great gray owl

The great gray owl is a Forest-Sensitive species. In Idaho, great gray owls are classified as "Vulnerable" (S3). Great gray owls occur in mid- to high-elevation conifer forests, nesting in mature forest stands with snags present (Hayward 1994; USFS 2003b). In southeast Idaho and northwestern Wyoming, great gray owls most often use broken tree-tops and old stick nests (i.e., raptor) found in lodgepole pine, Douglas-fir, and aspen forests near clear-cuts or natural meadows (Franklin 1988). Great gray owls will also nest on the top of mistletoes (USFS 2003b). Great gray owls forage for rodents, especially northern pocket gophers (*Thomomys talpoides*), in openings in conifer forests (Franklin 1988; USFS 2003b).

Great gray owls have been recorded in the region of the Study Area (USFS 2003b, Maxim 2004a, IDFG 2014a) and were observed within the Study Area. As was described for boreal owl, great gray owl surveys were conducted during three efforts in March and April 2014 (Stantec 2016e). Fifteen call stations were surveyed during each effort, as described in the Wildlife Resources TR. Additional owl calling stations were also added during surveys conducted for the Panel B, B2 layback expansion area that occurred within the Study Area for the East Smoky Panel Project in March 2015. No great gray owl responses were detected at any of the stations.

Great gray owl vocalizations were detected during northern goshawk listening surveys in April. One great gray owl was visually observed after completion of northern goshawk surveys in April. Two great gray owls were visually observed during northern goshawk broadcast calls in May early in the morning. One great gray owl responded to the broadcast call with soft "call" notes and eventually flew to the north and was joined by a second great gray owl. The pair of owls was again observed in the same location that evening. The region of the observations (locations shown on **Figure 3.8-2**) was intensively searched for nests or signs of nesting for approximately 10 hours by three different biologists. There was suitable nesting habitat (i.e., large open-topped snags, conifer trees with large mistletoe brooms), but no evidence of nestlings, whitewash, pellets, or other indirect signs were found that indicated nesting activity.

In 2015, two nesting pairs of great gray owls were incidentally observed during other surveys. One nest, a previously recorded stick nest (**Figure 3.8-2**) had blown over and a chick was found on the ground with an adult in a nearby tree. The additional active nest was located to the southeast (**Figure 3.8-2**); two adults were observed and chicks were heard in the nest.

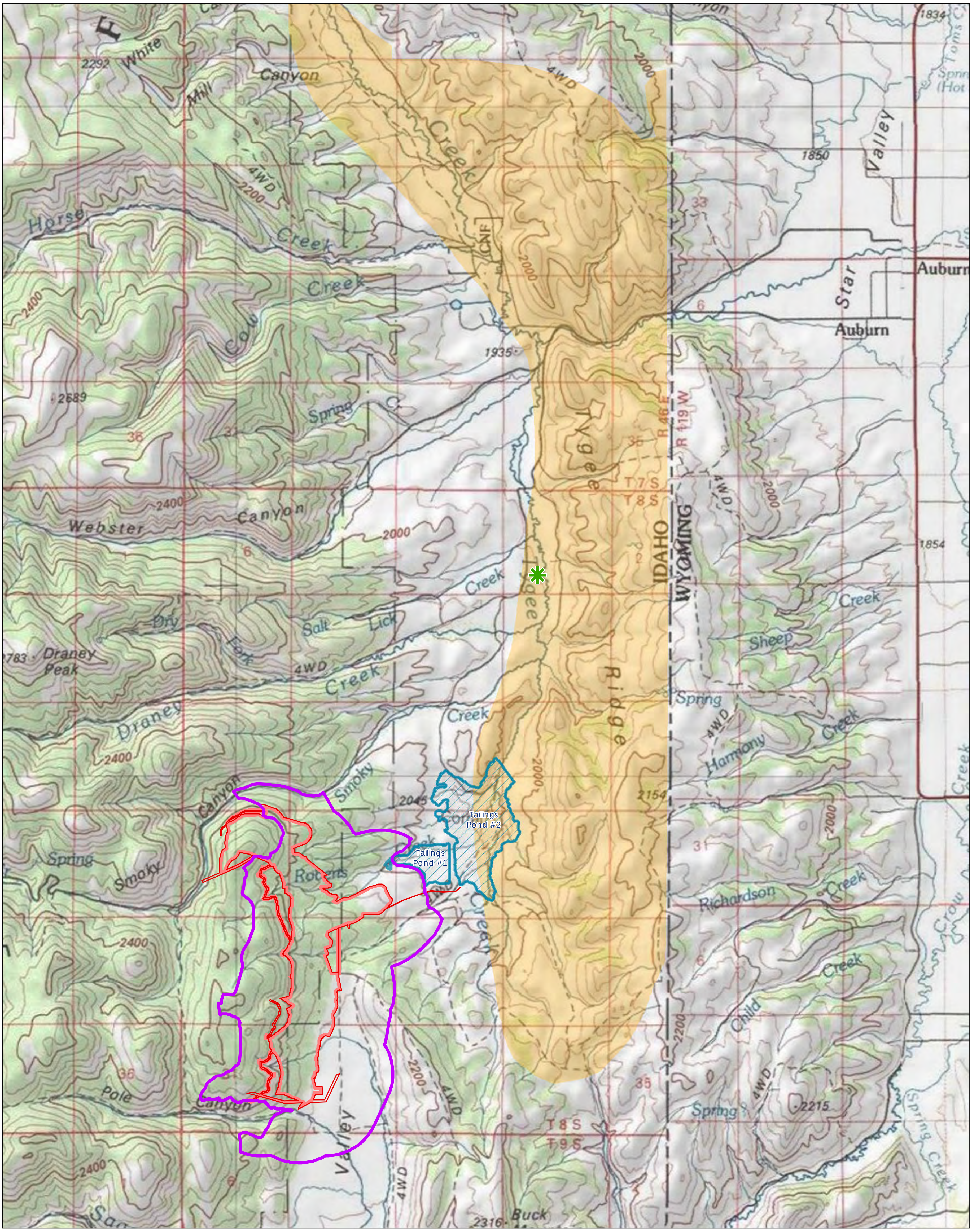
Greater sage-grouse

The greater sage-grouse is a Forest-Sensitive species. In Idaho, greater sage-grouse are classified as "Apparently Secure" (S4). Greater sage-grouse are classified as Type 2 by the BLM. In March 2010, the USFWS designated the greater sage-grouse as a candidate for listing under the ESA. Concerns about long-term declines in greater sage-grouse populations and habitat prompted unprecedented large-scale efforts in Idaho and other western states to conserve the species while continuing predicable levels of land-use activities. In May 2015, the BLM and USFS released their Final Idaho and Southwestern Montana Sub-Regional Greater Sage-Grouse Land Use Plan Amendment and EIS (Greater Sage-grouse Final EIS) (BLM and USFS 2015) for greater sage-grouse management and in September 2015, the BLM released the ARMPA for Idaho and Southwestern Montana (BLM 2015b). The ARMPA incorporates measures to conserve, enhance, and restore greater sage-grouse habitat into existing land use plans. The USFS also released a ROD for Land Management Plan Amendments in September 2015. These amendments covered the CTNF and contained similar amendments to the BLM ARMPA (USFS 2015a). In September 2015, the USFWS determined that the ongoing conservation efforts had significantly reduced threats to the point where the greater sage-grouse was no longer warranted for protection under the ESA.

The ARMPA contains three management decisions relating to non-energy leasable minerals such as phosphate (the ARMPA however does not apply to lands within the Study Area because even though the BLM manages the subsurface mineral rights, there is no mapped greater sage-grouse habitat). The management decisions allow leasing within known phosphate leasing areas to continue subject to standard stipulations as long as the area is not considered a Priority Habitat Management Area (PHMA). Seasonal or daily timing restrictions as well as greater sage-grouse required design features may be required as part of a Condition of Approval for exploration activities or initial mine development (e.g., when new timber removal, shrub clearing, etc. is required). There are no PHMAs within the Study Area. A General Habitat Management Area (GHMA) is located approximately 1/3-mile to the east of the Study Area (**Figure 3.8-3**).

Greater sage-grouse depend on sagebrush, particularly big sagebrush and silver sagebrush (*Artemisia cana*) for food and cover year-round (Connelly et al. 2004). Greater sage-grouse utilize riparian and upland meadows and sagebrush grasslands during summer, sagebrush dominated rangelands with herbaceous cover during breeding (i.e., lekking, nesting, and early brood-rearing), and during the autumn greater sage-grouse use upland meadows, riparian areas, greasewood bottoms, and agricultural fields. Breeding occurs on "leks" or openings surrounded by sagebrush in broad valleys, ridges, benches, and plateaus or mesas (Connelly et al. 2004). Lek sites generally have good visibility for predator detection, acoustical qualities so mating sounds will carry, and an abundance of sagebrush within about 300 to 660 feet used for escape cover. Hens build nests at the base of a live sagebrush plant and remain in sagebrush vegetation with chicks until conditions are too dry, at which point hens with broods move towards wet meadow or riparian areas. Preferred nest habitats are those with live sagebrush along the periphery for escape cover. Early brood-rearing habitat is generally identified as sagebrush habitat surrounding each lek. Greater sage-grouse in southeastern Idaho traveled as far as 50 miles from breeding and nesting habitats to summer ranges (Connelly et al. 1988 as cited in Stantec 2016e).

Within the Study Area, there are no known leks (IDFG 2014a), although anecdotal evidence indicates there may previously have been leks in the area where the existing tailings ponds are now located (Stantec 2016e). A group of greater sage-grouse were observed in 2015 approximately two miles to the northeast of the northern boundary of the Study Area, near the Draney Creek dairy farm (Stantec 2016e) (**Figure 3.8-3**). An IDFG biologist visited the site on April 24, 2015, but greater sage-grouse had left the location approximately two weeks earlier and no lekking was confirmed. It is suspected that the location could be a satellite or temporary (early season) location for a lek located to the east (lek 3C030) that was active in the past but is currently undetermined (confirmed use in 2001, but has not been monitored since (Stantec 2016e). Greater sage-grouse have been documented approximately six miles to the south in Crow Creek and several leks are known approximately 10 miles to the west in Slug Creek (JBR 2013). While there are no known leks within the Study Area, greater sage-grouse using leks close to the Study Area may use sagebrush habitats found in the Study Area, including for nesting and as brood habitat (Stantec 2016e). However, greater sage-grouse were not observed in the Study Area.



Legend

- Display Site (2015)
- Project Area Boundary
- Tailings Ponds
- Study Area (includes 1/2 mile buffer, modified to remove existing disturbance)
- Closest General Habitat Management Area (GHMA)*

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Copyright:© 2013 National Geographic Society, i-cubed
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1 2
Miles
1:60,000 (at original document size of 11x17)
N

* SOURCE: BLM 2015

Figure 3.8-3
Greater Sage-grouse Habitat
East Smoky Panel Mine EIS

Harlequin duck

The harlequin duck is a Forest-Sensitive species. In Idaho, breeding harlequin ducks are classified as "Critically Imperiled" (S1). Harlequin ducks migrate inland from oceans to breed on clear, swift-flowing streams (IDFG 2005a). In Idaho, harlequin ducks feed primarily on benthic macroinvertebrates and use second-order or larger streams containing reaches with an average one to seven percent gradient, riffle habitat, clear water, gravel- to boulder-sized substrate, and forested bank vegetation.

Harlequin ducks are not expected to occur on the CTNF (USFS 2003b) or within the Study Area, as there is no suitable or potential harlequin duck breeding habitat. Existing tailings ponds could be used rarely as resting stops during migration.

Northern goshawk

The northern goshawk is a Forest-Sensitive species. In Idaho, northern goshawks are classified as "Apparently secure" (S4) and are a BLM Type 2 species. Northern goshawks inhabit montane coniferous and deciduous forests, forest edges, and open woodland stands (Groves et al. 1997). In Idaho, northern goshawks nest in coniferous and aspen forests, and spend the winter in riparian or agricultural areas.

Forested areas of the Study Area provide suitable foraging and breeding habitat for northern goshawk. Recent observations of northern goshawks have been made in several locations surrounding the Study Area (IDFG 2014a; JBR 2013; Dobrich 2011, 2012, 2013). Adult northern goshawks and potential northern goshawk nests were observed during survey efforts in the Study Area. Northern goshawk broadcast and acoustical surveys were conducted in 2014 and 2015 throughout the Study Area (Stantec 2016e).

Survey results are described in the Wildlife Resources TR (Stantec 2016e) and observed locations shown on **Figure 3.8-2**. In 2014, northern goshawks were observed both visually and audibly on various days during the surveys, some in response to broadcast calls, and two stick nests in aspen trees were discovered within 400 feet of the observation. It did not appear the nests were active (i.e., incubating or brooding adult on nest) at the time of observation. Later, in conjunction with great gray owl nest searching efforts, the region of the northern goshawk observations was extensively searched for approximately 10 hours by three different biologists. There were no signs of nesting activity (e.g., whitewash, incubating bird, prey remains, fresh nesting material) at the nests in the area. The nests in the area of all the 2014 sightings and responses were visited in 2015 and the aspen trees they were located in were found to have blown over since being observed in 2014.

In 2015, a pair of northern goshawks were observed, but no nest guarding behavior was seen and the area was searched but no nest was found.

Olive-sided flycatcher

In Idaho, breeding populations of olive-sided flycatchers are classified as "Vulnerable" (S3). Olive-sided flycatcher is a BLM Type 2 species. Olive-sided flycatchers are found in taiga, subalpine coniferous forests, mixed forests, boreal bogs, muskeg, and borders of lakes and streams, especially in areas burned by wildfires with standing snags (Groves et al. 1997). Females build cup-shaped nests in coniferous or deciduous trees and characteristically hunt from a perch. This species may occur in the Study Area in woodland habitats, but was not noted.

Peregrine falcon

The peregrine falcon is a Forest-Sensitive species. In Idaho, peregrine falcons are classified as "Vulnerable" (S3). Peregrine falcons occupy a wide range of habitats and are generally found in open country near rivers, marshes, lakes, and coasts (USFS 2003b). Foraging habitat includes wetland and riparian habitats, meadows and parklands, croplands and orchards, gorges, mountain valleys, and lakes that support populations of small- to medium-sized terrestrial birds, shorebirds, and waterfowl. Cliffs are preferred nesting sites, although reintroduced birds now regularly nest on man-made structures such as towers and high-rise buildings. In Idaho, 26 pairs of peregrine falcon were known to breed in 2012 (Stantec 2016e). The nearest occupied nesting locations are at Grays Lake, Grays Ridge (i.e., Grays Lake South), and Soda Springs.

There is no suitable breeding habitat for peregrine falcons in the Study Area, but waterfowl use of the tailings ponds may attract foraging peregrine falcon. Peregrine falcons have been observed in the region of the Study Area and although none were observed within the Study Area, one peregrine falcon was incidentally observed in July 2014, approximately 0.5 miles northeast of the Study Area near the tailings pond (**Table 3.8-1**).

Prairie falcon

In Idaho, the prairie falcon is classified as "Apparently Secure" (S4). In Idaho, prairie falcons breed in shrub steppe and dry, mountainous habitat, and winter at lower elevations (Groves et al. 1997). Prairie falcons nest primarily on cliffs. This species is known to occur in the region (Sauer et al. 2014 as cited in Stantec 2016) but breeding habitat in the Study Area is limited. No prairie falcons were observed in the Study Area in 2014.

Sagebrush sparrow

The sagebrush sparrow (formerly known as sage sparrow) is a BLM Type 2 species and in Idaho, the sagebrush sparrow is classified as "Vulnerable" (S3). Sagebrush sparrows are highly correlated with big sagebrush and preferred habitats are contiguous and dense (Hansley and Beauvais 2004b as cited in Stantec 2016e, Wiens and Rotenberry 1981 as cited in Stantec 2016e). Sagebrush sparrows typically breed in interior stands of sagebrush, avoiding edges and other fragmented habitats. During migration and winter, sagebrush sparrows will use arid plains, grasslands, and other open habitats (Groves et al. 1997). In the Study Area, there are suitable habitats for the sagebrush sparrow in Sage Valley; however, none have been observed in the Study Area.

American three-toed woodpecker

The American three-toed woodpecker (formerly known as the northern three-toed woodpecker) is a Forest-Sensitive species and in Idaho, American three-toed woodpeckers are classified as "Imperiled" (S2). American three-toed woodpeckers are year-round residents of high-elevation, spruce-fir forests. The highest densities of woodpeckers occur in freshly burned forests (0 to 3 year's post-burn), and generally in areas with a high density of lightly burned trees (IDFG 2005a). Populations have increased in response to spruce bark beetle outbreaks (Hill 2002 as cited in Stantec 2016e, Koplin 1969). American three-toed woodpeckers nest in cavities in snags and may return to the same territory in succeeding years (Hill 2002 as cited in Stantec 2016e).

Suitable nesting and foraging habitat in spruce and lodgepole pine forests is present in the CTNF and the Study Area. American three-toed woodpeckers were observed in the Study Area during surveys in 2014. American three-toed woodpecker surveys were conducted in April and May 2014 (Stantec 2016e) and responses to broadcast calls were confirmed at various survey points within the Study Area.

Trumpeter swan

The trumpeter swan is a Forest-Sensitive species. In Idaho, breeding trumpeter swans are classified as "Critically Imperiled" (S1) and non-breeding trumpeter swans are classified as "Imperiled" (S2). Trumpeter swans are a BLM Type 2 species.

In Idaho, trumpeter swans breed on marshes, lakes, and beaver ponds and winter along shallow, slow-moving waters (Groves et al. 1997). Trumpeter swans forage on submerged and emergent vegetation and aquatic insects. Trumpeter swans found in the region of the Study Area are part of the Rocky Mountain population or "Tri-state" flock (Montana, Wyoming, and Idaho). In 2012, counts of the breeding population numbered approximately 130 and 210 birds in Wyoming and Idaho, respectively (Olson 2012a). Trumpeter swans winter in the Tri-state in larger numbers; approximately 6,000 trumpeter swans were counted in the winter of 2012 in Idaho and Wyoming (Olson 2012b). Overall, trumpeter swan populations are increasing in the region. Breeding populations in the region of the Study Area are known at Grays Lake, Soda Springs, along the Salt River, and Bear River (Olson 2012a).

The nearest suitable habitat to the Study Area for trumpeter swans is wetland and pond habitats in the Crow Creek drainage (approximately 3.5 miles south of the Study Area). Up to eight trumpeter swans have been documented during winter survey efforts (Dubovsky 2003; USFS 2012, 2013, 2014). The tailings ponds in and near the Study Area may provide suitable habitat during migration; no incidental observations were made during survey efforts in 2014.

Willow flycatcher

In Idaho, breeding populations of willow flycatchers are classified as "Secure" (S5). The willow flycatcher is a BLM Type 2 species. Willow flycatchers are present in the region of the Study Area spring through fall. Willow flycatchers breed in riparian habitat that has a mid-story of willows or alders and an intact lower layer (Ritter 2000, Douglas et al. 1992). In the greater Yellowstone region, willow flycatchers prefer nesting in willows with more dense and tall structure (Olechnowski and Debinski 2008 as cited in Stantec 2016e). This species may occur in the Study Area in riparian habitat, especially along willow thickets surrounding Roberts Creek and the tailings pond; no incidental observations were made during general survey efforts in 2014.

3.8.4 Mammals

3.8.4.1 Big Game

Elk and mule deer are the two most highly visible and common large mammals that occur within the Study Area and are important species for the local economy and public interest. During field studies in 2014, elk, mule deer, and moose and were commonly observed both directly and indirectly in all seasons. Sage Valley and other lower elevation areas on the eastern side of the Study Area are winter habitat (RMEF 2015). However, the Study Area is not believed to support a large population of wintering elk, deer, or moose, as tracking surveys in winter 2014 did not find evidence of yards or congregating animals.

Moose (*Alces alces*) are included in this discussion due to sympatric relationships with elk and deer within the general area and in surrounding habitats of southeast Idaho. In general, big game species (i.e., mule deer, elk, and moose) use most portions of the Study Area year-round. Species-specific findings are discussed in more detail as follows.

Elk
Elk are habitat generalists and grazers, their diet shifts seasonally and they will consume grasses, forbs, and woody vegetation (e.g., willow and aspen). Elk are distributed throughout the Study Area and region. The Diamond Creek Zone (1,659 square miles), which contains the Study Area, is some of the most productive elk habitat in southeastern Idaho (IDFG 2010). However, the open habitat and moderate road densities contribute to the relatively high vulnerability of elk in this Zone. In 2013, the elk population was estimated at 2,352 animals (IDFG 2014b).

In the region, elk most often use southerly and western aspects with slopes less than 20 degrees as winter range. General winter and summer range habitat has been mapped in the Study Area (RMEF 2015; BLM and USFS 2007). According to the RMEF (2015) data, the entire Study Area is general summer habitat. Approximately 43 percent of the Study Area — Sage Valley and other lower elevation areas on the eastern side of the Study Area — is winter habitat. Most of the winter habitat is outside proposed disturbance areas; however, approximately 130 acres of proposed disturbance would be within winter habitat. In addition, there is critical summer habitat adjacent to the Study Area to the west. Although elk migrate to the Bear Lake Plateau area (south of the Study Area) in winter, many elk populations do not make long-range movements between seasonal ranges. A common destination for elk in winter is the Soda Hills area (Stantec 2016e). Kuck (1984) found that in the Deer Creek drainage (approximately five miles south of the Study Area), summer and winter use areas are typically adjacent and movements often overlap seasonally. The IDFG does not collect or have any specific information on big game migration corridors within or adjacent to the Smoky Canyon Mine area (Stantec 2016e).

IDFG has reports of a herd of 45 elk in Sage Valley, and believes the herd to be substantially larger than that, with a lot of calves being produced in the aspen patches along the edges of the valley (Stantec 2016e). Elk were observed in the Study Area during surveys in spring and summer.

Mule Deer
Mule deer are the most abundant and widely distributed big game animal in Idaho (Groves et al. 1997). Typical mule deer habitat consists of coniferous forests, shrub steppe, grasslands with shrubs, and chaparral. They are primarily browsers, and much of their diet is shrubs and trees, especially in the winter (USFS 2003b).

Winter range is a critical component of mule deer habitat. Mule deer are highly susceptible to high mortality during periods of prolonged deep snow and low temperatures. The condition of a deer at the start of winter depends on the quality of the habitat it occupies during the rest of the year. The winter strategy is to minimize energy loss (becoming sedentary and using thermal cover) and to eat enough to prolong fat reserves (USFS 2003b). An apparent change in the winter distribution of mule deer has occurred primarily in Unit 76. During the 1950s and 1960s, deer use of the Soda Front (Wood Canyon south to Montpelier) was extensive, while use of the Bear Lake Plateau (Unit 72) was minimal. Currently, the Bear Lake Plateau and the Soda Hills Area represent the two most significant winter ranges for mule deer in Unit 76 (IDFG 2011).

Generally, summer and winter areas for mule deer are usually 10 to 20 miles distant, in higher-elevation aspen and conifer communities. Roads fragment habitats and migration corridors and can alter seasonal migrations, which reduces the overall suitability of mule deer habitat (IDFG 2008). The most common destination for mule deer moving through the Study Area and Project Area is the Bear Lake Plateau, the largest winter range in the area (Stantec 2016e). In addition, a small group of mule deer winter in the Crow Creek area northeast to Buck Mountain, northeast of the Project Area (Stantec 2016e). However, the IDFG does not collect or have any specific information on big game migration corridors within or adjacent to the Smoky Canyon Mine area (Stantec 2016e).

The most recent survey for mule deer populations in the area was conducted in 2006 by IDFG for Management Unit 76, and resulted in a population estimate of 3,363 mule deer (IDFG 2011). The general buck to doe ratio objective is 15 bucks per 100 does. The current ratio is 12 bucks per 100 does (IDFG 2011).

Mule deer have been observed in the Study Area during summer and the Project Area occurs within mule deer summer range.

Moose
In Idaho, moose prefer shrubby, mixed coniferous and deciduous forests with nearby riparian areas for foraging. In winter, moose rely on hardwood conifer forests for cover (Groves et al. 1997). Moose in southeast Idaho do not concentrate in specific wintering areas, but are widely dispersed in aspen and conifer communities year-round (Kuck 1984). In the Crow Creek drainage, moose used forest habitat types heavily, with most observations occurring in aspen at elevations between 7,000 and 7,500 feet. Most moose were found using northern and east aspects with slopes of 20 degrees or less. Moose have been observed in the Study Area during all seasons.

3.8.4.2 Carnivores

In 2014, general carnivore and winter tracking surveys were conducted in March and early April. A variety of carnivore tracks were detected during the surveys and included: coyote, red fox, gray wolf, weasel, striped skunk (*Mephitis mephitis*), and mountain lion. Red squirrel and snowshoe hare were also detected during the surveys.

Four trail cameras were also deployed throughout the carnivore tracking survey and detected red fox, coyote, and striped skunk. Non-carnivore species detected during surveys on the trail cameras included snowshoe hare, red squirrel, mule deer, moose, and elk. American badger (*Taxidea taxus*) was observed in 2015 during other surveys.

General carnivore surveys previously conducted within the region of the Study Area (Maxim 2000b as cited in Stantec 2016e; 2004a) documented coyote, American badger, bobcat, red fox, and black bear (*Ursus americanus*).

The four-predator species of special interest, American marten, fisher, Canada lynx, and North American wolverine were not detected during surveys in 2014. American marten and fisher are described below; as special status species, Canada lynx and North American wolverine are described in **Section 3.8.4.2**.

Fisher
In 2011, the USFWS determined that fisher in the Idaho, Montana, and Wyoming belonged to the United States Northern Rocky Mountains Distinct Population Segment (DPS). On October 5, 2017, the USFWS published a 12-month finding in the Federal Register that the Northern Rocky Mountain fisher distinct population segment is not warranted for listing as either an endangered or threatened species under the Endangered Species Act (82 FR 46634). In Idaho, fishers are classified as “Secure” (G5, IDFG 2013a).

Fishers inhabit most forest types in northern regions with abundant prey. In the west, fisher range extends south into Idaho, Montana, and the Rocky Mountains of Wyoming. In Wyoming, suitable fisher habitat is limited to the northwestern portion of the state (Wyoming Natural Diversity Database 2010 as cited by Wyoming Game and Fish Department [WGFD] 2010). In Idaho, fishers are known to occur in northern and central mountains portions of the state.

The Study Area is outside the current known range of fisher and no observations of fisher were made during survey efforts in the Study Area in 2014.

American Marten

The American marten is classified as widespread and secure (S5, IDFG 2013a).

American marten are found in dense deciduous, mixed, or (especially) coniferous forests. In Idaho, martens use a variety of forest types, with the greatest activity in mature spruce-fir forests (USFS 2003b). American marten have been documented in the northern portion of the CTNF. In 1995, 50 American marten were transplanted into the Bear River Range approximately 50 miles southwest of the Study Area. Although this species was not observed in the Study Area during survey efforts in 2014, USFS biologists observed marten tracks approximately 0.5 miles west of the existing Smoky Canyon Mine and approximately 1.1 miles west of the Study Area on March 19, 2016 (Stantec 2016e). This provides indication that the Study Area may provide suitable habitat for American marten.

3.8.4.3 Bats

One Anabat II detector was deployed on three different nights in June 2014 at three locations in the Study Area: the tailings pond, near a drainage in a forest opening, and a forest clearing, respectively. A total of 56 call sequences were recorded (**Table 3.8-3**). Three bat species were identified: big brown bat, hoary bat, and silver-haired bat. The tailings pond location (i.e., open water habitat) had the majority (96 percent) of recorded call sequences. Seventeen (30 percent) of the call sequences were assigned to the unknown myotis, high-frequency, or low-frequency guild.

Table 3.8-3 Bat Survey Observations

SPECIES / GUILD	SURVEY NIGHT AND HABITAT TYPE			
	06/10/2014 TAILINGS POND	06/11/2014 FORESTED DRAINAGE	06/12/2014 FOREST OPENING	TOTAL
Big brown bat	1			1
Hoary bat	3			3
Silver-haired bat	11			11
Big brown/silver-haired bat	22			22
Unknown myotis species	3			3
Unknown high-frequency	2	2		4
Unknown low-frequency	12			12
Total	54	2		56

Fourteen species of cave- and tree-roosting bats are known to occur in Idaho (Perkins and Peterson 1997). Forested habitats throughout the Study Area and region provide suitable habitats for foraging bats and roosting sites for tree-roosting bats such as silver-haired bats (*Lasionycteris noctivagans*) and hoary bats (*Lasiurus cinereus*). Roost sites may include tree cavities, snags, or hollow areas under exfoliating bark or in living trees (Idaho Museum of Natural History [IMNH] 2011).

Previous surveys conducted in the region of the Study Area (Maxim 2004a, 2000b as cited in Stantec 2016e) documented six species of bats: big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), silver-haired bat, and hoary bat. The most frequently detected of these species (i.e., long-eared myotis, long-legged myotis, and silver-haired bat) are associated with forested areas. Within the Study Area, there are no adits or caves that provide suitable roosting sites for cave-roosting bat species.

3.8.4.4 Special Status Species

Gray wolf

As of May 5, 2011, gray wolves in Idaho were delisted from the ESA (FR 76(87) [May 5, 2011]:25590-25592) and are now managed by the IDFG. In Idaho, they are classified as “Vulnerable” (S3) and are a BLM Type 2 species.

Gray wolves frequently travel and hunt in packs that vary in size, depending on resources and individual wolf characteristics (Mech 1989). Home ranges vary across regions of the Rocky Mountains from approximately 230 to 1,500 square miles (Oakleaf 2002 as cited by Meaney and Beauvais 2004). In the northern Rocky Mountains, gray wolf habitat is best characterized by the amount of forested cover and density of elk populations (Oakleaf et al. 2006). Gray wolves prey on a variety of mammals, including mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), and beaver (*Castor canadensis*). In Wyoming (populations excluding Yellowstone National Park) in 2015, the gray wolf annual populations was 382 individuals in 48 packs and average pack size was 8.0 animals (USFWS et al. 2016). The nearest identified packs of gray wolves in Wyoming are the Dog Creek, Daniel, and Big Piney packs, all within approximately 50 miles from the Study Area. In southeastern Idaho, two gray wolf packs have been confirmed, the Tex Creek and Pine Creek packs, each approximately 40 miles away from the Study Area (IDFG and Nez Perce Tribe 2014).

Canada lynx

The Canada lynx is listed as a Threatened species under the ESA (FR 65(58) [March 24, 2000]: 16052-16086). In 2009, approximately 9,500 square miles of critical habitat was designated for Canada lynx in the Greater Yellowstone area. The Study Area is approximately three miles to the northwest of mapped critical habitat.

The Northern Rocky Mountain/Cascades Region (38 million acres), which includes parts of the CTNF, contains the majority of Canada lynx occurrences in the United States. Canada lynx habitat across their western mountain range is characterized by Douglas fir, spruce (*Picea* spp.)/fir, and fir-hemlock (*Tsuga* spp.) forests between approximately 5,000 and 6,500 feet (Aubrey et al. 2000). Over their entire range, Canada lynx occur predominantly where snowshoe hares are abundant, especially early successional stands with high stem densities. In southern boreal forests, red squirrels and other alternative prey are important constituents of the diet, as snowshoe hare densities are lower (Apps 2000; Aubrey et al. 2000). Relatively large home ranges appear to be characteristic of lynx in southern boreal forests (Aubrey et al. 2000).

In the past 30 years, there are few records of Canada lynx in the region of the Study Area. Within a 5-mile buffer around the Study Area, there is only one reported Canada lynx observation. The observation was reported near Diamond Creek and was observed sometime between 1950 and

1960 (IDFG 2014a). In 2005, a female Canada Lynx with two young was observed approximately 15 miles northwest of the Study Area in a reclaimed mine area (IDFG 2013b). However, annual sampling in the CTNF since 1990s, as well as specific surveys conducted in 2013 in the area where the female lynx was observed, resulted in no detections of Canada lynx (BLM 2013b, USFS 2003c). Discussions between USFS, USFWS, and BLM concluded that the female lynx observed in 2005 was likely from a lynx reintroduction program in Colorado — several lynx reintroduced to Colorado returned northward — that passed through the CTNF (BLM 2013b).

Canada lynx are known to occur in northwestern Wyoming including the Wyoming Range, approximately 15 miles to the east of the Study Area (BLM 2005 in Stantec 2016e). The Montpelier and Soda Springs Ranger districts, including the Study Area, have been identified as potential linkage habitat between the "core" Canada lynx habitat in Bridger-Teton National Forest and "peripheral" habitat in the Ashley National Forest in Utah (USFS 2003b). Two linkages are identified by the USFS (2003c, Appendix D-7, Map 1) approximately 10 miles south of the Study Area. One of the linkages is a broad area of relatively undisturbed land linking the Bridger-Teton National Forest and the CTNF. The other linkage is the shortest distance between two portions of the CTNF (across disturbed land and U.S. Highway 30). No Canada lynx were observed in the Study Area during surveys.

Pygmy rabbit

The pygmy rabbit is a Forest-Sensitive species (USFS 2003b). In Idaho, pygmy rabbits are classified as "Imperiled" (S2; IDFG 2013a) and are a BLM Type 2 species. Pygmy rabbits in Idaho are not part of the Columbia Basin DPS that is listed on the ESA. The USFWS conducted a status review of pygmy rabbits in 2010 and found that listing was not warranted (FR 75(189) [September 30, 2010]:60516-60561).

Pygmy rabbits are limited to habitat characterized by deep, sandy soils and tall (often greater than six feet), dense big sagebrush, which provides both food and cover (Katzner 1994 as cited in Stantec 2016e, Gabler et al. 2001). Burrows are usually located on slopes at the base of sagebrush plants. Within the CTNF, there is no occupied habitat (USFS 2003b) and in Wyoming, predicted habitat is outside the region of the Study Area (Wyoming Natural Diversity Database 2010 as cited by WGFD 2011). There is no suitable habitat for pygmy rabbit in the Study Area and none were observed in the Study Area.

Spotted bat

Spotted bats are a Forest-Sensitive species (USFS 2003b). In Idaho, spotted bats are classified as "Vulnerable" (S3; IDFG 2013a).

Spotted bats are rare and their distribution is highly fragmented. The limiting factor to their occurrence is most likely suitable roost sites (i.e., rock and cliff crevices) and human disturbance (IDFG 2005a). Spotted bats usually occur in deep, narrow canyons, and roost in cracks or crevices within the rocky outcrops and cliffs. In Idaho, the spotted bat occurs mainly in the southwest corner of the state and habitat contains vegetation dominant with sagebrush, juniper, mountain mahogany, and cottonwood (Perkins and Peterson 1997; IDFG 2005a).

In 2003, one spotted bat was recorded in south-central Idaho, west of Almo (Rodhouse et al. 2009). Survey efforts within the CTNF have not documented the presence of spotted bats (USFS 2003b). Suitable roosting habitat is not present within or near the Study Area and spotted bats were not detected during previous survey efforts in the region (Maxim 2004a, 2000b as cited in Stantec 2016e) or within the Study Area.

Townsend's big-eared bat

The Townsend's big-eared bat is a Forest-Sensitive species (USFS 2003b). In Idaho, Townsend's big-eared bats are classified as "Vulnerable" (S3; IDFG 2013a) and are a BLM Type 2 species.

Townsend's big-eared bats occur in much of western North America, in a variety of habitats from desert shrub to deciduous and coniferous forest, and over a wide range of elevations (Pierson et al. 1999). The species' distribution is strongly correlated with the availability of caves or cave-like roosting habitat such as abandoned mines.

Past surveys within the CTNF have documented Townsend's big-eared bats in the Bear River Range, Pruess Range, Portneuf Range, and Elkhorn Mountains (USFS 2003b). Surveys conducted in the Montpelier Ranger District of the CTNF found mines with active summer and wintering populations of Townsend's big-eared bats. No suitable maternity or hibernacula habitat is present in the Study Area as the Study Area does not contain caves. However, snags in the Study Area may be suitable for habitat for roosting. Townsend's big-eared bats were not observed or detected during previous survey efforts in the region (Maxim 2004a, 2000b as cited in Stantec 2016e) or within the Study Area.

Uinta chipmunk

In Idaho, Uinta chipmunks are classified as "Critically Imperiled" (S1; IDFG 2013a).

The Uinta chipmunk is associated with montane coniferous forests above 6,560 feet AMSL, often near logs and brush in open areas, and at forest edges (Groves et al. 1997). In Idaho, the species has been found in areas with Douglas-fir, Engelmann spruce, or aspen; with an understory of sagebrush and various forbs and grasses. Uinta chipmunks were not observed in the Study Area, but are assumed to occur in the Study Area within suitable habitat.

North American wolverine

The North American wolverine in Idaho are classified as "Imperiled" (S2; IDFG 2013a) and are a BLM Type 2 species. On December 14, 2010, the USFWS found the petition to list the wolverine as Threatened or Endangered "not warranted" (FR 75 (239) [December 14, 2010]: 78030-70861). On February 4, 2013, the USFWS published a proposed rule to list the distinct population segment (DPS) of the North American wolverine occurring in the contiguous United States as a threatened species under the ESA (78 FR 7864). On August 12, 2014, the USFWS withdrew its proposal to list this species as Threatened (79 FR 47522). However, on April 4, 2016, the District Court for District of Montana vacated the withdrawal and remanded the decision to the USFWS for further consideration. The court's action effectively returned the status of the wolverine back to a proposed species under the ESA (81 FR 71670). On October 19, 2016, the USFWS announced reopening of the comment period on the February 4, 2013, proposed rule, and initiation of a new status review of the North American wolverine (81 FR 71670).

The North American wolverine occurs within a wide variety of boreal forests, tundra, and mountain habitats, although they are usually associated with remote montane-forests (Banci 1994). Idaho and Wyoming are the southern extent of the North American wolverine's Rocky Mountain range (FR 73 (48) [March 11, 2008]: 12929-12941). The North American wolverine has home ranges up to 600 square miles and daily movements in search of food may cover 25 miles. In Idaho, North American wolverines use habitats with steep slopes often greater than 8,000 feet with preferred habitats being north-facing (Copeland et al. 2007). Persistent, stable snow greater than five feet deep in these areas appears to be a requirement for denning.

In the region of the Study Area, several recent occurrences of wolverine have been reported. In 2005, wolverine tracks were observed approximately 15 miles northwest of the Study Area near the Ballard Mine (Greystone 2006 as cited by BLM 2011). In February 2008, North American wolverine tracks were observed in Smoky Canyon to the west of the Study Area (IDFG 2014a). In winter 2014, wolverine sightings were confirmed near the Utah/Wyoming border and in the Uinta Mountains (Maffly 2014). North American wolverine may rarely travel through the Study Area to forage or during dispersal movements; no observations of North American wolverine were documented during winter tracking surveys of the Study Area in 2014.

3.8.5 Amphibians and Reptiles

Reptiles and amphibians are present year-round in the Study Area in both upland and aquatic (i.e., wetland, stream) habitats. Past studies (Shive et al. 2000) have documented tiger salamander (*Ambystoma tigrinum*), boreal chorus frog (*Pseudacris maculata*), rubber boa (*Charina bottae*), and western terrestrial garter snake (*Thamnophis elegans*) within the Study Area. Boreal toad tadpoles were observed approximately four miles southwest of the Study Area in 2003 (Maxim 2004b), but toads were not found during follow up surveys.

Visual Encounter Surveys (VES) were conducted in June 2014 at three reaches along Roberts Creek and three reaches around the tailings pond. Thirty-five boreal chorus frog egg masses were observed, but no frogs were detected (see Appendix C of the Wildlife Resources TR [Stantec 2016e]). Night audible surveys were also conducted in June 2014, at one site on the tailings pond and one site on Pole Canyon Creek, respectively. No amphibians were audibly detected (see Appendix C of the Wildlife Resources TR [Stantec 2016e]). The surveys were conducted according to the appropriate methodology (see Appendix A of the Wildlife Resources TR [Stantec 2016e]); however, based on site-conditions, the surveys were conducted too late in the season to detect breeding amphibians. Boreal chorus frogs were heard in the tailings pond and Sage Valley in April, but at the time of the survey, few areas in the Study Area met the conditions to be considered amphibian habitat.

Amphibian surveys were conducted again in May 2015 to improve the probability of detecting breeding adults. VES were conducted at three reaches along Roberts Creek and three around the Roberts Creek diversion pond; three reaches along the Roberts Creek diversion; one seasonal pond located west of the tailings pond; four ponds in Sage Valley; and two reaches of Pole Creek. Results are presented in Appendix C of the Wildlife Resources TR (Stantec 2016e), along with habitat data and notes. Fourteen boreal chorus frog egg masses were observed in the Roberts Creek diversion pond, with no adults detected. No amphibians were detected in the diversion canal or Roberts Creek, despite the presence of what appeared to be suitable habitat and the presence of boreal chorus frogs in the adjacent tailings ponds (boreal chorus frogs could be heard calling from the littoral zone of the tailings pond throughout the surveys). Boreal chorus frog adults and egg masses were observed or detected via audible surveys in the small seasonal pond southwest of the tailings pond and in the Sage Valley ponds. No amphibians were detected along Pole Canyon Creek, which was fast flowing and mostly lacking suitable amphibian habitat. No species other than boreal chorus frog were detected in May within the Study Area. Follow up surveys in July focused on the Sage Valley ponds; two of the ponds had dried up and no amphibians were detected at the two ponds that still had water.

3.8.5.1 Special Status Species

Columbia Spotted Frog

The Columbia spotted frog is a Forest-Sensitive species (USFS 2003b). In Idaho, Columbia spotted frogs are classified as "Apparently Secure" (S4; IDFG 2013a).

Columbia spotted frogs require specific habitat components; water-flooded burrows for hibernation, pooled water for breeding, shallow pond margins for foraging, and corridors containing water and vegetative cover for migrating between breeding and hibernation sites (IDFG 2005b).

Suitable habitat is present on the CTNF within montane wetland habitat however the Study Area is outside the range of the Columbia spotted frog (IDFG 2005b) and none were observed during surveys.

Northern Leopard Frog

The northern leopard frog is a BLM Type 2 species. In Idaho, northern leopard frogs are classified as "Imperiled" (S2; IDFG 2013a).

Northern leopard frogs are associated with a variety of wetland habitats, including marshes, pond margins, and slow-moving sections of streams and rivers (Maxim 2004b). In southern Idaho, northern leopard frog populations have been reported in the Snake River and tributaries, the Portneuf River, Bear River, and Marsh Valley in the southeast. In south-central Idaho, the northern leopard frog is an abundant species and is present in Dry Valley Creek (IDFG 2014a). Although northern leopard frogs were not observed in the Study Area, they have been observed in the nearby Dry and Slug Creek valleys (JBR 2012) and may exist in suitable habitats.

Common Garter Snake

In Idaho, the common garter snake is classified as "Vulnerable" (S3; IDFG 2013a).

Garter snakes are found in a variety of habitats such as grasslands, shrublands, woodlands, and open areas in forests. In Idaho, they are generally associated with marshes and wet areas (Groves et al. 1997). This species was not observed in the Study Area but may exist in suitable habitats.

Boreal Toad

The boreal toad is a Forest-Sensitive species and a BLM Type 2 species.

The boreal toad is a subspecies of western toad (*Anaxyrus boreas*) and shares most, if not all, of their traits. Five boreal toad subspecies have been documented through mitochondrial deoxyribonucleic acid (DNA) analyses, with one of the five groups identified as occurring in Caribou County, Idaho (Hogrefe et al. 2005). Boreal toads are found in a variety of habitats such as desert springs and streams, meadows and woodlands, and in and around ponds, lakes, reservoirs, and slow-moving waterways (Keinath and McGee 2005; Groves et al. 1997). Breeding areas are typically shallow water areas at the edges of ponds, or lakes, stream or river edges with slow-moving water, or other flooded or ponded areas. After breeding, boreal toads move to more terrestrial habitats. During the winter, boreal toads hibernate in habitats that may be up to 1.5 miles from aquatic breeding habitat (Keinath and McGee 2005). Boreal toads occupy relatively high elevation habitats compared to other western amphibians, ranging from 5,000 to 10,000 feet AMSL. Occupied wetlands are surrounded by a variety of upland vegetation communities, including sagebrush and grasslands, pinyon-juniper, mountain shrubs, and coniferous forest (Hogrefe et al. 2005).

Boreal toad tadpoles were observed near South Fork Sage Creek, approximately four miles southwest of the Study Area, in June 2003 (Maxim 2004b). However, follow up surveys did not find any boreal toads. This species was not observed in the Study Area during surveys, but may occur within wet meadows or another wetland habitat year-round.

3.9 FISHERIES AND AQUATICS

The Study Area **(Figure 3.9-1)** for fisheries and aquatic resources includes streams within the topographically defined watersheds associated with the Tygee Creek and Sage Creek drainage basins, along with a reach of Crow Creek from its confluence with Sage Creek downstream to the Wyoming border. The Study Area boundary was developed with the IDT experts and professional judgement. Streams within the Tygee Creek drainage include Roberts Creek, Tygee Creek, Smoky Creek, Draney Creek, Salt Lick Creek, Webster Canyon Creek, and Spring Creek. Streams in the Sage Creek drainage include Pole Canyon Creek, North Fork Sage Creek, Hoopes Spring, South Fork Sage Creek, and Sage Creek. Streams in the northern portion of the Tygee Creek drainage (Draney Creek, Salt Lick Creek, Webster Canyon Creek, and Spring Creek) were originally included in the Study Area in the event that groundwater impacts to a series of springs that appear to be the source of surface water in these drainages were predicted. Although the impact potential to those streams has been discounted based upon further groundwater interaction studies and evaluation, they remain within the Study Area to provide a more complete coverage of the baseline condition within the Tygee Creek watershed.

The various monitoring programs, studies, and reports that have been reviewed to describe the baseline condition are described in detail in the Fisheries and Aquatics Resources TR (Stantec 2017c) and summarized below.

Monitoring programs and studies associated with past EISs and/or various Smoky Canyon Mine compliance obligations include:

- Baseline aquatic ecological data collected prior to mining (Mariah 1980);
- Long-term monitoring data collected twice yearly from 1981 to 2005 (contained in annual reports submitted by TRC Environmental Corporation, formerly TRC Mariah Associates Inc.) and biennially from 2005 to the present (contained in annual reports submitted by TRC Environmental Corporation from 2005 to 2009, and annual reports submitted by Formation Environmental since 2010);
- Baseline data collected in 2000 (Chadwick 2001) in support of the Final Supplemental EIS for the Smoky Canyon Mine, Panels B&C (BLM and USFS 2002a), and the associated technical report (JBR 2000);
- Data collected in 2004 as part of the studies to support the Smoky Canyon Mine SI (NewFields 2005);
- Data collected in 2003 for the Final Baseline Fisheries and Aquatic Resources Technical Report for the Manning and Deer Creek Phosphate Lease Areas (Panels F and G; Maxim 2004b);
- Data collected in 2010 as part of the studies to support the RI and Feasibility Study for the Smoky Canyon Mine (Formation Environmental 2014);
- Data collected between 2006 and 2008 to support development of a site-specific selenium criterion (SSSC; Formation Environmental 2016a);

- Data collected as part of mitigation monitoring for the Manning and Deer Creek Phosphate Lease Area (Panels F and G; Formation Environmental 2016a); and,
- Data collected voluntarily by Simplot (i.e., not required under any monitoring plans or compliance obligations) to maintain data continuity at several long-term monitoring locations (Formation Environmental 2016a).

Data and reports from State and Federal agencies include:

- IDEQ Beneficial Use Reconnaissance Program (BURP) data;
- IDEQ's 2014 Integrated Report (IDEQ 2017a);
- The Salt River Subbasin Assessment and TMDL (IDEQ 2017b);
- USFS data collected on Draney Creek in 2000, 2003, and 2010 (USFS 2000a, 2003d, and 2010);
- USFS data collected on Webster Creek in 2000 (USFS 2000b); and,
- The Idaho Fish and Wildlife Information System (IFWIS) Database (IDFG 2014a).

3.9.1 Aquatic Influence Zones

AIZs apply to the habitats on NFS land associated with aquatic areas (lakes, reservoirs, ponds, streams, wetlands, springs, bogs, etc.) under Management Prescription 2.8.3 of the RFP (USFS 2003a). AIZs apply to protect, restore, and maintain health of these areas. AIZ attributes must be maintained in areas developed for minerals. Therefore, the overlapping Management Prescription 8.2.1, which is currently directing management decisions as described in **Section 1.5.1**, does not preclude management direction in these AIZs.

The delineation of AIZs depends upon water source type (perennial, intermittent, wetland, etc.). The guidelines from USFS (2003a) are detailed in the Fisheries and Aquatic Resource TR (Stantec 2017c). They guide the AIZ width determination using criteria related to markers including the stream channel's inner gorge, riparian vegetation, tree height, 100-year floodplain, or a minimum slope distance when the other criteria are less. Different criteria are applicable depending upon whether the water source is one of the following:

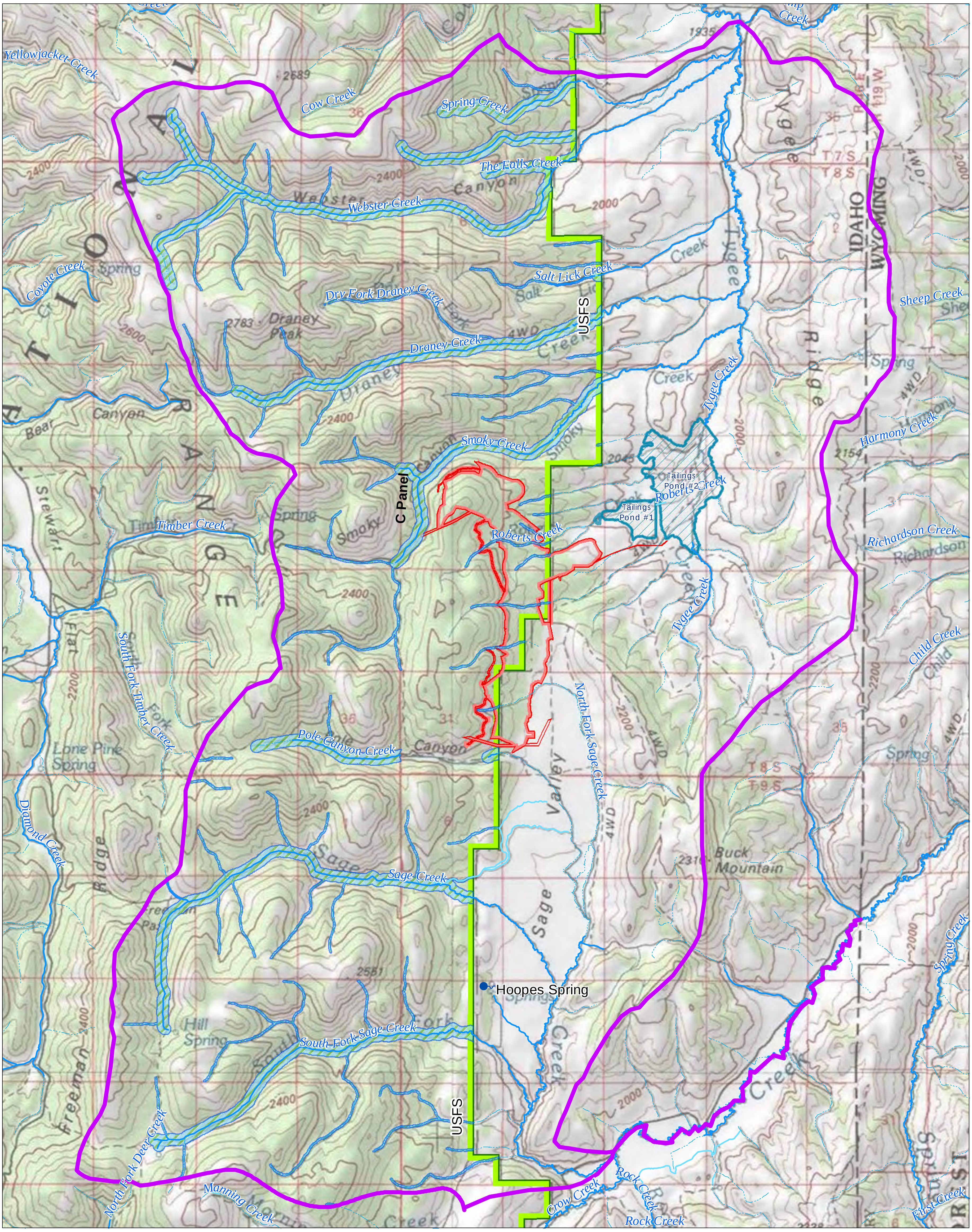
- a fish-bearing stream,
- a non-fish-bearing but permanently flowing stream,
- a pond, lake, reservoir, or wetland greater than one acre, or
- a seasonally flowing or intermittent stream or wetland less than one acre.

AIZs in and near the Study Area (only apply on NFS land) are shown on **Figures 3.9-1**, **3.9-2a**, **3.9-2b**, and **3.9-2c**. In total, there are 249 acres of AIZs in the Study Area. For Pole Canyon Creek, much of the stream is in a pipe under a large-cross valley ODA. As a result, AIZs only apply to the stream reaches upstream and downstream of the ODA. Downstream of the ODA, the stream is perennial below the diversion outlet because the pipe does not allow the water to naturally infiltrate below the ODA any longer. However, the diversion outlet is on private land and AIZs do not apply to the stream downstream of the outlet. In addition, surface flow from Pole Canyon Creek rarely reaches Sage Creek except in high flow years during run-off conditions. A small perennial seep emanates from the toe of the ODA. Although flow from the seep rarely reaches the perennial flow in the downstream diversion structure, the seep is perennial and to be conservative an AIZ for perennial streams is applied from the toe of the ODA to the USFS boundary. There are also AIZs identified along Smoky Creek within areas already disturbed by Panels B and C mining activities.

3.9.2 Aquatic Habitat

Various descriptors of habitat quality have been collected over the years within and near the Study Area, at various times and at various stream locations **(Figures 3.9-2a**, **3.9-2b**, and **3.9-2c)**.

- Physical habitat was assessed on most streams within the Study Area in 2004 using IDEQ Beneficial Use Reconnaissance Program (BURP) protocols as part of the SI. Although this data is older, it is presented in **Table 3.9-1** because it encompasses most streams in the Study Area and provides the basic descriptions of many streams.
- In 2015, physical habitat was assessed on Spring Creek, Webster Creek, Draney Creek, and Roberts Creek (these streams were not included in the SI). The 2015 assessment followed a modified BURP protocol that collected only the data required to derive IDEQ's Stream Habitat Index (SHI). It also included an assessment of channel stability using the Stream Reach Index/Channel Stability Evaluation (SRI/CSE) procedure. The 2015 data is presented in **Table 3.9-2**.
- Substrate embeddedness has been monitored in the Study Area as part of the long-term monitoring. From 1990–2002, it was assessed annually at 10 sites on five streams: Smoky Creek (USm and LSm), Tygee Creek (UT-1 and LT), Pole Canyon Creek (UP and LP), Sage Creek (US and LS), and South Fork Sage Creek (USS and LSS). These sites were also monitored from 2005–2009; however, monitoring occurred during the summer rather than in the fall and TRC (2008) did not consider the data comparable to the fall data. As a result, the data has not been included in subsequent annual reports and is not included here. Beginning in fall 2010, monitoring was reduced to biannual sampling at six locations on five streams. Embeddedness data is qualitative and may have limited utility; however, because a long-term data record is available for these six locations, it is presented in **Table 3.9-3** to describe trends over time.
- Data used other than the 2004, 2015, and long-term embeddedness data includes detailed data collected on Smoky Creek in 2000 (Chadwick 2001); IDEQ BURP data; IDEQ streambank erosion inventory (SEI) and McNeil core data for Draney Creek, Smoky Creek, Tygee Creek, and Crow Creek; data on South Fork Sage Creek from 2003 (Maxim 2004b); data from the Panels F and G monitoring (Formation Environmental 2016a); and data from the SSSC development (Formation Environmental 2016a).



Legend

- Project Area Boundary
- Tailings Ponds
- Surface Ownership Boundary
- Fisheries and Aquatics Baseline Study Area
- Spring/Seep
- Stream/River
- Intermittent Stream
- Other Waterway
- Aquatic Influence Zones (AIZ) within the Fisheries & Aquatics Study Area

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Copyright:© 2013 National Geographic Society, i-cubed
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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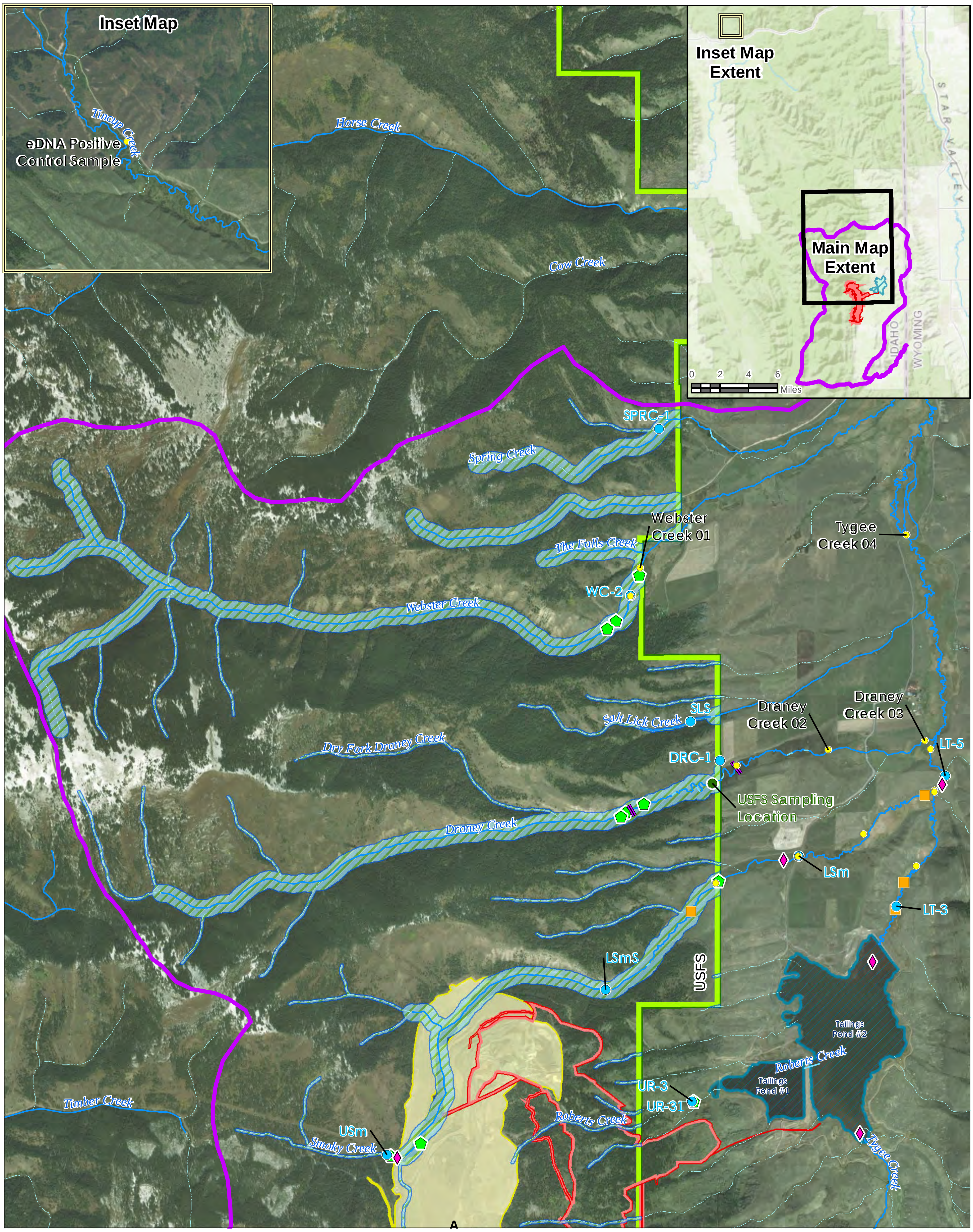
Figure 3.9-1
Fisheries and Aquatics Study Area
East Smoky Panel Mine EIS



Legend

- Project Area Boundary
- Tailings Ponds
- Existing Disturbance Area
- Surface Ownership Boundary
- Fisheries and Aquatics Baseline Study Area
- Aquatic Influence Zones (AIZ) within the Fisheries & Aquatics Study Area
- Stream/River
- Intermittent Stream
- Other Waterway
- 1980 Baseline Sampling Location
- e-DNA Sampling Location
- Aquatic Resource Sampling Location
- USFS Sampling Location
- 2000 Baseline Sampling Location
- BURP Location
- Draney Creek Diversion

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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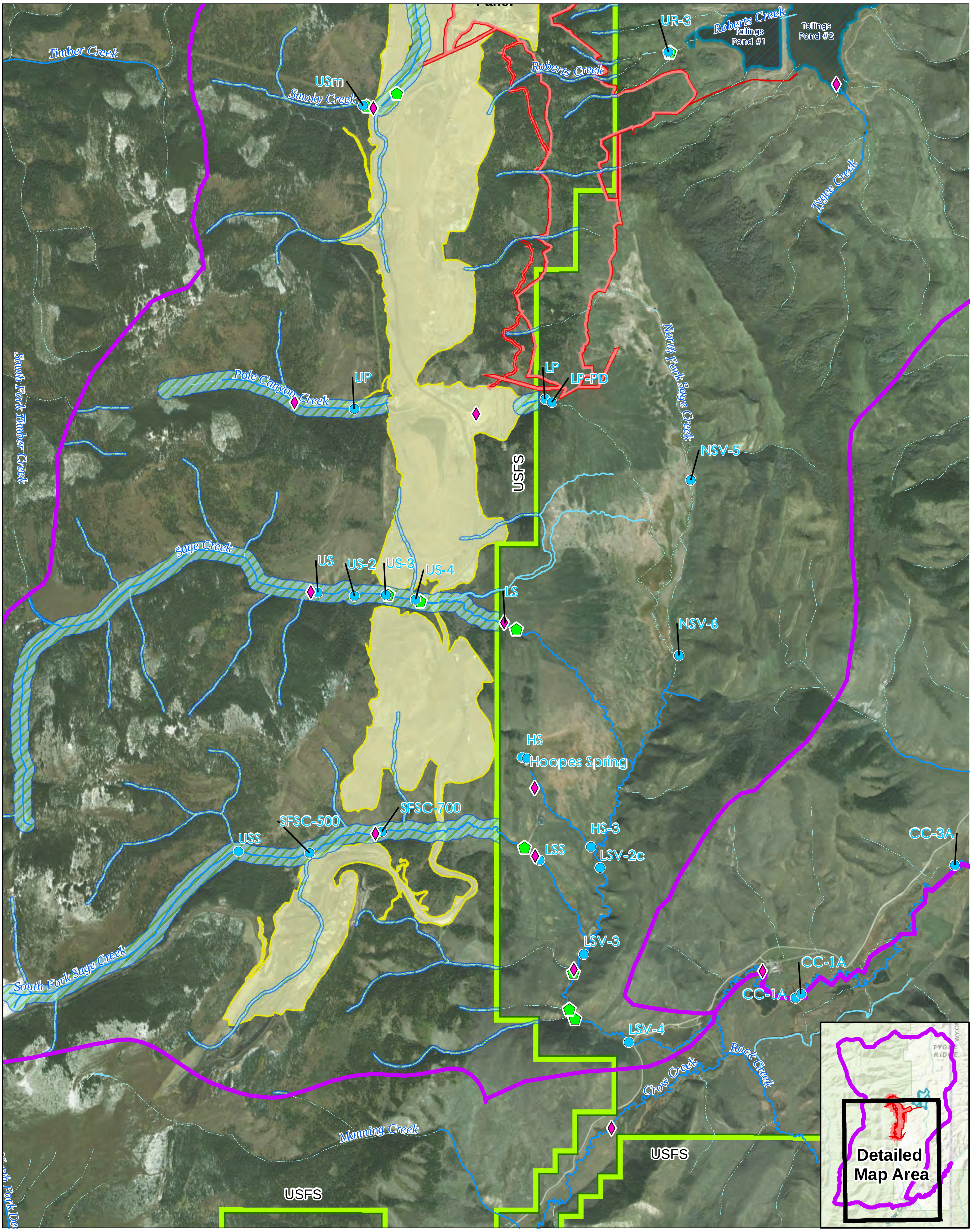
Figure 3.9-2a
Aquatic Influence Zones and Sampling Locations: North End of Study Area
East Smoky Panel Mine EIS



Legend

- Project Area Boundary
- Tailings Ponds
- Existing Disturbance Area
- Surface Ownership Boundary
- Fisheries and Aquatics Baseline Study Area
- Aquatic Influence Zones (AIZ) within the Fisheries & Aquatics Study Area
- Stream/River
- Intermittent Stream
- Other Waterway
- 1980 Baseline Sampling Location
- Aquatic Resource Sampling Location
- BURP Location

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
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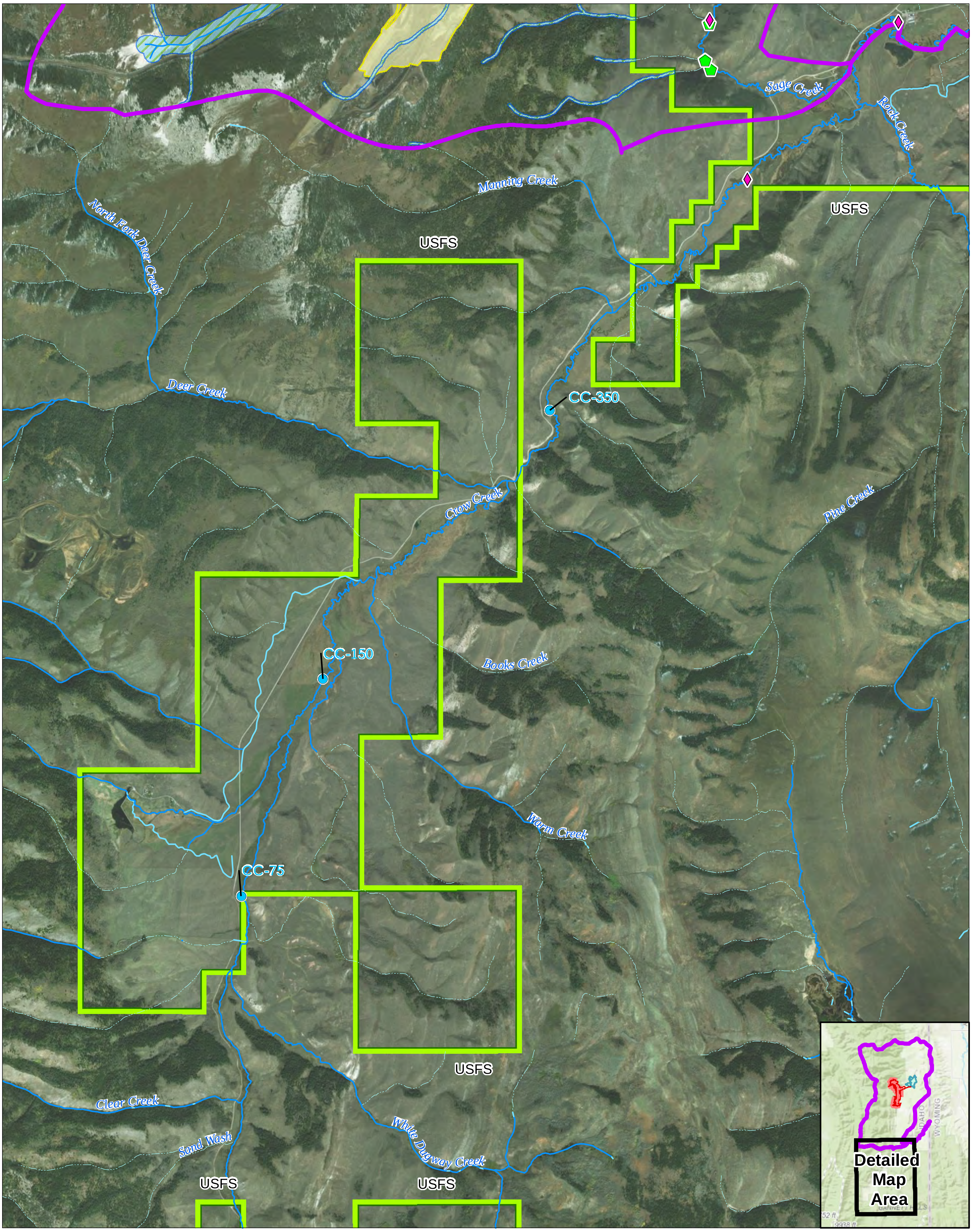
Figure 3.9-2b
Aquatic Influence Zones and Sampling Locations: South End of Study Area
East Smoky Panel Mine EIS



Legend

- Existing Disturbance Area
- Surface Ownership Boundary
- Fisheries and Aquatics Baseline Study Area
- Aquatic Influence Zones (AIZ) within the Fisheries & Aquatics Study Area
- Stream/River
- Intermittent Stream
- Other Waterway
- 1980 Baseline Sampling Location
- Aquatic Resource Sampling Location
- BURP Location

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.9-2c
Aquatic Influence Zones and Sampling Locations: Outside of Study Area
East Smoky Panel Mine EIS

Table 3.9-1 2004 Habitat Quality Data

	SMOKY CREEK		TYGEE CREEK	ROBERTS CREEK	POLE CANYON CREEK		SAGE CREEK				S. FK. SAGE CREEK		HOOPES SPRING
	USm	LSm	LT-5	UR-3	UP	LP	LSV-4	LS	US	US-4	USS	LSS	HS
Discharge (cfs)	0.19	0.89	0.69	0.11	0.43	0.19	11.6	2.5	5.72	-	0.36	5.4	1.5
Cross-section depth (feet)	-	0.31	0.48	-	0.14	-	0.48	0.48	0.41	-	0.15	0.49	0.63
Ave. width (feet)	2.0	1.5-2.0	2.0	1.5-2.0	2.5-3.0	1.5	22	3.5-4.0	3.5-4.0	4.5	2.5-3.0	11	4
Reach length (feet)	300	350	300	300	300	300	660	470	300	300	300	333	300
Rosgen stream type	E	E	B	E	A	G	C	G/B	A	A	A	B	B
Sinuosity	1.8	<1.5	1.9	<1.5	<1.0	<1.0	2	1.5	<1.5	<1	<1	1.3	1.3
Substrate	cobble/ boulder	sand/gravel/ macrophytes	sand/ cobble	sand/gravel/ macrophytes	cobble/ cobble	gravel/ sand/ silt	cobble/ gravel	cobble/ gravel	cobble/ boulder	cobble/ boulder	cobble/ boulder	gravel/ cobble	gravel/ sand
Stream bank conditions	stable/ covered	stable/ covered	unstable/ uncovered	stable/ covered	stable/ covered	unstable/ covered	unstable/ covered	unstable/ covered	stable/ covered	stable/ covered	stable/ covered	stable/ covered	stable/ covered
Bank stability	stable	stable	unstable	stable	stable	unstable	unstable	unstable	stable	stable	stable	stable	stable
Stream bank cover	vegetated	vegetated	uncovered	-	vegetated	vegetated	vegetated	vegetated	vegetated	vegetated	vegetated	vegetated	vegetated
Canopy closure (%) Left	10	30	0	0	100	90	2	<5	30	100	80	2	0
Canopy closure (%) Middle	10	30	0	0	50	90	0	0	20	50	80	0	0
Canopy closure (%) Right	10	30	0	0	100	90	2	5	40	100	80	1	0
% large woody debris (LWD)	20-30	0	0	0	70-80	20	<5	<1	60-70	50	70	0	0
# pools	2	4	2	4	12	1	10	4	8	12	12	2	2
Pool variability	-	-	-	-	-	-	16	-	-	-	-	-	-
Predominant habitat	riffle/run	run	glide/pool	run	riffle/run	riffle/run	glide/pool	riffle/run	riffle/run	riffle/run	riffle/run	riffle/run	riffle/run
Embeddedness score	3	3	6	3	16	5	18	16	18	10	13	18	16
Pool substrate character	-	-	6	-	-	-	18	-	-	-	-	-	-
Channel shape	5	11	5	11	16	2	18	6	12	18	10	15	7
Disruptive pressure	5	8	2	8	10	5	9	5	10	9	8	5	9
Zone of influence	6	6	2	6	8	2	10	2	9	8	6	2	8
Instream cover	LWD/ overhead veg	macrophytes	macrophytes	macrophytes	vegetated/ LWD/ substrate	LWD	vegetated/un dercut banks	substrate only	LWD/ substrate	LWD/ substrate	LWD/ boulders/ canopy	vegetated /undercut banks	Heavy macrophytes
Bank angle (degrees)	40-50	70-80	40-50	90	>140	10-20	>140	50-60	110-120	>140	90-100	>140	120-130
Instream cover score	5	6	2	6	18	5	18	10	17	18	20	11	15
% undercut banks	<10	<5	0	<5	50	<1	60	<5	30	40	30	20	<5

	SMOKY CREEK		TYGEE CREEK	ROBERTS CREEK	POLE CANYON CREEK		SAGE CREEK				S. FK. SAGE CREEK		HOOPES SPRING
	USm	**LSm**	**LT-5**	**UR-3**	**UP**	**LP**	**LSV-4**	**LS**	**US**	**US-4**	**USS**	**LSS**	**HS**
Notes	large amount of fines deposition from flume to culvert under haul road	heavy macrophyte growth in channel, channel almost undefined	several high cut banks eroding	heavy macrophyte growth in channel	2-3x volume of flows present at UP as opposed to LP – good to high quality habitat, pools are plunge/step pools over LWD and boulders	low flow volume, substrate heavily embedded, deeply entrenched, lack of scour velocity flows	some erosion, bank slumping evident	some high banks	high quality habitat, plunge pools present, but small holding areas, several large beaver ponds downstream	stream bank cover consisted of LWD and vegetation, good quality habitat, some embeddedness due to detention pond blowout	width difficult to determine due to heavy vegetative cover – LWD abundant – many downed trees	-	some erosion near mouth of flume

Source: NewFields (2005)

3.9.2.1 Stream Habitat Index (SHI) and Stream Habitat Index 2 (SHI2)

SHI

The SHI, described in Grafe (2002), includes 10 habitat measures indicative of water quality conditions. Five of the metrics are quantitatively measured and five are qualitatively estimated. The metrics are: instream cover; large organic debris (or large woody debris; LWD); percent fines (< 2 millimeters); embeddedness; Wolman size classes; channel shape; percent bank cover; percent canopy cover; disruptive pressures; and zone of influence. A sum of the numeric scores assigned to each metric value produces an overall SHI score from 0 to 100, which is then compared to reference conditions and assigned a condition rating. Condition ratings are assigned based on the 25th and 10th percentiles of reference conditions for three ecoregions.

The Study Area is in the Northern and Middle Rockies ecoregion, with the following conditions ratings:

1 <58 = <10th percentile of reference

2 58-65 = 10th–25th percentile

3 66 = >25th percentile

SHI2

IDEQ revised its assessment guidance in 2016 (IDEQ 2016) and made changes to some of its multimetric indices. The metrics, indices, and scoring of the SHI did not change, but site classification and the condition rating thresholds did. The SHI2 uses a new unified site classification for habitat, macroinvertebrate, and fish indices. Three site classes were developed based on the benthic macroinvertebrate assemblages in reference streams, and then confirmed for habitat and fish. The Study Area is in the Foothill Site Class. Habitat condition rating thresholds for the foothill site class are based on the 50th and 10th percentiles of reference:

1 <53 = <10th percentile of reference

2 53-68 = 10th–50th percentile

3 >68 = >50th percentile

IDEQ has made a policy decision to use SHI2 for data collected from 2013 forward (Van Every 2017). Since most data described in this report is older than 2013, all years are compared to the SHI condition rating thresholds for consistency. However, to comply with the IDEQ decision making, data collected since 2013 is compared to both the SHI and SHI2 condition rating thresholds.

Table 3.9-2 2015 SHI/SHI2 Data, Scores, and Condition Categories

HABITAT VARIABLE	SPRING CREEK	WEBSTER CREEK	DRANEY CREEK	ROBERTS CREEK
	SPRC-1	WC-2	DRC-1	UR-3
Discharge (cfs)	4.88	1.8	1.08	0.25
Ave. width (feet)	14.1	4.4	4.0	1.6
Reach length (feet)	328	328	328	328
Channel shape	100	45	88	100
Gradient (%)	2-4	<2	<2	1-2
% Fines	9.7	9.0	20	22
# Wolman classes	6	6	5	6
% Bank vegetation	100	95	88	100
Mean width undercut bank (feet)	0.30	0.00	0.00	0.00
% Canopy cover	56	34	31	100
# Large organic debris	19	2	0	0
# pools	0	2	5	0
Habitat Distribution				
% Riffle	100	90	75	100
% Pool	0	10	25	0
Substrate – % each size class (mm)				
silt/clay/fine sand (0-2.5)	9.70	9.09	20.38	21.57
fine pebble (2.5-6)	0.00	0.61	0.00	3.92
pebble (6-15)	3.03	6.06	6.37	44.44
coarse pebble (15-31)	9.09	20.00	22.29	20.26
very coarse pebble (31-64)	29.70	33.33	36.31	7.19
small cobble (64-128)	37.58	30.91	14.65	2.61
large cobble (128-256)	10.91	0.00	0.00	0.00
small boulder (256-512)	0.00	0.00	0.00	0.00
medium boulder (512-1024)	0.00	0.00	0.00	0.00
large boulder (>1024)	0.00	0.	0.00	0.00
Total SHI Score[1]	**71**	**58**	**46**	**70**
SHI Condition Category[2]	**3**	**2**	**1**	**3**
SHI2 Condition Category[2]	**3**	**2**	**1**	**3**

Source: Formation Environmental (2016a)

[1] Maximum possible SHI or SHI2 score = 100

[2] SHI Condition categories (Northern and Middle Rockies Ecoregion): 1 <58 = <10th percentile of reference, 2 58-65 = 10th–25th percentile, 3 >66 = >25th percentile. SHI2 Condition categories for (Foothill Site Class): 1 <53 = <10th percentile of reference, 2 53-68 = 10th–25th percentile, 3 >68 = >25th percentile

Table 3.9-3 Substrate Embeddedness Ratings

STREAM	LOCATION	FALL 1990-2002[1]		FALL 2010	FALL 2011	FALL 2013	FALL 2015
		MIN	MAX				
Smoky Creek	LSmS	Dry[2]	2	1	1	2-3	2
	LSm	1	2	1	3	2	2
Tygee Creek	LT-3	1	2	1	2	4	4
Pole Creek	LP/LP-PD[3]	1	2	2	2	2	3
Sage Creek	LS	1	5	5	5	4	4
South Fork Sage Creek	LSS	3	5	4	5	4-5	4
Rating	**Rating Description**						
5	<5% of surface covered by fine sediment						
4	5-25% of surface covered by fine sediment						
3	25-50% of surface covered by fine sediment						
2	50-75% of surface covered by fine sediment						
1	>75% of surface covered by fine sediment						

Source: Formation Environmental 2016b, 2014, and 2012

[1] As summarized in Formation Environmental (2016c), data from 2003-2009 is not included.

[2] LSmS was not sampled until Spring 2001 and was dry in Fall 2001.

[3] Data prior to Fall 2010 is from LP, but the site was moved downstream after construction of the diversion in 2008 and subsequent data is from LP-PD.

3.9.2.2 Spring Creek

Spring Creek is entirely fed by a small spring complex located a short distance upstream of the USFS boundary. It flows onto private land where it is used for fish production and recreational fishing on the Salt River Trout Ranch. On NFS land, it is larger than most of the other nearby headwater streams, with a mean width of approximately 14 feet. As shown in **Table 3.9-2**, it has well vegetated banks and generally a low percentage of fine sediment in the substrate. This is at least partially due to it being spring-fed (i.e., flow is constant, allowing bank vegetation to become well established). There were, however, no pools noted in the survey reach, which affected the overall SHI/SHI2 score (Formation Environmental 2016b). Even with the lack of pools, the total SHI score was 71, which is assigned a condition rating of 3 under both SHI and SHI2. Overall SRI/CSE rating was good (Stantec 2017c).

3.9.2.3 Webster Creek

Webster Creek is a small, spring-fed stream with a channel width that is typically between three and six feet (**Table 3.9-2**). Upstream of the USFS boundary, multiple large beaver ponds provide good habitat for fish; however, trampled and unstable stream banks were noted in the same reach by USFS (2000a). Downstream of the USFS boundary, Webster Creek flows through pasture land that is heavily grazed, with very little streamside vegetation and obvious unstable banks. During visual surveys of the downstream portions, there did not appear to be any water diversions that limit upstream fish movement. The beaver dams near and above the USFS boundary may pose a partial barrier to fish passage; however, observations suggest that side channels with sufficient flow exist to allow movement around and through the pond complexes (Stantec 2017c). On NFS land upstream of the reach sampled in 2015, there is a diversion that conveys a sizeable portion of water to irrigators below the USFS boundary (USFS 2000a), but it is unknown if it presents a barrier to fish passage.

In 2015, habitat at WC-2 received an overall SHI/SHI2 score of 58 and a condition rating of 2 under both the SHI and SHI2 thresholds. It scored poorly for LWD, instream cover, canopy cover, and channel shape (Stantec 2017c). However, it had the lowest percentage of fine sediment of all the streams surveyed to the north of Smoky Creek in 2015, with a substrate composed primarily of coarse/very coarse pebble (size from 15-64 mm; 53 percent) and small cobble (31 percent). SHI scores from Idaho BURP sampling in 1998 and 2004 were 71 and 50, respectively. SHI/SHI2 score in 2013 was 48. The 1998 location was downstream from the site sampled in 2015 (WC-2), and the 2004 and 2013 locations were upstream of WC-2. The 2004 and 2013 locations were within and immediately upstream of beaver pond complexes and contained much higher percentages of fine sediments and lower percentages of covered and stable banks than the site sampled in 1998, which was downstream of the beaver dam complexes. Overall SRI/CSE rating in 2015 was good (Stantec 2017c).

3.9.2.4 Draney Creek

Draney Creek is a small, low flow stream with an average width of approximately four feet. The lower portions (between where it crosses the Stump–Tygee road and its confluence with Tygee Creek) flow through grazed pasture in an artificial channel where there is little riparian vegetation or fish habitat. Upstream of the road crossing, there are large beaver dam complexes mixed in with short undammed stream reaches. The largest beaver dam complex is upstream of the USFS boundary in an area of extremely thick willows (USFS 2010). This area may provide good fish habitat, but is difficult to assess due to the lack of a confined channel. Above the willow/beaver pond area, the stream may at times be intermittent due to an upstream irrigation diversion, which is discussed in the following paragraph and shown on **Figure 3.9-2a**. Because of the limitations present for sampling near the beaver ponds and the intermittent reaches above the beaver ponds, the baseline surveys conducted in 2015 were conducted on private land below the USFS boundary.

There are two diversions and a culvert that may present barriers to upstream fish movement in Draney Creek, at least during periods of the year. These barriers are described in Stantec (2017c). In addition to the two diversions and culverts, there is a channelized portion of the stream channel just upstream of the confluence with Tygee Creek, and the two large beaver dam complexes both upstream and downstream of the downstream diversion discussed above. The channelized portion provides poor fish habitat, but does not appear to impede upstream movement. Similarly, while the beaver dam complexes have the potential to impede upstream movement, they are located in broader portions of the Draney Creek canyon bottom and are spread out with lots of side channels (i.e., beaver dams do not span the entire creek). As a result, they do not appear to prevent upstream fish movement.

Of the streams north of Smoky Creek that were sampled in 2015, Draney Creek received the lowest SHI/SHI2 score (46) and a condition rating of 1 under both SHI and SHI2 thresholds. The low score is due to a high percentage of fine sediment (approximately 20 percent) and limited canopy cover. Draney Creek also had the poorest SRI/CSE score, but still received a rating of good (Stantec 2017c). Upstream of the reach sampled in 2015, the USFS (2010) also noted high amounts of fine sediment and unstable banks. BURP data from 1998 and 2003 had SHI scores and ratings similar to the 2015 score and rating (52 and 58, respectively, both a SHI condition rating of 1). Both the 1998 and 2004 sample locations had high amounts of fines (35 and 52 percent, respectively) and poor scores for embeddedness and bank stability.

Draney Creek was listed as impaired in Idaho's most recent federally approved Integrated Report (IDEQ 2014) due to the inability to meet its presumed beneficial uses of cold water aquatic life, secondary contact recreation, and salmonid spawning, as well as for physical habitat alterations. The pollutants identified were sediment and bacteria (*E. coli*). The SEI conducted in 2012 by IDEQ indicated that stream bank stability is 61 percent (below the 80 percent considered normal) and likely the primary contributing factor to the high amounts of fine sediment already noted above. McNeil core sampling data from 2012 also indicated levels of subsurface fines (62.5 percent < 6.25 millimeters, 22.2 percent < 0.85 millimeters) greater than IDEQ targets (27 percent < 6.25 millimeters, 10 percent < 0.85 millimeters). Sampling for *E. coli* in 2014 indicated that water quality standards for secondary contact recreation were being met, but that more data should be collected (IDEQ 2015c).

3.9.2.5 Smoky Creek

Smoky Creek is a small stream with an average width of approximately three feet and a mean depth of 0.5 feet or less (Chadwick 2001, Mariah 1980). Approximately one mile downstream where the stream enters the mine area, it typically goes dry or has very low flow in late summer and fall. Flow reappears at Lower Smoky Spring (LSmS), which provides the perennial base flow to lower Smoky Creek (Formation Environmental 2014). Downstream of LSmS are a series of beaver dams that cover the channel and much of the valley between the mine access road and the slope on the south side of the valley (Chadwick 2001). Downstream of the beaver dams, the stream meanders through open pasture. There are several diversions in the lower pasture, as least one of which appears capable of diverting the entire flow of Smoky Creek, leaving much of the natural channel dry (Chadwick 2001).

The most extensive habitat data for Smoky Creek comes from Chadwick (2001), which divided the stream into three reaches: reach 1 was from the Tygee Creek confluence upstream to the USFS boundary (≈2.2 miles); reach 2 was from the USFS boundary upstream to the series of beaver dams (≈0.8 miles); and reach 3 was from the upstream end of the beaver ponds (the ponds were not included in reach 2 or 3) to the point where the stream turns west into upper Smoky Canyon near the mine entrance (2.2 miles). Habitat in reaches 1 and 2 was inventoried using the USFS R1/R4 procedure (Overton et al. 1997). Habitat was not inventoried in reach 3 as much of the reach was dry or had minimal flow.

A summary of habitat parameters collected for reaches 1 and 2 by Chadwick (2001) is presented in **Table 3.9-4**. The lower reach, reach 1, had mostly stable banks, but the substrate was dominated by a larger percentage of fines (silt and sand) than reach 2. In contrast, much of reach 2 was deeply incised with unstable banks, but with a much lower percentage of surface fines. Chadwick (2001) hypothesized that the sediment being introduced from the eroded stream banks was being transported downstream into reach 1 (Chadwick 2001).

The embeddedness ratings (**Table 3.9-3**) indicate that there are typically high amounts of fine sediment at the LSm location, which is consistent with the high percentage of fines noted within this reach (reach 1) by Chadwick (2001). The LSm location was moved upstream approximately 400 feet in 2011 due to constraints on private property (Formation Environmental 2016b). The new location has a wider channel with more diverse substrate, which may explain slightly higher scores in 2013 and 2015. The long-term embeddedness data also shows high amounts of fine sediment at LSmS (Formation Environmental 2016b). The stream channel at LSmS is narrow with low flow and is adjacent to the main access road, all of which may contribute to the high amounts of sediment at this location (NewFields 2005).

Table 3.9-4 Summary of Habitat Parameters Measured on Smoky Creek in 2000

PARAMETER	REACH 1 (MOUTH TO CTNF BOUNDARY)	REACH 2 (CTNF BOUNDARY TO BEAVER PONDS)
Reach length (miles)	2.2	0.8
Mean width (feet)	3.0	3.6
Mean depth (feet)	0.5	0.3
Stable bank (%)	84.7	4.3
Undercut bank (%)	43.0	4.9
Gradient	1.4	2.2
Habitat types (% total)		
Low gradient riffle	19.3	69.4
Run	76.5	26.1
Pools	3.9	4.5
Other	0.3	0.0
% Surface fines	53.0	8.6
Substrate type (% total)		
Fines	51.7	15.0
Gravel	43.3	67.5
Cobble	5.0	17.5
Boulder	0.0	0.0
Bedrock	0.0	0.0

Source: Modified from Chadwick (2001)

Smoky Creek was listed as impaired in Idaho's most recent federally approved Integrated Report (IDEQ 2014) due to the inability to meet its presumed beneficial uses of cold water aquatic life, secondary contact recreation, and salmonid spawning, as well as physical habitat alterations. The pollutants identified were sediment and bacteria (*E. coli*). The SEI conducted in 2012 by IDEQ indicated that stream bank stability is 10 percent. This is well below the 80 percent considered normal, and is the primary contributing factor to the high amounts of fine sediment noted above. No suitable spawning habitat was found in 2012 using McNeil core sampling.

3.9.2.6 Tygee Creek

Tygee Creek is a small stream that flows north from the area containing the existing tailings ponds. The reach of Tygee Creek between Smoky Creek and the tailings ponds is a low gradient, meandering stream in mostly open meadow that is grazed by cattle (Chadwick 2001, Mariah 1980). The channel is narrow and relatively deep, with glide/pool habitat the dominant habitat type (**Table 3.9-1**). Streambanks are generally unstable and suffer from severe undercut erosion (Formation Environmental 2016b). Downstream where Smoky Creek enters, the stream becomes wider, but continues to flow through grazed pasture until its confluence with Stump Creek.

Tygee Creek generally has a gravel substrate, but with high percentages of fine sediment. Sediment was sampled on Tygee Creek approximately 350 m downstream from the dam in 2000 using a McNeil sampler by personnel from Maxim (with data reported in Chadwick 2001). Three replicate samples were taken from a riffle and results were 40 percent fines, 51 percent gravel, and 9 percent cobble (Chadwick 2001). The long-term embeddedness data (**Table 3.9-3**) shows that while embeddedness has historically been high at the LT-3 site, relatively high rankings for embeddedness (5-25 percent of the gravel particles covered by fine sediment) have been achieved in 2013 and 2015. However, this may be due to the fact that during assessments, the majority of areas with fine sediments were inundated with aquatic macrophytes (Formation Environmental 2016b). Because embeddedness is assessed visually, assessments have, therefore, occurred in areas without vegetation where the substrate is visible and there are lower amounts of fine sediment.

Tygee Creek was listed as impaired in Idaho’s most recent federally approved Integrated Report (IDEQ 2014) due to the inability to meet its presumed beneficial uses of cold water aquatic life and salmonid spawning, as well as for physical habitat alteration. Sediment issues, as described above, were confirmed by the SEI conducted in 2012, which indicated that stream bank stability is 55 percent (below the 80 percent considered normal; IDEQ 2015c).

3.9.2.7 Roberts Creek

Roberts Creek is a very small spring-fed stream that flows from the area just east of the existing mine down to the tailings ponds. At the tailings ponds, it is impounded behind a small dike and then routed in an artificial channel around the ponds to its confluence with Tygee Creek. The reach upstream of the impoundment is low gradient, with very few meanders, and is dominated by narrow run type habitat. Banks are generally well vegetated and stable (**Table 3.9-1**). The reach surveyed in 2015 had a substrate dominated by pebble (44 percent) and coarse pebble (20 percent), but with high amounts of surface fines (22 percent) (**Table 3.9-2**).

SHI/SHI2 score in 2015 was 70 with a condition rating of 3 under both SHI and SHI2 thresholds. Habitat measures that scored well were percent bank vegetation, canopy cover, disruptive pressure, and zone of influence. Measures that scored poorly were large organic debris (the stream is in an open meadow and willows, with no potential for large organic debris recruitments) and substrate (both percent fines and number of Wolman classes). SHI score (48) from the 2002 BURP location was lower than in 2015. The 2002 BURP location was near the 2015 sample location; however, IDEQ (2015c) noted that the 2002 sample was taken from a marshy location and is not representative of the entire reach. IDEQ (2015c) recommended that Roberts Creek be removed from Idaho’s list of impaired streams in the next integrated report.

3.9.2.8 North Fork Sage Creek

North Fork Sage Creek is a very narrow stream that flows along the eastern edge of Sage Valley. The stream starts near several small ponds on the northern end of the valley, and appears to be intermittent in this upper reach. Further south, flow is augmented by flow from several springs and appears to be perennial. Fish habitat has not been assessed in North Fork Sage Creek. North Fork Sage Creek was listed as impaired in Idaho's most recent federally approved Integrated Report (IDEQ 2014) due to selenium.

3.9.2.9 Pole Canyon Creek

Pole Canyon Creek is a small stream that passes between Panels A and D of the existing mine. It has been heavily impacted by the Pole Canyon ODA that covers a portion of Pole Canyon Creek's lower drainage, just upstream of its entry into Sage Valley. During construction of the ODA, coarse materials were dumped in the narrow canyon bottom first to form a "French drain" that would allow the stream to pass through the overburden. Several failures of the fill material occurred throughout the years, which likely resulted in the addition of fine-grained materials to the coarse overburden in the drainage bottom (NewFields 2005).

Various studies, such as the SI, identified contamination of groundwater and surface water due to water contacting material in the ODA (NewFields 2005). Various agreements (summarized in Formation Environmental 2014) led to construction of several projects designed to improve water quality in lower Pole Canyon Creek. These included: 1) a pipeline that diverts a portion of Pole Canyon Creek around the ODA so that it no longer comes in contact with the overburden; 2) an infiltration basin that directs any flow not captured by the pipeline into the Wells Formation aquifer upstream of the ODA; and 3) a channel along the hillslope to the north of the ODA intended to prevent water from running onto the ODA and contacting the overburden (Formation Environmental 2014). The pipeline and infiltration basin were completed in 2007 and the channel along the hillslope was completed in 2008. Installation of a Dinwoody cover to prevent water from infiltrating the ODA was begun in 2015 (Formation Environmental 2014).

Following construction of the diversion pipeline, the monitoring site on Pole Canyon Creek (LP) was moved downstream of the diversion outlet (LP-PD). As a result, some of the data in **Table 3.9-1** represents portions of the channel that are now dry. Upstream of the ODA, Pole Canyon Creek is relatively small (average width = 2.5–3.0 feet), with good quality habitat (i.e., clean substrate, stable banks, plunge pools, etc.). Downstream of the diversion, the stream is smaller (average width = 1.5 feet) due to flow lost to the infiltration basin and is impacted by additional water diversions (Formation Environmental 2016c). Impacts are evident in the long-term embeddedness data (**Table 3.9-3**), which shows that historically 50-75 percent of the substrate has been covered with fine sediment. There was less fine sediment reported in 2015. However, Formation Environmental (2016c) noted little overall change in their qualitative assessment in 2015; the channel was deeply incised and narrow, with very low flow and heavily eroded streambanks. Lower Pole Canyon Creek is diverted downstream of LP-PD, where flows only occasionally reach North Fork Sage Creek during periods of high spring runoff, which limits fishery potential at the site.

3.9.2.10 Hoopes Spring

Hoopes Spring is a large spring complex located between Sage Creek and South Fork Sage Creek that flows across the southern end of Sage Valley and into lower Sage Creek. Downstream reaches were called Middle Fork Sage Creek in early reports (Mariah 1980). Several sites have been sampled over the years, with the most common being HS and HS-3. HS is located near the source area and HS-3 is located further downstream where the many spring sources coalesce into a channel prior to joining Sage Creek. Habitat at HS was quantified in 2004 as shown in **Table 3.9-1**. At that site, it is a shallow, narrow stream with well covered and vegetated banks. Downstream, at HS-3, the stream becomes wider with more pool/glide habitat (Formation Environmental 2016a). SHI scores and conditions ratings from 2006–2015 have ranged from 32-45 at HS-3, which is a condition rating of 1. Mean summer flow for the same period at HS-3 is 6.73 cfs. As discussed in **Section 3.9.5**, water from Hoopes Spring is the primary source of selenium to Sage Creek and Crow Creek.

3.9.2.11 Sage Creek

Sage Creek begins in heavily vegetated forest land in an area with considerable beaver activity (Mariah 1980). It then flows through the active mine area and down into Sage Valley. As shown in **Table 3.9-1**, it has an average width of 3.5-4.0 feet at the US location, along with stable banks and a cobble/boulder substrate. There are pools present as well as large beaver dams. The LS location is downstream of the mine haul road crossing with disturbances noted at the site (Formation Environmental 2016c). The stream at this location is wider than upstream and relatively shallow, with high sinuosity (Formation Environmental 2016c). Despite the disturbance near the site, embeddedness has been lower than on many of the other streams, ranging from <5 percent to between 5-25 percent (**Table 3.9-3**). Formation Environmental (2016c) reports an abundance of medium to large cobbles.

SHI index scores at BURP sites within the active mining area were 79 and 71 in 1996 and 2001, respectively, with condition ratings of 3. These scores indicate good habitat present at these locations. Downstream of the active mining area, at the 2006 BURP location near the LS monitoring location, SHI score was 41, with a condition rating of 1. The lack of cover influenced the lower condition rating. However, IDEQ revisited the site in 2014 to conduct a SEI and pebble count. The data showed stable banks (96 percent) along a longer stream reach than was evaluated in 2006 and low amounts of fine sediment. IDEQ (2015) recommended that Sage Creek be resampled prior to considering removal from the list of impaired waters (currently listed upstream of the confluence with the North Fork Sage Creek due to combined biota/habitat bioassessments).

Further downstream, particularly near the confluence with Crow Creek, the stream channel and habitats change. It becomes much wider (22 feet at the LSV-4 location in 2004), with more glide/pool habitat. Some erosion and unstable banks were noted in 2004. SHI scores at the 1995 and 2001 BURP locations were 55 and 59, respectively, both with a condition rating of 2. SHI/SHI2 score at the 2013 BURP location was 50, which receives a condition rating of 1 under both SHI and SHI2 thresholds. The 2013 BURP location was located midway between the other two BURP locations. Although these scores are lower than the upstream locations, reflecting a decline in habitat conditions in a downstream direction, they have been relatively stable over time, indicating stable conditions. The reach of Sage Creek from the confluence with the North Fork Sage Creek down to Crow Creek is listed as impaired due to selenium (IDEQ 2014).

3.9.2.12 South Fork Sage Creek

As summarized in Formation Environmental (2016b), South Fork Sage Creek originates on NFS land west of the existing mine, flows east along the southern boundary of Panel E and into Sage Valley where it joins Sage Creek. Upper sections may be intermittent, with the South Fork Sage Creek Spring complex located approximately 500 feet upstream of LSS providing most of the flow to the lower portion of the stream. Habitat conditions in 2004 at both the upstream and downstream locations were good, with abundant LWD at the USS location and stable, vegetated banks at both locations. Maxim (2004b) also noted stable banks and gravel substrates at two sites assessed on South Fork Sage Creek in 2003. LWD was noted at both of the Maxim (2004b) sites, particularly the upstream location, which is consistent with the 2004 data. Embeddedness ratings have been between four and five since 2010, which is within the historic range and lower than most other stream locations (**Table 3.9-3**).

SHI score at the 2006 BURP location, located near LSS, was 54 with a condition rating of 1. Based on the 2006 BURP score, South Fork Sage Creek was listed as impaired due to combined biota/habitat bioassessments (IDEQ 2014). However, a site visit in 2014 revealed that the 2006 assessment was conducted in a reach of stream between two fences where cows were concentrated (IDEQ 2014). The 2012 SEI documented good bank stability (83 percent) and low amounts of surface fines in a longer, more representative reach (IDEQ 2015c). IDEQ (2015c) recommended a BURP resample in a more representative reach (it remains listed for combined biota/habitat bioassessments, as well as selenium).

3.9.2.13 Crow Creek

Habitat in Crow Creek was characterized by Maxim (2004b) as having a predominantly gravel substrate, with a stable riffle-pool pattern. Crow Creek was listed as impaired for *E. coli*, but the listing was in error (IDEQ applied data from a lower 4th order segment) and IDEQ (2015c) recommended that it be delisted.

Habitat conditions have been assessed as part of the SSSC (2007 and 2008), and Panels F and G monitoring (2009, 2010, 2011, and 2014). **Table 3.9-5** shows SHI/SHI2 and SRI scores from these assessments. SHI/SHI2 scores were generally low at all sites, typically within condition category 1 or 2. The lowest scores were at CC-350 in all years except 2007. SHI scores at most sites were highest in 2011, with scores higher only in 2014 at CC-350 and CC-1A. CC-1A, which is downstream of Sage Creek, had SHI scores similar to sites above mining related disturbance (CC-75 and CC-150, **Figure 3.9-2c**). SRI/CSE scores were similar between sites, with most sites scoring in the good stability range (39-76) in most years. CC-350 scored in the fair range (77-114) in most years.

Table 3.9-5 Summary of SHI and SRI/CSE Scores for Crow Creek, 2007–2011, & 2014

SITE	YEAR	SHI/SHI2 SCORE[1]	CONDITION CATEGORY[2]		SRI/CSE SCORE[3]	DATA SOURCE
			SHI	SHI2		
CC-75	Fall 2007	50	1		89	SSSC
	Fall 2008	56	1		70	SSSC
	Fall 2009	58	2		72	Panels F & G
	Fall 2010	55	1			Panels F & G
	Fall 2011	70	3		68	Panels F & G
	Fall 2014	60		2	65	Panels F & G
CC-150	Fall 2007	47	1		75	SSSC
	Fall 2008	56	1		76	SSSC
	Fall 2009	61	2		56	Panels F & G
	Fall 2010	59	2			Panels F & G
	Fall 2011	65	2		62	Panels F & G
	Fall 2014	60		2	54	Panels F & G
CC-350	Fall 2007	47	1		90	SSSC
	Fall 2008	39	1		103	SSSC
	Fall 2009	58	2		92	Panels F & G
	Fall 2010	46	1			Panels F & G
	Fall 2011	55	1		79	Panels F & G
	Fall 2014	58		2	69	Panels F & G
CC-1A	Fall 2007	50	1		76	SSSC
	Fall 2008	51	1		83	SSSC
	Fall 2009	60	2		66	Panels F & G
	Fall 2010	52	1			Panels F & G
	Fall 2011	60	2		68	Panels F & G
	Fall 2014	65		2	59	Panels F & G

Source: Formation Environmental (2016a)

[1] Maximum possible SHI or SHI2 score = 100

[2] SHI Condition categories (Northern and Middle Rockies Ecoregion): 1 <58 = <10th percentile of reference, 2 58-65 = 10th–25th percentile, 3 >66 = >25th percentile. SHI2 Condition categories for (Foothill Site Class): 1 <53 = <10th percentile of reference, 2 53-68 = 10th–25th percentile, 3 >68 = >25th percentile

[3] Overall Score Ranges: <38 Excellent, 39-76 Good, 77-114 Fair, >115 Poor

3.9.3 Macroinvertebrates

Biological monitoring of benthic macroinvertebrate populations in the Study Area began in 1979. The sampling program varied in subsequent years in regard to site locations and sampling season, though sample methodology has been consistent. Since 2011, six sites on five streams have been sampled biannually. The aquatics and fisheries TR (Stantec 2017c) discusses program and methodology details. Metrics analyzed and reported have also varied, but since 2010 have included those associated with the Stream Macroinvertebrate Index (SMI and SMI2), which are described below in **Section 3.9.3.1**.

Formation Environmental's (2016c) annual report for Simplot provides results for the most recent 2015 samples, as well as comparison to long-term data. Other data sources include IDEQ BURP data (sites on Webster Creek, Draney Creek, Smoky Creek, Tygee Creek, Roberts Creek, Sage Creek, and South Fork Sage Creek); Maxim (2004b); the SI; the RI; and the data collected on Crow Creek for development of the SSSC, the Panels F and G mitigation monitoring, and the voluntary monitoring (Formation Environmental 2016a).

Table 3.9-6 presents SMI metric scores at the long-term monitoring sites. Data on taxa richness, diversity, density, and evenness for the same sites is contained in Stantec (2017c). Stantec (2017c) also includes SMI2 scores for Sage Creek and South Fork Sage Creek in 2013 and 2015. SMI2 scores were calculated for these sites only, as other sites lacked the habitat data to calculate the adjusted metrics of the SMI2. **Tables 3.9-7** and **3.9-8** present SMI scores and condition ratings for Sage Creek and Crow Creek. Additional SMI scores and ratings can be found in Stantec (2017c).

3.9.3.1 Stream Macroinvertebrate Index (SMI) and Stream Macroinvertebrate Index 2 (SMI2)

The SMI and SMI2 were both developed by IDEQ, with the SMI2 being the most recent revision (IDEQ 2016). The indices are similar, but the metrics and rating categories vary as described below. IDEQ policy is to use the SMI2 for data collected from 2013 forward (Van Every 2017). Since most data described in this report is older than 2013, all data is compared to the SMI for consistency. Data collected since 2013 that has sufficient habitat data to calculate the metrics is also compared to the SMI2.

SMI

Development of the SMI included sampling streams known to be minimally affected by anthropogenic factors (i.e., streams that include high-quality habitats and good water quality). The index is organized such that an overall higher score, which ranges from 0 to 100 and is derived as a sum of the various metrics, indicates a stream is in good condition. A low score indicates the stream has been degraded relative to its potential score. The SMI includes nine metrics: total taxa richness; taxa richness for Ephemeroptera, Plecoptera, and Trichoptera (EPT); percent composition of Plecoptera; Hilsenhoff's Biotic Index (HBI), the percent dominance of the five most common taxa in the sample; percent composition of organisms in the "scrapers" feeding group, and; percent composition of organisms in the "clinger" feeding group. The indications provided by each of these metrics are described in Grafe (2002) and summarized in Stantec (2017c).

Table 3.9-6 Comparison of SMI Metrics at Long-term Monitoring Sites – 2010–2013, & 2015

	LSmS				LSm				LT-3				LP-PD				LS				LSS			
	2010	2011	2013	2015	2010	2011	2013	2015	2010	2011	2013	2015	2010	2011	2013	2015	2010	2011	2013	2015	2010	2011	2013	2015
Total Taxa Richness 100*(Total Taxa)/95th	43	51	43	43	51	59	49	59	59	51	59	57	62	65	41	51	62	54	70	57	70	59	68	59
Ephemeroptera Richness 100*(Ephemeroptera Taxa)/95th	30	40	30	30	20	50	20	30	20	10	30	50	60	60	30	50	60	60	70	70	60	60	50	60
Plecoptera Richness 100*(Plecoptera Taxa)/95th	50	38	38	38	25	38	38	50	25	13	13	0	50	63	25	25	38	25	38	38	38	38	25	25
Tricoptera Richness 100*(Tricoptera Taxa)/95th	0	22	33	33	33	33	56	44	44	56	67	67	56	56	22	33	33	67	44	22	56	67	78	78
Percent Plecoptera 100*(%Plecoptera Taxa)/95th	29	34	100	31	19	7	57	63	1	4	11	0	31	24	25	18	82	22	100	100	33	18	24	46
Hilsenhoff's Biotic Index (HBI) 100*(10-HBI)/(10-5th)	71	66	84	95	58	64	78	79	36	44	63	52	86	92	63	83	76	74	75	78	100	100	92	100
% 5 Dominant Taxa 100*(100-%5dom Taxa)/(10-5th)	65	25	46	28	46	23	67	66	6	26	29	31	40	45	24	80	35	31	40	35	45	23	53	46
Scraper Taxa 100*(Scraper Taxa)/95th	50	63	38	50	13	50	25	38	63	50	75	100	63	63	38	50	38	63	75	75	75	63	88	75
Clinger Taxa 100*(Clinger Taxa)/95th	42	53	42	53	42	68	53	68	53	47	63	68	68	68	37	58	58	63	84	74	84	79	84	84
SMI Score (Range 0-100)	42	44	50	45	34	44	49	55	34	33	46	47	57	59	34	50	54	51	66	61	62	56	62	64
Condition Rating	1	1	1	1	1	1	1	2	1	1	1	1	2	3	1	1	2	2	3	3	3	2	3	3

Source: Formation Environmental (2016c, 2014, 2012)

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Formation Environmental (2012, 2014, and 2016c) has used a SMI rating category system derived from examples in Grafe (2002), rated 1–3, based on the 25th percentile and the 10th percentile as shown below:

1	33-50 = minimum–10th percentile
2	51-58 = 10th –25th percentile
3	>59 = > 25th percentile

SMI2

As described for the SHI2 in **Section 3.9.2.1**, three site classes were developed based on benthic macroinvertebrate assemblages in reference streams. The Study Area is in the Foothill Site Class. The SMI2 includes six metrics for the Foothill Site Class: EPT taxa richness; percent composition of non-insect taxa; percent composition of EPT (excluding Hydropsychidae); percent composition of organisms in the "scrapers" feeding group; percent composition of tolerant taxa, and percent composition of sprawler taxa. A summary of the indications provided by each of these metrics is presented in Stantec (2017c). EPT taxa richness, percent non-insect taxa, and percent sprawler taxa are adjusted metrics. EPT taxa richness and percent non-insect taxa are adjusted for the proportion of fines in the substrate and percent sprawler taxa and adjusted for the percent of pool habitat in the sampled reach.

Condition rating thresholds for the Foothill Site Class are based on the 50th and 10th percentiles of reference:

1	<53 = <10th percentile of reference
2	53-61 = 10th–50th percentile
3	>61 = >50th percentile

3.9.3.2 Spring Creek

As part of the baseline data collection conducted in 2015, macroinvertebrates were sampled in Spring Creek to measure selenium concentrations in tissue. However, macroinvertebrates were not sampled quantitatively or assessed for community composition. Taxa data from the benthic tissue samples is contained in the Fisheries and Aquatics TR (Stantec 2017c).

3.9.3.3 Webster Creek

As part of the baseline data collection conducted in 2015, macroinvertebrates were sampled in Webster Creek to measure selenium concentrations in tissue. However, macroinvertebrates were not sampled quantitatively or assessed for community composition. Taxa data from the benthic tissue samples is contained in the Fisheries and Aquatics TR (Stantec 2017c).

Macroinvertebrates were sampled at BURP sites in 1998, 2004, and 2013. The 1998 location was downstream from the site sampled in 2015 (WC-2), and the 2004 and 2013 locations were upstream of WC-2. SMI scores were 65 and 66, in 1998 and 2004, respectively. SMI2 score in 2013 was 66. SMI/SMI2 condition ratings were 3 for all sites/years. Based on these sites, Webster Creek appears to provide good conditions for healthy macroinvertebrate populations and the conditions appear relatively stable over time.

3.9.3.4 Draney Creek

As part of the baseline data collection conducted in 2015, macroinvertebrates were sampled in Draney Creek to measure selenium concentrations in tissue. However, macroinvertebrates were not sampled quantitatively or assessed for community composition. Taxa data from the benthic tissue samples is contained in the Fisheries and Aquatics TR (Stantec 2017c).

Macroinvertebrates were sampled at one of the three BURP sites on Draney Creek. In 1998, the SMI score was 44, with a condition rating of 1. Given the habitat conditions, the likely limiting factor for macroinvertebrates is sediment.

3.9.3.5 Smoky Creek

Total SMI scores have been consistently low for LSmS and LSm from 2010–2015, with condition ratings greater than the minimum but less than the 10th percentile of reference conditions. It is likely that both sites are limited by high percentages of fine sediment, which reduces interstitial spaces necessary for macroinvertebrates. LSmS is also limited by the small amount of flow at the site, and the small narrow channel it forms, both limiting the macroinvertebrate habitat available (Formation Environmental 2012). Although SMI scores are consistently low, there is no clear upward or downward trend. Long-term richness, diversity, density, and evenness metrics are variable, but there is no clear upward or downward trend, which indicates conditions are relatively stable over time at both sites (Stantec 2017c).

When comparing the LSmS and LSm, there is no clear trend between total SMI scores (i.e., one site does not have consistently higher total scores than the other). There is also no clear trend between sites in the majority of the individual metrics. The exceptions are percent Plecoptera, HBI, percent 5 dominant taxa, and scraper taxa. Scores for these metrics have been higher at LSmS from 2010–2015. While these metrics differ somewhat in their indication, their SMI scores are all expected to be lower at a site where there are more disturbances and a more unstable substrate. The more open nature of the stream at LSm may contribute to low scores for these metrics at LSm.

SMI scores at the three BURP locations sampled in 1997 (two sites) and 2002 had scores of 50, 51, and 55, respectively. The 1997 sites are near USm and have scores similar to those recorded at that site in 2010 (Stantec 2017c). The 2002 site is upstream of LSm and it is unclear how that site compares to conditions at LSm. The macroinvertebrate data collected by Chadwick (2001) had higher taxa richness, diversity, and density than data that has been collected as part of the long-term monitoring. However, the data was also collected from different sites and it is unclear how comparable it is. Further, Chadwick (2001) noted that there were no apparent effects to macroinvertebrates from the high sediment levels noted in their other studies. They attribute this to their sampling method, which concentrated samples in riffles areas with coarse gravel/cobble substrates.

3.9.3.6 Tygee Creek

Total SMI score and condition rating has consistently been low at LT-3, reflecting overall poor conditions for macroinvertebrates at this site. However, there is no clear temporal trend in any of the SMI metrics, or in taxa richness, density, or evenness. Diversity has increased at the site since 2010, with diversity in 2015 higher than in all previous years. Metrics that consistently score low at this location are Plecoptera richness and percent Plecoptera. Macroinvertebrates were also sampled in 2010 at location LT-5 as part of the RI. Total SMI score was 27, which is less than the minimum threshold.

3.9.3.7 Roberts Creek

Less data is available for Roberts Creek than for some of the other streams in the Study Area. The most recent community data is from 2010 and indicates conditions are between the 10th and 25th percentile of reference conditions, with a SMI score of 52 (Stantec 2017c). SMI score from the 2002 BURP location (which was in essentially the same location as the 2010 sample) is similar, with a score of 56. Although two samples are insufficient to establish a conclusive trend, conditions at least appear to be relatively stable at that location. Macroinvertebrates were sampled in 2015, but only for tissue analysis.

3.9.3.8 North Fork Sage Creek

North Fork Sage Creek has been sampled only once, in 2010 as part of the RI (Stantec 2017c). SMI score was 13, which is less than the minimum threshold. Macroinvertebrate habitat in North Fork Sage Creek is extremely limited by lack of flow and high sediment.

3.9.3.9 Pole Canyon Creek

Total SMI scores at the LP-PD location have declined between 2011 and 2013, with an increase to near 2011 levels in 2015. In addition, most individual SMI metrics have declined since 2011, with a rebound for some in 2015. The higher scores for most metrics in 2011 may have been due to increased water that year from a wet spring and high runoff. Formation Environmental (2016c) suggests that communities at the LP-PD site are impacted by one or more factors, including water quantity, lack of habitat, and residual contaminated sediment from the water quality issues that were present prior to construction of the diversion.

3.9.3.10 Hoopes Spring

Macroinvertebrate populations at Hoopes Spring have been monitored infrequently. SMI scores for the HS location from 2006, 2007, and 2008 were 38, 29, and 27, respectively. Condition rating in 2006 was 1, and the other two years were below the minimum threshold. It should be noted that the channel at HS was almost completely clogged with aquatic macrophytes making sampling there difficult (Covington 2017). SMI scores for the HS-3 location for 2006, 2007, and 2008 were 39, 44, and 40, respectively, with a condition rating of 1. The most recent monitoring at HS-3 in 2010 resulted in a similar SMI score (41) and condition rating (1). This is indicative of poor conditions, which could be due to poor habitat (see **Section 3.9.2**) as well as selenium contamination (**Section 3.9.5**).

3.9.3.11 Sage Creek

Macroinvertebrate communities have been well sampled in Sage Creek (**Tables 3.9-6** and **3.9-7**). In the portion of the stream nearest the mine, essentially from the LS location and upstream, SMI scores have typically been good with condition ratings of 2 and 3 at most locations. The exception was US-4, which had a SMI of 44 and a condition rating of 1 in 2010. In contrast, the BURP sample taken near this location in 2001 had a SMI of 71 and a condition rating of 3. However, it was reported that US-4 was at the upper end of a beaver pond area in 2010 (Covington 2016). The fine sediment accumulation due to ponding likely led to the lower score at US-4 both temporally and spatially (i.e., relative to the other nearby sites sampled in 2010).

Although metrics like taxa richness, diversity and evenness appear to be relatively static at the long-term LS location over time, total SMI/SMI2 scores, and scores for many of the individual SMI metrics, have increased in the last two years sampled. The total SMI score has also increased relative to the 2006 BURP SMI score. This may indicate an improvement in conditions at the location, with what appears to be a relatively healthy benthic community (Formation Environmental 2016c).

Downstream of the LS location, between South Fork Sage Creek and Crow Creek the SMI scores have varied widely between 33 (below the minimum threshold) in 2013 at the BURP location near LSV-3 and 65 (condition rating 3) at the BURP location between LSV-4 and LSV-3 (Stantec 2017c). Sampling at LSV-2C and LSV-4 indicates conditions generally at the 10th percentile of reference conditions (**Table 3.9-7**). The poorer conditions downstream may be due in part to higher sediment loads, as well as water quality concerns (i.e., selenium).

Table 3.9-7 SMI Scores and Ratings at Lower Sage Creek Monitoring Locations

LOCATION	SCORE/ RATING	FALL 2006	FALL 2007	FALL 2008	FALL 2009	FALL 2010	FALL 2011	FALL 2014
LSV-2C	SMI	47	51	39	38	49	34	37
	Condition Rating	2	2	1	1	1	1	1
LSV-4	SMI	47	NS	NS	NS	51	34	43
	Condition Rating	1				2	1	1

Source: SSSC, Panels F & G Monitoring, Voluntary Monitoring (Formation Environmental 2016c)
NS = Not Sampled

3.9.3.12 South Fork Sage Creek

The LSS location on South Fork Sage Creek has had higher scores for nearly all metrics than most other locations within the Study Area, with SMI condition ratings of 3 in most years. Only the 2006 BURP data, 2011 data, and 2013 data had SMI/SMI 2 ratings of 2 rather than 3. The 2013 SMI2 rating was on the threshold between a rating of 2 and 3 and the overall score was similar to other years. Other than a dip in 2011, there is no clear trend in the SMI metric data or in the longer-term taxa richness, diversity, density, and evenness data. Data from Maxim (2004b) reported taxa richness numbers at both locations they sampled similar to the richness seen at LSS with the long-term monitoring. Diversity, however, was much lower at both Maxim (2004b) sites. Maxim (2004b) hypothesized that low scores were due to historic land use practices.

3.9.3.13 Crow Creek

Macroinvertebrate populations have been monitored routinely at several locations (**Table 3.9-8**). Maxim (2004b) also sampled two Crow Creek sites in 2003, but for only a subset of metrics included in the SMI. Maxim site locations are shown on **Figure 3.9-2b**.

SMI scores and condition ratings have been variable at all sites. Taxa richness has also been relatively low and similar to richness at the Maxim (2004b) locations (Stantec 2017c). Low SMI scores and low taxa richness indicates that Crow Creek macroinvertebrate populations in these reaches are limited, most likely by sediment, but that conditions have remained relatively stable over the years sampled, with no clear upward or downward trend.

Table 3.9-8 SMI Scores and Ratings at Crow Creek Monitoring Locations

LOCATION	SCORE/ RATING	FALL 2006	FALL 2007	FALL 2008	FALL 2009	FALL 2010	FALL 2011	FALL 2014
CC-75	SMI	56	59	48	65	56	44	51
	Condition Rating	2	3	1	3	2	1	2
CC-150	SMI	54	51	39	52	47	40	54
	Condition Rating	2	3	1	2	1	1	2
CC-350	SMI	51	52	48	54	51	42	60
	Condition Rating	2	2	1	2	2	1	3
CC-1A	SMI	45	40	41	53	32	41	36
	Condition Rating	1	1	1	1	1	1	1
CC-3A	SMI	63	46	40	NS	NS	NS	36
	Condition Rating	3	1	1				1

Source: SSSC, Panels F & G Monitoring, Voluntary Monitoring (Formation Environmental 2016c) NS = Not Sampled

3.9.4 Fish Populations

The Tygee Creek and Sage Creek watersheds provide habitat for several fish species. The fish species documented in the various streams within these watersheds are shown in **Table 3.9-9**. Yellowstone cutthroat trout (YCT) and sculpin are found throughout both watersheds. However, non-native brown trout are the predominant salmonid species in the Sage Creek watershed, particularly in the lower reaches of Sage Creek (Formation Environmental 2014). The most diverse fish assemblage is present in Crow Creek, where brown trout are also the predominant salmonid species. However, the greatest trout biomass is usually found in Sage Creek (Formation Environmental 2014). No fish have been captured during sampling in Pole Canyon Creek (Mariah 1980, NewFields 2005, Formation Environmental 2014). These streams have very low flow and poor habitat as discussed in **Section 3.9.2**.

In terms of sculpin, both mottled sculpin and Paiute sculpin have been found in the Study Area. Many studies (Mariah 1980, Chadwick 2001, and Maxim 2004b) did not differentiate between the two species and only listed sculpins as *Cottus* spp. As a result, **Table 3.9-9** lists sculpins not identified to species, mottled sculpins, and Paiute sculpins. However, NewFields and later Formation Environmental, have identified sculpin to species, and have found that most sculpins in the area tend to be Paiute sculpin (Formation Environmental 2014).

Table 3.9-9 Fish Species Documented in the Study Area in One or More Studies from 1979-2017

SPECIES	OCCURRENCE IN THE STUDY AREA											
	SPRING CREEK	WEBSTER CREEK	DRANEY CREEK	SMOKY CREEK	TYGEE CREEK	ROBERTS CREEK	N. FK. SAGE CREEK	POLE CANYON CREEK	HOOPES SPRING	SAGE CREEK	S. FK. SAGE CREEK	CROW CREEK
Special Status Species (Native)												
Northern leatherside chub *Lepidomeda copei*		X	X	X	X							X
Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*			X	X	X		X		X	X	X	X
Non-Special Status Species (Native)												
Longnose dace *Rhinichthys cataractae*				X	X	X						X
Mottled sculpin *Cottus bairdi*												X
Mountain sucker *Catostomus platyrhynchus*												X
Mountain whitefish *Prosopium williamsoni*										X		X
Paiute sculpin *Cottus beldingi*	X	X	X	X	X				X	X	X	X
Redside shiner *Richardsonius balteatus*					X							X
Sculpin *Cottus* spp.				X	X					X	X	X

SPECIES	OCCURRENCE IN THE STUDY AREA											
	SPRING CREEK	WEBSTER CREEK	DRANEY CREEK	SMOKY CREEK	TYGEE CREEK	ROBERTS CREEK	N. FK. SAGE CREEK	POLE CANYON CREEK	HOOPES SPRING	SAGE CREEK	S. FK. SAGE CREEK	CROW CREEK
Speckled dace *Rhinichthys osculus*												X
Utah chub *Gila atraria*					X							
Utah sucker *Catostomus ardens*												X
Non-native Species												
Brook trout *Salvelinus fontinalis*		X	X	X	X					X		X
Brown trout *Salmo trutta*	X								X	X	X	X
Rainbow trout *Oncorhynchus mykiss*											X	
Hybrids (rainbow/cutthroat)												X

Source: IDFG 2014a, Mariah 1980, Chadwick 2001, Maxim 2004b, NewFields 2005, Formation Environmental 2014, Formation Environmental 2016b, RMRS 2016, Covington 2017

3.9.4.1 Special Status Species

Northern Leatherside Chub

The northern leatherside chub is a small minnow native to northern Utah and Nevada, southern and eastern Idaho, and western Wyoming. It inhabits small to medium sized streams with low velocities and cool water (IDFG 2005a, WGFD 2011). Habitat needs are poorly understood, but deep pools with some form of cover (i.e., vegetation, woody debris, undercut banks) are thought to be important (WGFD 2011). On the CTNF, the species is often associated with beaver ponds (Stantec 2017c). It has a relatively broad diet, with insects comprising a large portion (USFWS 2011). Spawning typically occurs over gravel and cobble substrates in spring during high water, but some populations in Wyoming are thought to have a prolonged spawning period from April through August (Baxter and Stone 1995, as cited in WGFD 2011).

Historically, there was interconnectivity between populations, but populations have recently become isolated due to natural and anthropogenic habitat loss (Blakney et al. 2014). As a result, the species is currently distributed in fragmented, somewhat isolated pockets (i.e., with populations that may only inhabit a short reach of stream and be separated by large distances from the next nearest population) in portions of the Bear, Snake, and Green River drainages (Blakney et al. 2014).

Northern leatherside chub were documented in upper Tygee Creek in 2000 (Chadwick 2001) and 2004 (NewFields 2005). In 2000, 29 northern leatherside chub were collected in the vicinity of LT-3. The species was the most abundant species collected, with similar numbers of redside shiner sampled (n=28), but very few individuals of other species (Chadwick 2001). In 2005, three northern leatherside chub were collected from lower Tygee Creek at LT-5 (NewFields 2005). In addition, a single fish was collected in 2008 from the CC-350 location on Crow Creek (Formation Environmental 2014). However, sampling by the University of Idaho on both Tygee Creek and Crow Creek in 2010 and 2011 did not find any northern leatherside chub in either of these streams (Keeley et al. 2012).

Because the northern leatherside chub is patchily distributed, it can easily be missed using traditional electrofishing, which can have poor capture efficiency for non-game fish species (Reynolds et al. 2003). Because recent studies indicate that environmental DNA (eDNA) techniques may be a more powerful tool in detecting rare or sparsely distributed aquatic species (Jerde et al. 2011, Wilcox et al. 2016), eDNA techniques were used in 2015 to verify presence/absence of northern leatherside chub in Tygee Creek and its tributaries. Nine locations were sampled as shown on **Figure 3.9-2a** and described in Stantec (2017c).

The results of the analysis were positive detections in all four streams sampled (Tygee Creek, Smoky Creek, Draney Creek, and Webster Creek), although not at every sample location (Stantec 2017c). Crow Creek and streams in the Sage Creek drainage have not been sampled for northern leatherside chub using eDNA. Other than the single individuals sampled in Crow Creek, northern leatherside chub have not been collected from any streams in the Sage Creek drainage, despite rather extensive sampling. However, the species often inhabits areas with beaver ponds, and these areas are often not sampled via electrofishing. As a result, it is possible that the species could be present in portions of these streams that have not been sampled.

Yellowstone cutthroat trout

YCT is one of several subspecies of cutthroat trout native to the Rocky Mountain region. The historic range of YCT is the upper Snake River drainage (upstream of Shoshone Falls) and the Yellowstone River drainage upstream of (and including) the Tongue River (Endicott et al. 2016). Hybridization is the greatest cause for the decline of YCT (Kruse et al. 2000), with introduced rainbow trout the primary threat. Both migratory and resident YCT populations are present in the Salt River system and tributary streams. Migratory fish move upstream from Palisades Reservoir from March through May and spawn in the Salt River tributary streams. Resident populations live and spawn in tributary streams year-round. Spawning occurs from mid-May through early July. Young YCT emerge from eggs from July through September (BLM 2000).

Within the Study Area, YCT are present in most streams capable of supporting them (Roberts Creek and Pole Canyon Creek are too small and either support no fish populations, or extremely limited populations). The exceptions are Spring Creek and Webster Creek, which have populations of non-native brown and brook trout, but no YCT. Within the Tygee Creek drainage, they are typically present in low numbers, but are the dominant salmonid species in Draney Creek, Smoky Creek, and Tygee Creek. However, YCT populations in Draney Creek are threatened by land use and non-native fish, while populations in Smoky Creek and Tygee Creek are limited by poor habitat. The highest densities of YCT within the Study Area are in Sage Creek, although brown trout are more common than YCT in the lower reaches near Crow Creek.

3.9.4.2 Spring Creek

In 2015, only two species of fish were collected in Spring Creek, Paiute sculpin and non-native brown trout. There were 20 brown trout collected with a mean length of 124 millimeters (range from 72–236 millimeters) and a mean weight of 27 grams (range from 2.8–116.4 grams). The brown trout likely originated from the trout ranch (escaped upstream from the ponds). However, the range in length indicates that multiple age classes are present in the reach sampled and the fish are likely part of a self-sustaining resident population. There were 46 sculpin collected.

3.9.4.3 Webster Creek

Fish populations in Webster Creek on NFS lands are composed primarily of non-native brook trout. In 2000, the USFS surveyed a 2-mile portion of Webster Creek upstream of the USFS boundary. They collected only non-native brook trout and sculpin. The brook trout population was composed of all age classes (length ranged from 50–240 millimeters), with three adults over 200 millimeters in length (USFS 2000b). In the reach sampled using multiple passes (five reaches were sampled, four 40-meter reaches were sampled qualitatively and one 100-meter reach was sampled quantitatively), four brook trout were collected on the first pass, with no fish collected on the second pass, and two brook trout on the third pass.

Sampling in 2015 collected 10 brook trout from a 100-meter reach with a mean length of 204 millimeters (range from 145–246 millimeters) and mean weight of 100 grams (range from 32.3–183.1 grams). Although the data is insufficient to establish population trends (nor were the reaches in the same locations), it appears that a healthy population of brook trout is present in Webster Creek. No YCT were sampled in either event. The sculpin numbers were low in both 2000 (two collected) and 2015 (one collected). Based on the eDNA samples collected in 2015, northern leatherside chub are present in Webster Creek, with positive detection at both sample locations.

3.9.4.4 Draney Creek

Draney Creek supports populations of YCT, brook trout, and Paiute sculpin. Based on the eDNA data collected in 2015, northern leatherside chub are also present, with positive detection at all three locations sampled. The dominant fish species present varies by reach and the populations are influenced by water diversions and barriers to fish passage. In 2000, the USFS sampled two 40-meter reaches within the first 0.5 miles of stream upstream of the USFS boundary. They collected 18 of what they determined to be pure YCT, with multiple age classes present (USFS 2000b). However, a follow up survey in 2003 spot-shocked along approximately 200 meters of stream immediately upstream of the USFS, but did not collect any fish. They determined that the habitat conditions were marginal or inadequate for fish populations. A third survey in 2010 sampled a 100-meter reach in the same location as the previous surveys, and collected seven YCT. There were multiple age classes (length range was 70–155 millimeters).

The reach sampled in these three events is between the earthen dike and the uppermost water diversion, which are both discussed in **Section 3.9.2.3**. These structures limit upstream movement of fish and reduce streamflow relative to natural conditions. These factors, as well as the generally poor habitat, likely limit the fisheries potential of this reach.

Downstream of the earthen dike, YCT were more abundant in the 100-meter reach sampled in 2015. There were 24 YCT collected, with a mean length of 102 millimeters (range from 42–284 millimeters) and a mean weight of 13 grams (range from 8–73.2 grams). Brook trout were also present, with 14 collected. Mean length for the brook trout was 97 millimeters (range 52–193 millimeters). Paiute sculpin were also collected. This data indicates that YCT are more abundant below the passage barrier and with multiple age classes present appear to be resident fish. However, the sympatric brook trout populations also appear to be composed of resident fish, with multiple age classes present.

The reach sampled in 2015 had its downstream endpoint near a small culvert. Additional spot shocking below the culvert to obtain fish other than YCT for fish tissue analysis collected predominantly brook trout. Because the sample reach upstream of the culvert was dominated by YCT, it appears that the culvert may at least partially limit upstream movement of fish.

Although YCT are present in multiple reaches, and appear to be self-sustaining, YCT populations in Draney Creek are limited by the diversions, barriers, non-native fish, and poor habitat.

3.9.4.5 Smoky Creek

Fish populations in Smoky Creek are composed primarily of YCT, brook trout, sculpin, and longnose dace. Based on the eDNA analysis, northern leatherside chub are also present, with positive detection at all four locations sampled on Smoky Creek. No fish have been captured in the upper reaches of Smoky Creek (upstream of LSmS) on the two occasions it has been sampled (2004 and 2010) and fish populations appear limited to perennial reaches of the stream downstream of LSmS.

Near LSm, numbers of YCT and brook trout were similar in July 1979, but the numbers of brook trout were greater in both September 1979 and in 2000. No fish were captured in 2004, and only four fish (two sculpin and two YCT) were captured in 2010 (**Table 3.9-10**). It is unclear why fewer fish have been captured in more recent years, although habitat conditions are generally poor near LSm, as noted in **Section 3.9.2.1**, with better habitat upstream near the 2000 sample location. However, Chadwick (2001) also sampled downstream of LSm, near the confluence with Tygee

Creek, and collected similar numbers of cutthroat trout as their upstream reach. As a result, it is unknown if low fish numbers in 2000 and 2010 are due to the limited habitat conditions at LSm, or an overall decline in fish abundance.

Table 3.9-10 Fish Abundance for Smoky Creek Near LSm

SPECIES	ABUNDANCE (1ST PASS)					POPULATION ESTIMATE[1]				
	JUL-79[2]	SEP-79[2]	2000[3]	2004	2010	JUL-79[2]	SEP-79[2]	2000[3]	2004	2010
Yellowstone Cutthroat Trout	12	4	10	0	2	16	6	17	–	–
Brook Trout	12	18	44	0	0	15	21	54	–	–
Longnose dace	0	0	0	0	0	0	0	0	–	–
Sculpin	0	0	1	0	2	0	0	1	–	–

[1] If available – multiple passes not conducted in 2004 and 2010

[2] Location was the same as LSm

[3] Location was upstream of LSm by approximately ¾-mile

For comparability, abundance is shown for 1st electrofishing pass only

3.9.4.6 Tygee Creek

Tygee Creek is similar to Smoky Creek and Draney Creek, in that it supports a small population of YCT. However, as mentioned in **Section 3.9.4.1**, it is also one of two locations within the Study Area where northern leatherside chub have been documented prior to the eDNA surveys. Mariah (1980) noted three YCT in its most upstream reach near the tailings pond, and one YCT at a reach located downstream near Webster Creek. Speckled dace and sculpin were also captured. Chadwick (2001) noted a more diverse assemblage in their spot shocking near LT-3, with YCT (n=5), brook trout (n=2), redside shiner (n=28), northern leatherside chub (n=29), Utah chub (n=3), longnose dace (n=6), and sculpin (n=13) collected. The YCT collected were relatively large, with a mean length of 222 mm (Chadwick 2001).

Lower numbers of YCT, as well as fewer native fish species, have been sampled in more recent years at LT-5. In 2004, the fish collected were YCT (n=1), sculpin (n=14), longnose dace (n=2), and northern leatherside chub (n=3). The single YCT collected was an adult (270 mm). In 2010, the fish collected were YCT (n=11), Utah sucker (n=1), and Paiute sculpin (n=89). The mean length for the YCT collected in 2010 was 180 mm with a range from 126–263 mm. The variable numbers of YCT collected at the site and lack of younger fish indicate that YCT in upper Tygee may be moving into the reach from other areas. Self-sustaining populations may be limited by the poor habitat present.

It is unclear why northern leatherside chub numbers were so high in 2000, with relatively few collected since. However, the eDNA sampling and analysis indicate that they are still present in the upper Tygee Creek, with positive detection at the three most upstream sample locations. Northern leatherside chub DNA was not detected at the lowest sample locations, where the main road crosses the stream.

3.9.4.7 Roberts Creek

Roberts Creek has been sampled at UR-3 in 2004, 2010, and 2015. Only one fish has been collected, a single longnose dace in 2005. Fish habitat in Roberts Creek is extremely limited by the small size of the stream and low flow. Fish are present in the downstream impoundment and diversion (redside shiner were captured in the diversion during amphibian surveys and small fish were observed jumping in the impoundment), and may move up into the stream at times. However, spot shocking near the impoundment in 2015 did not produce any fish.

3.9.4.8 North Fork Sage Creek

Prior to 2017, fish had not been collected on North Fork Sage Creek, with sampling in 2004 and 2010. In 2017, four YCT were collected from North Fork Sage Creek. The fish were in good overall condition, but appeared lethargic, possibly due to low dissolved oxygen (Covington 2017). It is possible these fish moved up from Sage Creek, and then became stranded by low flow. In general, the small size, lack of flow, and poor habitat likely preclude fish populations from becoming established.

3.9.4.9 Pole Canyon Creek

Similar to North Fork Sage Creek, fish have not been collected or observed in Pole Canyon Creek. This includes during sampling prior to mine development (Mariah 1980) and in 2004 and 2010.

3.9.4.10 Hoopes Spring

Fish populations in Hoopes Spring are composed of YCT, brown trout, and sculpin. Mariah (1980) noted these three species at their 1979 sample location (approximately 3 miles upstream of the Sage Creek confluence), although numbers were highly variable. Since 2006, the highest population estimates for brown trout at HS-3 were in 2007 and 2012, with lower numbers in 2013, 2014, and 2015 (**Table 3.9-11**). However, it should be noted that the confidence intervals are also large in 2007 and 2012. Conversely, there have been greater numbers of YCT since 2008, with the highest numbers in 2015. Decreases in brown trout in recent years could be due to a combination of factors. As discussed in **Section 3.9.4.11**, lower than normal flows and shorter snowmelt runoff durations in recent years has likely reduced recruitment in other nearby streams. However, it may also be due to increases in selenium at the site (**Section 3.9.5**).

Table 3.9-11 Trout Population Estimates at HS-3 for 2006-2008, 2010, 2012-2015

SPECIES	FALL 2006	FALL 2007	FALL 2008	FALL 2010	FALL 2012	FALL 2013	FALL 2014	FALL 2015
Yellowstone Cutthroat Trout								
Estimated Number	0	0	7	9	19	18	2	23
95% Confidence Intervals			±1	±2	±7	±122	±0	±62
Number/km			64	82	173	164	18	210
Brown Trout								
Estimated Number	51	193	61	89	168	17	17	5
95% Confidence Intervals	±6	±369	±25	±27	±130	±2	±5	±1

SPECIES	FALL 2006	FALL 2007	FALL 2008	FALL 2010	FALL 2012	FALL 2013	FALL 2014	FALL 2015
Number/km	465	1759	556	811	1531	155	155	45.6
Sculpin								
Estimated Number	1,384	405	1,421				520	774
95% Confidence Intervals	±61	±30	±500				±200	±213
Number/km	12,614	3,691	12,951				4,739	7,054

Source: Formation Environmental (2016a).

Population estimates from 2009-2014 only include trout >75 mm in length. Population estimates based on 3-pass depletion

3.9.4.11 Sage Creek

Fish populations in Sage Creek from Sage Valley upstream are composed almost exclusively of YCT (**Table 3.9-12**). Mariah (1980) sampled two locations in 1979, one near US-3, and one near LS. Both showed populations of YCT, with brook trout reported near US-3 and brown trout near LS. Four locations were sampled in 2004, and all showed populations of YCT. The three locations sampled in 2010 all showed populations of YCT, with brown trout also collected at LS. In 2004 and 2010, a variety of age classes have been present at all locations, indicating resident populations. Numbers were lower in 2004 relative to 1979 (at comparable locations), but rebounded in 2010. Mean length and weights for YCT were lower in 2010 than in 2014, with higher numbers of young fish in 2010.

Near the confluence with Crow Creek (LSV-4), fish community composition changes, with brown trout dominant, although YCT are present in lower numbers. YCT have also been found at locations slightly further upstream (i.e., LSV-3 and LSV-2C) in low numbers (Formation Environmental 2014). **Table 3.9-13** shows brown and cutthroat trout population estimates for LSV-4 from data collected by Formation Environmental since 2006 (Formation Environmental 2016c). The highest numbers of both brown trout and cutthroat trout at LSV-4 were sampled in 2010, with lower numbers of both species in 2013, 2014, and 2015. This may be due to a combination of changing habitat quality and water quantity and quality (Covington 2017). Specifically, beaver dam activity downstream of the sampling reaches has altered two large pools that provided good habitat and previously contributed to high numbers. In addition, lower than normal flows and shorter snowmelt runoff durations in recent years has also likely reduced recruitment.

A similar trend (i.e., lower trout numbers since 2013) has been seen in other nearby streams. Dry Creek, Giraffe Creek, and Preuss Creek are located 9-10 miles south of the Study Area in the Thomas Fork drainage, which is a tributary to the Bear River. Trout populations in these streams are composed entirely of Bonneville cutthroat trout (BCT). **Figure 3.9-3** compares trout density in Sage Creek at LSV-4 (brown trout and YCT) to BCT density in Dry Creek, Giraffe Creek, and Preuss Creek. The spike in trout density seen on Sage Creek in 2010 was not mirrored by BCT populations in Dry Creek or Preuss Creek (Giraffe Creek was not sampled in 2010). However, all streams show a similar decrease in trout density since 2012. The similarity in trends between these streams provides some indication that there are factors other than beaver activity and water quality concerns affecting fish populations in the Study Area vicinity, such as lower than normal flows and shorter runoff durations.

Table 3.9-12 Fish Abundance for Sage Creek Sample Locations.

SPECIES	ABUNDANCE (1ST PASS)				MEAN LENGTH (MM)		MEAN WEIGHT (G)	
	JULY-79	SEP-79	2004	2010	2004	2010	2004	2010
US								
Yellowstone Cutthroat Trout	NS	NS	1	19	180	207	68	113
US-3								
Yellowstone Cutthroat Trout	9	8	4	NS	240	NS	148	NS
Brook Trout	2	2	0	0	–	–	–	–
US-4								
Yellowstone Cutthroat Trout	NS	NS	4	8	230	166	118	56
LS								
Yellowstone Cutthroat Trout	7	15	1	33	180	143	68	44
Brown Trout	3	5	0	1	–	287	–	237.5
LSV-4								
Brown Trout	20	15	11	12	231	293	187	221
Sculpin	0	0	29	54	–	–	–	–
Mountain Whitefish	1	8	0	5	–	–	–	–

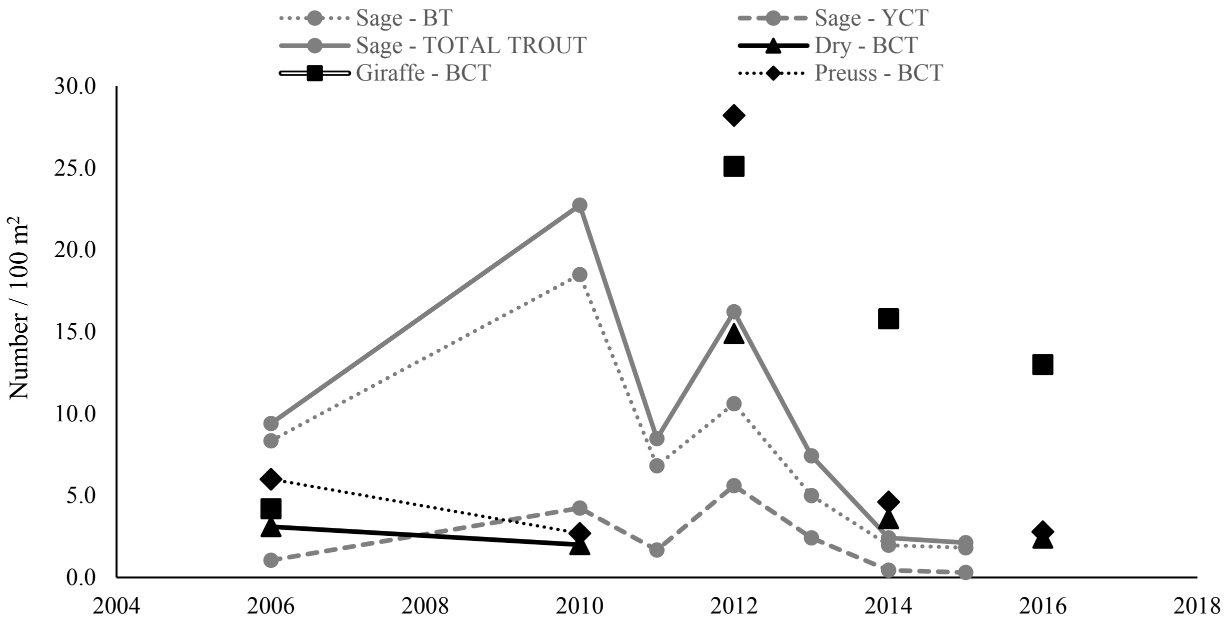
Source: Mariah (1980), NewFields (2005), Formation Environmental (2014)
NS=Not sampled
For comparability, abundance is shown for 1st electrofishing pass only

Table 3.9-13 Trout Population Estimates at LSV-4 for 2006, 2010-2015

SPECIES	FALL 2006	FALL 2010	FALL 2011	FALL 2012	FALL 2013	FALL 2014	FALL 2015
Yellowstone Cutthroat Trout							
Estimated Number	7	28	11	37	16	3	2
95% Confidence Intervals	±1	±26	±3	±26	±0	±0	±0
Number/km	55	221	87	293	126	23	16
Brown Trout							
Estimated Number	55	122	45	70	33	13	12
95% Confidence Intervals	±33	±293	±13	±50	±2	±2	±1
Number/km	435	965	356	553	261	102	94

Source: Formation Environmental (2016a).
Population estimates from 2010-2014 only include trout >75 mm in length. Population estimates based on 3-pass depletion

Figure 3.9-3 Trout Density in Sage Creek, Dry Creek, Giraffe Creek, and Preuss Creek



Source: Formation Environmental (2016a) and IDFG (2017).
Sage Creek population estimates from 2010-2014 only include trout >75 mm in length
Population estimates based on 3-pass depletion
BT=brown trout; TOTAL TROUT=brown trout and Yellowstone cutthroat trout; BCT=Bonneville cutthroat trout

3.9.4.12 South Fork Sage Creek

Due to limited habitat, upper reaches of South Fork Sage Creek support limited fish populations, while the downstream reaches (i.e., near Sage Valley) support populations of YCT, non-native brown trout, and sculpins (**Table 3.9-14**). The 2004 and 2010 data shows that the YCT and brown trout populations fluctuate, with YCT dominant in 2001 and brown trout dominant in 2010. However, the YCT present at the site have been adults, with only large adults present in 2010. In contrast, a variety of age classes are present for brown trout. Maxim (2004b) did not sample fish populations at a fixed location, but rather qualitatively spot-shocked along approximately 1.5 miles. They found that habitat was somewhat limited, but that eight YCT were captured.

Table 3.9-14   Fish Abundance for South Fork Sage Creek Sample Locations

SPECIES	ABUNDANCE (1ST PASS)				MEAN LENGTH		MEAN WEIGHT	
	JUL-79	SEP-79	2004	2010	2004	2010	2004	2010
USS								
Yellowstone Cutthroat Trout	0	1	0	NS	–	NS	–	NS
Brown Trout	19	20	0	NS	–	NS	–	NS
Rainbow Trout	0	2	0	NS	–	NS	–	NS
LSS								
Yellowstone Cutthroat Trout	NS	NS	14	4	191	335	114	368
Brown Trout	NS	NS	4	20	210	254	84	167
Sculpin	NS	NS	2	1	–	–	–	–

Source: Mariah (1980), NewFields (2005), Formation Environmental (2014)
NS=Not sampled
For comparability, abundance is shown for 1st electrofishing pass only

3.9.4.13 Crow Creek

The most diverse fish assemblages are in Crow Creek. Crow Creek was sampled in 2003 by Maxim (2004b) and has been monitored at multiple locations since 2006 (**Table 3.9-15**). Although the locations sampled since 2006 (Formation Environmental 2016a) are different than those sampled by Maxim (2004b), all locations indicate diverse communities, with brown trout the most dominant fish species in terms for biomass. Dace, mountain whitefish, sculpins, and YCT are also common and small numbers of cutthroat/rainbow trout hybrids have been noted. Numerous size classes for brown trout, mountain whitefish, and YCT indicate resident populations (**Table 3.9-15**, Maxim 2004b). Similar to lower Sage Creek, numbers of brown trout and YCT have been lower in recent years, likely from lower than normal flows and shorter snowmelt runoff durations, although variation in numbers captured is not atypical of western streams where annual variations of 50 percent or more are common (Platts et al. 1988).

Table 3.9-15 Fish Abundance, Lengths, and Weights for Crow Creek Locations CC-1A and CC-3A

LOCATION	SPECIES	YEAR	NUMBER CAUGHT	MEAN TOTAL LENGTH (MM)	LENGTH RANGE (MM)	MEAN WEIGHT (G)	WEIGHT RANGE (G)
CC-1A	Brown Trout	Fall 2006	13	300.2	96-413	304.7	8.0-583
		Fall 2007	77	159.6	77-414	80.7	4.6-521
		Fall 2008	53	199.0	76-448	129.4	3.3-700.2
		Fall 2009	48	182.0	64-350	92.1	2.1-32.5
		Fall 2010	101	142.6	71-371	55.7	1.3-477
		Fall 2011	50	177.4	76-443	136.6	3.4-879.4
		Fall 2012	219	122.5	52-440	40.9	1.3-646.3
		Fall 2013	85	169.4	70-345	73.9	2.9-396.1
		Fall 2014	36	246.1	80-369	179.5	4.5-463.3
		Fall 2015	20	233.9	90-415	202.3	3.5-695.4
	Yellowstone Cutthroat Trout	Fall 2006	4	301.0	146-412	353.4	27.6-650
		Fall 2007	19	279.1	74-483	262.7	1.1-908
		Fall 2008	17	294.9	172-376	268	55.7-477.1
		Fall 2009	31	256.0	60-396	219.4	1-554
		Fall 2010	36	271.8	153-405	221.5	31.7-712.6
		Fall 2011	30	290.2	164-386	259.6	41.5-593.3
		Fall 2012	43	271.1	60-381	209.9	2.1-468.2
		Fall 2013	16	305.6	176-380	297.0	49.6-508.2
		Fall 2014	18	295.2	156-379	281.6	33.8-515.7
		Fall 2015	17	287.2	38-425	317.8	0.8-796.5
	Brook Trout	Fall 2010	1	240.0	-	144.5	-
		Fall 2011	1	70.0	-	3.0	-
	Hybrids: Rainbow Trout/ Cutthroat Trout	Fall 2009	1	465.0	-	873.5	-
	Mountain Whitefish	Fall 2007	23	232.8	104-350	149.9	8-346
		Fall 2008	52	297.0	117-388	256.7	12.4-481.3
		Fall 2009	61	301.0	115-390	277.8	13-479
		Fall 2010	35	258.8	119-365	182.70	12.6-466.4
		Fall 2011	69	304.0	101-379	307.8	10-620.1
		Fall 2012	112	258.8	115-405	-	-
		Fall 2013	61	282.2	116-385	238.1	12.2-501
		Fall 2014	63	303.0	68-380	265.9	2.7-482.4
		Fall 2015	41	274.9	84-365	242.1	3.9-518

LOCATION	SPECIES	YEAR	NUMBER CAUGHT	MEAN TOTAL LENGTH (MM)	LENGTH RANGE (MM)	MEAN WEIGHT (G)	WEIGHT RANGE (G)
CC-1A	Sculpin	Fall 2006	38	77.5	39-100	3.2	1.0-11.6
		Fall 2007	32	81.9	40-105	8.5	0.5-16.6
		Fall 2008	11	58.2	32-107	3.7	0.4-15.1
		Fall 2009	51	71.3	39-105	3.6	1.1-8.3
		Fall 2010	92	63.8	24-110	4.7	0.1-15.4
		Fall 2011	47	70.4	28-110	6.0	0.1-17.4
		Fall 2012	165	59.8	29-107	3.0	0.1-13.1
		Fall 2013	161	75.0	31-109	6.7	0.7-18.9
		Fall 2014	102	56.3	27-114	3.6	0.1-18.5
		Fall 2015	158	76.1	35-115	6.2	0.3-22.1
	Longnose Dace	Fall 2007	22	81.0	60-119	6	2.4-16.8
		Fall 2008	8	83.0	66-94	6.3	2.5-8.6
		Fall 2009	15	70.3	32-100	4.02	1-10.6
		Fall 2010	19	86.3	61-115	6.60	2.0-14.8
		Fall 2011	19	70.5	57-104	4.4	2.0-12.1
		Fall 2012	28	63.0	30-102	3.7	0.1-11.9
		Fall 2013	26	72.9	26-120	6.2	0.2-19.4
		Fall 2014	7	87.0	70-94	6.1	3.6-7.7
		Fall 2015	25	50.3	22-97	2.3	0.1-10.9
	Speckled Dace	Fall 2006	18	61.5	54-72	0.8	1.7-4.0
		Fall 2007	96	68.7	52-88	3.5	1.1-7.9
		Fall 2008	51	67.1	47-88	3.5	0.3-8.1
		Fall 2009	23	67.7	56-86	3.6	1.1-8.3
		Fall 2010	30	68.3	35-94	4	0.3-9.4
		Fall 2010	8	≤ 30 (YOY)	-	-	-
		Fall 2011	1	71.0	-	3.7	-
		Fall 2012	18	63.9	27-92	2.8	0.1-7.6
		Fall 2013	7	66.1	32-93	4.6	0.3-9.3
		Fall 2014	7	71.1	27-88	5.0	2.7-6.8
		Fall 2015	8	47.6	22-84	1.9	0.5-6.2
	Redside Shiner	Fall 2006	8	105	105	2.4	8.2-10.6
		Fall 2007	19	74.8	38-100	4.7	0.1-9.7
		Fall 2008	16	61.7	32-98	2.7	0.5-10.3
		Fall 2010	6	27.5	24-31	0.4	0.1-0.6
		Fall 2011	1	95.0	-	7.1	-
		Fall 2013	12	101.1	82-115	10.1	5.3-15.7
		Fall 2014	1	87.0	-	8.2	-

LOCATION	SPECIES	YEAR	NUMBER CAUGHT	MEAN TOTAL LENGTH (MM)	LENGTH RANGE (MM)	MEAN WEIGHT (G)	WEIGHT RANGE (G)
CC-1A	Cyprinid Species	Fall 2013	6	<30	-	NM	-
	Utah Sucker	Fall 2006	1	170.0	-	49.8	-
		Fall 2009	1	298.0	-	242.5	-
		Fall 2010	8	38.7	31-47	0.6	0.3-1.1
		Fall 2011	4	349.8	71-484	695.5	3.4-1162.2
		Fall 2012	2	146.5	38-255	100.3	0.7-199.9
		Fall 2013	3	54.3	41-76	1.6	0.5-3.1
		Fall 2014	1	191.0	-	71.9	-
	Catostomus Species	Fall 2013	1	34.0	-	NM	
CC-3A	Yellowstone Cutthroat Trout	Fall 2006	9	287.7	159-385	264.2	37.9-542
		Fall 2007	28	324.3	208-412	347.3	101.5-631.3
		Fall 2008	17	302.5	205-424	303.8	81.6-727.6
		Fall 2010	20	319.4	210-426	336.6	83.9-819
		Fall 2012	33	310.2	50-498	334.3	0.7-1962.2
		Fall 2013	9	347.7	306-418	387.4	269.9-611.8
		Fall 2014	10	338.5	228-405	391.8	113-652
		Fall 2015	5	333.2	230-401	394.1	135.2-620
	Brook Trout	Fall 2007	1	281	-	217.6	-
	Mountain Whitefish	Fall 2006	10	312.9	274-336	249.2	191-417
		Fall 2007	15	266.7	207-377	179.5	84-415.5
		Fall 2008	48	294.7	121-356	254.5	9.1-446.5
		Fall 2010	119	275.3	101-368	207.8	7.7-442.7
		Fall 2012	126	270.5	93-406	225.6	6.8-571.2
		Fall 2013	76	307.2	106-396	257.0	9.2-467
		Fall 2014	33	307.2	226-390	269.7	106-468
		Fall 2015	25	312.4	213-372	294.7	138.8-524.8
	Sculpin	Fall 2006	10	73.0	53-96	3.1	2.0-12.4
		Fall 2007	4	91.8	83-98	8.5	5.9-11.1
		Fall 2008	5	60.4	46-110	3.9	0.5-15.6
		Fall 2010	6	86.3	71-107	9.2	4.2-16.9
		Fall 2010	4	-	≤ 30 (YOY)	-	-
		Fall 2012	28	60.7	36-110	3.9	0.1-17.4
		Fall 2013	64	72.7	40-101	5.5	0.7-11.4
		Fall 2012	1	43.0	-	0.8	-
		Fall 2013	5	88.6	77-109	9.3	5.2-18.2
		Fall 2014	29	67.3	30-111	6.4	0.2-21.7
		Fall 2015	57	76.9	36-112	6.9	0.5-20

LOCATION	SPECIES	YEAR	NUMBER CAUGHT	MEAN TOTAL LENGTH (MM)	LENGTH RANGE (MM)	MEAN WEIGHT (G)	WEIGHT RANGE (G)
CC-3A	Longnose Dace	Fall 2007	60	69.2	41-120	3.1	0.2-17.3
		Fall 2008	48	75.9	58-116	5.3	0.8-15.1
		Fall 2010	58	84.4	54-121	6.6	0.7-21
		Fall 2012	24	68.6	29-104	3.5	0.2-10.4
		Fall 2013	61	74.5	35-107	4.4	1.4-10.6
		Fall 2014	6	91.3	70-105	8.2	3.8-10.9
		Fall 2015	10	81.8	32-108	6.7	0.2-12.2
	Speckled Dace	Fall 2006	86	57.0	43-80	2.1	0.7-5.6
		Fall 2007	122	65.0	49-90	2.1	0.3-7.7
		Fall 2008	152	65.9	43-94	3.5	0.5-8.1
		Fall 2010	68	66.9	49-92	3.6	1.1-8.3
		Fall 2012	110	56.4	33-92	1.8	0.1-9.1
		Fall 2013	84	69.2	30-92	3.6	1.0-8.2
		Fall 2014	18	69.8	27-90	5.1	1.3-12.5
		Fall 2015	46	60.4	32-92	2.4	0.1-8.3
	Redside Shiner	Fall 2006	43	77.1	56-97	2.0	1.0-8.2
		Fall 2007	8	60.0	35-90	2.3	0.1-6.5
		Fall 2008	26	73.9	48-107	4.4	0.5-14
		Fall 2010	7	88.6	75-94	7.8	4.8-10.2
		Fall 2012	7	60.7	53-68	1.8	1.0-2.7
		Fall 2013	8	70.4	64-85	3.2	1.3-5.4
		Fall 2014	4	48.0	35-60	1.5	1.0-1.8
		Fall 2015	10	57.6	50-72	1.5	1-3.2
	Utah Sucker	Fall 2006	2	96.5	95-98	8.4	8.2-8.5
		Fall 2007	7	128.4	70-178	25.5	5.4-56.5
		Fall 2008	45	324.2	72-542	527.5	3.4-1730.8
		Fall 2010	2	107.0	48-166	25.3	0.8-49.8
		Fall 2012	24	324.8	37-578	685.4	0.2-1757
		Fall 2013	7	168.1	90-555	209.2	7.4-1401
		Fall 2014	14	206.1	68-495	318.4	2.9-1185
		Fall 2015	4	363.0	42-502	821.9	0.7-1360

Source: Formation Environmental (2016a)
Sculpin includes both mottled sculpin and Paiute sculpin
mm=millimeters

3.9.5 Selenium

Due to past difficulty in meeting water quality criteria at some locations near the existing mine, and the associated bioaccumulation of selenium in the food chain, selenium is the primary contaminant of concern for fisheries and aquatic resources. Studies show that fish bioaccumulate selenium primarily via ingestion (Hamilton 2004, Hamilton et al. 2004). Invertebrates and plants (e.g., periphyton and algae) concentrate dissolved selenium from the water, and this selenium can then be part of the food base for fish feeding in contaminated reaches of streams (Chapman 2007, Hamilton et al. 2004). In addition, selenium that is initially released to streams as dissolved compounds or particulates can also be removed from the water through chemical and microbial reduction, adsorption to clay and organic detritus, reaction with iron, precipitation, co-precipitation, and settling (Chapman 2007). Excessive bioaccumulation of selenium in fish can result in larval developmental abnormalities and mortality (Holm et al. 2005), with toxicity most pronounced in developing embryos (Formation Environmental and Habitech 2012).

Numerous studies have been conducted within the Study Area to characterize the nature and extent of selenium in aquatic biota. These include the SI, monitoring conducted as part of the effort to develop a SSSC for fish tissue, Panel F&G monitoring, and the RI (Formation Environmental 2014). These studies did not include streams to the north of Smoky Creek, and the 2015 data collection was conducted primarily to gather data from Spring Creek, Webster Creek, and Draney Creek. This section presents a summary of the data from these various studies. The selenium data for all streams with the exception of Crow Creek is presented in **Table 3.9-16**. Crow Creek data is presented and discussed in **Section 3.9.5.14**.

Table 3.9-16 Mean Selenium Concentration in Sediment, Periphyton, Macroinvertebrates, and Fish, Except for Crow Creek

STREAM	LOCATION	YEAR	SELENIUM CONCENTRATION (MG/KG DW)				
			SEDIMENT	PERIPHYTON	MACRO INVERTEBRATES	SCULPIN[1] (MEAN)	TROUT (MEAN)
Spring Creek	SPRC-1	2015	0.13	2.12	4.37	5.74	4.20
Webster Creek	WC-2	2015	0.13	0.93	6.30	*	5.44
Draney Creek	DRC-1	2015	0.35	0.44	3.61	4.44	4.30
Smoky Creek	USm	2004	0.51	22.00	3.72	*	*
		2010	0.63	*	5.93	*	*
	LSm	2004	1.80	*	3.50	*	*
		2010	0.62	*	3.11	*	4.74
Tygee Creek	LT-5	2004	0.63	2.42	21.91	5.95	*
		2010	0.73	*	3.69	4.35	4.82
Roberts Creek	UR-3	2004	0.30	1.00	*	4.87	*
		2010	0.40	*	1.53	*	*
		2015	8.10	1.79	12.4	*	*
N. Fk. Sage Creek	NSV-5	2004	0.37	*	5.96	*	*
	NSV-6	2010	6.50	*	11.90	*	*

STREAM	LOCATION	YEAR	SELENIUM CONCENTRATION (MG/KG DW)				
			SEDIMENT	PERIPHYTON	MACRO INVERTEBRATES	SCULPIN[1] (MEAN)	TROUT (MEAN)
Pole Canyon Creek	UP	2004	0.46	3.00	3.11	*	*
	LP	2004	58.10	69.10	90.71	*	*
	LP-PD	2010	13.40	*	16.90	*	*
Hoopes Spring[5]	HS-3	2006	Mean=6.9 Min=2.1 Max=10.5	6.5	Mean=20.08 Min=11.40 Max=28.40	21.85	20.60
		2007		6.2		22.60	18.14
		2008		24.2		23.81	26.99
		2010		*		17.35	19.56
		2011	*	*	*	*	24.12
		2013	*	*	*	32.48	35.04
Sage Creek[3]	US	2004	0.78	1.84	3.28	*	*
		2010	0.57	*	4.39	*	3.82
	US-4	2004	0.68	1.45	3.44	*	4.05
		2010	0.39	*	3.46	*	4.09
	LS	2004	1.80	2.14	3.11	*	3.61
		2009	*	*	*	*	5.39
		2010	0.65	*	7.98	*	3.83
Sage Creek[4]	LSV-2C	2006	*	2.60	*	17.47	19.45
		2007	5.40	18.50	8.26	15.12	16.23
		2008	5.70	4.38	23.90	23.13	20.23
		2009	11.90	13.00	25.50	16.61	20.32
		2010	7.00	13.30	53.40	18.66	16.24
		2011	5.50	8.54	12.70	14.29	17.16
	LSV-3	2010	6.60	*	64.60	16.53	13.53
		2013	*	*	*	32.13	*
	LSV-4	2004	3.30	4.00	*	17.24	15.86
		2006	*	7.42	*	20.01	16.20
		2007	3.90	11.70	9.08	18.28	15.18
		2010	4.70	10.50	24.10	20.25	19.38
		2011	2.00	17.20	17.60	18.55	22.42
		2013	*	*	*	41.64	*
S. Fk. Sage Creek[5]	USS	2004	0.47	1.02	17.10	*	*
	LSS	2004	Mean=1.5 Min=1.2 Max=1.9	1.58	Mean=10.3 Min=8.1 Max=12.6	5.24	*
		2009		*		12.9	*
		2010		*		12.5	14.1
		2011		*		12.5	15.6

Source: NewFields (2005), Formation Environmental (2014), Formation Environmental (2016b), Formation Environmental (2016a)

1 Concentration for forage fish, which is typically sculpin, but value is based on multiple species in Tygee Creek and on longnose dace for Roberts Creek.

2 Concentration is an estimated quantity due to matrix interferences during laboratory analysis.

3 Sage Creek upstream of Sage Valley has been sampled less intensively due to its location upstream of most contamination.

4 Sage Creek downstream of Hoopes Spring has been sampled more intensively due to contamination from Hoopes Spring.

5 Data on sediment and macroinvertebrates is presented as mean, minimum (min), and maximum (max) for the period of record as data for the individual years were not present in the sources used.

* Sample media not collected.

3.9.5.1 Selenium Thresholds

The selenium concentrations in fish tissue from all streams within the Study Area are compared to the whole-body fish tissue element of the 2016 Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater of 8.5 mg/kg dry weight (dw), and the whole-body effect threshold for brown trout of 13.2 mg/kg dw. Background information on these thresholds is presented below. Further, for streams without elevated selenium (primarily streams on the northern end of the Study Area, selenium concentrations in fish tissue are compared to reference concentrations from South Fork Tincup Creek (Stantec 2017c). Reference concentrations from South Fork Tincup Creek include concentrations for trout species, as well as for forage fish species (i.e., sculpin, dace, etc.). Mean fish tissue concentrations for trout in South Fork Tincup Creek ranged from form 1.8–9.16 mg/kg dw. Tissue concentrations for sculpins ranged from 2.8–12.8 mg/kg dw.

Because a selenium criterion has not been developed for macroinvertebrates, tissue from composite macroinvertebrate samples (i.e., tissue from multiple taxa) from monitoring locations upstream of mine disturbance was used to develop a mean tissue concentration for unaffected macroinvertebrate tissue of 3.75 mg/kg dw (Formation Environmental 2014).

Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016

The criterion outlined in EPA (2016b) is a chronic criterion composed of four elements; two elements are based on the concentration of selenium in fish tissue and two elements are based on the concentration in water. The fish tissue elements supersede the water elements, and the egg-ovary tissue element supersedes all other tissue elements. The fish tissue elements of the criterion state that freshwater aquatic life would be protected from the toxic effects of selenium if: 1) the concentration of selenium in the eggs or ovaries of fish does not exceed 15.1 mg/kg dw; and 2) the concentration of selenium in whole-body fish does not exceed 8.5 mg/kg dw, or in muscle tissue (skinless, boneless fillet) does not exceed 11.3 mg/kg dw.

The national criterion outlined in EPA (2016b) is a non-regulatory, scientific assessment of ecological effects. If the criteria are adopted by a state as water quality standards under section 303 of the Clean Water Act, and approved by EPA, they become applicable Clean Water Act water quality standards in ambient waters within that state. However, states may adopt water quality criteria that reflect adjustments to EPA's recommended criteria to reflect local environmental conditions. Alternatively, states may also derive numeric criteria based on other scientifically defensible methods but the criteria must be protective of designated uses. Idaho is currently in the process of determining what criteria to adopt (Mabey 2017). Until they adopt criteria, the fish tissue thresholds outlined in EPA (2016b) are not binding. However, they are included in this document for comparison, as it is a possible criterion that could be adopted. The whole-body concentration is used, as that is the most available type of data.

As stated above, states can adopt a more site or species specific criterion. Because previous draft aquatic life criteria (EPA 2002 and 2004) were based primarily on bluegill (*Lepomis macrochirus*) and not salmonids, Simplot undertook an effort to develop a SSSC for salmonids in Hoopes Spring, Sage Creek, and Crow Creek downstream of Sage Creek. The field and laboratory studies developed effects thresholds (EC10s for egg/ovary selenium) for brown trout and YCT. These data were subsequently included along with other species effects thresholds into the 2016 Aquatic Life Ambient Water Quality Criterion for Selenium (EPA 2016b). EPA's derivation of the effect threshold for brown trout is 21 mg/kg dw egg selenium, which is lower than the no effect concentration for YCT (>30 mg/kg dw egg selenium). Based on whole body concentrations, the brown trout threshold is 13.2 mg/kg selenium while the YCT value for whole body would be >15 mg/kg dw (EPA 2016b). Because the state could choose a site-specific criterion, and because these criteria were developed for the Study Area, this report also compares fish tissue values to the more conservative (i.e., lowest) value of 13.2 mg/kg dw.

3.9.5.2 Other Non-governmental Organization Data

In addition to the data collected as part of the SI, RI, SSSC, and Panel F&G monitoring, most recently, the groups Greater Yellowstone Coalition, Earthworks, and the Crow Creek Conservation Alliance have also conducted testing on trout tissue samples from Sage Creek and Crow Creek. Reports from Earthworks indicate selenium concentrations in fish tissue greater than the 2016 criterion of 8.5 mg/kg dw (Earthworks 2017). Although these results appear similar to the data discussed below (i.e. concentrations in fish tissue that are greater than 8.5 mg/kg dw), it is unknown if the GYC/Earthworks/Crow Creek Conservation Alliance data is directly comparable in this report. This is due in part to: 1) not knowing if the sample locations were the same because sample locations vs coordinates sometimes do not match; 2) issues with the way the data was reported because some samples were only reported as wet weight rather than dry weight, and; 3) a difference in the size of fish sampled because adult fish which may have migrated from other locations were collected rather than juvenile fish (Covington 2017). As a result, the data is not discussed in this report, but can be obtained for reference from Earthworks/Crow Creek Conservation Alliance.

3.9.5.3 Spring Creek

Selenium concentrations in macroinvertebrate tissue from Spring Creek (4.37 mg/kg dw) was higher than the reference concentration of 3.75 mg/kg dw. Mean selenium concentration in sculpin tissue (5.74 mg/kg dw) and trout tissue (4.20 mg/kg dw) were both below the 2016 criterion of 8.5 mg/kg dw and the brown trout threshold of 13.2 mg/kg dw. They were also within the range of reference concentrations collected in South Fork Tincup Creek.

3.9.5.4 Webster Creek

Selenium concentration in macroinvertebrate tissue from Webster Creek (6.30 mg/kg dw) was higher than the reference concentration of 3.75 mg/kg dw. Mean selenium concentration in trout tissue (no sculpins were collected) was 5.44 mg/kg dw, which is below the 2016 criterion of 8.5 mg/kg dw, the brown trout threshold of 13.2 mg/kg dw, and within the range of reference concentrations collected in South Fork Tincup Creek.

3.9.5.5 Draney Creek

Selenium concentration in macroinvertebrate tissue from Draney Creek (3.61 mg/kg dw) was below the reference concentration of 3.75 mg/kg dw. Mean selenium concentrations in both sculpin tissue and trout tissue (4.44 and 4.30 mg/kg dw, respectively) were below the 2016 criterion of 8.5 mg/kg dw and the brown trout threshold of 13.2 mg/kg dw. They were also within the range of reference concentrations collected in South Fork Tincup Creek (less than half the maximum seen in the reference concentrations).

3.9.5.6 Smoky Creek

Selenium concentrations in macroinvertebrate tissue from both USm and LSm were below the reference concentration of 3.75 mg/kg dw in 2004, as well as at LSm in 2010. The concentration was greater than the reference condition in 2010 at USm (5.93 mg/kg dw). Fish tissue was only collected from LSm in 2010, with a mean concentration from two fish (both YCT) of 4.74 mg/kg dw, which is below the 2016 criterion of 8.5 mg/kg dw and the brown trout threshold of 13.2 mg/kg dw. It is also within the range of reference concentrations collected in South Fork Tincup Creek.

3.9.5.7 Tygee Creek

Selenium concentration in macroinvertebrate tissue at LT-5 was 21.91 mg/kg dw in 2004, which is nearly six times the reference concentration of 3.75 mg/kg dw. However, in 2010, the concentration (3.69 mg/kg dw) was below the reference concentration. The mean concentration in forage fish in both 2004 and 2010 (5.95 and 4.35 mg/kg dw, respectively) was below the 2016 criterion of 8.5 mg/kg dw and the brown trout threshold of 13.2 mg/kg dw. It was also within the range of reference concentrations collected in South Fork Tincup Creek. In addition, the mean concentration for trout (4.82 mg/kg dw) was also below both thresholds and within the range of reference concentrations. It is unclear what may have led to such high concentrations in macroinvertebrate tissue in 2004, as the concentration in periphyton was relatively low.

3.9.5.8 Roberts Creek

The selenium concentration in macroinvertebrate tissues at UR-3 was well below the reference concentration of 3.75 mg/kg dw in 2010 (1.53 mg/kg dw); however, it was over three times the reference concentration in 2015 (12.4 mg/kg dw). It is unclear what may have led to this increase, as concentrations in sediment and periphyton were low. Only one fish has been collected from Roberts Creek, with a concentration of 4.87 mg/kg dw. This is below the 2016 criterion of 8.5 mg/kg dw, the brown trout threshold of 13.2 mg/kg dw, and within the range of reference concentrations collected in South Fork Tincup Creek.

3.9.5.9 North Fork Sage Creek

Sediment and macroinvertebrates in North Fork Sage Creek were sampled at different locations in 2004 and 2010. In 2004, they were sampled upstream of the Pole Canyon Creek confluence, but below the confluence in 2010. The higher selenium concentrations in both sediment and macroinvertebrate tissue at the downstream location clearly show the input of contaminated water from Pole Canyon Creek. At the upstream location, the selenium concentration in macroinvertebrate tissue (5.96 mg/kg dw) was above the reference concentration of 3.75 mg/kg dw, but the downstream concentration was nearly double that of the upstream (11.9 mg/kg dw) and three times the reference concentration. No fish tissue has been collected in North Fork Sage Creek.

3.9.5.10 Pole Canyon Creek

Similar to North Fork Sage Creek, the selenium data from Pole Canyon Creek clearly show the input of contaminated water from the Pole Canyon ODA, as well as the positive effect of the remediation measures implemented. Upstream of the ODA at UP, the selenium concentration in macroinvertebrate tissue (3.11 mg/kg dw) was below the reference concentration of 3.75 mg/kg dw in 2004. Downstream of the ODA, the concentration was 90.71 mg/kg dw in 2004 (over 24 times reference concentration). In 2010, at LP-PD, the concentration in macroinvertebrate tissue was 16.9, which is substantially lower than in 2004, but still higher than the reference condition. No fish have been collected in Pole Canyon Creek, but sediment concentration data shows a trend similar to the macroinvertebrate data.

3.9.5.11 Hoopes Spring

Hoopes Spring is the primary source of selenium to Sage Creek, and selenium concentrations are substantially elevated in all environmental media relative to most other streams (**Table 3.9-16**), reference conditions, the 2016 selenium criterion for whole-body tissue (8.5 mg/kg dw), and the brown trout whole body tissue threshold (13.2 mg/kg dw). The mean concentration in macroinvertebrate tissue from 2006-2010 is over five times greater than the reference concentration of 3.75 mg/kg dw, with a minimum concentration from the same time period that is three times greater. Consistent with the data from macroinvertebrates, mean concentrations in fish tissue (both sculpins and trout) have also been higher than the whole-body tissue thresholds (8.5 and 13.2 mg/kg dw) in all years. In all years, the whole-body tissue concentrations were at least double the 2016 criteria of 8.5 mg/kg dw, with trout tissue concentrations that were 2.7 times higher than the brown trout threshold in 2013.

3.9.5.12 Sage Creek

Upstream of the confluence with Hoopes Spring, selenium concentrations have generally been low, with concentrations in macroinvertebrate tissues below the reference concentration of 3.75 mg/kg dw in all years and at all locations, except for 2010 at LS, when the concentration was 7.98 mg/kg dw. In addition, mean concentrations in trout tissue have generally been below the EPA criterion for whole body tissue (8.5 mg/kg dw) and the whole-body tissue threshold for brown trout (13.2 mg/kg dw). There were, however, two trout in 2010 at US and one trout in 2009 at LS that had concentrations higher than both these thresholds (Formation Environmental 2014). Formation Environmental (2014) hypothesized that these fish may have moved upstream from lower portions of Sage Creek where selenium exposure is greater.

Downstream of Hoopes Spring, which is the primary source of selenium to Sage Creek, selenium concentrations in both macroinvertebrates and fish tissue are substantially elevated relative to upstream conditions, reference conditions, the 2016 selenium criterion for whole-body tissue (8.5 mg/kg dw) and the brown trout whole body tissue threshold (13.2 mg/kg dw). Concentrations in macroinvertebrate tissue have been greater than the reference concentration of 3.75 mg/kg dw at all locations and in all years, with concentrations often much greater. Consistent with the data from macroinvertebrates, mean concentrations in fish tissue (both sculpins and trout) have also been higher than the whole-body tissue thresholds (8.5 and 13.2 mg/kg dw) in all years. Of the 143 trout samples that have been collected since 2004, only 20 trout have had concentrations below the brown trout whole body tissue threshold (Formation Environmental 2014). Selenium concentrations in sculpin tissue in 2013 show a clear upward trend relative to past years.

3.9.5.13 South Fork Sage Creek

Selenium concentrations in macroinvertebrate tissue in South Fork Sage Creek have been greater than the reference concentration of 3.75 mg/kg dw in all years and at all locations, with a mean of 10.31 mg/kg dw, a minimum of 8.09 mg/kg dw, and maximum of 12.6 mg/kg dw. Mean fish tissue concentration for sculpin in 2004 (5.24 mg/kg dw) was less than the whole-body values of 8.5 and

13.2 mg/kg dw. The mean concentrations were higher than 8.5 mg/kg dw, but less than 13.2 mg/kg dw in 2009, 2010, and 2011. Since increasing from 2004–2009, concentrations in sculpin fish tissue have been relatively stable at LSS. Mean tissue concentrations for trout were above the 8.5 and 13.2 mg/kg dw thresholds in 2010 and 2011, with 13 of the 26 trout samples exceeding 13.2 mg/kg dw (Formation Environmental 2014).

3.9.5.14 Crow Creek

Crow Creek has been sampled extensively for trout tissue samples from 2006–2011, with 315 individual tissue samples collected (Formation Environmental 2014). Because the data is extensive, it is not presented in **Table 3.9-16** as was done for the other streams. Rather, a summary of the data based on Formation Environmental (2014) is presented here, with the data available in Stantec 2017c.

Upstream of the confluence with Sage Creek, fish tissue samples have been taken at five sample locations, CC-75, CC-100, CC-150, CC-300, and CC-350, in order from upstream to downstream. Downstream of Sage Creek, tissue samples have been collected from two locations, CC-1A and CC-3A, in order from upstream to downstream. From 2006–2011, mean selenium concentrations in trout tissue upstream of Sage Creek were below the 8.5 and 13.2 mg/kg dw thresholds at all locations. Mean selenium concentration in sculpin tissue at CC-350 in 2013 was just above the 8.5 mg/kg dw threshold (8.73 mg/kg dw).

Mean tissue concentrations downstream of Sage Creek have been elevated relative to the upstream concentrations. They have been above the 2016 criterion of 8.5 mg/kg dw in all years. They were also above the brown trout threshold of 13.2 mg/kg dw in 2008, 2010, and 2013, but were below 13.2 mg/kg dw in 2006, 2007, 2009, and 2011. In 2008, the range in mean concentrations for the two locations downstream of Sage Creek was 15.09–18.24 mg/kg dw. In 2010, only one location was sampled downstream of Sage Creek, with a mean concentration of 12.81 mg/kg dw. In 2013, mean selenium concentrations in sculpin tissue at CC-1A and CC-3A were 22.95 and 21.82 mg/kg dw, respectively. The increased values downstream of Sage Creek reflect selenium loading from that stream. Although the tissue concentrations are lower than in Sage Creek, likely due to dilution in the larger Crow Creek, selenium concentrations in sculpin tissue show a clear upward trend in 2013 relative to past years.

3.10 LAND USE, TRANSPORTATION, AND SPECIAL DESIGNATIONS

The Study Area for land use, transportation, and special designations consists of the Project Area plus a ½-mile buffer surrounding the proposed disturbance (4,686 acres; **Figure 3.10-1**). The Study Area boundary was developed with the IDT experts and professional judgement. The Study Area contains 2,660 acres of NFS land (57 percent) within the CTNF Soda Springs Ranger District as well as private lands (2,026 acres or 43 percent). Simplot-owned land in the Study Area is split-estate, which means that Simplot owns the surface rights, but the federal government owns the subsurface (underground) mineral rights.

The Study Area within the CTNF[1] Soda Springs Ranger District is administered under the CNF RFP (USFS 2003a). The total area administered by the CTNF is over 3,000,000 acres (USFS 2016). The portion of the Study Area on NFS land is contained within CNF RFP Administrative Unit M331Df (Pruess Ridges and Hills subsection) (USFS 2003a). Management of this area emphasizes:

- Retention of large security areas for wildlife;
- Linkage habitat between the CNF and the Bridger-Teton National Forest;
- Restoration and protection of BCT habitat, particularly on the east side of the subsection;
- Restoration of deteriorated rangelands; and,
- Management of phosphate reserves (mining) and forested vegetation.

The USFS's general land management philosophy is to sustain management for multiple uses such as recreation, timber, range, minerals, watersheds, fisheries, wildlife, wilderness, scenery, scientific research, and cultural resources. As part of its implementation of this philosophy, the CTNF establishes management prescriptions, which are a set of practices applied to certain areas on the CTNF to attain multiple-use and provide a basis for consistently displaying management direction. Management prescriptions do not stand alone, but are part of the management direction package for the CTNF that also includes Forest-wide goals, objectives, standards, and guidelines. Management prescriptions identified within the Study Area are briefly described as follows and shown on **Figure 3.10-1**. The Land Use TR (Stantec 2016f) discusses management prescriptions and their implementation in greater detail.

Prescription 2.8.3 – AIZ applies to the aquatic influence zone associated with lakes, reservoirs, ponds, perennial and intermittent streams, and wetlands. AIZ management direction overrides direction from other overlapping management areas. Management emphasis is to restore and maintain the health of these areas (USFS 2003a). This prescription applies to 249 acres or 5.3 percent of the Study Area.

Prescription 5.2 (b) – Forest Vegetation Management emphasizes scheduled wood-fiber production, timber growth, and yield. This prescription applies to 1,702.6 acres or 36 percent of the Study Area.

Prescription 8.1 (b) – Concentrated Development Areas applies to all existing concentrated developments including communications sites, utility corridors, and administrative sites. High noise levels may occur at these sites at times due to the use of heavy equipment and blasting. This prescription applies to 24.5 acres or 1 percent of the Study Area and is related to utilities.

Prescription 8.2.1 – Inactive Phosphate Leases applies to existing Federal Phosphate leases that have not been developed and do not have a current proposal for development and KPLAs. Until developed, these lands will generally resemble adjacent areas with a variety of vegetation types

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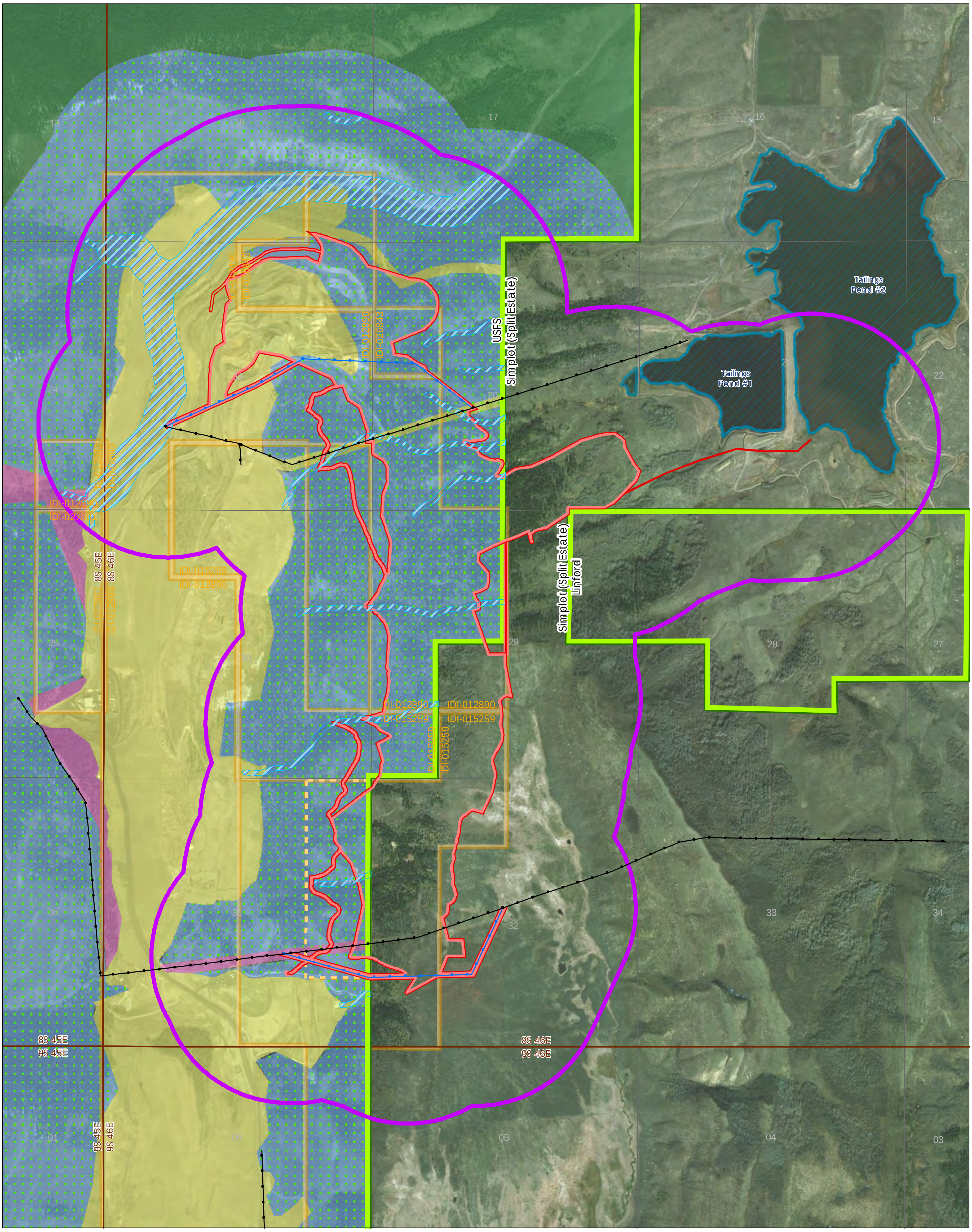
[1] The CNF and the Targhee National Forest were combined to form the CTNF in 2000.



Legend

- Existing Overhead Powerline
- Proposed re-route Overhead Powerline
- Project Area Boundary
- Tailings Ponds
- Surface Ownership Boundary
- Land Use Study Area
- BLM Lease
- Proposed Lease Modification Area

Management Prescriptions (CNF)

- 2.8.3 Aquatic Influence Zones (AIZ)
- Previously 5.2(b) Forest Vegetation Management
- 5.2(b) Forest Vegetation Management
- 8.1(b) Concentrated Development Area
- 8.2.1 Inactive Phosphate Leases and KPLAs
- 8.2.2(g) Phosphate Mine Areas

Notes

1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.10-1
Management Prescriptions
East Smoky Panel Mine EIS

and management activities. Associated mine development decisions would be made considering RFP Standards and Guidelines and the site-specific NEPA analysis prepared for the proposed activity, both on-lease and on adjacent lands. Following appropriate environmental analyses and M&RP approval, these lands will be managed according to Management Prescription 8.2.2.

Prescription 8.2.2 (g) – Phosphate Mine Areas are federal phosphate lease areas where mining, post-mining reclamation, or exploration is taking place. This prescription currently applies to 932 acres or 20 percent of the Study Area.

The private land in the Study Area may be subject to a local authority such as Caribou County. The Caribou County 2006 Comprehensive Plan (Caribou County 2006) has goals and policy regarding recreation pertaining to lands in the county. It provides recommendations for and supports development of recreation areas in the county. It includes both active and passive recreation activities. The goals and policies applicable to the Study Area are as follows:

2.1 Goal: Maintain positive relationships with all public lands entities and private owners for continuation of accessibility to popular recreation areas wherever possible. Encourage citizens to be involved in management decisions on public lands in the county.

2.5 Goal: Protect the agricultural life style.

2.1.1 Policy: Ensure the integrity of the county's open space and scenic beauty.

3.10.1 Land Use

3.10.1.1 Current Land Uses

NFS land in the Study Area is used for recreation, wood products extraction such as timber and firewood, livestock (sheep and cattle) grazing, wildlife habitat, and minerals extraction. Over 20 percent of the Study Area is currently occupied by mining facilities and mining-related disturbance (**Figure 3.10-1**). There are no conservation easements in the Study Area. Private land in the general area is used for mining, ranching, and recreation. The only private landowners in the Study Area are Simplot and Alan Linford/Crow Creek Ranches (**Figure 3.10-1**).

Rights-of-Way (ROW) provide access and corridors for utilities associated with the mine. Dispersed recreational activities include hunting, fishing, camping, hiking, skiing, and snowmobiling on NFS land (Stantec 2016f). There are no developed recreation sites in the Study Area. The Study Area may also be used for Tribal hunting, fishing, and ceremonial activities consistent with the Shoshone-Bannock heritage.

All of these uses, in addition to ongoing or event-type, natural and human-induced disturbances, influence the land or ecosystem condition. The desired condition of CNF land and ecosystems is one of sufficient complexity, diversity, and productivity to be resilient to disturbances (USFS 2003a).

3.10.1.2 Special Use Authorizations

The RFP (USFS 2003a) allows special uses that are compatible with other resources. SUAs are issued for uses that serve the public, promote public health and safety, protect the environment, and are legally mandated. Bonds or other security instruments are required if the CTNF determines that a use has potential for disturbance that may require rehabilitation or when needed to ensure other performance. The CTNF establishes and maintains rental and user fees for all SUAs. Current

SUAs are shown on **Figure 3.10-2** and are related to mining disturbances and facilities associated with the existing Smoky Canyon Mine.

The CTNF can issue SUAs for those portions of exploration and mining operations that lie on CTNF land outside mineral lease boundaries. Off-lease mine related SUA facilities could include portions of haul roads, mill sites, power lines, communication sites, temporary stockpiles (topsoil/ore/waste rock), or drainage control structures. However, permanent disposal of mine overburden solid waste is not permitted under SUAs [36 CFR 251.54].

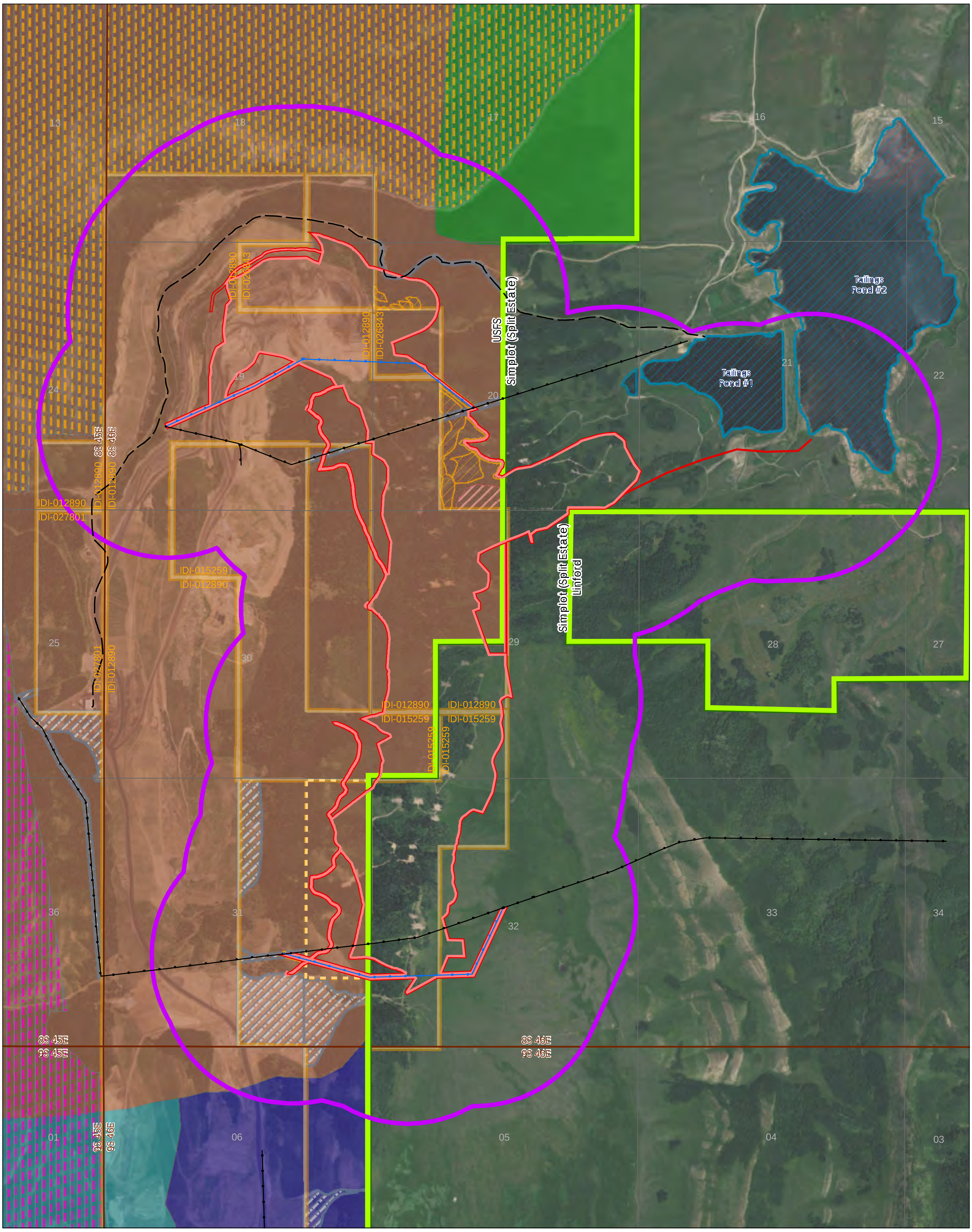
In addition to SUA areas on CTNF lands, other ROWs occur within the Study Area. The segment of the Smoky Canyon Road that passes through the north portion of the Study Area is in an easement granted to Caribou County by the CTNF for operation and maintenance of the road; it extends 33 feet each side of the road center line. Other segments of the Smoky Canyon Road outside the CTNF are under county jurisdictions – Caribou County in Idaho and Lincoln County in Wyoming.

3.10.1.3 Grazing and Range Resources

All 2,660 acres of NFS land in the Study Area are authorized for grazing under USFS grazing allotments. The desired future condition for grazing management on the CTNF that applies to the Study Area is to provide forage for domestic livestock while maintaining healthy and sustainable rangelands.

USFS grazing allotments within the Study Area include Salt Lick Creek, Sage Valley, and Pole Draney (**Figure 3.10-2**). However, only minor acreages (<100 acres total) of the Salt Lick Creek and Sage Valley allotments are within the Study Area and are not impacted by the Project, thus are not addressed in **Chapter 4**. Most of the Study Area falls within the boundaries of the Pole Draney Allotment.

The Pole Draney Allotment totals 12,071 acres, of which 2,561 acres (21 percent) is within the Study Area. There are 2,924 AUMs for the allotment; one AUM is the amount of forage needed by one cow and her calf (cattle) or approximately five ewes and their lambs (sheep) for one month. The Pole Draney Allotment is grazed from June 27 through September 20 of each year (USFS 2015b) and is currently utilized for sheep. According to the permittee, sheep are trailed from the south and arrive at the Pole Canyon Dump area around the 1st of July. They spend between 13 and 19 days, depending on available forage, feeding north to the slurry line corridor. They stay mostly on the NFS land but may also use some of Simplot's private land. They trail west along the slurry line corridor and then cross to the north of the Smoky Canyon Road. The first month on the allotment is spent on these lower slopes because the forage is advanced enough and the second part of the summer is spent gaining elevation as the forage matures. They feed to the north and west of the Smoky Canyon Mine until it is time to leave the allotment. They cross the active mine just north of the Pole Canyon dump and then trail south along the forest boundary on their way through and off the NFS land. Access to portions of the Pole Draney Allotment is coordinated with the Smoky Canyon Mine to avoid conflicts due to mining activities. The permittee is allowed to cross the mine area to get sheep to the allotment. Animals are not allowed to rest, water, or graze in the mine area.



Legend

- Existing Tailings Pipeline
- Existing Overhead Powerline
- Proposed re-route Overhead Powerline
- Project Area Boundary
- Tailings Ponds
- Surface Ownership Boundary
- Land Use Study Area
- BLM Lease
- Proposed Lease Modification Area

Special Use Authorization (SUA)

- Existing Special Use Authorization (SUA)
- Proposed Special Use Authorization (SUA)
- Proposed Mineral Materials Permit Area

Inventoried Roadless Area

- Sage Creek
- Stump Creek

Grazing Allotment (CNF)

- Pole Draney Sheep & Goat
- Sage Valley Cattle & Horse
- Salt Lick Creek Cattle & Horse
- Timber Creek Sheep & Goat

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.10-2
Land Use, Range Resources and Special Uses
East Smoky Panel Mine EIS

3.10.1.4 Recreation

Recreational use on federal lands is governed by federal land management plans, which generally include management for dispersed recreation. Land management plans and policies that apply to the Study Area include the CNF RFP (2003a) and the CNF Revised Travel Plan (RTP; USFS 2005a), as well as the Statewide Comprehensive Outdoor Recreation and Tourism Plan (SCORTP) and county land use regulations. These plans and policies, as they relate to recreation opportunities within the Study Area, are described briefly as follows and in more detail in the Recreation and Transportation Baseline TR (Stantec 2016g).

The CNF RFP (USFS 2003a) establishes the desired future condition for recreation on the CNF as, "People visiting the National Forest enjoy a broad range of recreation opportunities amid natural settings. Recreation experiences and settings meet public expectations of quality and variety, while complimenting other resource objectives." The CNF RFP provides a set of land management categories and prescriptions for management of CNF land.

The State of Idaho has plans that identify issues and opportunities in outdoor recreation and tourism (IDPR 2013) and guide the allocation of resources for maintaining and developing recreation facilities, practicing wise resource stewardship, and understanding the recreational needs of citizens (IDPR 2014). The Caribou County 2006 Comprehensive Plan (Caribou County 2006) describes goals and policy regarding recreation pertaining to lands in the county. It provides recommendations for and supports development of recreation areas in the county. It includes both active and passive recreation activities. County goals include enhancing accessibility to recreational sites and improving roadways leading to recreational areas. County policies deal with accessibility, public land diversity of use, and trail improvements.

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) is a system adopted by the USFS used to inventory, plan, and manage for recreational opportunities on NFS lands (USFS 1982). Its main objective is to attain consistency in the management of recreation through the integration of recreation and resource management planning. There are seven ROS classes which range from essentially natural, low-use areas (resource-dependent recreational opportunities) to highly developed, intensive use areas (facility/vehicle-dependent recreational opportunities). The CTNF includes four of those classes:

- Semi-primitive non-motorized (SPNM), which are areas over one-half mile from a designated motorized route with few facilities and development; SPNM makes up 26 percent of the CTNF.
- Semi-Primitive Motorized (SPM), which indicates areas within one-half mile of a motorized route with few facilities and development, and which account for 29 percent of the CTNF.
- Roaded Modified (RM) and Roaded Natural (RN). These are areas that are within one-half mile of a designated road and generally offer more facilities, information, and management presence.

The portion of the Study Area within the CTNF contains the two ROS classes: SPNM and RM (**Figure 3.10-3**). However, within the currently mapped SPNM class in the Study Area, there are disturbances associated with past and current mining activities associated with the Smoky Canyon Mine, and thus, the class assigned for this area might not be applicable. These classes are described in more detail as follows.

SPNM

The area is predominantly a natural landscape. Recreational activities include backpacking, nature viewing, hunting (big game, small game, and upland birds), rock-climbing, hiking, and cross-country skiing. The experience provides for minimal contact with others, a high degree of interaction with nature, and a great deal of personal risk and challenge. Where there is evidence of other people, interaction is low, and few management controls exist (USFS 1982).

RM

The area has been substantially modified by development of structures and characterized by vegetative manipulation. All forms of access and travel modes may occur, although roads are generally not well suited to highway-type vehicles. Use by high clearance vehicles is common. OHV use on designated routes or areas is encouraged. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. Moderate user densities are present away from developed sites (USFS 1982).

Current Recreation Conditions

Many recreation opportunities are offered on the CTNF, such as camping, hiking, mountain bike riding, hunting, snowmobiling, cross country skiing, horseback riding, OHV use, wildlife viewing, photography, and scenic drives. The top five recreation activities of CTNF visitors were wildlife viewing, viewing natural features, walking/hiking, relaxing, and driving for pleasure (USFS 2005b). The portions of the Study Area under federal jurisdiction are technically available for dispersed, backcountry, and undeveloped recreational uses, although due to active mining and restricted public access under Prescription 8.2.2 in some areas, these opportunities are fairly limited or not utilized. OHV use is popular on the CTNF; however, only 2.2 miles of USFS roads are present in the Study Area that would be available for OHV use. Therefore, OHV use is limited in the Study Area and will not be discussed further.

The most popular type of recreation within the Study Area is hunting for big game, including elk, moose, and deer. The Study Area is within IDFG Hunting District 76 where big game, upland birds, small game, and water fowl are harvestable. Hunting is prevalent throughout the CTNF during designated hunting seasons resulting in a substantial increase in recreational use at those times; however, hunting within the Study Area when compared to the rest of the CTNF would still be considered light due to the existing Smoky Canyon Mine. The terrain, combined with access safety restrictions and noise near current mining activity and lack of motorized access in some areas, deters many hunters from using the immediate area. Similarly, activities popular in the surrounding area are less likely within the Study Area because of these factors. Further, Smoky Creek is the only creek within the Study Area that contains game fish species, but due to its limited size and access restrictions, it likely does not support any semblance of a recreational fishery.

There are no parks or developed recreation facilities within the Study Area. The closest developed facilities, the Diamond Creek campground and Diamond Creek warming hut, are located approximately 4 miles west of the Study Area. There are no developed hiking trails within the Study Area.

The main recreational access to the Study Area is the Timber Creek Road/Smoky Canyon Road (Forest Road 110), which is accessed from Diamond Creek Road via Georgetown Canyon Road from State Highway 30 at Georgetown in Idaho or from Stump Creek Road via Tygee Road in Auburn, Wyoming (**Figure 3.10-4**; **Section 3.10.2**).

Of all the varied recreation activities that occur on the CTNF, the only activity that occurs in the immediate vicinity of the Project Area is dispersed recreation in the form of big game hunting. Even this activity is minimal due to very limited access and the ongoing nearby mining activities. No developed trails, developed sites, or dispersed camping opportunities exist in the Project Area.

3.10.2 Transportation

Access to the Study Area from the south is provided via U.S. Highway 30 traveling north from Montpelier, Idaho to Georgetown (**Figure 3.10-4**). From Georgetown, access is from Georgetown Canyon Road to Diamond Creek Road, then to the Timber Creek/Smoky Canyon Road (Forest Road 110). In addition to their use as access to the Study Area, Diamond Creek Road, Georgetown Canyon Road, and Wells Canyon Road are also considered primary routes across the CTNF. Access to the Study Area from the east is provided via U.S. Highway 89 to Auburn, Wyoming, then by traveling west on Tygee Road in Auburn, to Stump Creek Road. Stump Creek Road intersects Smoky Canyon Road (**Figure 3.10-4**).

Most roads to and within the Study Area were originally constructed as access for grazing, timber harvest, and mineral extraction. Most of these roads have been located, designed, and constructed to an approved CTNF or county standard. There are currently 9.5 miles of mapped roads within the Study Area (**Figure 3.10-3**). The only NFS road in the Study Area is the Smoky Canyon Road (Forest Road 110). Unnamed, native surface roads also access the Study Area from the east on private land (**Figure 3.10-3**; **Table 3.10-1**).

Table 3.10-1 Transportation Routes within the Study Area

ROAD	MILES WITHIN STUDY AREA	TYPE OF ROAD	PUBLIC USE
Smoky Canyon and Timber Creek Road	2.2	NFS	Open
Unnamed Roads (private)	7.3	Private	N/A

The CNF RFP (USFS 2003a) includes the following desired future conditions and goals applicable to transportation and access within the Study Area:

<u>Desired Future Conditions</u>

- Transportation system provides access to the CNF to meet planning and management goals including recreation, special uses, timber management, grazing, minerals development, and fire protection.

The transportation system is safe, environmentally sound, and is responsive to public needs and affordable to manage and maintain (USFS 2003a).

Goals

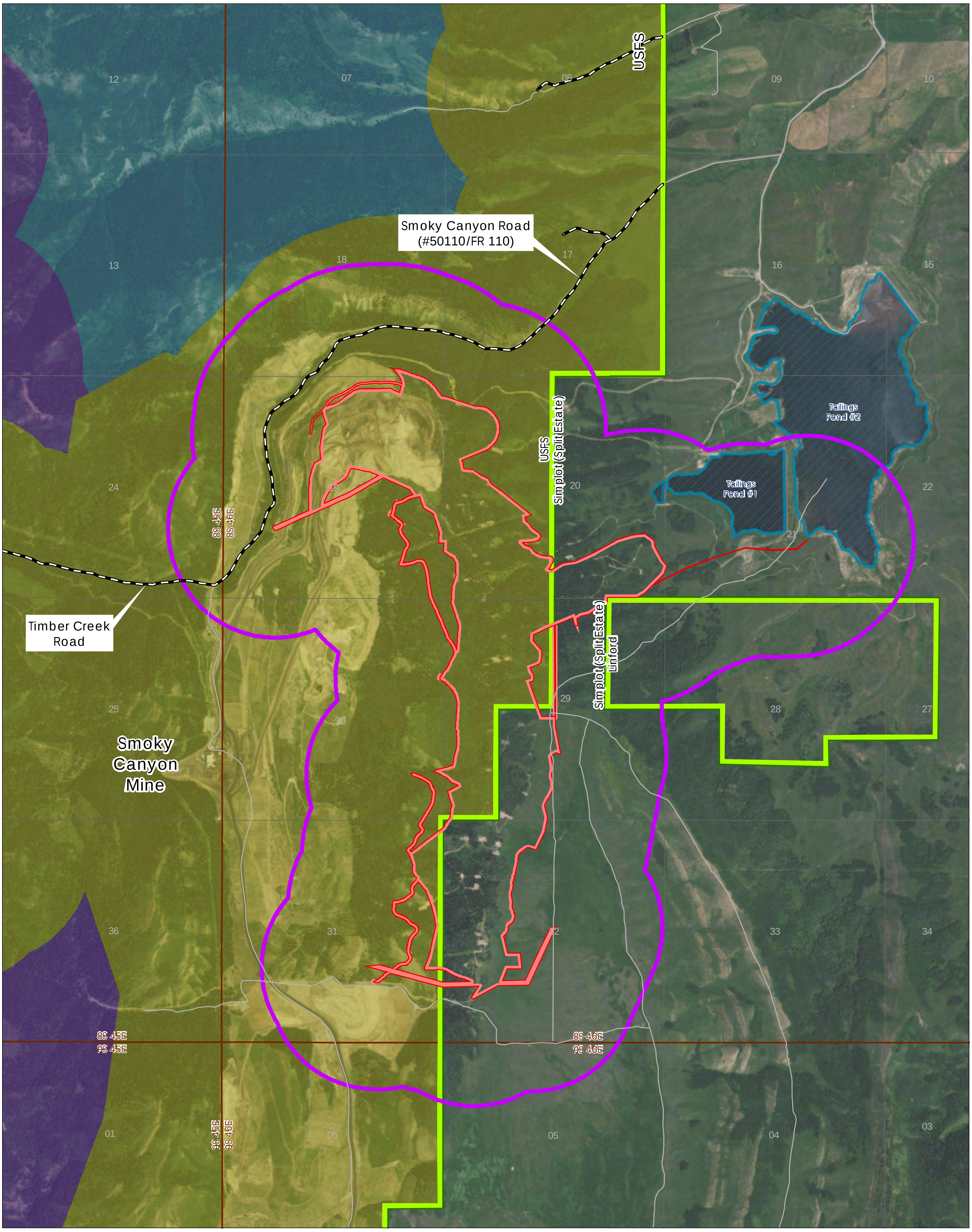
- NFS roads and trails needed for long-term objectives are maintained in a manner that provides for user safety and minimized impacts to forest resources.
- The forest transportation system is developed and maintained at the minimum level necessary to effectively and efficiently manage natural resources, provide user access, protect capital investments, provide for user health and safety, and protect the environment (USFS 2003a).

In August 2005, the CTNF completed the RTP to be in compliance with the 2003 RFP. The purpose of the RTP analysis and decision was to determine the motorized road and trail system, the non-motorized trail system, and designated mechanized trails for the CTNF. Motorized and non-motorized areas during winter season were also analyzed in the RTP (USFS 2005a).

The CNF RFP (USFS 2003a) and the RTP (USFS 2005a) provide direction on management of roads both generally and by prescription. In areas designated for semi primitive recreation, roads and trails are designed and maintained to allow for easy passage to maintain or enhance semi-primitive motorized and dispersed recreation opportunities. In areas designated as phosphate mine areas, public access is generally restricted due to safety concerns. Road construction and reconstruction are allowed to provide for mine development, but these roads are usually obliterated following mining activities unless site specific analysis determines the road is needed for forest management or public access.

The Smoky Canyon Mine is generally accessed by the Smoky Canyon Road (Forest Road 110). Simplot has worked with the USFS to improve the segment of the Smoky Canyon Road west of the intersection with the mine access road, which is typically referred to as Timber Creek Road. Under an SUA for the buried slurry line that runs down the Smoky Canyon/Timber Creek Road, Simplot conducts normal road maintenance including removal of debris; blading and shaping of roadway surfaces and ditches; repair of any roadway structures; restoration of eroded fills or berms; removal of snow; and installation of safety signs as appropriate. Improvements have included the addition of aggregate surfacing to the existing Timber Creek Road all the way to the Diamond Creek Road intersection (**Figure 3.10-4**) and some minor drainage improvements. The segments of the Smoky Canyon Road, northeast of the USFS boundary, are under county jurisdiction (Caribou County, Idaho and Lincoln County, Wyoming), and Simplot coordinates maintenance with the county on portions of these segments.

During the winter months, the Smoky Canyon Road from the northeast provides the only access to the mine. Although primary use of the road is for mine access traffic used by mine employees, commercial vendors, and suppliers, current use of the Smoky Canyon Road includes continued access to upper Smoky Creek and further west to Timber Creek and the Diamond Creek area along the single-lane gravel Timber Creek Road (during late spring through early fall months only). From Auburn, Wyoming, to the Wyoming/Idaho State line and then continuing west and south nearly another 5.2 miles, Stump Creek Road is about 24 feet wide with an asphalt surface. From that point, it becomes the Smoky Canyon Road, an improved surface, gravel, double-lane road to the intersection with the mine access road. A five-strand barbed wire fence lines the road on each side, and there are numerous cattle guards. As Smoky Canyon Road turns west and becomes Timber Creek Road, it transitions into a single lane, aggregate road which connects with the Diamond Creek Road.



Legend

- Existing Tailings Pipeline
- Project Area Boundary
- Tailings Ponds
- Surface Ownership Boundary
- Recreation Study Area

Roads

- Caribou National Forest Road Open to All Vehicles, Yearlong
- Various Existing Roads

Recreation Opportunity Spectrum (ROS)

Caribou National Forest

- Roaded Natural/Roaded Modified
- Semi-Primitive Motorized
- Semi-Primitive Non-Motorized

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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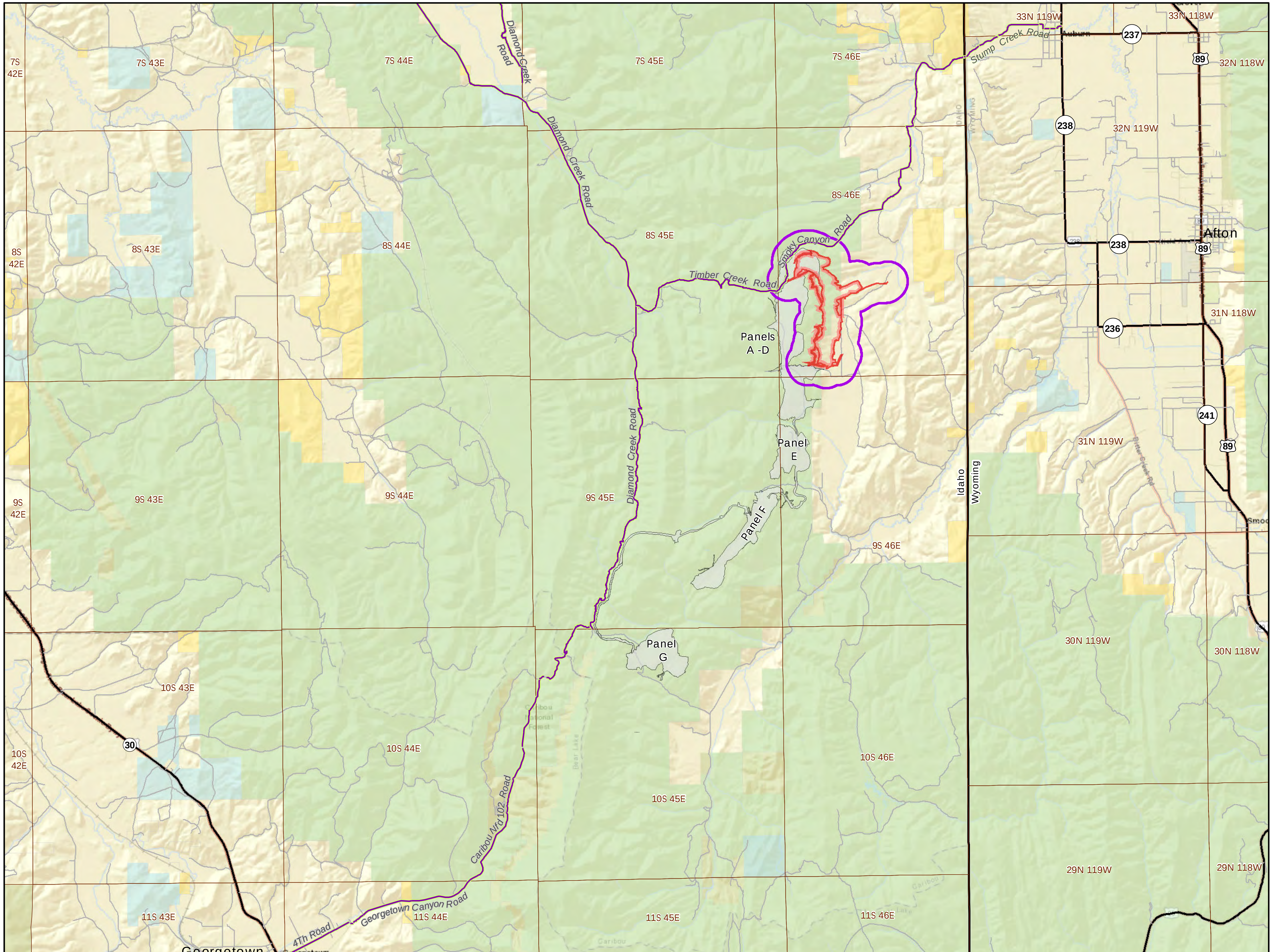
Figure 3.10-3
ROS Classifications and Nearby Roads
East Smoky Panel Mine EIS



Legend

- Study Area Access Road
- Major Road
- Minor Road
- Township Boundary
- Project Area Boundary
- Existing Mine Disturbance Boundary
- Recreation and Transportation Study Area

Land Ownership

- BLM
- Private
- State
- USFS

<u>Notes</u>

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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<u>Figure 3.10-4</u>
Area Transportation
East Smoky Panel Mine EIS

Of the 201 full time employees that work at the Smoky Canyon Mine (Simplot 2016a), approximately two-thirds of the employees car-pool to and from the mine. Mine traffic is present seven days a week, 365 days a year, although approximately one-fourth of the employees work a standard Monday-Friday week. Most employees work 14 days per month (rotating 12-hour shifts of 3 days/week then 4 days/week). Thus, assuming that two-thirds of the employees car-pool, it was estimated that approximately 31 vehicles per day travel to the mine between Monday and Friday, and an additional 100 vehicles used by mine employees working 12-hour rotating shifts travel on Smoky Canyon Road seven days a week. The busiest times on this road would occur around shift changes and normal arrival and departure times from work that occur between 5:00 to 7:00 am and 5:00 to 6:00 pm. Saturdays and Sundays would have the least amount of travel on Smoky Canyon Road from mine related (employees and vendors) traffic, but these are likely the busiest travel days by recreational users.

The approximate number of vendor vehicles/visits to the mine each day was estimated using the Smoky Canyon Mine security log/sign-in sheets for the months of May and June 2004 and 20 random day counts (two per month) from January through September 2004. Based upon this data, it is estimated that approximately 15 vehicles/day from vendors/visitors use FR 110 to access the Smoky Canyon Mine. Visitor numbers to the mine are highest during the late spring and summer months when groups of teachers and students take tours. There has not been an increase in vendor needs in recent years; therefore, these estimates still apply.

3.10.3 Special Designations

The USFS assigns some NFS lands special designations due to their unique characteristics or benefits. Examples include National Wild and Scenic Rivers, National Monuments, Research National Areas, Land and Water Conservation Fund, and Inventoried Roadless Areas (IRAs).

The only specially-designated land that occurs within the Study Area, but is outside the Project Area, is the Stump Creek IRA (**Figure 3.10-2**). Approximately 257 acres (less than 1 percent) of the 96,824-acre Stump Creek IRA overlaps the Study Area (**Figure 3.10-2**), but since the Project would not result in any disturbance within this IRA, special designations, specifically IRAs, will not be addressed in **Chapter 4**.

3.11 VISUAL RESOURCES

The Study Area for visual resources was initially developed based on a preliminary seen/unseen analysis of the Project Area relative to potential sensitive viewers in the vicinity and later refined during field work (Stantec 2016h) to include a one-mile buffer around the Smoky Canyon Mine and proposed East Smoky Panel, as well as the points where sensitive viewers would view the Project in the context of the existing Smoky Canyon Mine (**Figure 3.11-1**). The Study Area boundary was developed with the IDT experts and professional judgement.

3.11.1 Visual Resource Management

3.11.1.1 Overview of Visual Analysis

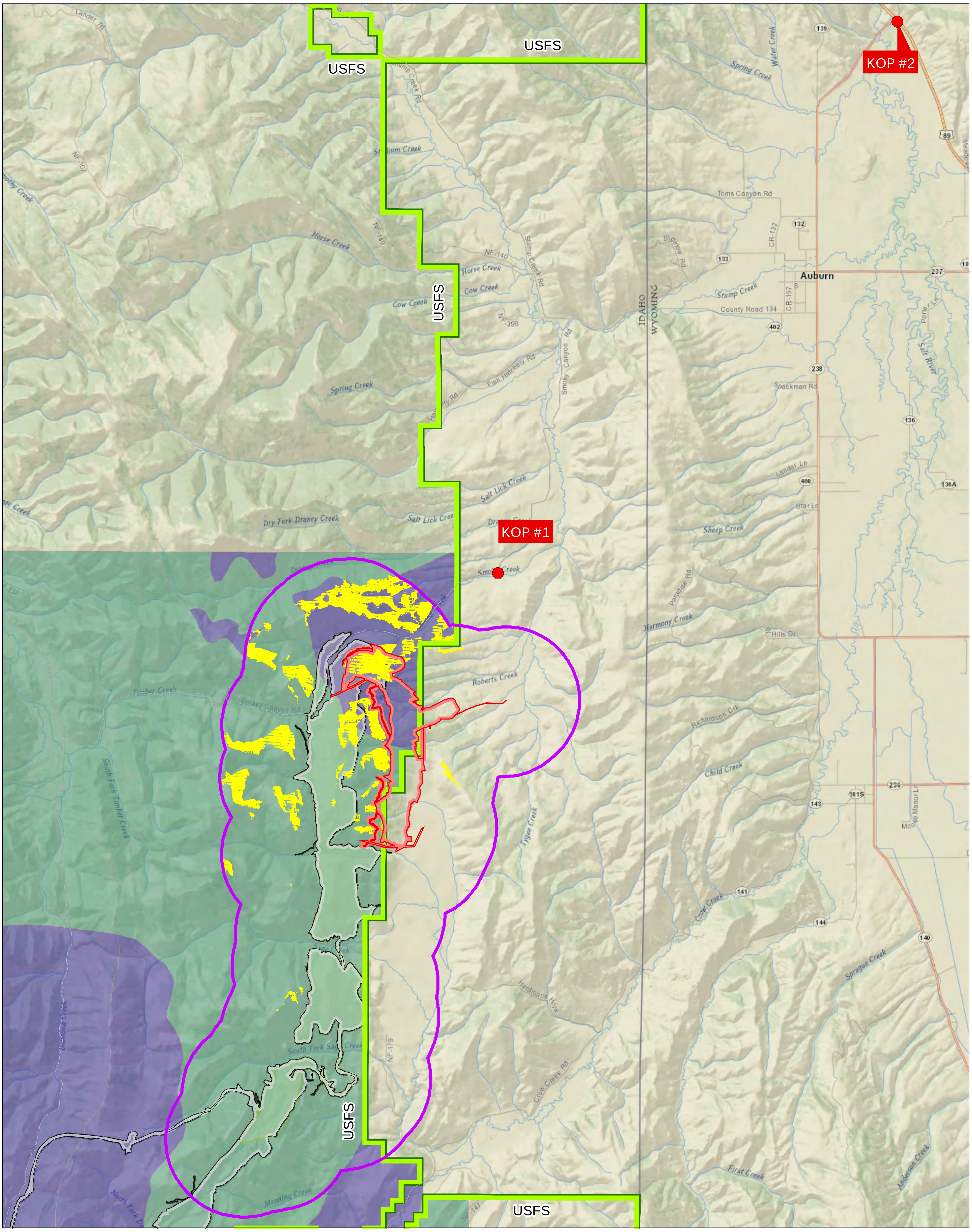
Federal land use management agencies have developed a variety of methods for describing landscapes and for analyzing the impacts to the scenic quality of a landscape. The common goal of these methods is to apply a level of objectivity and consistency to the process and to reduce the subjectivity associated with assessing landscape visual quality. One concept commonly used to assess impacts to scenic quality is contrast analysis. Contrast analysis can be summarized as the degree to which a project or activity affects scenic quality or visual resources depending on the visual contrasts created or imposed by a project on the existing landscape. The contrasts can be measured by comparing the project's features with the major features in the existing landscape (BLM 1986). Each land use agency applies the concept differently (e.g., different terminology, different methodologies for assessing impacts); however, the essential contrast analysis process described as follows is common to federal land management agencies.

Visual contrast analysis compares the existing, characteristic features and contrasts of the landscape to the contrasts imposed on that landscape by a proposed project. The landscape features used in the comparison are the forms, colors, textures, and lines that comprise the existing and potentially modified landscape. Landscape form refers to the unified masses or shapes of the landscape being analyzed, such as existing structures, topography, and natural objects (e.g., conical peaks, blocky mesas, rolling grassland). Landscape color refers to the colors of structures, vegetation, soil, water, rock, and sky. Landscape textures are the variations, patterns, density, and graininess of the landscape surface (e.g., uneven, sparse, and seemingly random-ordered shrubs in an arid landscape; even, orderly, and dense rows of trees in an orchard), and the dimensions of those surface variations (e.g., tall conifers, short grasses). Linear landscape features are the real or imagined paths that the eye follows when perceiving abrupt changes in form, color, or texture. These are often noticeable as the edge effect created at the boundary of two contrasting areas (e.g., a line of trees along a rocky slope or ledge, the abrupt boundary between forest and grassland, a dark ridgeline silhouetted against a bright sky). It should be noted that all of these observable landscape features (line, form, color, and texture) can be affected by environmental factors that include the viewing distance, the angle of view, atmospheric effects (e.g., haze, fog, dust, smoke), lighting conditions, and time of day.

For the Study Area, aesthetic or visual analysis involves determining the degree of visual change between the existing landscape and the landscape that would be produced by the Project for areas of "high scenic value" or "high visual sensitivity," that is, landscapes that are most interesting and appealing. These tend to be the undeveloped, natural landscapes with a harmonious blend, abundance, and diversity of lines, forms, colors, and textures.

A Key Observation Point (KOP) is one of a series of points on a travel route, use area, or a potential use area where the view of a management activity would be representative of views of the area. KOPs are chosen based on existing land use, frequency of visibility, duration of visibility, and anticipated activities of the observer. The criteria for selecting representative KOPs are as follows:

- Areas with visual sensitivity (as discussed previously), which for the Project Area includes areas designated as having High or Very High scenic integrity and areas with designated high Visual Quality Objectives (VQOs).



Legend

- Key Observation Point (KOP)
- Project Area Boundary
- Surface Ownership Boundary
- Visual Resources Study Area
- Existing Smoky Canyon Mine Disturbance
- Areas within the Study Area Visible from KOPs

Caribou National Forest Visual Quality Objectives

- Modification
- Partial Retention

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

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Figure 3.11-1
Key Observation Points, Visibility Analysis and Visual Quality Objectives
East Smoky Panel Mine EIS

- The potential number of viewers of the Project Area. The most comprehensive views of the Project Area should be from major thoroughfares (highways, scenic backways, popular hiking trails and overlooks, and major travel intersections).

- The length of time the Project Area is in view. Motorists on the major thoroughfares or in frequently used recreation areas would have the best views of existing scenic quality and any changes to that quality.

- The angle of observation. More weight is given to potential viewpoints that show more of the Project Area, as more potential impacts would be visible. Views that are elevated and present slopes and aspects that show more of the Project Area are preferred. Conversely, flat areas are not considered ideal representative viewpoints because a relatively small portion of the Project Area is likely to be visible.

Typically, KOPs used for analysis are selected along well-used roadways and trails and near communities, as these are areas where the greatest number of people will see the project impacts for the longest time.

In general, an evaluator analyzes contrast by:

1. Describing the baseline Project Area landscape from the KOPs, using the landscape elements or features of form, line, color, and texture as previously discussed.

2. Determining the potential impacts to the baseline scenic quality after reviewing the Project description, determining the types and intensities of proposed development, describing the Project Area landscape, and noting the agency visual objectives for the area.

3. Using a mental process and landscape photographs to mentally overlay the proposed project activities and changes to the scenic environment onto the Project Area's existing baseline scenic landscape.

4. Determining if the degree of proposed impacts and Project-created visual contrasts meets or exceeds scenic integrity objectives of federal agencies on the portion of the Project Area that lies within its jurisdiction.

3.11.1.2 USFS

The CNF RFP (2003a) states that VQOs established in accordance with the Scenery Management Handbook 701 (USFS 1995) would be changed to adopt Scenic Integrity Objectives (SIO). However, until the Scenery Management System is fully implemented, projects should be planned and implemented to meet the VQOs as displayed on the Forest VQO map.

The USFS Visual Management System (VMS) relies on visual inventory and scenic quality classes to manage visual resources. National Forest System lands are typically inventoried based upon a system of VQOs as part of the forest unit planning process. They are represented by five terms, which can be defined as visual resource management goals. The VQOs are categories of acceptable landscape alteration measured in degrees of deviation from the natural landscape and are described in **Table 3.11-1**.

Table 3.11-1 Visual Quality Objectives

VISUAL QUALITY OBJECTIVE	OBJECTIVE DESCRIPTION
P - Preservation	Provides for ecological changes only. Management activities, except for very low visual impact recreation facilities are prohibited.
R - Retention	Activities are not evident to the casual forest visitor. Provides for management activities that are not visually evident. Under retention, activities may only repeat form, line, color and texture, which are frequently found in the characteristic landscape.
PR - Partial Retention	Activities may be evident, but must remain subordinate to the characteristic landscape. Activities may also introduce form, line, color or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.
M - Modification	Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in foreground or middle ground.
MM - Maximum Modification	Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

(USFS 2003a)

According to the RFP (USFS 2003a), the scenic environment of the CNF will be maintained through adherence to existing VQOs, with the exception of phosphate mining. Phosphate mining activities and reclamation may or may not meet the given VQO (USFS 2003a). In the case where the VQO is not met, the M&RP would mitigate visual changes to the degree that reclamation methods and economics allow.

3.11.2 Baseline Conditions for Visual Resources

3.11.2.1 Overview

The Project Area lies on the east slope of the Webster Range, which is generally north trending. Near the Project Area, Smoky Creek, Pole Canyon Creek, North Fork Sage Creek, and Sage Creek flow eastward through the Smoky Canyon Mine. Existing mining activity in the Project Area is evidenced by pit walls, roads, mine facility buildings, power lines, and overburden disposal areas.

The opportunity to experience the landscape and interpret scenery and visual change is dependent upon the degree of public access and use of an area. The only public access to the Project Area is along the Smoky Canyon/Timber Creek Road.

The western portion of the Smoky Canyon Mine area is characterized by fairly high elevations, and incised drainages with steep gradients. The eastern portion of the Study Area is characterized by lower elevations and meandering streams within broad valleys. Land cover in the Study Area is a mix of aspen and conifer forests, shrub lands, and largely unvegetated areas disturbed by mining activities. There is a strong seasonal aspect to the visual resource. Spring and summer offer varying shades of green, with foliage softening land forms. Fall colors of red and yellow can be brilliant along the creeks and bottoms and throughout forested areas interspersed with aspen patches. A blanket of snow in the wintertime colors the area uniformly white, punctuated by colors and textures created by forested areas.

The more resistant Rex Chert and Grandeur members of the Phosphoria Formation form outcrops and dip slopes along ridges. The Rex Chert Member consists of massive grey and black chert and cherty limestone. The Grandeur Member consists of light-brownish-grey limestone and dolomite with some chert nodules near the top.

3.11.2.2 CNF Management of Visual Resources

All NFS lands in the Project Area have been classified by VQOs and the VQOs for the Study Area and surroundings are shown on **Figure 3.11-1**. As shown, these areas are classed as either Modification or Partial Retention.

Additionally, as described in the CNF RFP (USFS 2003a), the USFS manages lands using management prescriptions, which are a set of practices applied to a specific area to attain multiple-use and provide a basis for consistently displaying management direction on land administered by the CNF. The CNF has established a management prescription 2.1.2(b), Visual Quality Maintenance, which emphasizes maintaining the existing scenery within major travel corridors with high quality natural vistas (USFS 2003a). However, this management prescription is not applied by the USFS to lands within the Study Area for visual resources for the Project.

3.11.3 Key Observation Points (KOPs)

Two KOPs were established for capturing the views of sensitive viewers traveling in the area (**Figure 3.11-1**).

3.11.3.1 KOP 1

KOP 1 is located on the tailings pond road near the junction with the Smoky Canyon Road (Forest Road 110). The view point was from the junction on the south side of the Smoky Canyon Road looking southwest. This is the view for westbound travelers on the Smoky Canyon Road, which would include mine employees, recreationists, and local landowners/residents. The Smoky Canyon Road is a two-lane road that has an all-weather surface; therefore, sensitive viewers would be traveling between 30 and 40 miles an hour. Viewers looking southwest would be viewing existing Smoky Canyon Mine disturbance in Panel B partially blocked by an undisturbed ridge (**Photo 3.11-1**). The portions of the Smoky Canyon Mine and the Project Area visible from KOP 1 are within the Partial Retention VQO.

Photo 3.11-1 KOP 1 (Photographed April 2015)

Viewers from KOP 1 are at an elevation lower than the mine and are looking up at the mining disturbance located at a higher elevation. The landscape is characterized by mountains and rolling hills in the distance with gently rolling open valleys in the foreground and middle ground. The mountainside forms an irregular curvilinear line at the skyline with rounded, sculpted natural landforms and blocky irregular landforms where mining has occurred. Mining disturbance appears as flattened areas that create horizontal lines that contrast with the surrounding softer, more rounded mountaintops.

The fence in the foreground adds strong vertical elements to the surrounding vegetation. Foreground vegetation consisting of grasses and small shrubs gives way to larger shrubby vegetation that obscures middle ground views. Background vegetation is mixed conifer and deciduous trees, with mined areas devoid of vegetation. Because the photo was taken in spring, foreground grasses are mixed green and brown, and shrubs are shades of brown because they have not yet leafed out. Conifer forest in the background is dark green punctuated by snow and light brown deciduous trees that have not yet leafed out.

Textures in the foreground range from smooth to pebbly on the dirt road, soft to spiky where grasses and shrubs are growing. Vegetation textures in the background are vertical and spiky where forested with conifers, and smooth to dappled in mined areas.

Previous mine disturbance is distinct and noticeable in the background.

3.11.3.2 KOP 2

KOP 2 is located at the intersection of U.S. 89 and Wyoming Highway 238. The Smoky Canyon Mine and Study Area are visible to the southwest; therefore, the KOP represents the views of south bound travelers on U.S. 89 and southwest bound travelers on Wyoming Highway 238. Travelers on U.S. 89 would include both people traveling through the area as well as local or regional residents who would be traveling at highway speeds of 55 miles per hour or more. Travelers on Highway 238 would be locals to the area traveling at slower speeds appropriate to a local two-lane highway. The portions of Smoky Canyon Mine and the Project Area visible from KOP 2 are within the Partial Retention VQO.

Photo 3.11-2 KOP 2 (Photographed May 2015)

Viewers at KOP 2 are at a lower elevation than the mine, which is viewed in the background across rolling hills and valleys (**Photo 3.11-2**). The hills and rolling mountainous terrain create an undulating line at the skyline. Land forms are mostly horizontal, soft, and rounded oval shapes interrupted by flat-appearing valleys. Foreground vegetation consists of grasses, a few shrubs, and deciduous trees that appear newly leafed out when photographed. Valley vegetation appears relatively flat and green, while middle ground vegetation on hillsides is varying shades of dark green to black and stippled. Background vegetation is patchy shades of green where forested areas give way to shrubs or grasses, which appear smooth to stippled or dotted.

The texture of trees and shrubs in the foreground is coarse, rough, and ragged, compared to the relatively smooth or stippled appearance of vegetation in the middle ground and background. The mine is brown and readily distinguished from the surrounding vegetation, but the curvilinear lines and soft forms blend with the background topography so that, while the color distinguishes it from the surroundings, it does not attract attention from this distance. The brown color of the mine disturbance in the distance repeats the brown colors of the road cut and drainage banks in the foreground to middle ground.

The foreground to middle ground is dominated by the serpentine road through the valley and rolling hills. The landscape is also dotted with various structures, making the scene appear rural and pastoral.

3.12 CULTURAL RESOURCES

Cultural resources are non-renewable resources. The National Historic Preservation Act (NHPA) of 1966 (as amended) and the Archaeological Resources Protection Act (ARPA) of 1979 are the primary laws regulating preservation of cultural resources. Federal regulations obligate federal agencies to take into account the effects of their undertakings on important archaeological and historic sites in the area of potential affect (APE).

Cultural resources are defined as any definite location of past human activity identifiable through field survey, historical documentation, and/or oral evidence. Cultural resources include archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains. Cultural resources have many values and provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of history.

Section 106 of the NHPA, as amended, requires federal agencies to take into account any action that may adversely affect any structure or object that is, or can be included in the NRHP. These regulations, codified at 36 CFR 800, provide a basis for which to determine if a site is eligible. Beyond that, the regulations define how those properties or sites are to be dealt with by federal agencies or other involved parties. These regulations must be considered for historic properties or sites of historic importance, as well as for archaeological sites.

Cultural resources provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of history. The guidelines for evaluation of significance and procedures for nominating cultural resources to the NRHP can be found in 36 CFR 60.4. In order to be eligible for nomination to the NRHP, a cultural resource site/historic property must retain cultural integrity and meet at least one of the four National Register Criteria:

- association with events that have made a significant contribution to the broad patterns of our history, or
- association with the lives of persons significant to our past, or
- embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
- have yielded or may be likely to yield information important in prehistory or history.

A Traditional Cultural Property (TCP), as defined in the NHPA, is a property that is eligible for inclusion on the National Register of Historic Places "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998). Stated another way, a TCP is defined as a property with "significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (Parker and King 1998).

The term "Heritage Resources", used by the Forest Service, encompasses not only cultural resources but also traditional and historic use areas by all groups (Native Americans, Euro-Americans, etc.). Heritage resources include lifeways or the way humans interact and survive within an ecosystem (USFS 2003b). Objects, buildings, places, and their uses become recognized as "heritage" through conscious decisions and unspoken values of particular people, for reasons that are strongly shaped by social contexts and processes (Avrami et al. 2000).

Heritage resources define the characteristics of a social group (i.e., community, families, ethnic group, disciplines, or professional groups). Places and objects are transformed into "heritage" through values that give them significance.

3.12.1 Cultural Context

Evidence of 11,000 years of prehistoric occupation and use of the CTNF has been documented through rock shelters, stone circles, hunting blinds, bison kill sites, and projectile points (USFS 2003b). The prehistory of southeastern Idaho and the northeastern Great Basin has been previously detailed (e.g., BLM 1981; BLM and USFS 1998; Butler 1978, 1986; Carambelas et al. 1994; Gehr et al. 1982; Lohse 1993; Madsen 1982; Meatte 1990; Ringe et al. 1987; Swanson 1972, 1974). Overviews specific to the history of southeastern Idaho have been written to address the needs of cultural resources management (e.g., BLM 1981; Fiori 1981; Sommers and Fiori 1981) and to identify a number of significant themes for the region. These prehistories are based on archaeological research and may differ from the perspective of local Indian tribes.

The following brief prehistoric overview was summarized from the Final EIS for the CNF Phosphate Leasing Proposal (BLM and USFS 1998).

3.12.1.1 Prehistory

The prehistory of southeastern Idaho can be divided into at least three periods; Paleo-Indian (ca. 10,000 to 7,000 before present [B.P.]), Archaic (7,000 to 300 B.P.), and Protohistoric (300 B.P. to present). These periods are generally defined by distinct artifact types and characterized by different settlement and subsistence patterns.

Paleo-Indian Period
The Paleo-Indian period largely is defined by three projectile point types: Clovis, Folsom, and Plano. Paleo-Indian groups who occupied the region focused their subsistence efforts on large, migratory animals as indicated by the association of Folsom spear points and large animal remains. It may be reasonable to assume that Paleo-Indian groups in southeastern Idaho also traveled over large annual ranges (Goodyear 1979; Letourneau 1992) and exhibited a high degree of residential mobility (Binford 1980; Kelly and Todd 1988).

Archaic Period
The Archaic period is generally defined by the introduction of stemmed (Pinto series) and notched (Northern Side-notched and Elko series) projectile points and the apparent broadening of the resource base. The shift from large, lanceolate-shaped points to small, stemmed and notched points

is believed to be related to the introduction of the atlatl and dart from two separate regions, the Great Basin and the Plains (Gruhn 1961). Although data indicates that large mammals were the primary food resource of Archaic groups, the exploitation of a wider array of resources is evidenced in ground stone artifacts and small mammal remains at some sites (Sant and Douglas 1992). The Archaic Period can be subdivided into three subperiods based on variation in artifact assemblages and settlement and subsistence practices (Sant and Douglas 1992). These subperiods are the Early Archaic (7,000 to 4,500 B.P.), Middle Archaic (4,500 B.P. to 1,300 B.P.), and the Late Archaic (1,300 to 300 B.P.).

Subsistence and settlement patterns in southeastern Idaho remained fairly consistent between the Early and Middle Archaic (Gruhn 1961; Ranere 1971; Swanson 1972), although artifact assemblages differ. The Late Archaic is defined by the introduction of ceramics and small triangular and side-notched points. These artifact classes, particularly the ceramics, indicate the occupation of at least two groups or "cultural manifestations" (Butler 1986) in southeastern Idaho: the Fremont (ca. 1300 to 650 B.P.) and the Shoshonean (ca. 700 B.P. to present). The Fremont are typically thought of as horticulturalists. Evidence for horticulture has not been found in southeastern Idaho (Holmer 1986; Ringe et al. 1987); therefore, the presence of Fremont artifacts has been problematic to some. Sant and Douglas (1992) suggest that Fremont artifacts arrived in southeastern Idaho through trade. Some have argued that northern Fremont populations were primarily hunters and gatherers, rather than horticulturalists (Madsen 1982; Simms 1990); if that is the case, then the presence of Fremont artifacts in southeastern Idaho would likely be a consequence of Fremont hunter-gatherers occupying the area.

Occupation of southeastern Idaho by the Shoshone and Bannock coincides with the expansion of Numic speaking people from the southwestern Great Basin to the north and east. Brown-ware ceramics and Desert Side-notched and Cottonwood triangular projectile points are thought to be temporally and ethnically sensitive artifacts. Artifacts recovered from the Wahmuza site, in southeastern Idaho, indicate continuous Shoshonean occupation since 700 B.P. (Geminis 1986 as cited in Sant and Douglas 1992). The Shoshone and Bannock groups are characterized as relatively mobile hunter-gatherers.

The Shoshone-Bannock Tribes state that the ancestors of the Shoshone and Bannock peoples have an extensive history in southeastern Idaho and the Project Area. Their ancestors used present-day southeastern Idaho for subsistence hunting, fishing, gathering, medicinal and ceremonial purposes, warfare, transportation, and social purposes.

Protohistoric

Existing research and records indicate two horse-owning groups may have passed through the Manning Creek Tract (south of the Project Area) during their annual forays. According to Stewart (1938), the Cache Valley Shoshone hunted and gathered along the Bear River and crossed the Wasatch Mountains (south of the Project Area) during bison hunting excursions to Wyoming. Bannock and Shoshone groups living at Fort Hall also may have passed through the area while hunting elk, deer, and mountain sheep, and gathering berries along the Bear River (Murphy and Murphy 1986), or when traveling to Wyoming to hunt bison (Stewart 1938). These hunting and gathering forays began to change during the nineteenth century, when westward expansion and increasing conflicts with Euro-Americans eventually forced most of the Shoshone and Bannock into the reservation system. Mixed bands of Shoshoni or the Western Shoshone signed a treaty with the United States Government at Soda Springs, Idaho on October 14, 1863 (Kappler 1941), which set aside large tracts of Indian land in Idaho, Nevada, Oregon, Utah, and Wyoming

(Manning and Deaver 1992). Unbeknownst to the Shoshone people, this treaty was not ratified by the United States Government. In 1867 and 1868, the Fort Hall and Wind River Valley Reservations, respectively, were established, and by 1868, the Shoshone had relinquished all their lands in Idaho and Wyoming except for lands specifically set aside as reserves (Clements and Forbush 1970). The Bannock were assigned to the Fort Hall Reservation in 1869, and between 1879 and 1907, a number of other Native American groups were relocated to Fort Hall (Manning and Deaver 1992).

Sacred sites, such as burials, rock art, monumental rock features and formations, rock structures or rings, sweat lodges, timber and brush structures, eagle catching pits, and prayer and offering locales, are located throughout the region (Manning and Deaver 1992). Much of the landscape in southeastern Idaho also is sacred to local Native American groups and, thus, is not defined by archaeological remains.

3.12.1.2 Euro-American History

Fur trappers and explorers were the first non-native Americans to pass through the region (Fiori 1981) and are documented as early as the early 1800s. In the early-1800s, under the command of Robert Stuart, one group of Astorians (fur traders whose base was Fort Astoria) made their way from the Bear River to the Salt River and thence to the Snake River, a route which likely took them through Georgetown Canyon, Crow Creek, and Star Valley. During the early 1840s, great numbers of emigrants began moving westward. In Idaho, emigrants could follow the Oregon Trail, via Fort Hall and Fort Boise, or the California Trail at Soda Springs, Fort Hall, or Raft River (Fiori 1981). Brigham Young led Mormon pioneers into the Salt Lake Valley in 1847, and by early-1860, had dispatched settlers into southeastern Idaho (Fiori 1981). The general area surrounding the Project Area, including the town of Soda Springs (the County seat), was along the routes of the earliest explorers, fur trappers, and emigrants.

Soda Springs was an early transportation hub (ISHS 1981a) with open valley connections to Bear Lake and Wyoming, with the Blackfoot River north to Montana, with Portneuf Valley used by Oregon Trail emigrants to Fort Hall, with Hudspeth's Cutoff west to California, and down Bear River to Cache Valley and Salt Lake.

Between the 1860s and 1890s, miners and railroad workers came to southeastern Idaho. Cariboo Fairchild, who had taken part in the gold rush in the Cariboo region of British Columbia in 1860, discovered gold in this region two years later (IMNH 2017). A modest gold rush began in the Caribou Mountain area in 1870 and ended in the early 1900s (USFS 2003b). During this time, Keenan and Caribou City became thriving boomtowns. Sulfur mining commenced in the early 1880s.

The mines in the Cariboo District depended on distant sources for supplies. The miners' needs provided an enticement for settlers to develop the surrounding country at a time when not too many other economic attractions were available to encourage settlement of southeastern Idaho (ISHS 1981b).

Livestock

As necessitated by the mining boom, small herds of cattle were driven into the region during the 1860s. Crowding on the plains prompted cattlemen to locate larger herds in southeastern Idaho during the 1870s and 1880s (Fiori 1981). Sheep were brought into the area as early as the 1830s-1840s by missionaries and emigrants (Fiori 1981), with larger herds brought in during the mining boom. Large herds of sheep were established in Caribou County during the late 1890s and early1900s (Barnard et al. 1958 as cited in BLM and USFS 1998). Basque sheep herders moved to the area after 1925 (Carambelas et al. 1994). Grazing allotments encompass the Project Area (See **Section 3.10.1.3**). Evidence of historic and modern livestock grazing is present within the Project Area in the form of arborglyphs, livestock trails, and temporary campsites. Arborglyphs are etchings or carvings of art and words in aspen trees that over time turn black against the white trunk, becoming more apparent. Recent studies (Mallea-Olaetxe 2000) indicate the relevance of tree carvings in depicting livestock usage/trailways, range boundaries, sheep herder lifeways, cultural affiliations, periods of use, and transportation routes.

Roads

Freighting was the original mode of mass transportation of goods in southeastern Idaho. The discovery of gold and the explosive growth of mining towns in Idaho and Montana resulted in a surge of freighting activities along the trade routes to the mines. By the 1860s, freight and stage roads passed through southeastern Idaho and contributed to its settlement (BLM 1981; ISHS 1971). Large scale freighting occurred between 1864 and 1884. There were two main routes in this region: the Montana Road (from Corrine, Utah to western Montana) and the Kelton Road (from Kelton, Utah to Boise, Idaho). Approximately 1,000 freighters hauled between Idaho and Montana on the Montana Road in 1873 (BLM 1981). One early report states that the only "direct and safe route [to Cariboo Mountain gold deposits] is to go up the regular Montana road to Ross Fork…" (ISHS 1981b). Road conditions were poor, and tolls were often charged to obtain funding for improvements. Railroads diminished the need for freighting except in the areas not served by railroads.

Early settlers developed the Crow Creek Road, in the Project Area, as a path of commerce from Fairview, Wyoming to Montpelier, Idaho (Druss et al. 1979). This road is still well traveled and is known as the Crow Creek Road. It runs southwest and south to Montpelier Canyon and west to the town of Montpelier. It appears on historic General Land Office (GLO) maps (1901, 1902) of the area as *Montpelier to Star Valley Road.*

The Fairview Cutoff was a route from Fairview, Wyoming to Soda Springs, Idaho. The route cut off from Crow Creek at Hardmans Hollow, ran north to Tygee Creek, then southwest through Smoky Canyon to Soda Springs (Druss et al. 1980). Located north of the Project Area, this road is known currently as the Smoky Canyon Road.

Timber

Timber resources in southeastern Idaho are not as abundant as in other parts of the state, but still played a role in the development of the area. As communities were established, lumber was harvested locally through primitive means such as the pit saw (BLM 1981). As the demand for lumber grew, other means of lumbering were needed. A water-powered sawmill was the next technology introduced into the region, built by Samuel Parkinson and Thomas Smart in 1863 in Franklin. In response to railroad construction in the West, Majors Tie Camp was established in 1868 by Alexander Majors, who directed the cutting of thousands of trees along the Bear River. Majors floated the resulting ties down the Bear River to Corrine, Utah, where they were used for the Transcontinental Railroad. A steam sawmill was brought into the area in 1871. Approximately 30 sawmills were operating in southeastern Idaho by 1883. Historic sites associated with sawmills and lumbering activities have been recorded in the general Project Area.

3.12.2 Previous Research

Cultural resource inventories for previous mine expansions have recorded prehistoric and historic sites in and around the current Project Area. Site types in the general vicinity include prehistoric campsites, mining sites, and livestock/ranching sites. Also, historic sites associated with sawmills and lumbering activities have been recorded. Other known historic sites near but not within the Project Area include the Lander Trail, Fairview Cutoff, and Oneida Salt Works. Historic GLO maps show two historic roads were historically present adjacent to the Project Area. Prehistoric sites found in the area are generally considered significant due to the paucity of prehistoric sites in this high elevation environment.

There have been 29 previous cultural resource inventories completed (**Table 3.12-1**) within 1 mile of the Project Area. Four previously conducted surveys completely inventoried the Project APE (Pagano 2014a, 2014b, 2014c, and 2015).

Table 3.12-1 Previous Cultural Resource Inventories within One Mile of the Project Area

REPORT NUMBER	TITLE	AUTHOR	YEAR	PROJECT NUMBER
1989/1515	Survey Report #3, Smoky Canyon Project, 1981. Basin and Range Research, Pocatello.	Druss, Claudia and Steven Wright (Basin and Range Associates)	1981	CRM-CB-110
1989/1519	Final Report: Intensive field study of archaeological resources at drill locations & proposed roads, Smoky Canyon Lease I-012890, J.R. Simplot Co., Fall 1978.	Druss, Mark (Idaho State University [ISU])	1978	CRM-CB-19
1989/1520	Final Report-Stage I investigation & analysis of archaeological resources in pit area, mill sites, and dump site, Smoky Canyon Lease I-012890, J.R. Simplot Company, Summer and Fall 1979.	Druss, Mark (ISU)	1980	CRM-CB-61
1989/1521	Archaeological Survey, 161 kv Transmission Line, Smoky Canyon Area.	Druss, Mark (ISU)	1982	CRMB-CB-124
1989/1534	Archaeological Investigations in the Smoky Canyon Area, 1980.	Druss, Mark et al. (ISU)	1981	--
1989/4474	Cultural Resources Inventory of the Smoky Canyon Mine Lease.	McGuire, David	1982	--
1989/4529	A Class III Cultural Resource Inventory of Proposed Tailings Reservoir No. 2 at J.R. Simplot Company's Smoky Canyon Mine, Caribou County, Idaho.	McNees, Lance and Craig S. Smith (Mariah Associates)	1988	--
1989/5497	A Cultural Resources Snow Monitor of Four Proposed Drill Pads and Two Access Roads, Caribou County, Idaho.	Polk, Michael (Sagebrush Consultants)	1987	--
1989/6883	Archaeological Investigations in Eastern Idaho: the Lower Valley Power and Light Tincup Loop Transmission Line Cultural Resource Survey. Caribou National Forest.	Walker, Danny	1982	--

REPORT NUMBER	TITLE	AUTHOR	YEAR	PROJECT NUMBER
1991/529	A Class III Cultural Resource Inventory of Additional Area for the Proposed Tailing Reservoir No. 2 at J.R. Simplot Company's Smoky Canyon Mine, Caribou County, Idaho.	Smith, Craig	1991	ID3-91-38
1992/764	An Archaeological Evaluation of Site 10CU90, Caribou County, Idaho.	Polk, Michael (Sagebrush Consultants)	1982	--
1993/224	Diamond Creek GIS Area. Caribou National Forest.	Christensen, B. (USFS)	1991	CB-91-0218
1994/167	Diamond Creek GIS Update. Caribou National Forest.	Robertson, Mary (USFS)	1993	CB-93-306
1995/1034	Alan Linford Springs Development & Pipeline. Frank Fink, SCS Boise.	Robertson, Mary (USFS)	No date	NRCS95455
1997/490	JR Simplot Panel B Exploration, Extension of 1996 Req. Caribou National Forest.	Robertson, Mary (USFS)	1997	CB-97-432
1997/664	Smoky Canyon Panel B Exploration, Caribou National Forest.	Robertson, Mary (USFS)	1997	CB-97-434
1997/851	Simplot Smoky Canyon Phosphate Exploration BLM Report. BLM, Idaho Falls District.	Cresswell, Lisa (BLM)	1997	ID-030-97-8
1998/58	Hartman Land Exchange. BLM, Idaho Falls District.	Myler, Terrie (BLM)	1997	CEEA#97-14
2002/622	Smoky Canyon Panels B&C. Prepared for J.R. Simplot Co., Boise, by Frontier Historical Consultants, Grand View, Idaho.	Gray, Dale (Frontier Historical Consultants)	2001	CB-01-530
2006/567	Pole Canyon Removal Area, Frontier Historical Consultants, Grand View, Idaho.	Stratham, William (Frontier Historical Consultants)	2006	CB-06-562
2010/552	Soda Springs Allotments Management Plan. Caribou N.F.	Hall, D. (USFS)	2010	CB-10-603
2013/349	Soda Springs RD 5 Allotments AMP. Caribou National Forest.	Shelton, Jeffry (USFS)	2012	CB-12-649
2013/527	JR Simplot Smoky Canyon Mine Diversion Channel, Caribou County.	Pagano, Sandy and Michael Polk (Sagebrush Consultants)	2012	CB-12-0655
2015/2	JR Simplot East Smoky Canyon, GW-29 Exploration Area.	Sandy Pagano (Sagebrush Consultants)	2014*	CB-14-689
2014/569	JR Simplot East Smoky Canyon, Proposed Borrow Areas.	Sandy Pagano (Sagebrush Consultants)	2014*	2014-PFO-15
2015/60	JR Simplot East Smoky Canyon, GW-30 Groundwater Monitoring Well.	Sandy Pagano (Sagebrush Consultants)	2014*	CB-15-694/ 2015-PFO-3
2015/294	The Proposed J. R. Simplot East Smoky Panel, Smoky Canyon Mine, Caribou County, Idaho.	Sandy Pagano (Sagebrush Consultants)	2015*	CB-15-692/ 2015-PFO-4

*project-specific inventory within the APE

As a result of the previous inventories, 10 previously recorded sites (**Table 3.12-2**) have been recorded within 1 mile of the Project Area. The prehistoric sites include lithic scatters while the historic sites include arborglyphs (i.e., tree carvings associated with sheep herding activities), a salt works site, and a sheep bridge.

Table 3.12-2 Previously Recorded Sites within One Mile of the Project Area

SITE NUMBER	AFFILIATION	NRHP EVALUATION	LAND STATUS
10CU76 (CB-33)	Native American, Historic	Eligible	CTNF
10CU77 (CB-34)	Native American	Eligible	CTNF
10CU90 (CB-77)	Native American	Undetermined	CTNF
10CU112 (CB-94)	Historic	Undetermined	CTNF
10CU113 (CB-95)	Historic	Undetermined	CTNF
10CU132 (MA337-1)	Historic	Not eligible	Private
10CU247 (DG-1)	Historic	Undetermined	CTNF
10CU326 (CB-468)	Historic	Not Eligible	CTNF
10CU418 (CB-598)	Historic	Undetermined	CTNF
29-15962 (CB-445)	Historic	Undetermined	CTNF

3.12.3 Cultural Resource Sites

As a result of the Project-specific cultural resource inventories (Pagano 2014a, 2014b, 2014c, and 2015), two historic sites were identified within the Project Area. No prehistoric sites were encountered during the inventories. The two historic sites have been evaluated as not eligible for the NRHP (**Table 3.12-3**), and the SHPO concurred with this determination (SHPO 2015).

Table 3.12-3 Cultural Resources in the Project Area

SITE NUMBER	SITE TYPE	AFFILIATION	NRHP EVALUATION
CB-635	Log Cabin	Euro-American	Not Eligible
CB-636	Corral	Euro-American	Not Eligible

3.12.4 Heritage Resources

Southeastern Idaho has been traditionally utilized by the Shoshone-Bannock Tribes for subsistence and ceremonial uses. The Fort Bridger Treaty of 1868 reserved the Tribes' rights to hunt, gather, and fish on all unoccupied federal lands (See **Section 3.13**). Physical remains of prehistoric lifeways on the CTNF include campsites and associated artifacts (USFS 2003b). During previous consultations (BLM and USFS 2007), the Shoshone-Bannock Tribes stated that the general areas within and adjacent to the Project Area are currently used for traditional activities such as hunting, gathering, and ceremonial uses. According to the RFP (USFS 2003b), representations of historic lifeways on the forest include wagon trails, homesteads, mining sites, and Civilian Conservation Corps camps.

Heritage resources in or adjacent to Project Area also include the historic uses of livestock trailing and grazing. This is in part evidenced in the numerous arborglyphs (tree carvings) present in and around the Project Area, as well as the stock drive (CB-593). Grazing availability and allotments in the Project Area are described in **Section 3.10.1.3**. Roads and trails in the Project Area are described in **Section 3.10.1.4** (Recreation) and **Section 3.10.2** (Transportation).

3.13 NATIVE AMERICAN CONCERNS AND TREATY RIGHTS RESOURCES

The Shoshone-Bannock Tribes are a sovereign nation with their own governing system and not simply members of the general public. The federal agencies must consult at the government-to-government level, in accordance with federal laws, treaties, and executive orders. The trust responsibility of the federal government includes an obligation to protect and preserve the natural resources affecting the Tribes' treaty rights and therefore must consider the effects of federal actions on Tribal interests and rights.

Federal agencies are required by law (National Historic Preservation Act of 1966 and Archaeological Resources Protection Act of 1979) to consult with Native Americans on actions that may affect their traditions or uses of public lands. Specifically, the agencies are required to follow the Section 106 process as recorded in 36 CFR 800 - Subpart B, as amended January 11, 2001. The goal of the BLM as stated in Policy Manual Section 8160 is to "assure that tribal governments, Native American communities, and individuals whose interests might be affected have a sufficient opportunity for productive participation in BLM planning and resource management decision making." To this end, the Pocatello BLM Field Office and the CTNF, Soda Springs Ranger District have engaged in consultation with the Native Americans associated with southeastern Idaho.

The American Indian Religious Freedom Act (AIRFA) of 1978 states "...henceforth it shall be the policy of the United States to protect and preserve for American Indians their inherent right and freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites [42 United States Code (U.S.C.) 1996]." Agencies are required to review their policies and procedures in consultation with traditional native religious leaders.

Executive Order (EO) 13007 - Indian Sacred Sites requires agencies to accommodate access to and ceremonial use of Indian sacred sites and to avoid adversely affecting the physical integrity of said sites. According to EO 13007, a sacred site is defined as "any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." Sacred sites may consist of a variety of places and landscapes.

The DOI Departmental Manual 512 DM 2 (DOI 1995) requires that all bureaus within DOI develop policies and procedures to identify, conserve, and protect Indian Trust Assets, trust resources, and tribal health and safety. Indian Trust Assets are legal interests in assets held in trust by the United States for Indian Tribes or individuals and can include: minerals, hunting and fishing rights, and water rights.

3.13.1 Introduction

The Shoshone-Bannock Tribes state that the ancestors of the Shoshone and Bannock peoples have an extensive history in southeastern Idaho and the Project Area. Their ancestors used present-day southeast Idaho for subsistence hunting, fishing, gathering, medicinal and ceremonial purposes, warfare, transportation, and social purposes.

The Fort Hall Reservation was created by Executive Order on June 14, 1867 and was established as a permanent homeland to Shoshone and Bannock peoples pursuant to the Fort Bridger Treaty of July 3, 1868. The original reservation was approximately 2 million acres, but by subsequent cessation agreements, the United States obtained land for non-Indian settlers, and the federal government. An 1888 Executive Order ceded the Marsh Valley area for settlement, resulting in the loss of approximately 240,000 acres of Reservation lands. A June 6, 1900 Agreement with the Tribes ceded surplus lands resulting in the establishment of the City of Pocatello when approximately 419,000 acres of treaty-reserved lands were opened for settlement. The current Fort Hall Indian Reservation is approximately 544,000 acres, which does not include recently acquired lands adjacent to the Reservation. Some of the CTNF is in those ceded lands.

The 1868 Fort Bridger Treaty reserved off-reservation treaty rights on all unoccupied federal lands. These rights include hunting, fishing, gathering, and other practices such as trade.

The CTNF is also part of the ancestral homeland of the Northwest Band of the Shoshoni. Their core homeland included northern and western Utah and the southeast corner of Idaho. In their 1863 Treaty, they assented to the Fort Bridger Treaty (Treaty with the Shoshoni-Northwestern Bands, July 30, 1863). As stated in the 1863 Treaty signed at Box Elder, the Northwest Band of the Shoshoni "assent to all of the provisions of said treaty, and the same are hereby adopted as a part of this agreement, and the same shall be binding upon the parties hereto." Thus, tribal members of the Northwest Band of Shoshoni also have reserved rights to hunt, fish, and gather on all unoccupied federal lands of the United States.

Prior to white settlement of the west, the Shoshone and Bannock peoples were comprised of many smaller nomadic bands inhabiting a vast area of the west. Their aboriginal territory includes six states and ranged north into Canada and south to Mexico. The bands were generally extended family groups who moved across the western landscape hunting, fishing, and gathering with the changing seasons. The Fort Hall area was a traditional wintering area for many of the bands. In addition to gathering camas bulbs, many bands met on the Camas Prairie for trade events each spring. The CTNF was an integral part of the Shoshone-Bannock Tribes ancestral lands.

Few "traditional use sites" have been documented through consultation with the Tribes. This is due mostly to privacy issues. For this analysis, it is assumed that the NFS lands were, and are, used for traditional practices such as hunting, fishing, and gathering. It is also assumed that Tribal members utilize the CTNF for traditional activities such as ceremonies and religious practices. To protect the privacy of the Tribes, these activities will be discussed and analyzed in general terms. The following information is from "Shoshone-Bannock Tribes" published by the Shoshone-Bannock Tribal Cultural Committee and Tribal Elders.

> *Spirituality and religious ceremonies have always played a significant role in Indian cultures. Natural resources played an integral part of these ceremonies. Items such as sweet sage and tobacco made from a variety of plants were and are used in ceremonies. The Indians gathered many plants for medicinal purposes, including chokecherry, sagebrush, and peppermint. A myriad of other plants were gathered for food and to provide shelter. Rocks and clays were also used for ceremonies, ornamentation and shelter. Some bands inhabiting the upper Snake region were known as the "sheepeaters" since bighorn sheep were a staple of their diet. Buffalo, elk, deer and moose were also hunted and used by the aboriginal people. The Shoshone and Bannock bands also relied on upland game birds and small mammals. Salmon fishing was an integral part of aboriginal culture. Geysers, thermal pools and other water features were also utilized heavily by the Shoshone-Bannock Tribes.*

These activities are still practiced today across the CTNF and southeastern Idaho although the extent of those activities is unknown. Many Tribal members hunt, fish, and gather for subsistence and to maintain their traditional way of life.

3.13.2 Indian Treaty Rights

The federal government has federal trust responsibilities to Native American Tribes (DOI 1995). As discussed previously, the 1868 Fort Bridger Treaty, between the United States and the Shoshone and Bannock Tribes, reserves the Tribes' right to continue traditional activities on all unoccupied federal lands. The Tribes' advocate the preservation of harvest opportunity on culturally significant resources necessary to fulfill inherent, traditional, and contemporary Treaty Rights (Shoshone-Bannock 1994). The Project Area is within the portion of southeast Idaho that is of historical usage for hunting and gathering (Shoshone-Bannock 2003) and continues to retain cultural values.

Article 4 of the 1868 Treaty states, "The Indians herein named…shall have the right to hunt on the unoccupied land of the United States so long as game may be found thereon…" While the Treaty itself only specifies hunting, the court case "State of Idaho v. Tinno" established that any rights not specifically given up in the Treaty were, in fact, reserved by the Tribes. Further, in the Shoshone language, the same verb is used for hunt, fish, and gather so it is assumed that the Tribes' expect to retain rights for all of those practices (from a presentation at the Shoshone-Bannock Tribes, 1868 Fort Bridger Treaty Rights Seminar: April 12-13, 2004).

The Tribes' Fish and Game Department regulates and enforces the 1975 Tribal Fish and Game Code, for all off-reservation hunting and fishing activities. The federal agencies recognize that the Tribes' regulate their own Tribal members for hunting and do not require Tribal members to secure state hunting permits to hunt within BLM or USFS lands.

Tribal grazing rights outside the Fort Hall Reservation only exist in areas ceded to the federal government. As stated in Article IV of the Agreement of February 5, 1898 (31Stat. 674, 15 Stat.

673), between the United States and the Shoshone-Bannock Tribes, ratified by the Act of June 6, 1900: "So long as any of the lands ceded, granted and relinquished under this treaty remain part of the public domain, Indians belonging to the previously mentioned Shoshone-Bannock tribes, and living on the reduced Fort Hall reservation, shall have the right, without any charge therefore, to cut timber for their own use, but not for sale and to pasture their livestock on said public lands, and to hunt thereon and to fish in the streams thereof." None of these ceded areas are within the Project Area; therefore, Tribal grazing rights are not affected by the Project. In 2002, an MOU was signed by BLM and the Fort Hall Business Council regarding the recognition of Tribal grazing rights on public land within the ceded land boundary established by the previously stated Agreement of February 5, 1898 (31Stat. 674, 15 Stat. 673), between the United States and the Shoshone-Bannock Tribes, ratified by the Act of June 6, 1900.

In regard to federal trust responsibilities, known items of interest to the Tribes are as follows.

Tribal Historical/Archaeological Sites
Project-specific cultural resource inventories have been conducted in the Project Area. This information is in **Section 3.12** (Cultural Resources). No prehistoric archaeological sites were located within Project Area boundaries during the inventories.

Rock Art
No resources of this nature have been identified in the Project Area.

Sacred Sites (EO 13007)/TCP (NHPA)
EO 13007 directs federal land-managing agencies to accommodate Native Americans' use of sacred sites for religious purposes and to avoid adversely affecting the physical integrity of sacred sites. Federal agencies managing lands must implement procedures to ensure reasonable notice where an agency's action may restrict ceremonial use of a sacred site or adversely affect its physical integrity. No sacred sites have been identified in the Project Area.

A TCP, as defined in the NHPA, is defined as a property that is eligible for inclusion on the NRHP "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community" (Parker and King 1994). Stated another way, a significant TCP is defined as a property with "significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (Parker and King 1994). No TCPs have been nominated or designated in the Project Area.

Traditional Use Sites
Traditional use sites are those historically used by tribes for traditional land uses including fishing, hunting, gathering, ceremonies, and religious practices. Few traditional use sites have been documented through consultation with the Tribes as Tribal information regarding these sites is closely guarded. The Tribes have not disclosed specific details of traditional use in the Project Area; however, they have asserted that the area is significant, traditionally used, and retains cultural values.

Water Quality
The Project Area includes lands in the Tygee Creek and Sage Creek watersheds. A detailed discussion of water resources is located in **Section 3.5** of this EIS.

Wetlands
One wetland was identified in the Project Area, as noted in **Section 3.7.4**.

Fisheries

Fisheries and Aquatics resources are addressed in detail in **Section 3.9**. Roberts Creek, North Fork Sage Creek, and Pole Canyon Creek are small streams lacking sufficient flow and habitat to support fish populations. Spring Creek, Webster Creek, Draney Creek, Smoky Creek, Tygee Creek, Sage Creek, South Fork Sage Creek, and Crow Creek support fish populations, including populations of non-native brook trout and brown trout, as well as populations of native Yellowstone cutthroat trout. In Spring Creek, lower Sage Creek, and Crow Creek non-native brown trout are the most abundant game species. In Webster Creek, non-native brook trout are the most abundant. In all the other streams, Yellowstone cutthroat trout are the most abundant game species, although sculpins and other fish species are more numerous.

Studies of habitat conditions and macroinvertebrate populations indicate relatively poor environmental conditions in Draney Creek, Smoky Creek, and Tygee Creek. Habitat conditions and fish populations are healthier in Spring Creek, Webster Creek, Sage Creek, South Fork Sage Creek, and Crow Creek. Lower Sage Creek and Crow Creek support the most diverse fish communities and largest populations of game fish species. Concentrations of selenium in fish tissue from reaches of Sage Creek downstream of Hoopes Spring have been greater than the EPA whole body tissue threshold for brown trout. Selenium concentrations in fish from Crow Creek downstream of Sage Creek have also been shown to be elevated above the EPA threshold, although not as consistently as fish from lower Sage Creek.

The Tribes have not designated any specific traditional fishing areas on the CTNF, but the entire CTNF is used for exercising fishing rights.

Vegetation

Specific information regarding vegetation in the Project Area can be found in **Section 3.7**. Access to traditional plant resources is protected under the Fort Bridger Treaty of 1868. As discussed in **Section 3.7.7**, the Culturally Significant Plants Database for the Shoshone – Bannock Tribes (EWMP 2014) was reviewed and an informal inventory was conducted while other vegetation data were being collected. Thirty-five out of the 238 species listed in the database were observed within the Study Area while conducting detailed forest and vegetation data collection.

The Tribes use specific-sized lodgepole pine trees for tipi poles. Baseline studies indicate that approximately 50 percent of the vegetation in the Vegetation Study Area (the Project Area with a 0.25-mile buffer) is composed of the aspen/conifer, Douglas-fir, dry aspen/conifer, dry conifer mix, lodgepole pine, or mixed conifer communities, each of which includes lodgepole pine as a possible component.

Noxious Weeds and Invasive Species

There is Tribal concern about non-native vegetation replacing native vegetation. See **Section 3.7.8** for discussion on noxious weeds and invasive species within the Project Area.

Wildlife

Detailed information regarding the wildlife in the Project Area can be found in **Section 3.8**. Big game wildlife important for Tribal hunting includes elk, deer, antelope, and moose. Small game important for Tribal hunting includes sharp-tailed grouse, sage grouse, rabbits, rockchucks (marmots), squirrels, and partridges. Eagles, wolves, and grizzly bears are also of concern to the Tribes.

Grizzly bear, antelope, and partridge are likely absent from the Project Area. No bald eagle nests occur within 2.5 miles of the Study Area. No greater sage-grouse and sharp-tailed grouse are known to occur within the Study Area.

There is suitable habitat for the gray wolf, but wolves are known only as transient visitors. Mule deer, elk, and moose roam through most of the Study Area year-round. Numerous calves are produced in the aspen patches along the edges of Sage Valley.

Land Access/Transportation

Currently motorized access to the Project Area is via the Smoky Canyon/Timber Creek Road (Forest Road 110).

In addition, there are 4-wheel drive/OHV roads and trails through the Project Area. The area can also be accessed by horse and foot with few areas of restriction, although active mining areas occur immediately adjacent to the Project Area that are restricted. Additional information regarding access into the Project Area can be found in **Section 3.10.2** (Transportation).

Treaty Rights Access

The Tribes are concerned with retaining access on unoccupied federal lands in order to exercise Tribal Treaty Rights. The Tribes assert their responsibility to preserve their Treaty Rights for future use of lands to ensure future opportunity, and therefore it is Tribal policy to "promote the conservation, protection, restoration, and enhancement of natural resources".

According to the Tribes, "access" to exercise Treaty Rights goes beyond the concept of simple entry into the Project Area by vehicle or foot. "Access" also includes continued availability of the traditional natural resources in an area. Therefore, the Tribal interpretation of loss of access extends to the exclusion, limitation, or unavailability of the traditional resources due to mining disturbance and road construction. It would also presumably apply to the displacement of wildlife in those areas.

Recreation

Most recreation in the Project Area is dispersed (no improvements). There are no developed campgrounds. The dominant type of dispersed recreation is hunting for elk, moose, and deer. Fishing occurs on Crow, Deer, and Diamond Creeks, outside the Project Area to the west and south.

As discussed previously, Tribal hunting and gathering rights, reserved by the 1868 Treaty, need no state regulations or permits to be exercised by Tribal members. The Tribes' Fish & Game Department regulates and enforces the 1975 Tribal Fish & Game Code for all off-reservation hunting and fishing activities. Federal agencies recognize that the Tribes regulate their own Tribal members for hunting, and do not require Tribal members to secure State hunting or fishing permits within BLM or USFS lands.

Land Status

Much of the Project Area is on NFS land administered by the CTNF and is mostly unoccupied federal lands, although Simplot holds existing federal mineral leases and operates an existing mine; most lands are available for Treaty Rights use as stated in the Fort Bridger Treaty of 1868. These rights include hunting, fishing, gathering, and other practices such as trade. Regarding transfer of federal lands, the Shoshone-Bannock Tribes have stated (Shoshone-Bannock 2005):

> "*…The transfer or purchase of federal lands, and the extension of leases for mining on federal lands by private businesses enable them to control access and use, which jeopardize access to certain Shoshone-Bannock traditional fishing, hunting and gathering areas, and grazing and timber use…*"
>
> and:
>
> "*…The Shoshone-Bannock Tribes oppose any land transfers that impacts our treaty rights of hunting, fishing and gathering on federal lands. We certainly welcome the opportunity to work with any federal agency is transferring any federal lands to the Shoshone-Bannock Tribes to insure the Tribes' treating rights are secured for future generations…*"

Air Quality

Specific data regarding air resources is located in **Section 3.3**. All lands within the Study Area have been designated Class II for NAAQS. The air quality in the vicinity of the Smoky Canyon Mine is good to excellent because of the site's remote location, and relatively limited industrial activity in the area. Air quality in the Study Area is designated as in attainment or unclassifiable for all NAAQS and Idaho Ambient Air Quality Standards.

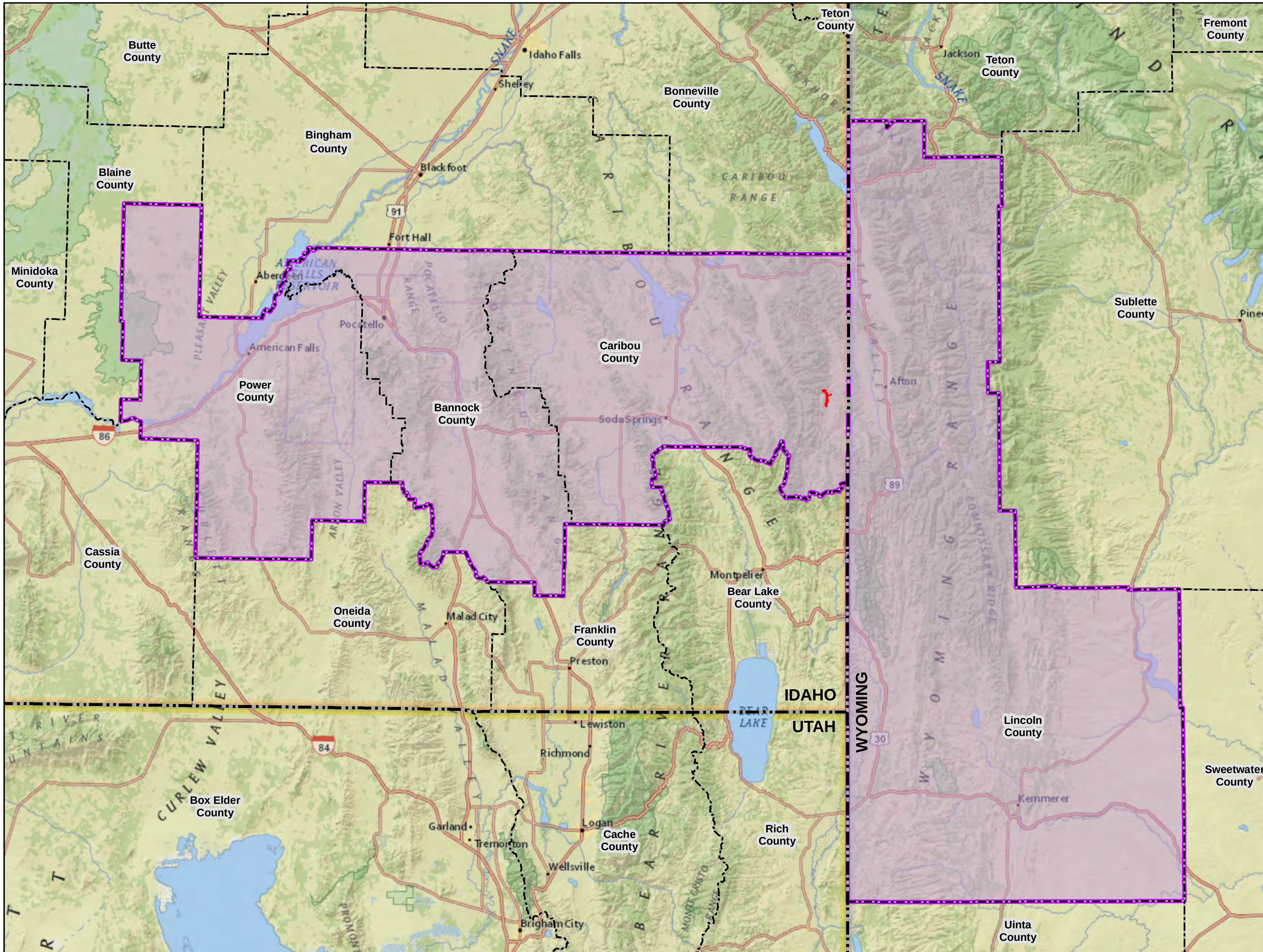
Socioeconomics and Environmental Justice

See **Sections 3.14** and **3.15**, respectively, for baseline information regarding socioeconomics and environmental justice (EO 12898).

EO12898 directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. The affected environment for wildlife and fish can be found in **Sections 3.8** and **3.9**, respectively.

3.14 SOCIAL AND ECONOMIC RESOURCES

The social and economic factors associated with the Project and the Smoky Canyon Mine were studied for the four-county area of Bannock, Caribou, and Power counties, Idaho; and Lincoln County, Wyoming (**Figure 3.14-1**). This Study Area boundary was developed with the IDT experts and professional judgement. Baseline conditions for economic history, land ownership (including the reservation component), population, demographics, employment, wages and income, housing, government finance and services, agriculture and mining were gathered. The primary data sources used in evaluating social and economic resources related to the Project and anticipated impacts were various sources of economic data collected and published by government agencies, as described in the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i). The U.S. Department of Commerce was the largest data source utilized, including the U.S. Census Bureau 2010 Decennial Census.



Legend

- Project Area Boundary
- Socioeconomics and Environmental Justice Study Area
- State Boundary
- County Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 5 10 15 20 Miles

1:950,400 (at original document size of 11x17)

N

Figure 3.14-1
Socioeconomics and Environmental Justice Study Area
East Smoky Panel Mine EIS

In general, residents of Caribou County, Idaho and Star Valley, Wyoming are known to travel to Pocatello, Idaho, Evanston, Wyoming, and Salt Lake City, Utah, for goods and services that are not available locally. Over the past several decades, the western portion of Wyoming has seen an influx of affluent residents, property owners, and tourists centered around Jackson, Wyoming, as has the entire Greater Yellowstone area. Many of these affluent property owners are part-time residents of western Wyoming and maintain permanent residences elsewhere. Simultaneously, the area's economy has become more dependent upon investment income (dividends, interest, and rent) and government transfer payments and less dependent upon mining and manufacturing. Natural resources are important components of the residents' lifestyle, recreational activities, and the economy of the four counties.

3.14.1 Land Ownership and Population

3.14.1.1 Land Ownership

The four counties are contiguous, with Power County, Idaho being the farthest west and Lincoln County, Wyoming being the farthest east. The location of the four counties in relationship to surrounding areas in Idaho, Utah, and Wyoming is shown on **Figure 3.14-1**. Bannock and Power counties, Idaho, comprise the Pocatello, Idaho Metropolitan Area as defined by the U.S. Office of Management and Budget. The other two subject counties are not part of any metropolitan statistical area. Government is a significant landowner in each of the four counties (**Table 3.14-1**). Bannock County has the highest percentage of privately owned land of the four counties. Lincoln County is the largest of the three counties and is over three times as large as Bannock County, the smallest of the four.

Table 3.14-1 Land Ownership in the Study Area

DESCRIPTION	BANNOCK COUNTY	CARIBOU COUNTY	POWER COUNTY	LINCOLN COUNTY
Acres	734,178	1,151,231	922,793	2,623,356
Federal	26.5%	39.4%	30.5%	73.1%
Fort Hall Indian Reservation	6.8%	0.9%	8.6%	0.0%
State	6.5%	9.3%	2.9%	4.1%
City and County (Other)	9.0%	5.2%	9.5%	0.4%
Private	51.2%	45.2%	48.4%	22.3%

Source: cloud.insideidaho.org 2016

The Fort Hall Indian Reservation overlaps lands that are within Bannock, Caribou, and Power counties (as well as Bingham County outside of the Study Area). The Shoshone-Bannock Tribes govern the Reservation, with most government offices and tribal businesses located in Fort Hall (Shoshone-Bannock Tribes 2016). Fort Hall is in Bingham County, outside of the Study Area.

Further, the federal government has federal trust responsibilities to Native American Tribes (DOI 1995) and the 1868 Fort Bridger Treaty reserves the Shoshone and Bannock Tribes' right to continue traditional activities on all unoccupied federal lands. While the Treaty itself only specifies hunting, the lawsuit "State of Idaho v. Tinno" established that any rights not specifically given up in the Treaty were, in fact, reserved by the Tribes. Further, in the Shoshone language, the same verb is used for hunting, fishing, and gathering, so it is assumed that the Tribes' expect to retain rights for all of those practices (from a presentation by the Shoshone-Bannock Tribes, 1868 Fort Bridger Treaty Rights Seminar: April 12-13, 2004). The Tribes' Fish and Game Department regulates and enforces the 1975 Tribal Fish and Game Code for all off-reservation hunting and fishing activities. The federal agencies recognize that the Tribes regulate their own tribal members for hunting and do not require Tribal members to secure state hunting permits to hunt on lands managed by the BLM or USFS. Tribal grazing rights outside the Fort Hall Reservation only exist in areas ceded to the federal government, none of which occur in the Project Area. In regard to federal trust responsibilities, other known items of interest to the Tribes include tribal historical and archaeological sites, rock art, sacred sites, traditional cultural properties, traditional use sites, treaty rights access, and physical and biological resources (e.g., water quality, wetlands, fisheries, vegetation, wildlife). All of these subjects are addressed in this EIS.

3.14.1.2 Population and Demographics

The population of Bannock County, Idaho is concentrated in the City of Pocatello, which had a 2014 population of 54,292, or 65.5 percent of the Bannock County, Idaho population. Soda Springs is the largest city in Caribou County, Idaho, with a 2014 population of 2,980, which was 43.9 percent of the Caribou County, Idaho population (U.S. Census 2016).

American Falls is the largest city in Power County, Idaho, with a population of 4,314 or 57.0 percent of the Power County, Idaho population. Lincoln County, Wyoming has two centers of population. Kemmerer, in the southern part of the county, is the county seat. Kemmerer and surrounding communities account for about 30 percent of the population. Kemmerer had a 2014 population of 2,732, while the nearby towns of Diamondville and Opal had populations of 737 and 96, respectively. The other population center in Lincoln County, Wyoming is the Star Valley in the northwest portion of the county. Afton, essentially Star Valley, had a 2014 population of 1,968. The largest population concentration in the Study Area is in the City of Pocatello in Bannock County, which is part of the Pocatello Metropolitan Area. The second largest population of 13,922 occurs in Chubbuck in Bannock County (U.S. Census 2010).

Simplot provided data on its employees (Simplot 2016b) showing that the Smoky Canyon Mine averaged 254 employees in 2015 and the associated Don Plant averaged 372 employees for the same year. Data showing where their employees resided is incomplete but likely to approximate the proportion of employees in each of the population areas. For the Smoky Canyon Mine, 193 lived in Wyoming compared to 53 living in Idaho; The Idaho contingent included workers residing in Caribou, Bingham, and Bear Lake counties (Simplot 2016a). All employees of the Don Plant lived in Idaho, the great majority in Pocatello (Simplot 2016a). Simplot also employed 121 workers in its Agribusiness Administration division and 253 in its Simplot Grower Solutions retail division in 2015 (Simplot 2016b).

3.14.1.3 Housing

Although the majority of the Project's employees live in Lincoln County, the remaining Study Area counties may also be affected. According to the 2010 Census, a greater number of housing units in the Study Area occur in Bannock County, as would be expected, given the proportionately large population. Bannock County also has the highest number of vacant units (2,509). Approximately 16.8 percent of Caribou County's housing units, owned or rental, are vacant, while

Lincoln County has the highest rental vacancy rate (17.8 percent). This information is presented in the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i).

3.14.2 Local Government Finances and Services

Local government finances for the Study Area counties are presented in the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i). These data include all local governments, including county governments, municipalities, school districts, and special districts within the counties. Lincoln County had the second highest general revenue, highest per capita taxes and spent the largest percentage of its budget on education. Bannock County had the highest general revenue and spent the highest percentage on health care. Caribou County had the second lowest general revenue, lowest per capita taxes, spent the highest percentage for police protection among the four counties, and had the lowest debt (per capita and total). All of the counties spent their third highest percentage of budget on highways. Lincoln County had the highest outstanding debt per capita, followed by Power County.

3.14.2.1 Current Fiscal Condition

The Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i) presents the actual budget revenues and expenditures for 2012 and 2013 for the Study Area counties. Public finances in all counties included locally derived revenues, with the largest share derived from property and other taxes. Other taxes may have included sales tax, motor vehicle taxes, and general service taxes. The three categories of Taxes, Charges for Services, and Intergovernmental Revenues accounted for over 90 percent of all revenue in Bannock, Caribou, and Lincoln counties, and over 80 percent in Power County for 2012 and 2013. Intergovernmental Resources dropped by approximately five percent in Bannock County, and approximately 31 percent in Lincoln County between 2012 and 2013, while increasing by five percent in Caribou County, and 21 percent in Power County between 2012 and 2013.

Bannock, Power, and Lincoln counties did not experience an overall increase in revenues between 2012 and 2013. Note that Wyoming does not have personal or corporate income tax.

Spending in Caribou County for 2012 and 2013, and Lincoln County for 2012, was roughly parallel (in percentage terms) across measurable categories of General Government, Public Safety, and Public Works/Roads, comprising between 70 and 79 percent of their total expenditures during both 2012 and 2013. Spending across these three same categories was between 61 and 65 percent in Bannock County, and 88 percent in Lincoln County in 2013. General Government was the highest expenditure in Bannock and Power Counties in both 2012 and 2013, and Lincoln County in 2012, while the highest expenditure category was Public Works/Roads in Caribou County in 2012 and 2013, and Lincoln County in 2013.

3.14.2.2 Community Services

Schools

The Study Area is served by four school districts. **Table 3.14-2** outlines the school districts in the Study Area and enrollment statistics for the 2014-2015 school year.

Table 3.14-2 School Enrollment in the Study Area

SCHOOL DISTRICT	2014-2015 SCHOOL DISTRICT ENROLLMENT
Bannock County	
Marsh Valley Joint School District #21	1,271
Pocatello/Chubbuck School District #25	12,504
Caribou County	
Grace Joint School District #148	463
North Gem School District #149	197
Soda Springs Joint School District #150	815
Power County	
American Falls Joint High School District #381	1,450
Arbon Elementary School District #383	20
Rockland School District #382	184
Lincoln County	
Lincoln County School District #1	634
Lincoln County School District #2	2,681

Sources: ISDE 2015; WDE 2015

Law Enforcement

The Bannock County Sheriff's Department (BCSD) provides law enforcement to the unincorporated areas of Bannock County, and four contracted municipalities. The patrol area encompasses 1,142 square miles. The BCSD includes the patrol, detention, detective, court services, training, civil, and support services divisions. As of 2012 there were 19 patrol deputies in the department. A modern jail facility was constructed in 1994 and can house 253 inmates (Enviroscientists Inc. 2015). The Pocatello and Chubbuck police departments provide law enforcement services to the two incorporated cities. The Pocatello Police Department (PPD) employs 90 sworn officers. The PPD includes patrol/traffic, investigations, and support services divisions. The PPD staffing ratio is currently 1.6 officers per 1,000 persons in the population (Enviroscientists Inc. 2015). The Chubbuck Police Department (CPD) provides law enforcement services to the City of Chubbuck and includes the following divisions: patrol; criminal investigations; animal control; code enforcement; records; and evidence (Enviroscientists Inc. 2015).

The Caribou County Sheriff's Office (CCSO) provides law enforcement services to the unincorporated areas of Caribou County, as well as to the cities of Bancroft and Grace. The CCSO employs eight sworn officers and includes patrol and criminal investigation; civil and driver's license; communications and dispatch; and detention divisions (Enviroscientists Inc. 2015). The Soda Springs Police (SSPD) provides law enforcement services to the City of Soda Springs, and employs a staff of seven full-time sworn personnel and two non-sworn personnel (Enviroscientists Inc. 2015).

Law enforcement services in the unincorporated portions of Power County and the community of Rockland are provided by the Power County Sheriff's Office (PCSO). The PCSO provides patrol, crime, dispatch, and administrative services. The PCSO also issues driver's licenses and coordinates with local and state police. The American Falls Police Department provides law enforcement services within the City of American Falls.

Portions of the Study Area are located within the District 5 patrol area of the Idaho State Police (ISP), which covers approximately 4,677 road miles. The ISP enforces traffic laws, investigates traffic collisions, assists motorists, and conducts criminal interdiction along Idaho's interstate, state, and secondary highways. The ISP force also provides assistance to local sheriff's offices and police departments in performing other law enforcement duties, as required (Enviroscientists Inc. 2015).

The Lincoln County Sheriff's Office (LCSO) provides law enforcement services to the unincorporated areas of Lincoln County with branch offices in Kemmerer and Afton. The LCSO includes two main divisions: support, which includes detention, civil processing, and administration; and operations, which includes patrol, investigations, and dispatch. The LCSO employs approximately 17 sworn patrol officers (Enviroscientists Inc. 2015). Law enforcement services within incorporated cities in Lincoln County are provided by the Kemmerer Police Department, the Diamondville Police Department, the Afton Police Department, the Cokeville Police Department, the Alpine Police Department, the LaBarge Police Department, and the Thayne Police Department.

Portions of the Study Area are located within District 3 of the Wyoming Highway Patrol (WHP). The WHP includes two main divisions: field operations and support services. The field operations primarily include the patrol of approximately 6,800 miles of highways, traffic enforcement, crash investigation, criminal interdiction, drug interdiction, and commercial vehicle enforcement (Enviroscientists Inc. 2015).

Fire Protection

Fire protection services in the Study Area are provided by several local, state, and federal agencies. Fire protection services in the unincorporated areas of Bannock County are provided by the following: the Inkom Fire District; the Lava Fire District; the McCammon Fire District; the Pocatello Valley Fire Department; and the Downey Fire Department. The City of Pocatello Fire Department and the City of Chubbuck Fire Department provide fire protection services within the two cities. Wildland fire protection services are provided by federal and state agencies such as the USFS, BLM, and IDL (Bannock County 2011).

As the primary landowners in Caribou County are federal and state agencies, fire protection in Caribou County is primarily provided by the USFS, BLM, and IDL. The remainder of Caribou County is protected by four volunteer fire departments (VFDs): the Caribou County VFD is staffed by 18 volunteers; the Grace VFD is staffed by 13 volunteers; the Bancroft VFD is staffed by 12 volunteers; and the City of Soda Springs VFD is staffed by 17 volunteers (W.H. West & Associates 2004).

The American Falls VFD and Rockland VFD provide fire protection services in Power County. The American Falls VFD consists of one fire station with 19 paid per call firefighters. The Rockland VFD consists of one fire station with 16 volunteer firefighters. Wildland fire protection services in the County are provided by the USFS, BLM, and IDL (Power County 2010).

Fire protection services in Lincoln County are primarily provided by seven volunteer fire districts: Bear River Fire District; Upper Valley Fire District; Thayne Fire Department; Alpine Fire Department; La Barge Fire Department; Kemmerer Fire Department; and the South Lincoln County Fire District. Other agencies such as the USFS and the BLM assist with firefighting efforts on federal and state lands (WDFPES 2013).

Health Care

Bannock, Caribou, and Power counties are part of District 6 of the Southeastern Idaho Public Health District (SIPHD). The SIPHD provides non-critical community health services within the SIPHD area. SIPHD clinics are located in Pocatello, Soda Springs, and American Falls within the Study Area. The SIPHD has partnered with Health West, Inc. to provide non-critical community health services in Aberdeen, American Falls, Chubbuck, Downey, Lava Hot Springs, McCammon, and Pocatello. Medical services are also provided at the Portneuf Medical Center in Pocatello, Bannock Memorial Hospital in Pocatello, Caribou Memorial Hospital in Soda Springs, and the Power County Hospital District in American Falls. (EnviroScientists Inc. 2015)

Public health services in Lincoln County are provided by the Lincoln County Public Health Department (LCPHD). The Public Health Nursing Program, an organization within the Community and Rural Health Division of the Wyoming Health Department, provides non-critical health services and testing at clinics located in Kemmerer and Afton (Enviroscientists 2015). Medical services are also provided at the Star Valley Medical Center in Afton and the South Lincoln Medical Center in Kemmerer.

Electricity and Natural Gas Service

Electrical service in Bannock, Caribou, and Power counties is provided by Rocky Mountain Power, Utah Power, and Idaho Power Company. Soda Springs Municipal Light and Power and Lower Valley Energy also provide electrical service to areas in Caribou County. Natural gas service in Bannock, Caribou, and Power counties is provided by Intermountain Gas Company. Electrical service in Lincoln County is provided by Rocky Mountain Power and Lower Valley Energy. Natural gas service in Lincoln County is provided by Questar Gas Company.

Water Service

The majority of potable water in the unincorporated portions of the Study Area is provided by private wells. There are public water systems in the following incorporated cities in the Study Area: Chubbuck and Pocatello in Bannock County; Soda Springs, Grace, and Bancroft in Caribou County; American Falls and Rockland in Power County; and Kemmerer in Lincoln County. Smaller community public water systems also occur throughout the Study Area.

Wastewater Service

A majority of the wastewater service in the unincorporated portions of the Study Area is provided by individual septic systems. Some of the larger communities and incorporated cities have public sewer systems.

Landfill

There are multiple landfill locations in the Study Area where residents may bring refuse for disposal or recycling. The Bannock County Landfill and McCammon Transfer Station provide solid waste and recycling facilities for residents and businesses in Bannock County. Landfills are located in the City of Grace in Caribou County and the City of American Falls in Power County. Solid waste and recycling facilities in Lincoln County can be found at the Kemmerer Landfill, the Cokeville Landfill, and the Thayne Landfill.

3.14.3 Employment

As described in the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i), the unemployment rate in all four counties increased between 2008 and 2010, as mirrored by the economic downturn in the U.S. starting in 2008. Between 2008 and 2010, the unemployment rates in Bannock and Power counties approximately doubled, and nearly tripled in Lincoln County. The unemployment rates decreased in 2012 and decreased even further in 2014 when it ranged from a low of 4.0 percent in Caribou County to a high of 5.4 percent in Lincoln County (Stantec 2016i).

Employment by industrial sector, using the North American Industry Classification System (NAICS) for the Study Area (**Table 3.14-3**) shows that employment declined for all but two sectors between 2007 and 2010: transportation, warehousing, and public utilities; and healthcare and social assistance. By 2013, the only other sectors where employment exceeded 2007 levels were farming, manufacturing, and wholesale trade. Government was a major source of employment in the Study Area in 2013, representing 18.2 percent of jobs. This was followed by retail trade; healthcare and social assistance; finance, insurance and real estate; manufacturing; and accommodation and food service.

Employment at the Smoky Canyon Mine and the Don Plant has remained relatively stable in recent years. The mine employed, on average, 250 workers in 2012, 243 in 2013, 240 in 2014, and 254 in 2015 (Simplot 2016b). The Don Plant employed, on average, 355 workers in 2012, 357 in 2013, 350 in 2014, and 372 in 2015 (Simplot 2016b). These figures do not include indirect employment (impacts on regional businesses that provide goods and services directly to the mine) or induced employment (jobs created as a result of employee spending in the region), which are estimated to create an additional 2.69 jobs in the region for every direct mine employee and 1.87 for every Don Plant employee (BEA 2017). In other words, in addition to the approximately 626 workers employed at the Smoky Canyon Mine and the Don Plant in 2015, an additional 1,379 jobs in the region can be attributed to the Smoky Canyon Mine Project (Peterson 2013).

Table 3.14-3 Employment by Industrial Sector NAICS Basis in the Study Area from 2001 – 2013

DESCRIPTION	2001	2004	2007	2010	2013
Total Employment	60,855	63,501	68,893	62,585	63,705
Farm Employment	3,132	2,960	2,827	2,813	2,886
Nonfarm Employment	57,723	60,541	66,066	59,772	60,819
Forestry, Fishing, and Related Activities	102[B,C,P]	116[B,C,P]	367[C]	312[B,C]	81[B,C,P]
Mining	782[B]	678[B,C]	1,248	1,212[B]	899[B,C]
Construction	4,685	4,570[C]	5,839[C]	3,973[C]	3,792
Manufacturing	5,587	3,912[C]	3,988[C]	3,517[C]	4,209
Transportation, Warehousing, and Public Utilities	640[B,P,L]	661[B,P,L]	2,263[P,L]	2,424[P]	2,453
Wholesale Trade	1,362[P, L]	1,378[P, L]	1,473[P,L]	1,345[P]	1,560
Retail Trade	7,448	7,637	8,173	6,879	7,080
Information	882[C,P]	1,010[P]	1,171	704[P]	673[P]
Finance, Insurance, and Real Estate	3,709	4,275	5,277	5,022[P]	5,238
Accommodation & Food Service	4,153	4,180	4,371	4,069[P]	4,008
Health Care & Social Assistance	4,013[L]	4,032[P,L]	4,600[C,P]	6,416[C]	6,896[P]
Other Services Except Public Administration	2,627	2,961	3,096	3,018	3,053
Professional, Scientific, and Technical	2,275[P]	2,310[P]	2,734	1,966[L]	234[B,L]
Administrative & Waste Management	3,038[L]	3,892[L]	4,235[C,L]	2,772[C,P]	3,052[C,P]
Government and Government Enterprises	12,194	12,977	12,916	11,790	11,637

Source: Bureau of Economic Analysis (BEA 2015)

Notes:

B – data for Bannock County not included to avoid disclosure of confidential information

C – data for Caribou County not included to avoid disclosure of confidential information

P – data for Power County not included to avoid disclosure of confidential information

L – data for Lincoln County not included to avoid disclosure of confidential information

On a county-by-county level (**Table 3.14-4**), government was the top employer in Bannock and Lincoln counties in 2013 (18.8 percent and 19.2 percent, respectively). For Caribou and Power counties, the largest employers were in the manufacturing industry, with approximately 16 percent of Caribou County's total employment, and approximately 25 percent of Power County's total employment. In addition to government, the construction, retail trade, and mining industries were important to Lincoln County, making up approximately 29 percent of the total 2013 employment. Mining alone made up approximately nine percent of Lincoln County's total employment.

In addition to government, other industrial sectors accounting for significant portions of employment in Bannock County are retail trade (12.4 percent), health care (13.8 percent), and accommodation and foodservices (7.2 percent).

Important industrial sectors in Caribou County are manufacturing, farm employment, and construction. Mining, the sector that includes the phosphate mines, accounted for 7.3 percent of Caribou County employment in 2010 (data not available for 2013). The phosphate processing plants are included under the manufacturing sector, which in 2013 accounted for 15.8 percent of employment in Caribou County, while construction accounted for 9.0 percent of employment.

The largest industrial sector in Power County in terms of employment is manufacturing, which was responsible for 25.0 percent of employment in 2013. Of the four counties, Power County is also the most dependent upon farm employment, accounting for 18.2 percent of total employment.

Industrial sectors accounting for significant portions of employment in Lincoln County are construction (10.9 percent) and retail trade (9.5 percent). Although a large majority of the employees at the Smoky Canyon Mine live in Lincoln County, their employment is reported under Caribou County, since that is where the actual employment occurs.

Table 3.14-4 Employment by NAICS Industrial Sector (2013) in the Study Area

INDUSTRY	BANNOCK COUNTY	CARIBOU COUNTY	POWER COUNTY	LINCOLN COUNTY
Farm Employment	915	554	812	605
Forestry, Fishing, and Related Activities	D	D	D	81
Mining	D	D	48	851
Utilities	128	31	10	202
Construction	2,201	439	102	1,050
Manufacturing	2,095	770	1,115	229
Wholesale Trade	1,125	137	193	105
Retail Trade	5,533	383	252	912
Transportation and Warehousing	1,420	99	267	296
Information	501	50	D	122
Finance and Insurance	2,586	103	D	320
Real Estate and Rental and Leasing	1,494	213	D	522
Professional, Scientific, and Technical Services	D	174	60	D
Management of Companies and Enterprises	D	D	D	D
Administrative and Waste Management Services	2,764	D	D	288
Educational Services	546	53	D	61
Health Care and Social Assistance	6,188	175	D	533
Arts, Entertainment, and Recreation	923	53	D	145
Accommodation and Food Services	3,229	164	63	552
Other Services, Except Public Administration	2,203	195	159	496
Government and Government Enterprises	8,419	683	685	1,850
Total Employment	**44,739**	**4,878**	**4,465**	**9,623**

Source: BEA 2014

D = not shown to avoid disclosure of confidential information, but the estimates for these items are included in the totals.

Major private employers in Bannock County are Beacon Health Services, Belmont Care Center, Convergys Customer Management, Farmers Insurance Group, Heinz Frozen Foods, Idaho State University, Portneuf Medical Center, ON Semiconductor, Union Pacific Railroad, Varsity Contractors, and Wal-Mart. The largest industrial sector by number of employees was government (Idaho Department of Labor 2015a).

Major private employers in Caribou County, Idaho are Agrium U.S. Inc., Broulim's, Degerstrom-Dravo, J.R. Simplot Co. Smoky Canyon Mine, Kiewit, Mark III, Monsanto Company, and Mullen Crane & Transport. The largest industrial sector by number of employees was government (Idaho Department of Labor 2015b).

Major private employers in Power County, Idaho are Con Agra, County Line Farms, Driscoll Potatoes, Double L Manufacturing, Great Rift Transportation, Ken's Food Market, J. R. Simplot Company, Koompin Farms, and Lance Funk Farms. The second largest industrial sector by number of employees, after manufacturing, was government (Idaho Department of Labor 2015c).

Major employers (including government entities) in Star Valley are Lincoln County School District #2, Lincoln County Government, Lower Valley Energy, the J.R. Simplot Smoky Canyon Mine (however recorded in Caribou County), Aviat, Star Valley Cheese, Freedom Arms, and Maverick Corporation (Lincoln County 1998).

3.14.4 Wages and Income

Workers at the Smoky Canyon Mine had an average annual salary of $98,731, including benefits, in 2015, for an annual payroll of $25,077,772 (Simplot 2016b). Workers at the Don Plant had an average annual wage, including benefits, of $95,898 for a total annual payroll of $35,674,038 (Simplot 2016b). Using the Regional Input-Output Modeling System (RIMS II) economic input-output multipliers for the four-county area, additional indirect earnings would have been approximately $91,714,252 and induced earnings would have been approximately $18,840,690.

Caribou County had the highest average annual wage of the four counties and their respective states (**Table 3.14-5**) between 1980 and 2014; during this time period, the county's average annual wage increased 227 percent. The average annual wage in Bannock, Power, and Lincoln counties increased approximately 161 percent, 189 percent, and 189 percent, respectively, over the same period. Although Bannock County's average annual wage increased by 161 percent, it had the lowest average annual wages of the four counties throughout this period, although higher than the State of Idaho in 1980 and 1991 (BEA 2016a).

Lincoln County had the highest estimated median household income in 2014 at $66,530, driven primarily by the health care industry, followed by Caribou County at $54,481. Bannock County had the lowest median household income in the Study Area in 2014 at $43,953. Lincoln County had the lowest percentage of persons living below the poverty level, while Bannock and Power counties had the highest percentage of persons living below the poverty level (U.S. Census 2015a-d).

Although in 2014 there was a significant difference in the percentage of people living below the poverty level among the four counties, the percentage of people living below the poverty level for the state of Idaho was 15.6 percent, and, for the state of Wyoming, the poverty rate was 11.6 percent (American Community Survey 2016). Consequently, only Bannock County had a poverty level higher than that of its respective state, and only by half a percent. It can be concluded from previously presented information that no counties in the Study Area would be considered minority populations under CEQ guidelines for low income populations.

Table 3.14-5 Average Annual Wages, Median Household Incomes, and Poverty Levels in the Study Area

WAGES AND INCOME	IDAHO	BANNOCK COUNTY	CARIBOU COUNTY	POWER COUNTY	WYOMING	LINCOLN COUNTY
Average Annual Wage (1980)[1]	$12,174	$13,094	$15,714	$14,252	$15,335	$15,160
Average Annual Wage (1990)[1]	$18,739	$19,008	$22,817	$20,300	$20,058	$20,368
Average Annual Wage (2000)[1]	$27,557	$24,512	$31,475	$28,115	$27,138	$25,680
Average Annual Wage (2010)[1]	$35,714	$32,493	$44,239	$34,799	$42,637	$39,406
Average Annual Wage (2014)[1]	$38,893	$34,202	$51,451	$41,191	$47,361	$43,751
Median Household Income Estimate (2010-2014)[2]	$47,334	$43,953	$54,481	$45,010	$58,252	$66,530
Estimate of Persons Living Below Poverty Level (%) (2010-2014)[2]	15.6	16.1	9.1	13.4	11.6	7.9

Sources:
[1]BEA 2016a
[2] U.S. Census 2015a-d; U.S. Census 2016

The structural change in the Study Area's economy in recent years is shown in **Table 3.14-6.** Income from investments (dividends, interest, and rent) dropping from 16.8 percent of total personal income in 2001 to 14.9 percent in 2010 (during the recession), then up to 18.2 percent in 2014. Personal current transfers (i.e., Social Security, veterans' benefits, unemployment insurance, etc.), between 2001 and 2014 rose from 15.4 percent of total personal income to 22.6 percent in 2010 (during the recession), then down to 21.4 percent in 2014.

According to the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i), between 1970 and 2000, mining increased as a percent of personal income in the four-county area from 3.7 percent in 1970 to 9.3 percent in 1980, then decreased to 3.1 percent in 2000. Transportation and public utilities decreased from 16.4 percent of personal income in 1970 to 9.5 percent in 2000, and retail trade dropped over the same period from 11.7 percent of personal income to 9.2 percent. Over the same period service industries increased from 9.9 percent of personal income to 17.1 percent, and government increased from 16.6 percent to 24.2 percent (BEA 2016a).

Between 2001 and 2010, mining increased as a percent of personal income from 2.6 percent to 4.1 percent, then declined to 2.9 percent. Manufacturing followed an opposite pattern, falling from 16.1 percent in 2001 to 8.5 percent in 2010, then rising to 11.4 percent in 2014. Two NAICS industrial sectors grew overall as percentages of personal income in the Study Area between 2001 and 2014: transportation and warehousing (1.2 percent to 4.3 percent) and health care and social assistance (7.3 percent to 11.1 percent) (BEA 2016b).

Table 3.14-6 Personal Income by NAICS Source in the Four-County Study Area from 2001-2014 (Dollars Times 1,000)

DESCRIPTION	2001	2010	2014
Total Personal Income	2,422,612	3,475,116	3,931,068
Population (persons)	105,741	115,902	116,368
Earnings by Place of Work (Wages plus Employer Paid Supplements)	1,818,162	2,369,702	2,594,558
Per Capita Personal Income (dollars)*	90,940	124,617	143,441
Farm Earnings	55,831	80,151	104,027
Forestry, Fishing, and Related Activities	1,552[B,C,P]	6,381[B,C]	1,266[B,C,P]
Mining	47,698[B]	97,017[B,P]	75,181[B,C,P]
Utilities	2,080[B,P,L]	37,285[P]	38,107
Construction	44,290	54,356[C]	46,920
Manufacturing	292,520	200,519[C]	296,567
Transportation and Warehousing	21,855[B]	116,970	128,776
Wholesale Trade	53,572[P,L]	64,650[P]	91,693
Retail Trade	136,199	159,996	177,741
Information	27,049[C,P]	30,884[P]	34,737[P]
Finance, Insurance, and Real Estate	68,738	97,433	111,855[C]
Professional, Scientific, & Technical Services	59,674[P]	67,826[L]	86,222[C]
Health Care & Social Assistance	132,535[L]	260,363[C]	287,184[P]
Accommodation & Food Services	47,868	61,008[P]	68,148[P]
Government and Government Enterprises	446,453	582,848	624,769
Federal, Civilian	41,116	63,354	63,765
Military	6,645	18,408	13,421
State Government	162,957	219,267	242,169
Local Government	235,735	281,819	305,414

Source: BEA 2016b

*Unlike the other data this category is not x 1,000.

B – data for Bannock County not included to avoid disclosure of confidential information

C – data for Caribou County not included to avoid disclosure of confidential information

P – data for Power County not included to avoid disclosure of confidential information

L – data for Lincoln County not included to avoid disclosure of confidential information

In 2013, Bannock County had the most diversified sources of earnings of the four counties (**Table 3.14-7**). Government employment was responsible for 16.4 percent of the earnings in Bannock County, followed by health care and social assistance (10.2 percent), retail trade (5.3 percent), and manufacturing (4.8 percent). In determining personal income for Bannock County, there was a positive adjustment for Caribou County's economy was less diverse than Bannock County's in 2013, with two industry sectors, manufacturing and government, making up approximately 42 percent of the total earnings. Manufacturing accounted for 30.4 percent of Caribou County's earnings, while government employment made up 11.5 percent. The next largest industry, as measured by wages, was construction with 8.9 percent. In Caribou County, there was a negative adjustment for residence of approximately $65 million, indicating a net pattern of commuting outside of the County for employment.

Table 3.14-7 Personal Income by NAICS Source by County in the Study Area for 2013 (Dollars Times 1,000)

WAGES AND INCOME	BANNOCK COUNTY	CARIBOU COUNTY	POWER COUNTY	LINCOLN COUNTY
Personal Income	2,574,578	274,472	316,317	757,490
Population[1]	83,249	6,808	7,719	18,364
Per Capita Personal Income (dollars)	30,926	40,316	40,979	41,249
Earnings by Place of Work	1,660,119	262,863	259,441	405,118
Adjustment for Residence[2]	64,664	(55,915)	(14,541)	48,450
Net Earnings by Place of Residence	1,508,700	178,460	222,588	405,797
Farm Earnings	21,983	37,816	95,019	10,999
Mining	(D)	(D)	(L)	75,195
Construction	82,701	2,554	915	23,133
Manufacturing	123,572	24,362	3,002	46,100
Wholesale Trade	62,936	83,654	72,026	7,599
Retail Trade	136,727	6,365	14,234	3,746
Transportation and Warehousing	98,377	8,815	5,947	24,878
Health Care and Social Assistance	263,425	3,982	14,626	15,979
Accommodation and Food Services	54,252	3,445	(D)	13,414
Government and Government Enterprises	423,118	2,557	667	8,289

Source: BEA 2015

[1]U.S. Census midyear population estimates. Estimates for 2010-2013 reflect county population estimates available as of March 2014.

[2]The adjustment for residence is the net inflow of the earnings of interarea commuters. For the US, it consists of adjustments for border workers and U.S. residents employed by international organizations and foreign embassies.

Note: All dollar estimates are in current dollars (not adjusted for inflation).

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) Less than $50,000, but the estimates for this item are included in the totals.

Power County's economy was the least diverse in 2013, with two industries making up approximately 53 percent of the total earnings. Farming accounted for 30.0 percent of personal income and manufacturing was responsible for 22.8 percent of the earnings; government employment constituted another 9.1 percent. The high manufacturing numbers in Power County result from the Don Plant, the ConAgra-Lamb Weston food manufacturing plant, and AMS, Inc.'s environmental and geotechnical sampling equipment manufacturing plant. In determining personal income, Power County also had a negative adjustment for residence of approximately $14.5 million, also indicating a net commuting pattern into the county for employment.

In 2013, Lincoln County's economy was diverse, with three industries making up approximately 30 percent of the total earnings. Government employment was responsible for 14.4 percent of the earnings in Lincoln County, followed by mining (9.9 percent), and construction (6.1 percent). In determining personal income for Lincoln County, there was a positive adjustment for residence of approximately $48 million, indicating a net commuting pattern outside of Lincoln County for employment.

3.14.5 Agriculture

Agriculture plays an important role in the economies of each of the Study Area counties. As presented in the Socioeconomics and Environmental Justice Baseline TR (Stantec 2016i), Power County has the highest value of agricultural production among the four counties, producing more than $238 million worth of agricultural products in 2012. The value of production was dominated by crops in Bannock, Caribou, and Power counties, while livestock accounted for the majority of production in Lincoln County. Although crops dominated the value in Bannock and Caribou counties, cattle accounted for 21 and 17 percent of the value of the overall production in those counties respectively. Cattle accounted for 45 percent of the total value of production in Lincoln County. Vegetables, melons, potatoes, and sweet potatoes were significant crops in Bannock and Power counties, while grains were the highest single commodity of agriculture in Caribou County.

Power County had the largest and most profitable farms of the four counties. The average return in Power County was $773,746 in 2012. Bannock County had the smallest farms and the smallest average profits. The farms in Lincoln County were slightly more profitable than those in Bannock County and Caribou County farms were close to the four-county Study Area average of $194,131 in 2012.

Collectively, the four counties contained 2,171 farms in 2012 (defined as those with sales of agricultural products of $1,000 or more). The average return for the four-county Study Area was $194,131, although over 70 percent of the farms in Bannock County had sales of less than $10,000 and Caribou County was the only one with fewer than 50 percent of the farms averaging less than $10,000. Over half the people engaged in farming in Bannock and Lincoln counties had a principal occupation other than farming and over 60 percent worked at least one day annually off the farm. Over 35 percent worked more than 200 days off the farm (NASS 2012). While agriculture plays a large role in the identity and social life of the area, these statistics indicate that outside employment is usually necessary in addition to farming.

3.14.6 Mining in Idaho

3.14.6.1 Idaho Mining Industry

A study completed for the Idaho Mining Association (IMA) for the years 2007 to 2012 (Peterson 2013) stated that mining jobs were among the highest paid industrial or service employment sectors in Idaho with average earnings per worker of $102,132 (including salary, employee fringe benefits, and all employer contributions to fringe benefits). Average annual salary for Smoky Canyon Mine workers in 2015, including wages and benefits, was $98,731; for the Don Plant the average annual salary plus benefits for 2015 was $95,898 (Simplot 2016b). This was shown by data collected from the eight operating members of the IMA in 2012, including the three southeastern Idaho phosphate operators (i.e., J.R. Simplot, Agrium, Inc., and Monsanto, Inc.). The other IMA members mine for commodities other than phosphate. In 2012, there were approximately 3,206 IMA member company direct employees, subcontractors, or employees from mining-related operations. This included approximately 2,399 from direct mine and mine processing employment; approximately 368 were identified as subcontractor employees; and approximately 439 employees were from agricultural cluster related Idaho operations.

Impacts from mining were apportioned into two levels in the IMA study. The first level was the direct impact of mining expenditures on the Idaho economy – the jobs, payroll and earnings, gross state product, and sales that are directly created by the industry as export (export is defined as any activity that brings new revenues to Idaho) businesses. The second was comprised of two parts: 1) the impacts on other regional businesses that provide goods or services to the mines – the indirect impacts– and; 2) the effect of employee and related consumer spending on the economy – the induced impacts. The indirect and induced impacts are often called "ripple" or multiplier effects of mining and mine processing on the economy (Peterson 2013).

For every direct IMA job, an *additional* 1.89 jobs are created in the Idaho economy. This jobs multiplier is robust because of three major factors. First, the high wages paid to mining workers creates a high level of employee spending and strong downstream consumer linkages to the overall economy. Secondly, there are deep backward linkages from IMA firms' mining activity to Idaho's economy from the products and services that IMA firms purchase from other Idaho's businesses. Finally, mine processing, particularly fertilizer and herbicide manufacturing, has robust employment multipliers resulting from that industry's backward economic linkages (Peterson 2013).

Simplot's Smoky Canyon Mine made purchases totaling $12,991,222 to Idaho vendors in 2015, and the Don Plant made purchases of $14,657,530 (Simplot 2016b). Simplot's Agribusiness Administration division made purchases from Idaho vendors totaling $1,654,245 in 2015, and the Simplot Grower Solutions division made purchases from Idaho vendors totaling $10,430,560 (Simplot 2016b).

The multiplier effects are driven by the exports of an economy. Exports (i.e., the new money coming into an economy) set off a web of transactions as each business seeks to fulfill the demands of their customers. Mining's impact upon the economy is thus comprised of the magnitude of the multiplier(s) and the magnitude of the exports. The sum of the direct, indirect, and induced effects measures the total impact of an industry to an economy (the multiplier effects). IMA member company economic impacts create a substantial contribution to state and local tax revenues, including the direct tax payments of IMA member companies, and the indirect and induced tax impacts from the economic activity resulting from mining and mine processing. In 2012, IMA member company mining activity contributed $25.9 million in local property taxes, $39.4 million in Idaho sales taxes, $13.4 million in excise, royalties, and other taxes, and $27.8 million in personal and corporate income taxes, for a total of $106.6 million, including the multiplier effects. Out of the $106.6 million total tax contributions, approximately $71.4 million were from IMA phosphate industry member firms located in southern Idaho (Enviroscientists, Inc. 2015).

In 2015, Simplot paid $2.7 million in property taxes to Power County, $48,000 to Bannock County, and $748,000 to Caribou County (Simplot 2016c). Total tax expenditures for the Smoky Canyon Mine were $797,088 in 2015; for the Don Plant, tax expenditures for 2015 were $2,736,444. For the AgriBusiness Administration and Simplot Grower Solutions division, Simplot paid an additional $1,137,950 (Simplot 2016b).

An Idaho Mine License Tax Return must be filed by every person or entity that mines or receives royalties from a mining claim in Idaho that contains precious or valuable minerals or metals. The tax rate for the mine license tax is one percent of the net value of the ores mined or extracted or of the royalties received. The majority of the taxes collected, or 66 percent, goes to the state's general fund, while the other 34 percent is allocated to the abandoned mine reclamation fund (Enviroscientists Inc. 2015).

3.14.6.2 Idaho Phosphate Mining and Processing Industry

Phosphate is an essential component of the nitrogen-phosphorus-potassium fertilizers that are consumed by the world's agricultural industry. Phosphate rock minerals are the only significant global source of phosphorus. The U.S. is the world's leading producer and consumer of phosphate rock, which is used to produce fertilizers and industrial products (BLM and USFS 2007).

Since phosphate mining began in southeastern Idaho, there have been a total of 31 phosphate mines in the area (USGS 2001). Of these, 12 were small underground mines, all of which produced small quantities of ore and have been closed for years. There have been 20 surface mining operations of which those with significant production and surface area include: Waterloo, Conda, Gay, Ballard, Maybe Canyon, Georgetown Canyon, Mountain Fuel, Henry, Little Long Valley, Lanes Creek, Champ, Smoky Canyon, Enoch Valley, Rasmussen Ridge, and Dry Valley (BLM and USFS 2007). Simplot's Idaho phosphate mining and fertilizer manufacturing operations are part of an integrated phosphate nutrient/fertilizer network for the Western United States. Simplot is the largest provider of phosphate nutrients in the Western United States. As such, their products are key to the viability and vitality of agriculture in the West, including the San Joaquin Valley in California. The phosphate resources in Idaho are important for providing food security for the United States and assists with providing nutrients necessary for feeding the sustaining world agriculture and food production.

Royalties from the Idaho phosphate industry have risen from approximately $8 million in 2010 to over $10 million in 2015 (**Table 3.14-8**). Phosphate royalties account for over 90 percent of mineral lease payments in Idaho. Fifty percent of federal mineral lease payments are returned to the states. Idaho returns 10 percent of the federal mineral royalties it receives from the federal government to the impacted counties, in this case, Caribou County, Idaho. Phosphate rock represents about 30 percent of the value of nonfuel minerals produced in Idaho.

Over the past 4 years (Fiscal Year End 2013 – 2016), the Smoky Canyon Mine has provided royalty payments to the Office of Natural Resources Revenue (ONRR) that have annually ranged from $4.1 to $5.4 million (Simplot 2016d).

Table 3.14-8 Idaho Phosphate Sales and Royalties for Operations on Federal Land

DESCRIPTION	2010	2011	2012	2013	2014	2015
Sales Volume (tons)	3,907,353	4,236,877	5,167,959	4,461,461	5,267,317	5,376,712
Sales Value ($)	171,260,429	167,406,627	188,332,575	194,948,619	218,448,635	208,914,974
Reported Royalties ($)	8,553,747	8,370,331	9,416,629	9,747,431	10,922,432	10,556,968

Source: ONRR 2015, 2016

Southeastern Idaho is currently home to three large phosphate mining operations. These mines are operated by J.R. Simplot, Agrium, Inc., and Monsanto, Inc. Phosphate rock is converted into either phosphate fertilizer or elemental phosphorus at processing plants near Soda Springs, Idaho and Pocatello, Idaho. Ore from J.R. Simplot's Smoky Canyon Mine is transported via an 86-mile slurry pipeline to the company's wet process phosphoric acid (WPPA) plant in Pocatello. Agrium, Inc. operates the North Rasmussen Mine, which supplies its Conda WPPA plant. Monsanto, Inc. operates the Blackfoot Bridge Mine, which supplies its elemental phosphorus plant in Soda Springs.

3.15 ENVIRONMENTAL JUSTICE

Demographics and income data (Stantec 2016i) were used to determine if there are any minority or low-income populations, as defined by environmental justice analyses, and if those populations would be disproportionately affected by the Project. The four subject counties are relatively uniform demographically (**Table 3.15-1**). Because Bannock County accounts for 71.6 percent of the population in the four counties, the demographics for the Study Area are highly influenced by the demographics of Bannock County. The presence of Idaho State University in Bannock County also influences the demographics. Bannock County is 91.9 percent white, while Caribou County, Power County, and Lincoln County are 97.2 percent, 93.4 percent, and 96.3 percent white, respectively. Hispanic is the most populous minority in each of the four counties. The largest Native American population in the four subject counties is in Bannock and Power counties, which include portions of the Fort Hall Indian Reservation. Native Americans represent 3.5 and 2.9 percent of these counties' populations, respectively.

The racial composition of the four counties within the Study Area is relatively uniform, as shown in **Table 3.15-1**. Consequently, it can be concluded that no populations exist in the Study Area that would be considered minority populations based on race or ethnicity under CEQ Environmental Justice guidelines.

As noted in **Section 3.14.4** and in **Table 3.14-5**, none of the counties in the Study Area would be considered to have an Environmental Justice population based on poverty levels, either. Thus, since there are no Environmental Justice populations, this topic will not be analyzed in **Chapter 4**.

Table 3.15-1 Racial Composition in the Study Area in 2013

RACE	BANNOCK COUNTY	CARIBOU COUNTY	POWER COUNTY	STATE OF IDAHO	LINCOLN COUNTY	STATE OF WYOMING
White[1]	76,573/ 91.9%	6,639/ 97.2%	7,186/ 93.4%	1,511,234/ 93.7%	17,648/ 96.3%	540,648/ 92.7%
Black or African American[1]	667/ 0.8%	20/ 0.3%	77/ 1.0%	12,903/ 0.8%	183/ 0.2%	9,915/ 1.7%
American Indian or Alaska Native[1]	2,916/ 3.5%	41/ 0.6%	223/ 2.9%	27,418/ 1.7%	183/ 1.0%	15,164/ 2.6%
Asian[1]	1,167/ 1.4%	41/ 0.6%	38/ 0.5%	22,580/ 1.4%	57/ 1.0%	5,249/ 0.9%
Native Hawaiian or Other Pacific Islander[1]	250/ 0.3%	14/ 0.2%	15/ 0.2%	3,226/ 0.2%	18/ 0.1%	583/ 0.1%
Two or More Races	1,833/ 2.2%	82/ 1.2%	162/ 2.1%	35,483/ 2.2%	202/ 1.1%	11,081/ 1.9%
Hispanic or Latino[2]	6,332/ 7.6%	369/ 5.4%	2,393/ 31.1%	190,315/ 11.8%	825/ 4.5%	56,573/ 9.7%
Total Population	82,839	6,830	7,694	1,612,843	18,326	583,223

Source: U.S. Census 2015a, 2015b, 2015c, and 2015d

[1]Includes persons reporting only one race.

[2]Hispanics may be of any race, so also are included in applicable race categories.