



U.S. Department of the Interior
Bureau of Land Management

Robinson Mine Plan of Operations Amendment Draft Environmental Impact Statement DOI-BLM-NV-L060-2020-0008-EIS



U.S. Department of the Interior
Bureau of Land Management
Bristlecone Field Office
702 North Industrial Way
Ely, Nevada 89301-9408

December 2020

**Estimated Cost to Prepare this
Draft Environmental Impact Statement**
Bureau of Land Management (Cost Recovery):
\$224,000.00
Proponent: \$1,016,000.00



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Ely District Office

702 North Industrial Way

Ely, Nevada 89301

<https://www.blm.gov/nevada>



In Reply Refer To:

3809 (NVL0600)

NVN-68654

December 2020

Dear Reader:

Attached for your review and comment is the *Robinson Mine Plan of Operations Amendment Draft Environmental Impact Statement* (draft EIS) prepared by the Bureau of Land Management (BLM) Ely District, Bristlecone Field Office. The BLM prepared this document to provide an objective analysis of the Proposed Action and alternatives based on the best available science and thus to inform a BLM decision about whether or not to approve a proposed amendment to the *Plan of Operations for the Robinson Project* (Mine Plan) as submitted to the BLM by the KGHM Robinson Nevada Mining Company (hereafter KGHM Robinson). This EIS was developed in accordance with the National Environmental Policy Act of 1969 (NEPA), the Federal Land Policy and Management Act of 1976, implementing regulations, BLM's NEPA Handbook (H-1790-1), and other applicable laws and policy. Because the notice of intent for this EIS was issued before September 14, 2020, the BLM developed this EIS in accordance with the 1978, as amended, Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations 1500–1508 from 1978, as amended in 1986 and 2006). The BLM retains responsibility for compliance with NEPA.

As described in Chapter 1 of this EIS, the proposed amendment to KGHM Robinson's Mine Plan, if approved by the BLM, would allow KGHM Robinson to expand current mining operations onto as much as 1,106 acres of land, of which 869 acres would be BLM-managed land. The proposed Mine Plan amendment would also provide for mining an additional 4 years beyond the currently approved plan for concluding active operations in 2024.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the draft EIS. We are particularly interested in feedback concerning the adequacy of the proposed alternatives as well as the thoroughness and technical accuracy of the impact analyses presented; your comments will help to inform the revisions to the draft EIS that will lead to the final EIS, which is the next phase of the NEPA process. In developing the final EIS, the BLM will make a determination on a Preferred Alternative, which may be a combination or minor variation of the alternatives presented in this draft EIS. Public comments will be accepted for 45 calendar days following the U.S. Environmental Protection Agency's publication of a notice of availability in the *Federal Register*. The BLM can best use your comments and resource information submissions if received within the review period.

Comments may be submitted electronically to blm_nv_eydo_robinson_eis@blm.gov or submitted by mail to: BLM Ely District Office, 702 North Industrial Way, Ely, Nevada 89301, ATTN: Project Manager Tiera Arbogast.

Your review and comments on the content of this document are critical to the success of this NEPA process. If you wish to submit comments on the draft EIS, we request that you make your comments as specific as possible. Comments will be more helpful if they include suggested changes, additional sources, or alternate methodologies, and if they reference a section or page number.

To be considered and to merit a written response, comments must be in writing (paper or electronic format), substantive, and timely. Substantive comments do one or more of the following:

- Question, with reasonable basis, the accuracy of information in the draft EIS
- Question, with reasonable basis, the adequacy of, methodology for, or assumptions used for the environmental analysis

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- Present valid new information relevant to the analysis
- Present reasonable alternatives other than those analyzed in the draft EIS
- Cause changes or revisions in one or more of the alternatives

Comments that are not substantive generally contain only opinion or preferences but will be considered and included as part of the decision-making process. They will not, however, receive a formal response from the BLM. Comments that are not considered substantive include the following:

- Comments in favor of or against the Proposed Action or alternatives that do not include reasoning that meets the criteria listed above
- Comments that only agree or disagree with BLM policy or resource decisions and that do not include justification or supporting data that meet the criteria listed above
- Comments that do not pertain to the 21,636-acre Mine Plan boundary or the project
- Comments that take the form of vague, open-ended questions

Before including your address, telephone number, email address, or other personal identifying information in your comment, please be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public meetings to provide an overview of the document, respond to questions, and take public comments will be announced by local media, on the BLM project website, and/or by public mailings at least 15 days in advance. Because of the ongoing Coronavirus Disease (COVID-19) pandemic, and in keeping with guidance from federal and state public health officials, public meetings during the draft EIS comment period will be held in a virtual format rather than in person. Details on how to sign in to these live events by computer and/or telephone will be provided well in advance of the meetings. Please see the project website, <https://go.usa.gov/xvYad>, for specific information about the date(s), time, and means by which you can participate in these meetings.

Copies of the draft EIS have been sent to affected federal, state, and local government agencies and American Indian tribes. Bound copies of the draft EIS are also available for public inspection at the BLM Ely District Office, 702 North Industrial Way, Ely, Nevada 89301, and at the White Pine County Public Library at 950 Campton Street in Ely.

The draft EIS can be downloaded at no cost from the BLM project website—<https://go.usa.gov/xvYad>—by clicking on the “Documents” tab to the left. Please note that the main body of the draft EIS and the appendices (Appendices A–K) are posted under separate links on this website. Or, to request that a compact disk copy of the document be mailed to you, please send an email **that includes your name and postal mailing address** to blm_nv_eydo_robinson_eis@blm.gov.

Thank you for your interest in the Robinson Mine EIS. We appreciate the suggestions you contribute to the EIS process. For additional information or clarification regarding this document or the EIS process, please contact Project Manager Tiera Arbogast via U.S. mail at the address shown above or by sending an email to blm_nv_eydo_robinson_eis@blm.gov.

Sincerely,

Jared Bybee, Bristlecone Field Office, Acting Field Manager
Bureau of Land Management

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Robinson Mine Plan of Operations Amendment

U.S. Department of the Interior
Bureau of Land Management
Ely District Office
Ely, Nevada
December 2020

Lead Agency: U.S. Department of the Interior, Bureau of Land Management (BLM)

Type of Action: (X) Draft () Final

Cooperating Agencies: U.S. Environmental Protection Agency, Region IX; Nevada Department of Wildlife; Sagebrush Ecosystem Technical Team; White Pine County Board of Commissioners

Responsible Official: Jared Bybee, Bristlecone Field Office, Acting Field Manager

For Further Information Contact: Tiera Arbogast
Project Manager
BLM Ely District Office
(775) 293-5042

Abstract

The KGHM Robinson Nevada Mining Company (KGHM Robinson) is proposing additional development at the Robinson Mine, located approximately 7 miles west of Ely, Nevada, to extend mine life approximately 4 additional years beyond its currently anticipated permanent closure in 2024. To accomplish this, the company is proposing renewed mining in the eastern portions of its privately owned Liberty Pit and a grant by the BLM to access and develop two specific areas of nearby BLM-managed public land on which to dispose newly generated waste rock (or overburden). Such mining-related use of public lands is allowable under both the 1872 General Mining Law and the Federal Land Policy and Management Act of 1976, provided that such uses that are “reasonably incident to mining;” the lands are afterward appropriately reclaimed to agency standards; and the use of public land does not result in “unnecessary or undue degradation” as defined in BLM Surface Management regulations (43 Code of Federal Regulations 3809).

Under the Proposed Action, the company would develop approximately 260 acres, immediately south of the Robinson Mine, to serve as the King Waste Rock Dump. An alternative scenario would allow the company to develop approximately 67 acres of BLM lands and 102 acres of KGHM-owned land adjacent to its existing North Tripp Waste Rock Dump. The company is also considering possible disposal of new waste rock within approximately 160 acres in its privately owned Ruth East Pit, where no future mining is planned. Lastly, KGHM Robinson is seeking access to 94 private acres and approximately 545 acres of BLM-managed lands adjacent to its existing Giroux Wash Tailings Storage Facility to a) obtain soil material to use in increasing the height of the Giroux Wash main impoundment and the surrounding perimeter dams, and b) to serve as growth media (e.g., topsoil) storage areas to be used in future reclamation of areas of mining-related surface disturbance.

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EXECUTIVE SUMMARY

Introduction

Robinson Nevada Mining Company, a subsidiary of Poland-based KGHM Polska Miedź S.A. (hereafter referred to as KGHM Robinson), owns and operates the Robinson Mine, a copper, gold, and molybdenum open-pit mine located in central White Pine County approximately 7 miles west of the Town of Ely, Nevada. Most of the mine and its associated facilities are located on lands owned by KGHM Robinson; however, portions of the current mining operation and substantial areas adjacent to the mine are on Bureau of Land Management (BLM)-managed lands.

The KGHM Robinson Mine *Plan of Operations for the Robinson Project* (Mine Plan) was originally approved in 1994 and has been amended several times since. A previous environmental impact statement (EIS) under the National Environmental Policy Act of 1969 (NEPA) analyzing a proposed expansion of operations at the Robinson Mine onto BLM-managed lands was published in September 1994, and a BLM decision approving an amendment to the Mine Plan was issued the following month. KGHM Robinson proposed other more limited expansions of mining activity in 2016 and 2018; these proposals for modifications to the Mine Plan then in effect were each analyzed in an environmental assessment (EA)-level document.

KGHM Robinson is currently proposing new amendments to the Mine Plan for an expansion of operations onto additional specific areas of BLM-managed lands and to allow mining to continue beyond the currently approved end-of-mine life of 2024. The BLM determined that this proposal would require that an EIS-level analysis be conducted prior to any agency decision. The Proposed Action and alternatives to that action are described in detail in Chapter 2 of this EIS. The potential impacts to a range of natural resources and human uses in and near the Robinson Mine are analyzed in Chapter 3.

Purpose of and Need for the Action

The BLM's purpose is to consider KGHM Robinson's proposal to expand their current mining operations within the 21,636-acre Mine Plan boundary (hereafter the project area) and to extend the existing mine life. Part of the BLM's purpose includes determining if changes, including additions or conditions to the Proposed Action, are necessary prior to approval of the Mine Plan amendment to meet the requirements of the BLM surface management regulations (43 Code of Federal Regulations [CFR] 3809). The need for the action is established by the BLM's responsibility under the Mining Law of 1872, the Federal Land Policy and Management Act, and the BLM's surface management regulations at 43 CFR 3809. Under these statutes and regulations, the BLM is required to review the proposed Mine Plan amendment to ensure that KGHM Robinson's activities include appropriate reclamation and do not cause unnecessary or undue degradation of public lands.

Alternatives

Alternatives are the heart of any EIS because they present other possible courses of action that could achieve the underlying purpose of and need for action to which the agency is responding. NEPA implementing regulations at 40 CFR 1502.14 also require consideration of a No Action alternative. The range of alternatives analyzed in this EIS, including the No Action alternative, is summarized below. Other potential alternatives that were initially considered by the BLM but subsequently dismissed from detailed analysis in the EIS are described in Section 2.3 of Chapter 2.

Alternative A: No Action

Under the No Action alternative, the BLM would not approve the 2019 Mine Plan amendment as written. Although KGHM Robinson could continue mining on their own private lands, no additional expansion onto BLM-managed lands would be permitted. Without additional areas on which to dispose waste rock generated by continued mining, nor the ability to obtain substantial additional volumes of soil to use in increasing the height of the primary impoundment and perimeter dams at the Giroux Wash Tailings Storage Facility (TSF), KGHM Robinson estimates that active operations at the Robinson Mine would cease in 2024.

Alternative B: King Waste Rock Dump (Proposed Action)

The Proposed Action would keep all project elements as described in the 2019 Mine Plan amendment with two exceptions: 1) development of the North Tripp Waste Rock Dump (WRD) would not be included as part of the Proposed Action, and 2) the total area of surface disturbance associated with the proposed King WRD would be reduced from approximately 470 acres, as described in the Mine Plan amendment, to 260 acres—a reduction of approximately 44%. The Proposed Action would include renewed dewatering and expanded mining operations in the eastern portions of the Liberty Pit as well as approval for KGHM Robinson to develop approximately 545 acres of BLM-managed land and 94 acres of private land adjacent to the Giroux Wash TSF. These areas would be used for obtaining borrow material for the previously approved increase in height of the TSF main impoundment and perimeter dams, as well as for growth media storage for final reclamation. If approved by the BLM, this alternative would result in an additional 793 acres of new disturbance on BLM-managed lands as well as disturbance on approximately 170 acres of KGHM Robinson-owned private lands, for a total of 963 acres of new surface disturbance. Mine life would be extended to 2028.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Alternative C would keep all project elements described in the 2019 Mine Plan amendment, including both the North Tripp and King WRDs; however, the allowable footprint of the King WRD would be reduced from the 260 acres under the Proposed Action to 234 acres under this alternative. Specifically, Alternative C would eliminate all proposed King WRD development east of County Road 44A. The North Tripp WRD would be expanded onto approximately 67 acres of BLM-managed lands and 102 private acres. As with the Proposed Action, this alternative would include dewatering and renewed mining in the eastern portions of the Liberty Pit and development of approximately 545 acres of BLM-managed land and 94 private acres adjacent to the Giroux Wash TSF. This alternative would result in approximately 869 acres of new disturbance on BLM-managed lands and 237 acres of KGHM-owned private lands, for a total of approximately 1,106 acres of new surface disturbance. As with the Proposed Action, mine life would be extended to 2028.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Alternative D would be similar to the Proposed Action in that it would include renewed dewatering and expanded mining operations in the eastern portions of the Liberty Pit as well as approval for KGHM Robinson to develop a total of approximately 639 acres of mixed public and private land adjacent to the Giroux Wash TSF. Alternative D, like Alternative C, would include the reduced 234-acre King WRD. Alternative D would, however, not include development of the North Tripp WRD. Rather, additional waste rock generated during continued mining would be disposed of within approximately 160 acres of

KGHM-owned lands within the Ruth East Pit. Approval of Alternative D would therefore result in approximately 767 acres of new surface disturbance on BLM-managed lands and on 330 acres of new surface disturbance on KGHM-owned private lands, for a total of approximately 1,097 acres. As with the Proposed Action and Alternative C, mine life would be extended to 2028.

RESOURCES

Chapter 1, Section 1.7.2 of the EIS explains which resources considered during initial internal and external scoping for this project were ultimately eliminated from detailed analysis in the EIS, and provides the rationale for why each was dismissed. The resources listed and described below are those the BLM determined should be brought forward for detailed analysis in Chapter 3 of the EIS.

Cultural Resources

The analysis area used to assess the impacts of the project on cultural resources consists of the approximate disturbance footprint for each alternative, which represents the direct area of potential effects (APE) for the project. No APE for indirect impacts has been defined for this project.

The project area was periodically occupied during the Paleoarchaic through the Late Prehistoric periods (ca. 13,500 B.P. to 150 years ago) by small bands of hunter-gatherers, and then in the late nineteenth century and early twentieth century became a center of mining activity. Mining at first focused on small deposits of precious metals (primarily gold and silver), but between 1905 and 1910, it rapidly evolved into large-scale mining and processing of copper ore. Cultural sites within the analysis area include lithic scatters, stone tool procurement locations, a rockshelter, and rock rings, as well as more recent architectural features and mining-related infrastructure. Depending on which alternative is selected, the project would directly and adversely affect six to 10 archaeological sites/architectural features determined to be eligible for the National Register of Historic Places (NRHP) as well as three architectural resources that are also NRHP-eligible. Because cultural resources are not renewable and because ground-disturbing activities would permanently alter or destroy these sites, appropriate mitigation measures in consultation with both the Nevada State Historic Preservation Office and consulting tribes would be required before ground disturbance can occur.

Geochemistry and Groundwater Quality

Geology beneath the project area ranges from acid-generating to alkaline materials. Existing geochemical characteristics of the project area groundwater are largely calcium bicarbonate waters with low to moderate total dissolved solids and alkaline pH with some naturally occurring sulfide oxidation of mineralized rocks resulting in elevated iron, manganese, and sulfate concentrations within circum-neutral groundwater. The geochemical makeup of the seepage from the waste rock facilities is determined by the resiliency of the evapotranspiration cover following reclamation. Management of reclamation cover in the immediate area would be managed to provide for continued maintenance of cover integrity. Because the landform and surface would be integrated into reclamation of the site as a whole, no irreversible indirect effects are anticipated from waste rock facility seepage; however, irretrievable impacts would occur until reclamation is completed successfully. Pit lakes would form over a period of time, with resulting irretrievable impacts on water quality. These irretrievable impacts would be long term but would not be irreversible. Most of the recovery would occur within 40 years after mining ceases; however, steady-state pit lake chemistry is modeled to occur at approximately 200 years. Dewatering impacts from the pit lakes would be irretrievable until impacts cease after the completion of mining (2028) when groundwater would begin rebounding. The predicted 90% recovery of the pit lakes would be complete by the year 2033.

Geology and Mineral Resources

The action alternatives would have an irreversible permanent alteration of the natural topographic and geomorphic features of 932 to 1,228 acres of the project area. Areas disturbed by mining would be reclaimed and revegetated as described above, but would not be fully restored to pre-disturbance topography. Similarly, the mineral extraction of approximately 905 million pounds of copper, 6 million pounds of molybdenite, 410 thousand ounces of gold, and 540 thousand pounds of silver would be an irreversible loss of those minerals in that they are finite resources that, once removed, would not be replaced or restored. The project would not impact the long-term geologic stability of the project area or the region.

Air Quality and Greenhouse Gas Emissions

Based on the EPA's FLIGHT data from reporting year 2018, the total emissions from the Robinson Mine, including all mobile source emissions, are less than 2% of the total GHG emissions reported in Nevada and approximately 0.011% of the nationwide GHG emission totals for reporting facilities when compared on a 100-year basis. The Robinson Mine is therefore a relatively minor producer of GHG emissions on a statewide basis, but nevertheless an annual contributor. Under the No Action alternative evaluated in this EIS, these emissions would largely cease in 2024. Under the Proposed Action and other action alternatives, GHG emissions from the mine would continue to 2028.

Recreation

Recreational use of the lands surrounding the project area includes hiking, mountain biking, hunting, camping, horseback riding, wildlife viewing, outdoor photography, geocaching, rock-hounding, picnicking, and other pursuits. The mine area plan of operations is not fenced, however the active mining area (including the proposed project area) is partially fenced and includes berms and signage to inform the general public that non-authorized access to the area is not permitted. Most of the BLM-managed and U.S. Forest Service-managed lands near the City of Ely and the project area are without formally constructed trails, although approximately 20 miles of a well-developed non-motorized trail system is located within the Ward Mountain Recreation Area directly south of the project area. Under the Proposed Action and action alternatives evaluated in this EIS, the primary mine-related impact to recreational uses would come from ground clearing and construction of the 260- or 234-acre (depending on alternative) King WRD, which would be developed directly north and approximately 0.3 mile from the Ward Mountain Recreation Area, and would therefore be highly visible to campers, hikers, and other users of that area. Depending on which alternative is selected, the project would remove between 767 and 869 acres of public access land that provides recreational opportunity. Additionally, 3.7 to 4.7 miles of the Ward Mountain Recreation Area trail system would experience visual impacts from the King WRD. These visual impacts would affect recreational experience for trail users. Ongoing construction noise would also be likely to diminish recreational experiences in this area. Noise and disturbance impacts would be irretrievable until cessation of mine operations (approximately 8 years). Visual impacts to recreationists would be irreversible in that reclaimed mining areas would still be visible and would contrast with the surrounding landscape. These visual impacts would lessen when these areas are reclaimed within 1 to 7 years (depending on revegetation success). Because recreationists have been subject to the existing mine disturbance since the BLM field office has managed recreation in the area, neither the small amount of public land impacts nor the increased irreversible visual impacts to recreationists would eliminate the long-term sustainable recreational experience.

Socioeconomics and Environmental Justice

The Robinson Mine is the leading employer and economic engine for the City of Ely and surrounding communities, as well as for White Pine County as a whole. The jobs it provides support much of the housing and many of the grocery, restaurant, automotive, recreation-related, and other businesses in and around Ely. The mine is also the largest single source of tax revenue for the county. Based on a previous long-term shutdown of operations in the early 2000s, any future closure of the mine would be expected to result in the loss of approximately 900 direct and indirect jobs in this area of Nevada, with correspondingly substantial reductions in sales tax and other tax revenue for local municipalities and the state. At present, the Robinson Mine is planning to permanently cease operations in 2024. BLM approval of any of the three action alternatives would extend operations to 2028. Therefore, any extension of mine life would be considered beneficial to individuals as well as to the local communities and the county, whereas an earlier closure date would be viewed as having adverse social and economic consequences for the area. There are qualifying environmental justice communities in the Ely area, but these populations are not expected to be disproportionately affected by BLM or other agency decisions resulting from the analysis in this EIS.

Mine closure under all action alternatives would result in irretrievable socioeconomic impacts related to the aforementioned loss of employment, tax revenue, and economic output. The level at which these economic impacts would be irreversible would depend on the type and amount of potential alternative economic generators. If such alternative sources do not develop, the impacts of mine closure on the economy of the Town of Ely and White Pine County would be irreversible. However, other economic drivers such as tourism, ranching, and mining in other mines near Ely would maintain a smaller sustainable economy, which, in turn, would provide for the social sustainability of the community.

Soils and Reclamation

The soils and reclamation analysis describes the characteristics of soil type found in the project area; evaluates how they may be affected by the Proposed Action and action alternatives; and discusses KGHM Robinson's plans for ongoing and future closure and reclamation at the Robinson Mine, including the applicability of different soils in the area for use as reclamation growth media. Overall, all action alternatives would result in soil disturbance on less than 1% of the hydrologic unit code (HUC)-12 subwatersheds within which the proposed mining activities would occur. This disturbance would lead to loss of soils in the project area from both water and wind erosion despite implementation of best management practices and other erosion control strategies. Long-term storage of topsoils and other soils for later use in capping and reclaiming disturbed areas, including revegetation and reseeding with BLM-approved seed mixes, should help to offset short-term losses directly resulting from additional disturbance under the Proposed Action or other action alternatives. The relatively low proportion of the project's disturbed soil within the analysis area (< 1%), combined with reclamation would prevent impacts to the long-term sustainability of soils in the impacted watersheds.

Vegetation

Vegetation in and near the project area consists primarily of established Great Basin pinyon-juniper woodlands interspersed with sagebrush, grasses, and a variety of ruderal species (i.e., species that tend to quickly occupy and propagate in disturbed areas). According to vegetation surveys conducted in 2019, no federally threatened, endangered, or proposed plant species occur in or near the project area (Stantec Consulting Services [Stantec] 2019). Although the exact areas of anticipated future surface disturbance vary by action alternative, construction of any the of the main project components within previously undisturbed areas (King WRD, lands surrounding the Giroux Wash TSF, and/or expansion of the North Tripp WRD) would result in a long-term impact on previously undisturbed vegetation communities. This

disturbance would range from 1.6% to 1.9% of the vegetated in the watershed. These disturbed areas would also be at risk for the introduction and establishment of invasive species, although this would be mitigated by successful weed management control programs and future reclamation activities. Vegetation disturbance would be irretrievable until revegetation occurs in approximately 1 to 7 years. Because most of the area would be reclaimed and revegetated, only the disturbance associated with expanded Liberty Pit (approximately 3,364 acres) would be irreversible. Regional Pinyon-Juniper woodland would incur a slight loss in productivity. The relatively low amount of disturbance combined with the short timeframe for revegetation would have a low effect on the long-term vegetation productivity in the project area.

Visual Resources

The BLM uses the Visual Resource Management (VRM) System to classify and manage visual resources on lands under its jurisdiction, assigning a Visual Resource Inventory (VRI) class designation to indicate the relative scenic quality of various areas. Those areas that are most pristine and considered to have the highest scenic value are assigned Class I, whereas those areas that are already heavily disturbed by human activity and subject to additional future disturbance are generally assigned Class IV. The lands within the project area are currently divided into Class II (7,882 acres) and Class III (5,219 acres) areas. Within Class II areas, the level of visual change should be kept low and not be readily noticeable to the casual observer, whereas within Class III areas, a greater degree of visual alteration to the landscape is allowed, but ideally these changes should be no more than moderate and should not dominate the surrounding view. When the BLM Resource Management Plan for Ely District is next amended or revised at a future undetermined date, much of the project area likely would be reclassified to Classes III and IV to reflect more accurately the visual effects of existing mine development on the visual landscape.

The Proposed Action and action alternatives would not dramatically alter the existing visual character of the project area, with the exception that under any of the action alternatives, the King WRD would be developed in the southern portion of the project area. The construction of a permanent waste rock disposal facility ranging from approximately 400 to 700 feet in height at full build-out and occupying 260 or 234 acres, depending on alternative, would represent a visually dominant and permanent landform modification in relation to the existing landscape. Furthermore, at a distance of less than 0.5 mile from the northern boundary of the Ward Mountain Recreation Area and trail system, the construction of this facility would introduce elements and/or patterns that create moderate to strong contrasts that would be visible to recreational users of that area and also potentially to travelers along U.S. Highway 6.

Water Resources

All alternatives (including the No Action alternative) through water level recovery (year 2327) would continue to impact the same four springs and seeps (total of 57) and one water right and users (total of 54). The action alternatives would have no additional impacts to seeps and springs and water rights (see Figure A-35 and Appendix I) in the analysis area in comparison with the No Action alternative. Similarly, total depletions from evaporation under the action alternatives would be similar to that under the No Action alternative. For the Proposed Action and Alternative C, total depletions would be approximately 1.7% of the total existing cumulative depletions in the analysis area, and for Alternative D, total depletions would be approximately 1.3% of the total existing cumulative depletions in the analysis area.

Wildlife

General wildlife within the project area includes big game species, upland game birds, non-game small mammal species, reptiles, and migratory birds. Special-status wildlife species guilds include raptors, bats, and a variety of sagebrush-obligate species. For big-game species, the analysis area is the extent of the Nevada Department of Wildlife–delineated game management unit within which the Robinson Mine is

located (GMU 131). For wildlife species without delineated habitats, the analysis area is the extent of the three HUC-12 watersheds that overlap the project area: Giroux Wash (HUC 150100110101), Lower Gleason Creek (HUC 160600081202), and Town of Ely-Murry Creek (HUC 160600081203).

Implementation of any of the three action alternatives (Proposed Action and Alternatives C and D) would have direct and indirect impacts on wildlife habitat within the project area. The acreage of direct ground disturbance would vary by alternative, but would average approximately 2% of the total available wildlife habitat within the analysis area. Indirect effects on wildlife could include increased traffic, noise, and nighttime lighting; these effects may result in displacement, increased mortality risk, or reduced reproductive success. Removal of wildlife habitat associated with the action alternatives (described above) would be irretrievable until revegetation occurs in approximately 20 years. Because the area would be reclaimed and revegetated, none of this disturbance would be irreversible, and the relatively low amount of disturbance combined with short-term impact would not affect the long-term vegetation productivity or long-term wildlife population sustainability in the analysis area.

Lands and Realty

Under the Proposed Action, the construction of the King WRD would remove a 0.55-mile portion of County Road 44A (see Figure A-2). Of this mileage, approximately 0.35 mile is currently open for emergency use only; the remaining 0.2-mile segment is still open to the public and includes the turnaround area developed to address the 2014 road closure. No irretrievable or irreversible impacts to lands and realty would occur under Alternatives A, C or D. Impacts to the County Road 44A ROW under the Proposed Action would be irretrievable for the life of the project or until the road is relocated. Relocating and opening the road to public travel after mine closure would effectively restore public use of the road and county maintenance.

Public Involvement

The BLM decision-making process is conducted in accordance with the requirements of NEPA, Council on Environmental Quality regulations, and U.S. Department of the Interior and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require that all federal agencies involve interested groups of the public in their decision-making, consider reasonable alternatives to proposed actions, and prepare environmental documents that disclose the potential impacts of proposed actions and alternatives. Public involvement, consultation, and coordination have been at the heart of the planning process leading to this EIS. These efforts were accomplished through public meetings, alternative means of comment submittal, news releases, a planning website, and *Federal Register* notices.

Comments on the draft EIS will be analyzed in detail and systematically categorized by the subject of individual comments contained in each submittal. The categories for comment analysis may include project alternatives, adequacy and availability of the project information provided by BLM, the NEPA process in general, and/or resource issue (listed alphabetically). Comments will be further classified by the type of comment submittal (e.g., personalized written letter, postcard, email, fax, form letter) and the source of the comment (e.g., individual, organization, tribe, federal agency, state agency, municipal government). Additional subcategories for analysis may be identified once the BLM has an opportunity to study the full range of comments received.

Individual comments received on the draft EIS will be tagged as either “substantive” or “non-substantive.” Generally speaking, “substantive” comments are those that call into question the accuracy of specific information provided in the draft EIS; provide alternative sources of technical or resource information; suggest project alternatives beyond those presented in the draft EIS; or question, on a

reasonable basis, the analytical assumptions, methodologies, or conclusions presented in the draft EIS. “Non-substantive” comments are those that merely express an opinion; raise issues that are beyond the scope of or irrelevant to the current project; or take the form of vague, open-ended questions. BLM will note and record “non-substantive” comments, but they will not receive a formal response. Comments identified as “substantive,” on the other hand, will form the basis for much of the revision that occurs between publication of the draft EIS and the final EIS. Each substantive comment will be included in an appendix to the final EIS, along with a formal BLM response stating whether or not the comment resulted in specific changes to the document.

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Abbreviations

°F	degrees Fahrenheit
ABA	acid base accounting
af/yr	acre-feet per year
AGP	acid-generating potential
amsl	above mean sea level
ANP	acid-neutralizing potential
APE	area of potential effects
BLM	Bureau of Land Management
BLM NEPA Handbook	BLM National Environmental Policy Act Handbook H-1790-1
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
COPEC	Constituent of Potential Concern
CO ₂ e	carbon dioxide equivalent
CWA	Clean Water Act
dB(A)	A-weighted decibels
DM	departmental manual
DR	decision record
DRG	Disturbance Response Groups
E	East (used in legal locations only)
EA	environmental assessment
EIS	environmental impact statement
EO	executive order
EOML	end of mine life
EPA	U.S. Environmental Protection Agency
EPM	environmental protection measures
ERA	ecological risk assessment
ESA	Endangered Species Act
FLIGHT	Facility Level Information on Greenhouse Gases Tool

FONSI	finding of no significant impact
FYI	fiscal year
g	gravity
GHG	greenhouse gas
GHMA	General Habitat Management Areas
GIS	geographic information system
GMU	Game Management Units
gmp	gallons per minute
GPS	global positioning system
GWP	global warming potential
HCTs	humidity cell tests
HUC	hydrologic unit code
IMPLAN	Economic Impact Analysis for Planning
IPCC	Intergovernmental Panel on Climate Change
Kennecott	Kennecott Copper Corporation's Nevada Mines Division
KGHM	KGHM Robinson Operation
KGHM Robinson	Robinson Nevada Mining Company, a wholly owned subsidiary of Poland-based KGHM Polska Miedz S.A.
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
Mine Plan	KGHM Robinson Mine plan of operations
MLRA	Major Land Resource Area
MOA	memorandum of agreement
MOU	memorandum of understanding
MT	metric ton
MWMP	meteoric water mobility procedure
N	North (used in legal locations only)
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NBMG	Nevada Bureau of Mines and Geology
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NO ₂	nitrogen dioxide
NOI	notice of intent
NPAG	non-potentially acid-generating
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NVC	National Vegetation Classification
O ₃	ozone
OHMA	Other Habitat Management Areas
OHV	off-highway vehicle
PAG	potentially acid-generating
Pb	lead
PGA	peak ground acceleration
PHMA	Priority Habitat Management Areas
Piteau	Piteau Associates
PM _{2.5}	particulate matter equal to or less than 2.5 microns in diameter
PM ₁₀	particulate matter equal to or less than 10 microns in diameter
PMU	population management unit
R	Range (used in legal locations only)
RFFA	reasonably foreseeable future actions
RMP	resource management plan
ROD	record of decision
SETT	Sagebrush Ecosystem Technical Team
SHPO	State Historic Preservation Office
SO ₂	sulfur dioxide
SLRU	Sensitivity Level Rating Units
SQRU	Scenic Quality Rating Unit
SRMA	Special Recreation Management Area
T	Township (used in legal locations only)
TSF	tailings storage facility
USC	United States Code

USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WRD	waste rock dump

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CHAPTER 1 PURPOSE OF AND NEED FOR THE ACTION

1.1 Introduction

Robinson Nevada Mining Company, a wholly owned subsidiary of Poland-based KGHM Polska Miedź S.A. (hereafter referred to as KGHM Robinson), owns and operates the Robinson Mine, a copper, gold, and molybdenum open-pit mine located in central White Pine County approximately 7 miles west of Ely, Nevada (Figure A-1¹). Most of the mine and its associated facilities are on lands owned by KGHM Robinson; however, portions of the current mining operation and substantial areas adjacent to the mine are on Bureau of Land Management (BLM)-managed lands. These lands are within the identified Mine Plan boundary encompassing 21,636 total acres of land (the project area). The KGHM Robinson Mine *Plan of Operations for the Robinson Project* (Mine Plan) was originally approved in 1994 (Robinson Mining Limited Partnership [RMLP] 1994) and has been amended several times since. Under the approvals granted by the 1994 Mine Plan and subsequent amendments, mining-related activities and surface disturbance by KGHM Robinson are authorized on approximately 1,592 acres of BLM-managed land and approximately 7,296 acres on private lands owned by KGHM Robinson located on the Mount Diablo Baseline and Meridian in the following locations:

- Township (T) 15 North (N), Range (R) 61 East (E), Sections 1 and 2
- T.15N., R.62E, Sections 5 and 6
- T.16N., R.61E, Sections 1, 2, 11, 12, 13, 14, 22, 23, 24, 25, 26, 27, 34, 35, and 36
- T.16N., R.62E, Sections 2 through 24, 28, 29, 30, 31, and 32
- T.16N., R.63E, Sections 7, 8, 17, 18, 19, and 20
- T.17N., R.62E, Sections 20, 21, 28, 29, 32, 33, 34, and 35

In April 2019, KGHM Robinson submitted a request to the BLM Ely District Office to authorize an amendment to the Mine Plan to 1) extend the life of Robinson Mine to 2028; 2) resume mining in the Liberty Pit, requiring the expansion of Liberty Pit; 3) construct the King Waste Rock Dump (WRD); and 4) provide for additional soil borrow areas around the existing Giroux Wash Tailings Storage Facility (TSF) to enable KGHM Robinson to build up, under previous BLM authorizations, the height of the tailings impoundment dam and thereby increase storage capacity within the TSF (Figure A-2). Potential expansion of the North Tripp WRD is considered an alternative to construction of the King WRD (KGHM Robinson Operation [KGHM] 2019a). In separate, subsequent discussions with the BLM, KGHM Robinson has proposed to backfill the eastern portion of the existing Ruth Pit with waste rock as an alternative means to reduce or eliminate a need for construction of the King WRD.

The BLM determined that the above requests (hereafter referred to as the project) are the subject of the National Environmental Policy Act (NEPA) environmental impact statement (EIS) level of analysis. The preparation of this EIS is intended to assist the BLM in the decision-making process through the identification, analysis, and public disclosure of potential impacts of the project on the human environment, including environmental, social, and economic impacts (40 Code of Federal Regulations [CFR] 1500.1(c)). Aside from BLM-managed lands, there are no additional federal or state-managed lands that would be disturbed by future mining operations as proposed in the 2019 Mine Plan amendment (KGHM 2019a). Additionally, the BLM is not aware of any other proposed activities in the project area that would be considered a connected action to the proposed Mine Plan amendment under NEPA. An analysis of likely or potential direct, indirect, and cumulative impacts to area resources and human uses

¹ Figures are located in Appendix A.

resulting from BLM approval of the proposed expansion of mine operations is provided in Chapter 3, Affected Environment and Environmental Consequences.

1.2 Project History and Background

Mining exploration and operations have been conducted in the Ely area, and specifically in the project area, since the late 1860s, when early mining activity in the area centered on small deposits of precious metals. Mining for precious metals declined near the turn of the century and by the early 1900s, mining in the Robinson Mining District focused almost exclusively on copper. Large-scale copper mining began in 1908 and by 1958 all the principal operations were consolidated into Kennecott Copper Corporation's Nevada Mines Division (Kennecott). Kennecott extracted ore from several underground and open pit mines, including the Tripp/Veteran, Liberty, Kimberley, and Ruth Pits. Kennecott terminated its mining activities in the Robinson Mining District in 1978. The mine was inactive until 1985 and was subsequently operated by Silver King Mining Company, Alta Gold, Alta Bay Joint Venture, Magma Nevada Mining Company, BHP Nevada Mining Company, Quadra Mining LTD., FNX Mining Ltd, and its present operator, KGHM Robinson (KGHM 2019a).

A previous EIS analyzing a proposed expansion of operations at the Robinson Mine, including certain activities on BLM-managed lands, was published in September 1994 with the accompanying record of decision (ROD) issued in October 1994 (BLM 1994a, 1994b). Other, more limited expansions of mining activity were proposed in 2016 and 2018 (BLM 2016a, 2019a, 2019b); each of these proposals for modifications to the approved Mine Plan were analyzed in environmental assessment (EA)-level NEPA documents. Following resource impact analysis and agency review, decision record (DR)/finding of no significant impact (FONSI) documents for each of the two proposed Mine Plan amendments were approved and issued by the BLM Ely District Office in December 2016 and February 2019, respectively (BLM 2017a, 2019a, 2019b).

1.3 Purpose of and Need for the Action

The BLM's purpose is to consider KGHM Robinson's proposal to expand their current mining operations within the 21,636-acre Mine Plan boundary (hereafter the project area) and to extend the existing mine life. To meet the requirements of the BLM surface management regulations (43 CFR 3809), the BLM's purpose also includes determining if changes (e.g., additions or conditions to the Proposed Action) in the Mine Plan amendment are necessary prior to its approval.

The need for the action is established by the BLM's responsibility under the Mining Law of 1872, the Federal Land Policy and Management Act of 1976 (FLPMA), and the BLM's surface management regulations at 43 CFR 3809. Under these statutes and regulations, the BLM is required to review the proposed Mine Plan amendment to ensure that KGHM Robinson's activities include appropriate reclamation and do not cause unnecessary or undue degradation of public lands.

1.4 Decisions to be Made

Following a thorough NEPA analysis, the BLM's decision includes whether to approve the proposed Mine Plan amendment and, if approved, to identify what modifications and/or additional mitigation measures are required to comply with 43 CFR 3809 regulations and the FLPMA mandate to prevent unnecessary or undue degradation.

1.5 Resource Management Plan Conformance

Resource management planning regulations mandate that all actions approved or authorized by the BLM be reviewed for conformance with existing land use plans (43 CFR 1610.5-3) (516 Departmental Manual [DM] 11.5 [BLM 2020a]). A proposed action and alternatives must either be consistent with the applicable

land use plan and clearly in agreement with the terms, conditions, and decisions of the approved plan, or a plan amendment must be completed for the proposal to be approved (BLM 2008a).

The Ely Resource Management Plan (hereafter the Ely District RMP) identifies the project area as open for mineral exploration and development (BLM 2008a). All development would comply with best management practices (BMPs) and other requirements detailed in the Ely District RMP, with the exception of the Visual Resource Management (VRM) Class II and VRM Class III requirements in the project area. Although the proposed project would not meet VRM Class II objectives, this is not reflective of the actual visual impacts of the project. The project's visual impacts would be consistent with the existing visual landscape conditions resulting from the current and historical land uses within the project area. When the Ely District RMP is next amended or revised at a future undetermined date, much of the project area would likely be reclassified to manage visual resources consistent with the existing mine development on the visual landscape.

1.6 Applicable Laws, Statutes, and Regulations

Federal regulations require that all mine plans (43 CFR 3809.411) and all rights-of-way (43 CFR 2804.25(d)) granted under FLPMA be analyzed in accordance with NEPA and Council on Environmental Quality (CEQ) regulations contained in 40 CFR 1500–1508. Because the notice of intent (NOI) for this EIS was issued before September 14, 2020, the BLM developed this EIS in accordance with the pre-2020 CEQ regulations (40 CFR 1500–1508 from 1978, as amended in 1986 and 2006). The BLM retains responsibility for compliance with NEPA.

Under NEPA requirements, the BLM must also coordinate with other federal, state, and local agencies whose responsibilities may include some aspects of the Proposed Action. As the lead federal agency under NEPA, the BLM initiates coordination with other agencies, including consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA); consultation with the State Historic Preservation Office (SHPO) under the National Historic Preservation Act (NHPA); compliance with the Clean Water Act (CWA), Federal Water Pollution Control Act, Clean Air Act, Solid Waste Disposal Act; and compliance with the Nevada Source Water Protection Program administered by the Nevada Division of Environmental Protection (NDEP).

The BLM considers a number of laws, policies, and orders when analyzing the proposed actions described in the 2019 Mine Plan amendment (Appendix C), including the General Mining Law of 1872, Section 302 of FLPMA, and BLM surface management regulations at 43 CFR 3809.

1.6.1 General Mining Law of 1872 and BLM Oversight

Locatable mineral activities conducted on federal land are authorized under the General Mining Law of 1872 (as amended) (30 United States Code [USC] 21–42). The BLM's regulatory responsibilities for oversight of mining activities on federal lands are provided for in 43 CFR 3700 and 3800. Mining operations on BLM-managed lands must be conducted in accordance with an approved mine plan.

A mine plan must contain all information as described under 43 CFR 3809.401. the BLM ensures that an operator and any locatable mining proposal prevent unnecessary or undue degradation of BLM-managed lands. As defined in 43 CFR 4809.5, *unnecessary and undue degradation* means any condition, activity, or practice that

- fails to comply with the performance standards provided under 43 CFR 3809.420;
- fails to comply with the terms of conditions of an approved plan of operations;
- fails to comply with other federal and state laws related to environmental protection and protection of cultural resource;

- is not “reasonably incident” to prospecting, mining, or processing operations as defined under 43 CFR 3715; or
- fails to attain a state level of protection or reclamation required by specific laws in areas such as the BLM-managed portions of the National Wilderness System or BLM-managed national monuments and national conservation areas.

When a proposed mine plan or its modification is complete and deemed ready for environmental analysis, the BLM initiates a review under NEPA. Numerous measures to reduce impacts on the surrounding environment are typically described in the proposed mine plan; specific stipulations and/or mitigating measures may be developed during the NEPA process, typically when the NEPA analysis is nearing completion and a preferred alternative has been identified. Once the BLM and the operator can be reasonably certain of how future mining activities, if approved, would be conducted, mitigating measures to the operator’s proposed mine plan are then included as conditions of approval in the BLM decision document.

When submitting a new mine plan, the operator must provide the BLM with a reclamation cost estimate that covers the estimated cost to implement the reclamation plan per the requirements of 43 CFR 3809.552(a) and 3809.554, including the costs of a third-party contractor to perform the reclamation and the costs of the BLM to administer the reclamation contract. When an existing mine plan is proposed to be modified, the operator must provide BLM with an estimate of the reclamation costs for all components of the existing and proposed operation that will be affected by the modification. Once the revised estimate has been accepted by the BLM and an acceptable financial instrument (43 CFR 3809.555) in the specified amount has been posted, the cost estimate and financial instrument together become a legal record of financial guarantee of reclamation.

1.6.2 Cooperating Agencies

CEQ regulations implementing NEPA allow the lead agency to invite other federal, state, tribal, or local agencies to serve as cooperating agencies in preparing the EIS (40 CFR 1501.6). A cooperating agency must hold legal jurisdiction over resources that could be impacted by the project or provide special expertise with respect to resource issues addressed by the NEPA analysis.

Based on previous NEPA analyses related to the Robinson Mine, the BLM invited the following federal, state, tribal, and local agencies with jurisdiction or special expertise related to the Proposed Action, as well as tribes with potential interest in the project, to be involved:

- Nevada Department of Wildlife (NDOW)
- Sagebrush Ecosystem Technical Team (SETT), a specific entity within NDOW
- U.S. Environmental Protection Agency (EPA) Region IX
- Ely Shoshone Tribe
- Duckwater Shoshone Tribe of the Duckwater Reservation
- Confederated Tribes of the Goshute Indian Reservation
- White Pine County Board of Commissioners

Cooperating agency participation may include reviewing analyses, contributing technical expertise, and assisting in the response to public comments as required by their jurisdiction or regulatory authority.

Cooperating agencies and the BLM have jointly developed memoranda of understanding (MOUs) to formalize the relationship and provide a framework for cooperation and coordination to successfully complete the EIS in a timely, efficient, and thorough manner, and to describe the respective roles, responsibilities, and expertise of each entity in the planning process.

As of the date of publication of the Robinson EIS NOI in the *Federal Register* (May 29, 2020) (BLM 2020b), signed MOUs are in place between the BLM and the following cooperating agencies:

- NDOW
- SETT
- EPA Region IX
- White Pine County Board of Commissioners

Additional details on coordination and consultation with these groups and agencies is provided in Chapter 5 of the EIS.

1.7 Public Scoping

Scoping is one of the first steps and an integral part of the NEPA process. It is an early and open process for determining the scope of issues to be addressed in the NEPA process and for identifying potentially significant issues related to the Proposed Action (40 CFR 1501.7). The objective of scoping is to inform the public regarding the proposed project and to solicit input regarding the issues that should be analyzed and the alternatives that should be considered to address those issues. The process involves both internal and external scoping. Internal scoping is conducted within the BLM to determine preliminary issues and concerns. External scoping provides an opportunity for members of the public to learn about the Proposed Actions and the agency-identified preliminary issues and to expand on those issues with any concerns or comments they may have.

1.7.1 Issues Identified During Scoping

For the purpose of the BLM NEPA analysis, an *issue* is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue is more than just a position statement, such as disagreement with grazing on BLM-managed lands. Issues point to environmental effects; for this reason, issues can help shape the proposal and alternatives, and help to guide the analysis. Per the *BLM National Environmental Policy Act Handbook H-1790-1* (BLM NEPA Handbook) (BLM 2008b), an issue

- has a cause-and-effect relationship with the proposed action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is amenable to scientific analysis rather than conjecture.

Comments and concerns expressed during the internal (BLM) and external (public) scoping period were grouped into resource topic. Table 1.7-1 presents the resource topics and primary issues an identified during scoping that were within the scope of the project. Additional detail regarding the scoping process, scoping comments received, and issues identified during scoping is available in the project's scoping report (Appendix D [BLM 2020c]).

Table 1.7-1. Issues Analyzed in Detail

Resource Topic	Issues
Cultural resources	Physical disturbance to cultural sites or indirect impacts to cultural setting due to noise and visual impacts of project facilities
Cultural resources: tribal consultation and concerns	Potential to impact cultural sites or areas of special significance to Native American tribes

Resource Topic	Issues
Environmental justice	Potential for disproportionate impacts on low-income and/or minority populations in White Pine County and/or the surrounding area
Geology and mineral resources	Geologic stability, removal of mineral resources
Air quality and greenhouse gas (GHG) emissions	Continued contribution to cumulative GHG levels due to continued operation of the mine until 2028
Recreation	Impacts to recreational setting, experience, and desired outcomes due to physical disturbance, noise, and visual impacts from project elements
Socioeconomics	Impacts on jobs, general revenue, and tax revenue from project operations and mine closure.
Soils and reclamation	Soil disturbance and potential erosion due to construction and operation
Vegetation	Physical removal of vegetation and increased potential of invasive species spread due to project construction and operation
Visual resources	Impacts to the existing visual landscape from project construction and mine closure
Water resources: geochemistry	Potential changes to geochemistry and groundwater quality from pit lakes, WRDs, construction, and operations
Water resources: groundwater	Potential changes to groundwater quantity from pit lakes, WRDs, construction, and operations
Wildlife (including special-status species)	Physical removal of habitat and noise disturbance affecting wildlife species in and around the project area.
Lands and realty	Physical disturbance or other impacts to operations of existing ROWs or land uses

1.7.2 Issues Analyzed in Brief

Issues outside the scope of this EIS are defined as those issues that are not directly related to decisions to be made regarding the proposed Mine Plan amendment (the Proposed Action) as well as issues that are not relevant to the purpose of and need for the actions (see Section 1.3). Table 1.7-2 provides a list of resource issues, identified by the BLM, where the impacts of the Proposed Action and alternatives in this EIS can be disclosed without detailed analysis. The rationale for that determination is also provided in Table 1.7-2.

Table 1.7-2. Issues Considered but Not Analyzed in Detail.

Resource Topic	Rationale for Elimination from Detailed Analysis
Public health and safety	Public health and safety were not analyzed in detail because the project would not change hazardous materials used, stored, or transported, nor would it change the current mining operations or safety program. Mine policies and procedures regarding public health and safety would remain identical to those under the No Action alternative. No other salient public health and safety risks were identified.
Transportation	<p>Transportation was not analyzed in detail because impacts to transportation under the Proposed Action would be the same as the impacts disclosed in the 1994 final EIS (the No Action Alternative), which are summarized below:</p> <ul style="list-style-type: none"> • Approximately 370 employees travelling through the Town of Ely and along Highway 50 (BLM 1994a:4-70) • Average truck traffic of 10 vehicles per day (20 one-way trips per day, or an average of one truck every 72 minutes) for material shipment to and from the property (BLM 1994a:4-72) • One to 2 train trips per day (BLM 1994a:4-72) • Increases in air travel from Yellan Airfield, which is described as underutilized (BLM 1994a:4-73) <p>However, under all action alternatives, these impacts would continue for an additional 4 years in comparison with the No Action alternative. These impacts would stop in 2024 for the No Action alternative and they would continue until 2028 for the action alternatives.</p>
Noise and vibration	Noise and vibration were not analyzed in detail as separate resource sections in this EIS. However, noise impacts and/or vibration impacts to other resources were analyzed and disclosed in the appropriate resource sections (see Section 3.6 Recreation and Section 3.12 Wildlife).
Grazing	Grazing was not analyzed in detail because the grazing use and resources would not be changed in comparison with the No Action alternative.

CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

As noted in Chapter 1, in April 2019, KGHM Robinson submitted a request to the BLM Ely District Office to authorize a modification to the Mine Plan to 1) extend the life of Robinson Mine to 2028; 2) resume mining in the Liberty Pit, requiring the expansion of the Liberty Pit; 3) construct the King WRD; and 4) provide for additional soil borrow areas around the existing Giroux Wash TSF to enable KGHM Robinson to build up, under previous BLM authorizations, the height of the tailings impoundment dam and thereby increase storage capacity within the TSF.

The BLM, in subsequent consultation with KGHM Robinson, developed two additional action alternatives that have the objective of meeting the project's purpose and need (see Chapter 1, Section 1.3) while also addressing environmental impacts or conflicts. Each of these action alternatives, as well as the NEPA-required No Action alternative, is described in Sections 2.2.1 through 2.2.4.

2.2 Proposed Action and Alternatives

2.2.1 Alternative A: No Action

Through FLPMA, U.S. Congress specifically empowers the Secretary of the Interior—and by extension the BLM Field Manager—the authority to deny approval of any proposed mining activity for locatable minerals on BLM-managed lands if it is determined the proposed activity would not comply with BLM 43 CFR 3809 surface management regulations and the FLPMA mandate to prevent unnecessary or undue degradation (43 USC 1732(b); 43 CFR 3809.5). Therefore, for the BLM to select the No Action alternative for the KGHM Robinson Proposed Action, the BLM would have to demonstrate that undue and unnecessary degradation would result from approval of Robinson's proposed Mine Plan amendment as submitted. However, under NEPA (40 CFR 1502.14), the No Action alternative also serves to provide a baseline for comparing anticipated impacts of the Proposed Action and thus helps to better inform the BLM decision with an estimate of the impacts of denying the proposed Mine Plan amendment.

Under the No Action alternative, the BLM would not approve the 2019 Mine Plan amendment (KGHM 2019a) as written. Although KGHM Robinson could continue mining on their own private lands, no additional expansion onto BLM-managed lands would be permitted. There would be no construction of the King WRD or additional expansion onto BLM-managed lands of the North Tripp WRD. The total volume of tailings stored at the Giroux Wash TSF would be restricted to those areas that had been previously granted approvals.

2.2.2 Alternative B: King Waste Rock Dump (Proposed Action)

This alternative would keep all project elements as described in the 2019 Mine Plan amendment (KGHM 2019a) with two exceptions: 1) development of the North Tripp WRD would not be included, and the total area of surface disturbance associated with the proposed King WRD would be reduced from approximately 470 acres, as described in the 2019 Mine Plan amendment, to 260 acres—a reduction of approximately 44% (Figure A-3). Other changes to mine facilities and components that are part of this Proposed Action are as follows:

- Extend mine life to 2028 (the 2019 Mine Plan amendment states 2027, but this was recently changed to 2028 during subsequent discussions between staff of the BLM Bristlecone Field Office and representatives of KGHM Robinson).

- New disturbance requested in the 2019 Mine Plan amendment would result in a total increase of approximately 963 acres of surface disturbance within the project area for a new end-of-mine-life total surface disturbance of 9,830 acres. The proposed increase would comprise 170 acres of new disturbances on private land controlled by KGHM Robinson and 793 acres of new disturbance located on BLM-managed lands.
- Resume mining in the Liberty Pit, requiring expansion of the existing Liberty Pit footprint to the north and south onto disturbed areas, while reducing the authorized footprint along the eastern pit boundary. The Liberty Pit footprint would expand by approximately 64 acres for a total new end-of-mine-life 2028 footprint of 703 acres, all of which would be located on private land and within previously authorized disturbances. The proposed expansion would lower the pit floor by approximately 280 feet, from approximately 6,580 to the 6,300 feet above mean sea level (amsl).
- Following cessation of Liberty Pit mining in 2014, KGHM Robinson also discontinued pit dewatering operations that resulted in water collecting and forming Liberty Main and Liberty Small pit lakes. Resumption of Liberty Pit mining operation would therefore also require resumption of Liberty Pit dewatering to remove excess water and maintain the pit in a minable condition. KGHM Robinson would reactivate existing pumping and piping facilities including pumps and pipelines to convey Liberty Pit water to the mill for use in the process circuit.
- Construct the new King WRD south of the Liberty and Ruth Pits to accommodate waste rock mined mainly from the Liberty East Pit. The dump footprint would be approximately 260 acres, with 12 acres located on private and 248 acres located on BLM-managed lands. The approximate dump height would be 700 feet above ground surface.
- Obtain soils from borrow pits adjacent to the Giroux Wash TSF to assist in previously approved annual vertical rises of the TSF perimeter. Expand borrow areas and growth media stockpiles onto previously undisturbed areas adjacent to the existing TSF disturbances. Site-clearing activities would include vegetation removal and growth media salvage on undisturbed areas. The salvaged material would be placed in growth media stockpiles located around the TSF perimeter. These actions would result in a total of 639 acres of new TSF yard disturbance (545 acres of BLM-managed lands and 94 acres of KGHM Robinson–owned private lands). Where necessary, V-ditches would be constructed to divert stormwater surface flows around the TSF perimeter (see Appendix D of Appendix C [2019 Mine Plan Amendment]).

2.2.2.1 Design Features: Applicant-Committed Environmental Protection Measures

KGHM Robinson commits to minimizing environmental effects during construction, operation, and reclamation of the proposed project through implementation of the environmental protection measures (EPMs) described in Appendix E. These include design features proposed by KGHM, as well as BLM-required stipulations and mitigations mandated by the Ely District RMP (BLM 2008a).

The Chapter 3 resource impact sections consider the application of these EMPs and assess resource impacts that would occur after the application of the measures. Where the BLM specialists have identified additional mitigation measures that could further reduce resource impacts, those mitigation measures are listed after the impact analysis (if applicable).

2.2.3 Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

This alternative would keep all project elements described in the 2019 Mine Plan amendment, including both the North Tripp and King WRDs; however, the allowable footprint of the King WRD would be reduced, which would serve to distance the facility from portions of the Ward Mountain Recreation Area trail system as well as reduce visual impacts to recreationists along the trail system and in nearby areas

(Figure A-4). Specifically, the areal extent of the King WRD would be decreased by approximately 10.6% through elimination of all proposed WRD development east of County Road 44A. The height of the proposed King WRD would, however, remain the same as that described in the Proposed Action—that is, approximately 700 feet above the existing ground surface. The total surface disturbance of the reduced King WRD would be approximately 234 acres, of which approximately 12 acres would be on private land owned by KGHM Robinson and the remaining 222 acres would be on BLM-managed lands. The expansion of the North Tripp WRD would be unchanged from that described in the 2019 Mine Plan amendment (i.e., an increase in total WRD area by 169 acres, with approximately 102 acres of the new disturbance located on private and 67 acres on BLM-managed land).

The advantages of this alternative include greater flexibility for transport and disposal of waste rock to maximize efficiency and decrease costs of mining the Liberty and the Tripp/Veteran pits, as well as greater flexibility in potentially continuing to operate the mine after 2028 in the event that exploration and/or mineral prices make continued mining financially feasible.

2.2.4 Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

This alternative would retain all project elements described in the 2019 Mine Plan amendment with the exception of North Tripp WRD, and it would include a reduced footprint for the proposed King WRD as described under Alternative C (Figure A-5). In addition, it would allow for backfilling of the Ruth East Pit as a means of disposing additional waste rock that would exceed the total volume that could fit within the reduced area of the King WRD. Backfilling the Ruth East Pit would have the added advantage of eliminating the potential for any future pit lake at that location.

KGHM Robinson has stated that their operational plan under this alternative would be to fill the Ruth East Pit to approximately 6,840 feet amsl, or approximately 600 feet above the current pit floor, with non-potentially acid-generating (NPAG) waste rock. Potentially acid-generating (PAG) waste rock, which is rock that still contains sufficient volumes of metals that, if left exposed over time to air and precipitation, has the potential to result in acid rock drainage, would be disposed of in the proposed King WRD. At least a 50-foot-thick layer of additional NPAG waste rock would then be placed atop the PAG to act as a cover or cap, thus reducing the potential for precipitation to infiltrate the PAG material. Alternative D includes the following tradeoffs when compared with the Proposed Action and Alternative C:

- This alternative would reduce visual and other impacts to both U.S. Highway 50 and to the Ward Mountain Recreation Area trail system because the allowed footprint of the King WRD would be approximately 10.6% smaller than the allowed footprint under the Proposed Action.
- This alternative would address issues related to the long-term presence of the pit lake in the Ruth Pit. Removal of the pit lake would eliminate potential indirect impacts to wildlife, particularly waterfowl. However, groundwater flow-through would occur in the absence of a pit lake hydraulic sink.
- This alternative has the potential to increase final mine reclamation costs due to need to borrow additional NPAG rock to close the Robinson Mine because most available NPAG material would be used to backfill the Ruth East Pit.
- This alternative would functionally eliminate the ability to resume mining in the Ruth East Pit under the backfill if that option were to be considered in the future.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

To eliminate encyclopedic analyses of alternatives that are not feasible, CEQ regulations mandate that alternatives that do not meet specific criteria be eliminated from detailed analysis (40 CFR 1502.14). The criteria for eliminating these alternatives is described under Section 6.6.3 of the BLM NEPA Handbook

(BLM 2008b). A summary of the alternatives considered but not analyzed in detail with accompanying rationale is provided below.

As stated in Section 2.1, an early alternative to the proposed Mine Plan amendment would eliminate the King WRD and retain only the proposed expansion of the North Tripp WRD. However, KGHM Robinson subsequently indicated to the BLM that transporting all of the waste rock to the North Tripp WRD would not be economically viable to sustain future mine production due to the distance of the North Tripp WRD from proposed operations. Additionally, use of the North Tripp WRD alone does not provide any substantive value in terms of reducing resource impacts because it provides the greatest potential for indirect impacts to greater sage-grouse (*Centrocercus urophasianus*) habitat and visual impacts to surrounding routes. Accordingly, this early alternative was eliminated from further detailed analysis due to economic infeasibility and because it provides no substantive reduction in impacts compared with the range of alternatives already being considered.

Similarly, KGHM Robinson had initially informed the BLM that another potentially feasible alternative would be to dispose all future waste rock as backfill within the Ruth East Pit. However, after additional study, KGHM Robinson concluded that use of the Ruth East Pit alone would not be technically feasible because there would be no available locations to store PAG waste rock while the deposition of NPAG rock proceeded over several years. This stand-alone “Ruth East Pit Backfill alternative” was therefore eliminated from detailed analysis in this EIS.

Sections 2.2.1 through 2.2.4 above represent the remaining practicable alternatives that arose from scoping for the proposed Mine Plan amendment. This scoping included internal scoping with the BLM interdisciplinary team for the project; consultation with KGHM Robinson; ongoing discussions with the cooperating agencies and formal scoping outreach to the general public. See Chapter 1, Section 1.7, Public Scoping and Chapter 5, Consultation and Coordination, for more details on this effort.

2.4 Comparative Features of Action Alternatives Analyzed in Detail

This section summarizes and compares the project elements between the three action alternatives. The information in Table 2.4-1 can help the reader understand differences between the alternatives; however, the reader is urged to read the detailed alternatives and analyses to understand specific differences.

Table 2.4-1 summarizes only the proposed surface disturbance, by alternative, between the three WRD placement alternatives and the proposed disturbance for expansion of borrow areas and growth media storage areas around the Giroux Wash TSF, as well as minor expansion of the Liberty Pit (which would occur only on KGHM-owned private land). All other major components of mine operations, including the mill and associated processing facilities, administrative buildings, equipment storage yards, parking areas, and other facilities, would remain fundamentally unchanged from their current configurations and uses.

Table 2.4-1. Robinson Mine Alternatives by Acres of Proposed New Disturbance

Disturbance	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
WRDs	BLM-managed lands: 248 acres KGHM-owned private lands: 12 acres Total: 260 acres	BLM-managed lands: 289 acres KGHM-owned private lands: 114 acres Total: 403 acres	BLM-managed lands: 222 acres KGHM-owned private lands: 172 acres Total: 394 acres

Disturbance	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Liberty Pit expansion	BLM-managed lands: 0 acres KGHM-owned private lands: 64 acres Total: 64 acres*	Same as the Proposed Action	Same as the Proposed Action
Giroux Wash TSF	BLM-managed lands: 545 acres KGHM-owned private lands: 94 acres Total: 639 acres	Same as the Proposed Action	Same as the Proposed Action

* Proposed expansion of the north and south sides of the Liberty Pit would occur exclusively on KGHM-owned private land within previously authorized disturbance.

2.5 Comparative Summary of Environmental Impacts

Table 2.5-1 summarizes and compares the anticipated environmental impacts from Alternative A: No Action; Alternative B: King Waste Rock Dump (Proposed Action); Alternative C: King Waste Rock Dump and North Tripp Waste Rock Dump; and Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump.

Table 2.5-1. Comparative Summary of Anticipated Environmental Consequences of the Robinson Mine Plan of Operations Amendment

Resource	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Cultural resources	No effect	The Proposed Action would result in adverse effects to five cultural resources within the analysis area (three archaeological sites and two architectural resources).	Alternative C would result in adverse effects to nine cultural resources within the analysis area (seven archaeological sites and two architectural resources).	Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action.
Geochemistry and groundwater quality				
Additional WRD surface disturbance (acres)	No change	260	403	394
Leachable constituents impacting unsaturated zone	The No Action alternative would leach constituents, including low pH leachate; metals such as aluminum, cadmium, copper, iron, and manganese; and TDS and sulfate exceeding water quality standards into the underlying unsaturated zone.	The Proposed Action would leach constituents exceeding water quality standards into the underlying unsaturated zone. These constituents would include low pH leachate; metals such as aluminum, beryllium, cadmium, copper, chromium, iron, manganese, nickel, and zinc; and other constituents such as arsenic and fluoride. TDS, including sulfate, are also modelled to enter the unsaturated zone.	Alternative C would leach constituents exceeding water quality standards into the underlying unsaturated zone. These constituents would include low pH leachate and metals such as aluminum, cadmium, copper, chromium, iron manganese, nickel, and zinc.	Management of waste under Alternative D would be handled for interaction of groundwater (saturated zone) rather than unsaturated zone.
Leachable constituents impacting groundwater	Because of the thickness of the unsaturated zone, leachable constituents would not reach groundwater.	Because of the thickness of the unsaturated zone, leachable constituents would generally not reach groundwater.	Because of the thickness of the unsaturated zone, leachable constituents would generally not reach groundwater.	Groundwater would interact with the waste rock backfill and would release concentrations of metals such as iron, manganese, cadmium, nickel, and TDS above groundwater standards.
Pit lake water impacts	The Liberty Main Pit lake would have neutral pH and concentrations of TDS, sulfate, fluoride, cadmium and manganese would exceed pit lake standards. Based on current monitoring, the Liberty East Pit would be acidic with high metal concentrations.	The Liberty Main Pit lake would have neutral pH with elevated TDS; predominately sulfate; fluoride above the pit lake standards; and cadmium, manganese, and uranium above the lower permit maximum contaminant level values.	Alternative C would remove geological components that contribute to dissolved solids and dissolved metal concentrations in pit lake water. Fluoride and cadmium concentrations would eventually exceed pit lake standards.	No pit lake would form for the Ruth East Pit. Impacts related to Liberty Pit lake would be the same as the Proposed Action.

Resource	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Geology and mineral resources	Ruth Pit would be partially backfilled with NPAG material from the Liberty Pit. Impacts would be similar to the backfill impacts under Alternative D.	<p>Impacts associated with instability under static or seismic loading conditions are not anticipated.</p> <p>Blasting vibrations would not damage any residential structures at distances greater than 1,500 feet from the blast locations.</p> <p>The Proposed Action would result in the permanent alteration of the natural topographic and geomorphic features on approximately 1,228 acres of proposed new disturbance for open pits, WRD, and borrow areas.</p>	<p>Impacts to geology, mineral resources, stability, and blasting vibrations would be the same as described for the Proposed Action.</p> <p>Alternative C would result in the permanent alteration of the natural topographic and geomorphic features on approximately 1,098 acres of proposed new disturbance for open pits, WRDs, and borrow areas.</p>	<p>Impacts to geology, mineral resources, stability, and blasting vibrations would be the same as described for the Proposed Action.</p> <p>Alternative D could increase final mine reclamation costs because of the need to borrow additional NPAG rock to close the project area because most available NPAG material would be used to backfill the Ruth East Pit.</p> <p>Alternative D would eliminate the ability to resume mining in the Ruth East Pit due to backfill.</p> <p>Alternative D would result in the permanent alteration of the natural topographic and geomorphic features on approximately 932 acres of proposed new disturbance for open pits, WRDs, and borrow areas.</p>
Air quality and greenhouse gas (GHG) emissions	No effect	<p>GHGs would continue to be generated by both stationary and mobile sources at approximately current estimated levels of 332,547 metric tons per year. When compared to the global GHG emissions, the emissions from the Proposed Action would be approximately 0.0006% of the global emission totals based on Intergovernmental Panel on Climate Change data from 2010.</p>	<p>Impacts would be similar to impacts associated with the Proposed Action.</p>	<p>Impacts would be similar to impacts associated with the Proposed Action.</p>
Recreation	No effect	<p>In all, 793 acres of recreational opportunities would be lost under the Proposed Action because of new disturbance and because approximately 4.7 miles of existing trails would be indirectly impacted.</p>	<p>In all, 222 acres of recreational opportunities would be lost under Alternative C because of new disturbance and because approximately 3.7 miles of existing trails would be indirectly impacted.</p>	<p>In all, 155 acres of recreational opportunities would be lost under Alternative D because of new disturbance and because approximately 3.7 miles of existing trails would be indirectly impacted.</p>

Resource	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Socioeconomics and environmental justice	<p>Under the No Action alternative, mining operations would not be extended beyond 2024, and the effects of mine closure would occur 4 years sooner than under the action alternatives.</p> <p>Effects would continue until mine closure in 2024. After 2024, the effects of mine closure would include a reduction in employment, annual economic output, and tax revenue generation in the analysis area.</p>	<p>Under the Proposed Action, mine closure would be delayed until 2028. The socioeconomic benefits of mine operations would continue for an additional 4 years. Following mine closure, the socioeconomic losses would be similar to those described under the No Action alternative.</p> <p>As compared to the No Action alternative, the extended mine life would provide additional time for employees to seek out alternative employment opportunities. The extended mine life would also provide additional time for local governments to complete mine closure planning, including further economic diversification, replacement of lost general fund revenues, and improved housing stock resiliency.</p>	<p>Effects under Alternative C would be similar to those described under the Proposed Action.</p>	<p>Effects under Alternative D would be similar to those described under the Proposed Action.</p>
Soils and reclamation	No effect	<p>Approximately one-third of the disturbance area under the Proposed Action would contain soils with K factors that are greater than 0.4. Areas of higher wind erodibility index and potential future prime farmlands (if irrigated) make up a very small proportion of the analysis area (< 1%).</p>	<p>Alternative C would disturb a larger area of soils with a K factor greater than 0.4 when compared to the Proposed Action. This alternative has a higher proportion of soils with increased wind erosion potential when compared to the Proposed Action. The same area of potential prime farmland as the Proposed Action would be disturbed. However, as with the Proposed Action, this disturbance would still be relatively low (< 1% of analysis area).</p>	<p>Alternative D would disturb a smaller area of soils with a K factor greater than 0.4 when compared to the other action alternatives, and it would be a smaller proportion of the analysis area. The area of higher wind erodibility index is the same as the Proposed Action and less than Alternative C. The same area of potential farmland as the other alternatives would be disturbed.</p>
Vegetation	No effect	<p>Under the Proposed Action, construction of various project components would result in the permanent disturbance of approximately 986 acres, of which approximately 793 acres is managed by the BLM.</p>	<p>Under Alternative C, construction of various project components would result in the permanent disturbance of approximately 1,065 acres, of which approximately 897 acres is managed by the BLM.</p>	<p>Under Alternative D, construction of various project components would result in the permanent disturbance of approximately 873 acres, of which approximately 767 acres is managed by the BLM.</p>
Visual Resources				

Resource	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Landscape character and scenic quality	No effect	Impacts to the existing scenic quality would be low, with changes in scenic quality and landscape character occurring in the southern portion of the analysis area. There would be change of Visual Resource Inventory scenic quality score from 18.5 to 18.0 for approximately 8,977 acres.	Impacts associated with Alternative C would be similar to impacts associated with the Proposed Action.	Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action.
Vehicle travel routes	No effect	Impacts to vehicle travel routes from the introduction of project components within the landscape would range from none to moderate based on proximity and dominance of project components in the landscape.	Impacts to vehicle travel routes from the introduction of project components within the landscape would range from low to moderate as compared to the Proposed Action.	Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action.
Recreational users	No effect	Impacts to recreational users from the introduction of project components within the landscape would range from moderate to high based on proximity and dominance of project components in the landscape.	Impacts to recreational users from the introduction of project components within the landscape would be similar to impacts associated with the Proposed Action.	Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action.
Reclamation	No effect	The effects of project reclamation on visual resources would be similar in nature to the impacts associated with construction, and operation. Impacts from reclamation would differ in that project components previously visible during the remaining 7-year active operation period would likely become less visible as a result of reclamation activities and removal of associated infrastructure (minus WRD mine pits and borrows pits) over the post-closure management period.	Impacts would be similar to impacts associated with the Proposed Action.	Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action.
Conformance with VRM Objectives		There would be approximately 232 acres of non-conformance within VRM II objectives. Non-conformance with existing VRM objectives is not reflective of the actual visual impacts of the project. The project visual impacts would be similar to the existing visual landscape conditions resulting from the current and historical land uses within the project area.	There would be approximately 213 acres of non-conformance within VRM II objectives. Non-conformance with existing VRM objectives is not reflective of the actual visual impacts of the project. The project visual impacts would be similar to the existing visual landscape conditions resulting from the current and historical land uses within the project area.	There would be approximately 213 acres of non-conformance within VRM II objectives. Non-conformance with existing VRM objectives is not reflective of the actual visual impacts of the project. The project visual impacts would be similar to the existing visual landscape conditions resulting from the current and historical land uses within the project area.

Resource	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Backfill and Reduced King Waste Rock Dump
Water resources	No additional dewatering Total depletions from evaporation under the No Action alternative would be approximately 1.7% of the total depletions in the analysis area.	Annual dewatering of 137 to 202 acre-feet per year (0.25% of total ground water depletions in analysis area). Total depletions from evaporation would be similar to the No Action alternative.	Dewatering impacts associated with Alternative C would be similar to impacts associated with the Proposed Action. Total depletions from evaporation would be similar to the No Action alternative.	Dewatering impacts associated with Alternative D would be similar to impacts associated with the Proposed Action. Total depletions from evaporation under Alternative D would be approximately 1.3% of the total depletions in the analysis area.
Wildlife	No effect	Approximately 852 acres of suitable habitat for general wildlife species, migratory birds, bats, and raptors would be disturbed, including 68 acres of suitable habitat designated for greater sage-grouse under the 2015 greater sage-grouse amendment, 0 acre of disturbance to habitat designated under the 2019 greater sage-grouse amendment, and up to 852 acres of big game habitat.	Approximately 1,008 acres of suitable habitat for general wildlife species, migratory birds, bats, and raptors would be disturbed, including 234 acres of suitable habitat designated for greater sage-grouse under the 2015 greater sage-grouse amendment or 51 acres of suitable habitat designated for greater sage grouse under the 2019 greater sage-grouse amendment. Additionally, up to 1,008 acres of big game habitat would be impacted.	Approximately 842 acres of suitable habitat for general wildlife species, migratory birds, bats, and raptors would be disturbed, including 68 acres of suitable habitat designated for sagebrush (Artemisia) species under the 2015 greater sage-grouse amendment, 0 acre of habitat designated under the 2019 greater sage-grouse amendment, and up to 842 acres of big game habitat.
Lands and realty	No effect	The construction of the King WRD would remove a 0.55-mile portion of County Road 44A (see Figure A-2). Of this mileage, approximately 0.35 mile is currently open for emergency use only; the remaining 0.2-mile segment is still open to the public and includes the turnaround area developed to address the 2014 road closure.	No effect	No effect

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENT CONSEQUENCES

3.1 Introduction

This chapter describes the existing environment in the context of the natural resources and human uses that have the potential to be affected by the Proposed Action and alternatives presented in Chapter 2. These natural resources and human uses are air quality, cultural resources, geochemistry, geology and mineral resources, greenhouse gas (GHG) emissions, recreation, socioeconomics and environmental justice, soils and reclamation, vegetation, visual resources, water resources, and wildlife.

For each resource, the analysis describes the following types of effects:

- Direct effects: Effects that are caused by activities associated with proposed mine expansion and would occur at the same time and in the same general location.
- Indirect effects: Effects that would occur at a different time or in a different location than the action(s) to which the effects are related.

Discussions of direct and indirect effects may be combined as appropriate in the sections below. For an analysis of potential cumulative effects on these same resources and uses, please see Chapter 4 as well as the closely related listing of reasonably foreseeable future actions (RFFAs) in Appendix F.

Sources that were used to complete the analyses in this chapter include reports, data, and other information provided by BLM managers and resource specialists, by KGHM Robinson and its contractors, and/or available from federal and state agencies. These sources were complemented by literature searches, electronic searches, personal interviews, and geographic information system (GIS) data.

3.2 Cultural Resources

Cultural resources are generally defined as physical manifestations (human-made and natural physical features) associated with past or present cultures that are, in most cases, finite, unique, fragile, and nonrenewable. These resources include prehistoric and historic-era archaeological sites, historic buildings and structures (architectural resources), and locations of important historic events. Cultural resources may also refer to places that are areas of traditional religious and cultural importance, including archaeological sites; landscapes; natural landforms; and small, discrete use areas that are important to the practice and continuity of traditional practices or necessary for maintaining a community's cultural identity.

An *archaeological site* is a specific type of cultural resource defined as “a location that contains the physical evidence of past human behavior that allows for its interpretation” (National Register Bulletin No. 36). A *historic property* is defined in the NHPA [54 USC 300308] as any “prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource.”

The analysis area used to assess the impacts of the project on cultural resources consists of the approximate disturbance footprint for each alternative, which represents the direct area of potential effects (APE) for the project (Figure A-6). As an existing active mine site, the project is not anticipated to change the visual, auditory, or atmospheric setting in comparison with existing conditions, and therefore, the

project would have no indirect impact on cultural resources. As a result, the BLM did not delineate a separate indirect APE for the project.

3.2.1 Affected Environment

The analysis area is in the Egan Range within the east-central Great Basin section of the Basin and Range physiographic province. The project area is in the interface between the Eastern Great Basin cultural area and the central Nevada portion of the Western Great Basin cultural area. Prehistorically, the area was occupied from the Paleoarchaic through the Late Prehistoric periods (ca. 13,500 B.P. to 150 years ago). Much of the earliest evidence for human occupation of the Great Basin is derived from rockshelters (namely Danger Cave, Smith Creek Cave, and Bonneville Estates) as well as the Sunshine Locality. These early occupants were hunter-gatherers using stemmed points and crescent tools. Significant Paleoarchaic sites in the Robinson Mine area include the Old Giroux Wash sites. During the later Archaic period, the Robinson Mine area was occupied by small forager groups that harvested a wide range of plant and animal foods. The horticultural Fremont influence can be seen in the eastern Great Basin during the late Archaic period. Archaic sites in the Robinson Mine area consist of lithic scatters containing diagnostic projectile points, as well as a quarry pit site. Terminal middle Archaic components bearing Elko and Gatecliff series projectile points are particularly common in sites in the Robinson Mine area. Late Archaic sites have also been documented in the Robinson Mining District, as have Fremont ceramics.

Historically, the valleys in the area around Robinson Mine were occupied by Mormon farmers and ranchers, who established a significant presence in the region in the 1890s (Stoner and Ringhoff 2017). Cattle ranchers from Texas and other parts of the country arrived in the area after the Civil War. Sheep herding also became a dominant industry in the late nineteenth century, creating conflict between cattle and sheep owners. After the Civil War, prospectors flooded into Nevada, leading to a mining boom in the nearby towns of Austin and Eureka. In 1867, Thomas Robinson made the first claim in what would become the Robinson Mining District in 1868. The district yielded mainly copper, with a smaller focus on silver and gold during its early years of production. The need to process large amounts of raw ore spurred industrialization of the Ely area in the early twentieth century. Mining companies imported a large amount of immigrant labor to work in the Robinson mines and mills, leading to rapid growth of Ely and East Ely and the company towns of Ruth, Kimberly, McGill, and Veteran between 1905 and 1910. The Robinson District was worked by both large copper companies and individual prospectors from 1905 to the end of World War I. After a post-depression downturn, copper production began to increase in the 1930s, as did the population of White Pine County. The towns of Ruth, Kimberly, Riepetown, Ely, and McGill flourished during World War II, which proved to be a boon for the mining industry. Kennecott Copper assumed control of the Robinson Mining District in 1958 and operated until 1980, after which multiple mining companies have worked at the mine (Stoner 2017).

Several cultural resources inventories have been conducted in the direct effects APE to evaluate potential effects from the Proposed Action and Alternatives C and D (Brockway and Hilderbrand 2019; Mehls 2018; Mueller 2020; Mueller and Stoner 2016; Stoner 2017; Stoner and Ringhoff 2006, 2007). The results of these inventories are briefly summarized below.

3.2.1.1 Archaeological Resources

The aforementioned inventories identified 73 archaeological sites within the APE. Of the 73 sites, 13 are eligible or unevaluated for the NRHP; the remaining sites are ineligible for the NRHP. Unevaluated sites are treated as historic properties in accordance with BLM cultural resources management. Historic properties in the APE consist of lithic scatters, historic mining sites, tool stone procurement locations, a pumping station, and transmission line, aqueduct routes, a rockshelter, and rock rings.

3.2.1.2 Architectural Resources

The aforementioned inventories identified eight architectural resources within the APE. The architectural resources are all buildings or structures located within archaeological sites. Of the eight architectural resources, five are recommended ineligible for the NRHP and three are currently unevaluated for the NRHP.

3.2.2 Environmental Consequences

3.2.2.1 Analysis Method

Impacts to cultural resources are discussed in terms of direct, indirect, and cumulative impacts from each alternative that could result in an adverse effect to cultural resources. As defined under 36 CFR 800.5(a)(1) (Criteria of Adverse Effect), an adverse effect occurs when a federal undertaking directly or indirectly alters any characteristics of a historic property that qualify it for the NRHP. An adverse effect to cultural resources is not limited to physical destruction or damage but also includes relocation of the property; changes in the character of the setting of the property; and the introduction of visual, atmospheric, or audible intrusions.

3.2.2.2 Direct and Indirect Impacts

Direct effects to archaeological and architectural resources are summarized below.

Alternative A: No Action

Under the No Action alternative, no additional expansion onto BLM-managed lands would occur. No ground disturbance would occur, and there would be no changes or alterations to the landscape; therefore, there would be no impacts to historic properties or unevaluated cultural resources. Existing conditions in the analysis area would continue.

Alternative B: King Waste Rock Dump (Proposed Action)

Archaeological Resources

Four eligible archaeological sites and five unevaluated archaeological sites fall within the analysis area under the Proposed Action. These sites consist of historic mining sites, lithic scatters, stone tool procurement sites, a historic pumping station, a historic transmission line, historic aqueducts, a rockshelter, and rock rings.

The four eligible sites are eligible for the NRHP under Criterion D, which means they “have yielded, or have the potential to yield, information important in prehistory or history” (U.S. Department of the Interior 1997). The project would avoid the four eligible archaeological sites and two of the unevaluated archaeological sites. The three remaining unevaluated archaeological sites would be directly physically impacted by ground disturbance associated with the Proposed Action. A testing plan (Stoner 2020) has been developed to evaluate these three sites for the NRHP. In the event these three sites are determined eligible for the NRHP, they will undergo mitigation in consultation between the BLM and the Nevada SHPO.

Architectural Resources

Three unevaluated architectural resources fall within the analysis area under the Proposed Action. One of the resources, a pump station, would be avoided by the project. Two of the three resources, consisting of two aqueducts, would be directly physically impacted by the Proposed Action’s ground disturbance

(Table 3.2-1). A testing plan (Stoner 2020) has been developed to evaluate these two resources for the NRHP and determine their eligibility.

Tribal Concerns and Values

In the central Nevada-Utah boundary area and Great Basin generally, tribal historical and cultural affiliations, trading networks, and other intertribal communication pathways existed long before present-day governmental and administrative boundaries and continue to exist irrespective of current geographical demarcations. For this reason, modern large-scale mining projects have the potential to adversely affect traditional tribal cultural practices and places that have significance to tribal cultural identities. For the purposes of analysis, it is assumed that the 963 acres of surface-disturbing activities associated with the Proposed Action poses a risk to these values. However, the actual type and extent of such impacts, if any, can only be determined through government-to-government consultation between the BLM and the respective tribes with the potential to be impacted. This consultation is used to solicit input from the tribes on those cultural values, religious beliefs, traditional practices, and legal rights of Native American people that could be impacted by these BLM actions. As described in Section 5.2 Tribal Consultation, the BLM is conducting ongoing consultation regarding the project with the Ely Shoshone Tribe, the Duckwater Shoshone Tribe, and the Confederated Tribes of the Goshute Reservation. As part of this government-to-government consultation efforts, the BLM has conducted correspondence and field visits with these tribes. This ongoing consultation process will identify any concerns from the consulting tribes and address them to the maximum extent possible. At this point, tribal concerns expressed have been associated with the potential impacts on cultural sites described in this section.

Mitigation of Adverse Effects

Complete avoidance of all historic properties is not feasible. If the testing plan (Stoner 2020) determines that the unevaluated sites in the analysis area are eligible for the NRHP, mitigation would be developed consistent with the programmatic agreement between the BLM and the Nevada SHPO (BLM and Nevada SHPO 2016) that directs how mine activity impacts on cultural resources would be addressed. This programmatic agreement mandates that when avoidance is not practical, the BLM will develop a historic properties treatment plan to minimize or mitigate project related adverse effects to historic properties. This historic properties treatment plan would be developed in consultation with the SHPO.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Archaeological Resources

Seven eligible archaeological sites and five unevaluated archaeological sites fall within the analysis area under Alternative C. These sites consist of historic mining sites, lithic scatters, stone tool procurement sites, a historic pumping station, a historic transmission line, historic aqueducts, a rockshelter, roads, and rock rings. The seven eligible archaeological sites are eligible for the NRHP under Criterion A, which means they “are associated with events that have made a significant contribution to the broad patterns of our history,” and/or Criterion D, which means they “have yielded or have the potential to yield, information important in prehistory or history” (U.S. Department of the Interior 1997).

The project would avoid three of the seven eligible archaeological sites and two of the five unevaluated sites. The four remaining eligible archaeological sites and the three remaining unevaluated archaeological sites would be directly physically impacted by ground disturbance associated with Alternative C. These four eligible archaeological sites would require mitigation prior to project implementation. Mitigation would consist of data recovery in the form of excavation or testing, artifact collection and analysis, or historical research. A testing plan (Stoner 2020) has been developed to evaluate the unevaluated sites for

the NRHP. In the event these sites are determined eligible for the NRHP, they will undergo mitigation in consultation between the BLM and the Nevada SHPO.

Architectural Resources

Impacts to architectural resources under Alternative C would be similar with those described above under the Proposed Action (See Table 3.2-1).

Tribal Concerns and Values

The potential risk of impacts to tribal concerns and values are identical to the Proposed Action with the exception that the direct disturbance impacts would total 1,106 acres.

Mitigation of Adverse Effects

Cultural resources that would be directly adversely affected by the proposed project would require the same mitigation outlined under the Proposed Action.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Archaeological Resources

Three eligible archaeological sites and five unevaluated archaeological sites fall within the analysis area under Alternative D. These sites consist of historic mining sites, lithic scatters, tool stone procurement sites, a historic pumping station, a historic transmission line, historic aqueducts, a rockshelter, roads, and rock rings. The three eligible sites are eligible for the NRHP under Criterion D.

The project would avoid the three eligible sites and two of the five unevaluated sites. The remaining three unevaluated sites would be directly physically impacted by ground disturbances associated with Alternative D. A testing plan (Stoner 2020) has been developed to evaluate these sites for the NRHP. In the event these three sites are determined eligible for the NRHP, they will undergo mitigation in consultation between the BLM and the Nevada SHPO.

Architectural Resources

Impacts to architectural resources under Alternative D would be consistent with those described above under the Proposed Action (see Table 3.2-1).

Tribal Concerns and Values

The potential risk of impacts to tribal concerns and values are identical to the Proposed Action with the exception that the direct disturbance impacts would total 1,097 acres.

Mitigation of Adverse Effects

Cultural resources that would be directly adversely affected by the project would require the same mitigation outlined under the Proposed Action.

Table 3.2-1. Summary of Potential Impacts to Cultural Resources in the Area of Potential Effects

Project Elements	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Number of archaeological sites that would be potentially affected by direct effects	3	7	3
Number of architectural resources that would be potentially affected by direct effects	2	2	2

Sources: Brockway and Hilderbrand (2019); Mehls (2018); Mueller (2020); Mueller and Stoner (2016); Stoner (2017); and Stoner and Ringhoff (2006, 2007).

3.2.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

Cultural resources are non-renewable, and ground-disturbing activities would permanently alter or destroy on-the-ground cultural resources, and the aspects that may make them eligible to the NRHP. Appropriate mitigation measures, in consultation with both the SHPO and tribes, must be completed before ground disturbance can occur. These mitigation measures would not prevent the irreversible impacts related to the alteration of the on-the-ground cultural resources. However, these measures would provide for recordation of information regarding these sites and would provide for the long-term retaining of information related to site type and setting for use in future education and study.

3.3 Geochemistry and Groundwater Quality

3.3.1 Affected Environment

The Liberty Pit is in the West Mineralized hydrogeologic block, comprising mainly altered shale (hornfels), monzanite porphyry, skarn, and rhyolite. Approximately 45% of the Liberty East Pit is classified as PAG material, with one outcrop of ore grade monzanite porphyry in the current pit floor reacting with shallow lake waters to generate low pH and high metal chemistry (Piteau Associates [Piteau] 2020a). Groundwater in this hydrogeologic block exceeds Nevada Drinking Water Standards for arsenic, iron, manganese, sulfate, and TDS (see Appendix C).

The Liberty East Pit currently contains previously dumped material including rhyolite, quartz monzonite porphyry, Ely Limestone, Chainman Shale, and minor formations contributing less than 1% to the total mass of waste rock. A small 10- to 20-foot-deep acidic pit lake has historically formed in the Liberty East Pit, with seasonal fluctuations in metal concentrations. Under the 2019 Mine Plan amendment, 134 million short tons of waste rock would be removed during the Liberty Pit East expansion. Mine waste material would be placed in a WRD. The King WRD is the proposed location for this waste (Proposed Action [Alternative B]) and the North Tripp WRD expansion is considered as an alternative facility (Alternative C). Waste material has also been proposed as backfill into the Ruth East Pit, with a reduced WRD (Alternative D).

The King WRD would disturb 260 acres of undeveloped land, 248 acres of which is on BLM-managed land south of the proposed expansion. Geology beneath the proposed King WRD is dominated by Rib Hill Sandstone and Ely Limestone. Groundwater levels near the proposed WRD are approximately 900 feet below grade, influenced by mine dewatering. Groundwater in the South Block beneath the King WRD is characterized as calcium-bicarbonate type waters, with low total dissolved solids (TDS) and alkaline pH.

Periodic exceedances of Nevada Drinking Water Standards for manganese, iron, sulfate, and TDS have been reported during groundwater investigations and sampling (Piteau 2020b; see Appendix C).

The alternative North Tripp WRD would be located northwest of the proposed pit, a proportion of which is to be placed on the existing North Tripp WRD (209 acres) and the remainder on undeveloped land (169 acres), 67 acres of which is on BLM-managed land. Geochemical characterization of the existing waste geological material within the North Tripp WRD indicates that the material is predominantly non-PAG, leachate generated is alkaline (pH > 8.5) with concentrations of arsenic slightly greater than the NDEP Profile I guidelines (Stantec 2020a). Geology underneath the North Tripp WRD is predominantly Guilmette Limestone and Pilot Shale, with an unsaturated zone of approximately 865–1,130 feet. Groundwater quality within the Weary Flat Block beneath the North Tripp WRD is calcium-bicarbonate type, with moderate TDS and with alkaline pH. An exceedance of Nevada Drinking Water Standards for radium has been reported during regular monitoring. A full description of KGHM's Comprehensive Waste Rock Management Plan is provided in Appendix K.

Approximately 97 million short tons of non-PAG material has been proposed to be placed in the Ruth East Pit (160 acres new disturbance), with the remainder placed in a reduced King WRD (234 acres new disturbance). The reduced King WRD would disturb 222 acres of BLM-managed land, with the remaining 12 acres on KGHM-owned private land. The Ruth East Pit is located within the Keystone Hydrogeologic Block (Stantec 2020a). Current water levels are approximately 6,350 feet amsl, with pre-pumping water levels as high as 6,580 feet amsl. Groundwater chemistry in the Keystone Hydrogeologic Block is influenced by naturally occurring sulfide oxidation of mineralized rocks, with a resultant elevated iron, manganese, and sulfate concentrations that exceed Nevada Drinking Water Standards (Piteau 2020b; see Appendix C).

3.3.2 Environmental Consequences

3.3.2.1 Analysis Method

Geochemical testing is required to evaluate impacts of geological materials—waste and pit walls—on water resources. Stantec (2020a, 2020b) completed a sequential testing and modeling program to estimate water quality of leachate seeping from the proposed and alternative WRDs, reactions as seepage moves through the unsaturated zone, and final concentrations impacting groundwater. The series of methods used to estimate an impact to groundwater include the following:

- A static geochemistry program to evaluate the potential for mine waste to generate acid and metal leachate. Tests included whole rock analysis, acid base accounting (ABA), and mineralogical testing.
- Modeling of static geochemical data to estimate volumes of waste material that can potentially generate acid and metal leachate. ABA results were combined with whole rock elemental analyses of calcium (proxy for acid-neutralizing potential [ANP]) and sulfur (proxy for acid-generating potential [AGP]) to estimate the total quantities of PAG and non-PAG materials. Kriging was used to estimate calcium and sulfur concentrations at the block model scale (50 × 50 × 50-foot cubes) and evaluated using the site specific PAG criterion for the Robinson Mine ([ANP/AGP] ratio below 0.3).
- Leachate and kinetic testing to provide estimates of leachate quality seeping from the waste material into the underlying unsaturated zone. Tests included meteoric water mobility procedure (MWMP) humidity cell tests (HCTs).
- Unsaturated flow was modeled for the King WRD and alternative North Tripp WRD expansion, assuming a 1.5-foot-thick vegetated cover. This included modeling average seepage rates for the WRDs based on mean annual precipitation.

- Attenuation modeling of seepage through the unsaturated zone to assess the adsorption properties of rock in the vadose zone. The vadose zone below the King WRD and North Tripp WRD expansion are hundreds of feet thick and are primarily carbonate rocks. Acidic and near-neutral pH water from MWMP tests were applied to geological units present in the King and the North Tripp WRD expansion vadose (unsaturated) zones. Tests were conducted using multiple water-rock ratios to calculate adsorption isotherms.
- Piteau estimated seepage water quality entering groundwater using on-site groundwater quality data (Piteau 2020b). Groundwater quantity was evaluated using a pit-scale groundwater model. The pit lake geochemical modeling process couples individual water and mass balance components and simulates their resulting chemistry through a series of dynamic solution mixing, chemical reactions, and mineral surface adsorption.

Geochemical testing results were adapted to model the quantity and quality of water that are predicted to occupy the Liberty and Ruth East Pits at the cessation of mining (Piteau 2020a).

The information above was used to assess predicted waste rock seepage water quality, pit lake water quality, and any related potential impacts to groundwater.

3.3.2.2 Direct and Indirect Impacts

This section looks at the qualitative impacts of mine waste generated from the expansion of the Liberty Pit. Waste material placed in aboveground WRDs have the potential to generate leachate that could impact groundwater to various degrees. This section describes the qualitative impacts of the alternatives. Table 3.3-1 compares and contrasts the relative impact of each alternative.

Alternative A: No Action

Under the No Action alternative, the project would not be developed. Geology and associated mineral resources would continue to be impacted by existing mining for another 2 years. Based on current monitoring, the Liberty East Pit would be acidic with high metal concentrations. The Liberty Main Pit lake would have neutral pH with concentrations of TDS, sulfate, fluoride, cadmium, and manganese that would exceed NDEP Profile III reference values (NDEP 2014). These impacts would continue as currently observed, as described for the existing affected environment, and as disclosed in previous NEPA documents that analyze the existing mine operations (BLM 1994a, 2016a, 2019a, 2019b). Currently the mine is scheduled to close in 2024, followed by reclamation and ultimate closure in accordance with Nevada and BLM requirements (see Appendix G). Groundwater impacts under the No Action alternative would continue as described under the Affected Environment for the hydrogeologic blocks.

Alternative B: King Waste Rock Dump (Proposed Action)

Liberty Pit

Wall rock in the proposed Liberty East Pit comprises primarily monzanite porphyry and Ely Limestone. Under the Proposed Action, PAG material remaining in the pit would be reduced from 45% to 20%. After mining-related dewatering, water would recover initially within the Liberty Main Pit but would eventually overflow into the Liberty East Pit once reaching the saddle between the two pits located at 6,550 feet amsl. Inflows into the pits are predominantly precipitation and runoff, with low groundwater contribution due to low permeability mineralized bedrock. Outflow from the Liberty Main Pit lake is only to the Liberty East Pit, which functions as a hydraulic sink.

Exceedances predicted for the Liberty Main Pit (fluoride, aluminum, cadmium, copper, manganese, sulfate, TDS, and uranium) would flow into the Liberty East Pit. Historic pit lake water within the Liberty East Pit has been acidic with multiple exceedances of water quality standards including NDEP Profile III reference values and KGHM Robinson permit maximum concentration levels. Under the Proposed Action, the removal of acid-generating material during mining, combined with the formation of a deeper pit lake providing a larger reservoir of alkalinity, would attenuate these seasonal pH fluctuations. During development of the Liberty East Pit lake, exceedances of cadmium and fluoride are predicted. The pit, however, would act as a sink, or low-spot, with groundwater flowing into the lake only and not leaving except through evaporation. During this process, concentrations of cadmium are predicted to fall below the NDEP Profile III reference value of 0.05 milligrams per liter (mg/L) after 30 years of pit lake filling and remain below this concentration for the remainder of the predicted period of 200 years. Fluoride concentrations are predicted to increase over time from 4.07 mg/L in year 1 to 5.02 mg/L in year 200, remaining above the Profile III reference value of 2 mg/L (Piteau 2020a). Ecological risk assessments (ERA) have been prepared for both the Ruth and Liberty Pits (Appendix H). These ERAs identify potential ecological risks from constituents in the Ruth and Liberty Pit lakes to selected bird and mammal species. For the Ruth Pit, the ERA identifies copper as a Constituent of Potential Concern (COPEC) in the Ruth West Pit lake and copper fluoride and pH as COPECs in the Ruth East Pit lake. The Liberty Pit ERA identifies copper and fluoride as COPECs in the Liberty Main Pit lake and aluminum, cadmium, copper, fluoride, and TDS as COPECs in the Liberty East Pit lake. Both the Ruth Pit and Liberty Pit ERAs used bird and mammal endpoint species body weights, water ingestion rates, and other appropriate adjustments factors and determined that harmful effects are not likely as a result of exposure to pit lake constituents (SRK 2019, 2020; see Appendix H)

Mine waste generated during the Liberty East expansion is predominately waste material from the Liberty East Pit (70%) and lesser amounts of Ely Limestone (14%), rhyolite (6%), monzanite porphyry (5%), and Chainman Shale (4%). The remainder is made up of Rib Hill Sandstone, Joana Limestone, Pilot Shale, and undefined material. Approximately 30% of the material being classified as PAG.

King Waste Rock Dump

The ABA data were combined with whole rock analysis to estimate the volume of PAG material that would be removed under the Proposed Action and placed in the King WRD. ABA considers two aspects of geological material: 1) its ability to generate acid (AGP) and 2) its ability to neutralize any acid generated (ANP). For the Robinson Mine, PAG materials are classified as materials with ANP/AGP < 0.3. Based on this analysis, 9% of the waste rock is estimated as PAG. Overall, the material to be removed from the Liberty Pit expansion has an overall ANP/AGP ratio of 2.32, well above the criterion for the Robinson Mine of 0.3, indicating that there is significant neutralizing material to counteract acid generated from the waste.

MWMP and HCT analyses determined the static and kinetic leaching properties of rock material. Both tests indicate that most PAG-classified materials from the Liberty East expansion are expected to generate acid. Short-term leachate generation (MWMP) indicates the release of deleterious constituents of concern including (in decreasing order of exceedance value) manganese, sulfate, TDS, cadmium, pH, aluminum, copper, iron, thallium, zinc, beryllium, selenium, fluoride, arsenic, chromium, and uranium. Long-term leachate generation (HCT) indicates that acidic water was produced in samples classified as PAG, with exceedances of manganese, sulfate, iron aluminum, copper, TDS, thallium, cadmium, fluoride, beryllium, zinc, arsenic, chromium, magnesium, selenium and uranium. The non-PAG-classified samples produced circum-neutral pH water (Stantec 2020a).

A screening level assessment of seepage chemistry originating from the King WRD (Stantec 2020b), assuming a 1.5-foot-thick vegetated cover and average seepage rates of approximately 5% of mean annual

precipitation, indicated the presence of several constituents that can enter into the subsurface and ultimately into groundwater. Two scenarios were considered: 1) the expected average seepage chemistry and 2) seepage from the worst 50% of materials (Stantec 2020b). The worst 50% of material was waste rock material with ANP/AGP ratios lower than the median ANP/AGP value (Geomega 2019; Stantec 2020a).

Impacted leachate that would be released by the King WRD would enter the unsaturated zone below and seep through a 700-foot unsaturated zone before entering the groundwater system. Several reactions would take place during this migration that could limit the final concentration of leachate as it mixes with the groundwater; this is a process called *attenuation*. Modeling predicts that the following constituents would leach from the King WRD: aluminum, cadmium, copper, iron, manganese, nickel (worst case only), pH, sulfate, TDS, and zinc (worst case only). With the exception of manganese and sulphate, these constituents would be attenuated before they reach groundwater. However, the ability of the unsaturated zone to attenuate manganese beneath the King WRD may be depleted within 1,000 to 2,000 years. Additionally, the cumulative addition of alkalinity (primarily in the form of sulfate) within the vadose zone may increase TDS values above South Block Water Pollution Control Permit Reference Values. However, modeling predicts that dilution with native groundwater would reduce TDS concentrations to below reference values.

For a comparison of alternative impacts, see Table 3.3-1.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Impacts under Alternative C would be similar to those under the Proposed Action with the exception that the footprint of the King WRD that would contribute to geochemical impacts would be reduced. Attenuation testing using rock from the King WRD area (Ely Limestone and Rib Hill Sandstone units) was considered to be a reasonable proxy for the vadose zone materials below the North Tripp WRD expansion (Pilot Shale and Guilmette Limestone units). Based on that testing, the North Tripp WRD expansion would be projected to cause seepage and would exceed the Weary Flat (North Tripp WRD) Water Pollution Control Permit NEV0092105 Reference Values for aluminum, cadmium (worst-case scenario modeled only), copper, iron, manganese, nickel (worst-case scenario modeled only), pH, and zinc (worst-case scenario modeled only). With the exception of manganese, the thickness of the unsaturated zone would prevent leachable constituents from reaching groundwater. However, this ability of the unsaturated zone to attenuate manganese may be depleted within 6,000 to 14,000 years. Additionally, the cumulative addition of alkalinity within the vadose zone may increase TDS (primarily in the form of sulphate) above Weary Flat (North Tripp WRD) Water Pollution Control Permit Reference Values. However, modeling predicts that dilution with native groundwater would reduce TDS concentrations to below reference values. For a comparison of alternative impacts, see Table 3.3-1.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Alternative D would have impacts similar to the Proposed Action in terms of impacts associated with Liberty Pit and to Alternative C in terms of impacts associated with the King WRD. Additionally, Alternative D would have impacts associated with the Ruth East Pit backfill. Proposed backfill of non-PAG material into the Ruth Pit would extend to 6,840 feet amsl, which is also above projected groundwater levels. For this reason, a pit lake would not form in Ruth East Pit under Alternative D. Interaction between the backfilled mine waste and groundwater that would enter the pit is predicted to produce circum-neutral waters with elevated concentrations of iron, manganese, cadmium, nickel, sulfate, TDS, and thallium. Flushing is predicted between years 30 and 50 from inflows from the South Block. Although this would remove several constituents, the long-term groundwater quality would still exceed

standards. The elevated TDS and metal concentrations in the backfill water would impact groundwater quality within the Keystone Block. For a comparison of alternative impacts, see Table 3.3-1 below.

Table 3.3-1 provides a summary alternatives comparison of geochemical impacts.

Water quality in the Liberty East Pit lake is predicted to have better quality under the action alternatives because PAG geological material would be removed from the pit. Additionally, the Liberty East Pit lake would act as a sink to reduce constituent impacts to regional groundwater. Alternative D would, however, eliminate the Ruth Pit lake, thereby impacting groundwater quality by increasing leaching of constituent metals from pit backfill to groundwater.

In summary, the Proposed Action and Alternative C would improve groundwater quality in comparison to the No Action alternative. This is because the Proposed Action and Alternative C would remove mineral materials from the Liberty Pit, which would reduce opportunities for leaching. Alternative D would have slightly more risk to groundwater contamination than the No Action alternative because it would backfill waste rock into the Ruth East Pit, which, because of the flow-through nature of the Ruth East Pit, would result in increased leaching of contaminants into groundwater. These risks could result in some exceedances of groundwater standards (as described above), but those exceedances would be eliminated over time through attenuation and dilution.

Table 3.3-1. Geochemical Impacts to Groundwater Resources by Alternative

Project Elements	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Additional WRD surface disturbance (acres)	0	260 (12 KGHM Robinson, 248 BLM)	403 (114 KGHM Robinson, 289 BLM)	394 (172 KGHM Robinson, 222 BLM)
Leachable constituents impacting unsaturated zone	Existing WRDs leach constituents exceeding water quality standards into the underlying unsaturated zone. These constituents include low pH leachate; metals including aluminum, cadmium, copper, iron, and manganese; and TDS and sulfate.	The King WRD would leach constituents exceeding water quality standards into the underlying unsaturated zone. These constituents include low pH leachate; metals including aluminum, beryllium, cadmium, copper, chromium, iron, manganese, nickel, and zinc; and other constituents including arsenic and fluoride. TDS, including sulfate, are also modelled to enter the unsaturated zone.	The Proposed WRDs would leach constituents exceeding water quality standards into the underlying unsaturated zone. These constituents include low pH leachate and metals including aluminum, cadmium, copper, chromium, iron manganese, nickel, and zinc.	Management of waste would be handled for interaction of groundwater (saturated zone) rather than unsaturated zone.
Leachable constituents impacting groundwater	Because of the thickness of the unsaturated zone, leachable constituents would not reach groundwater.	Because of the thickness of the unsaturated zone, leachable constituents would generally not reach groundwater. Modelling indicates that manganese and TDS (predominantly sulphate) have the potential to eventually leach out of the unsaturated zone into groundwater of the South Block over 1,000 to 2,000 years. These constituents would likely be diluted by groundwater to below groundwater standards.	Because of the thickness of the unsaturated zone, leachable constituents would generally not reach groundwater. In addition to the constituents entering the South Block from the King WRD, manganese and TDS from the North Tripp WRD have the potential to eventually leach out of the unsaturated zone into groundwater of the Weary Flat Block over 6,000 to 12,000 years. These constituents would likely be diluted by groundwater to below groundwater standards.	Groundwater would interact with the waste rock backfill and release concentrations of metals including iron, manganese, cadmium, nickel, and TDS, above groundwater standards. Impacted groundwater would flow toward the Keystone Block to the north.

Project Elements	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Pit lake water impacts	<p>The Liberty Main Pit lake would have neutral pH with concentrations of TDS, sulfate, fluoride, cadmium, and manganese that would exceed pit lake standards.</p> <p>Based on current monitoring, the Liberty East Pit lake would be acidic with high metal concentrations.</p>	<p>The Liberty Main Pit lake would have pH with elevated TDS; predominately as sulfate; and fluoride above the pit lake standards; and cadmium, manganese, and uranium above the lower permit maximum concentration level values. Concentrations are predicted to decrease over time due to a minor outflow to the South Block and major flow to the Liberty East Pit.</p> <p>The Proposed Action would remove geological components that contribute to dissolved solids and to dissolved metal concentrations in the Liberty East Pit lake water, thus generally improving conditions compared to the No Action. Cadmium is predicted to exceed pit lake standards in the first 30 years and fluoride concentrations over the modeled 200 years. Long-term concentrations of fluoride have stabilized at approximately 2 to 3 times the pit lake standards.</p> <p>The Liberty East Pit lake is a strong hydraulic sink and thus does not discharge water to the groundwater system. Evaporation would increase some elements, but not above pit lake standards.</p> <p>ERAs have been prepared for both the Liberty and Ruth Pits, which predict no harmful effects to potential wildlife receptors (Appendix H).</p>	Same as the Proposed Action.	<p>No pit lake would form for the Ruth East Pit. Impacts related to Liberty Pit lake would be the same as the Proposed Action.</p>

3.3.2.3 *Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity*

Dewatering under the Proposed Action would be irretrievable until it ceases after the completion of mining (2028) when groundwater would begin rebounding. The predicted 90% recovery of the pit lake (6,411 feet amsl) would be complete by the year 2033.

The geochemical makeup of the seepage from the WRD is determined by the resiliency of the evapotranspiration cover following reclamation. Management of reclamation cover in the immediate area would be managed to provide for continued maintenance of cover integrity. Because the landform and surface would be integrated into reclamation of the site as a whole, no irreversible indirect effects are anticipated WRD seepage; however, irretrievable impacts would occur until reclamation is completed successfully.

Pit lakes would form over a period of time, with resulting irretrievable impacts on water quality. The irretrievable impacts would be long term but would not be irreversible. Most of the recovery would occur within 40 years after mining ceases; however, steady-state pit lake chemistry is modeled to occur at approximately 200 years. Ongoing seepage from the WRD would occur; however, attenuation of the constituents of concern would occur through millennia. The total amount of proposed surface disturbance associated with WRDs, pit walls and floors, and pit lakes would be irreversible. These features would remain as permanent features on the landscape indefinitely.

Reclamation would provide for the long-term sustainability of the geochemistry of groundwater resources used in the general area and in the region. Implementation of required monitoring and adaptive mitigation (see Appendices G and H) would prevent impacts to that long-term sustainability.

3.4 Geology and Mineral Resources

3.4.1 Affected Environment

This section addresses the geologic setting and mineral resources associated with the project. The geologic setting section also provides background information for characterizing the hydrogeologic setting and rock geochemistry discussed in Section 3.3 Geochemistry and Groundwater Quality and Section 3.11 Water Resources.

3.4.1.1 *Geologic Setting*

Regional Geology

The Robinson Mine is located in the Egan Range of east-central Nevada, immediately south of the town of Ruth and approximately 6 road miles west of Ely, Nevada, in White Pine County (see Figure A-1). The Robinson Mining District, also known as the Ely, Ruth, or Kimberley District in past mining literature, is located in the northern half of T16N, R62E and R63E (Mt. Diablo meridian), and has been mined intermittently since 1868 (Nevada Bureau of Mines and Geology [NBMG] 1976; Tingley and Bentz 1983), with the principal metals produced being copper and gold, along with some by-production of molybdenum, silver, lead, zinc, iron, manganese, rhenium, palladium, and platinum (Seedorff et al. 1995). Mineralization is confined to an east–west belt through the district where Cretaceous plutons, or areas of solidified molten rocks lying below the surface, intrude into late Paleozoic limestones, sandstones, and shales (Figure A-7). Ore consists of copper sulfides and their oxidized equivalents occurring as veins, disseminations, and massive replacements in the plutons and the adjacent mineralized sedimentary rocks.

Groundwater percolating downward through the copper sulfide ores produced a blanket-like zone enriched in copper that has been one of the primary objectives of copper mining since the early 1900s.

Local Geology

The project area occupies a central location within the Great Basin section of the Basin and Range physiographic province. The Great Basin is noted for long, linear mountain ranges separated by broad valleys that usually exhibit interior drainage. Mountain ranges in the Great Basin can be 5 to 20 miles long. Great Basin valleys are often approximately equal in length to the mountain ranges and are usually at least 10 to 30 miles across.

The Basin and Range physiographic province is tectonically active with well-developed recent fault scarps (steep rock faces formed by shearing of rock) common along the margins of the valleys (Eaton 1982). The valleys have formed by downward movement and rotation of large blocks of the earth's crust. Thus, the mountain ranges are elevated remnants between these large areas of down-dropped rock.

The Egan Range is one such elevated block between the Steptoe Valley graben, or fault block valley, on the east and the White River Valley and Butte River Valley grabens on the west. Within the Robinson Mining District, faulting (i.e., movement and breakage of rocks along a zone of weakness in the crust) aligned in a northwest–southeast direction may have served to not only localize the plutonic intrusions and their associated ore bodies rich in copper, but also to disrupt these ore zones and displace them from their point of origin. Intrusion of plutonic rocks and extrusion of volcanic rocks (molten rock that solidified on the surface) may have locally deformed the bedrock formations of the district. The Great Basin topography in the Ely area formed after the period of plutonic intrusion, folding, mineralization, and faulting along the northwest–southeast faults (NBMG 1976). The Egan Range was elevated as the White River and Steptoe Valleys formed. Faults associated with this period of Basin and Range formation are aligned primarily in a north–south direction and transect the Robinson Mining District. Thus, the Robinson Mining District is the product of at least three periods of geologic disturbance:

- Late Cretaceous plutonic intrusion, folding and faulting along the northwest–southeast faults, and mineralization to form the copper ore bodies
- Eruption of volcanic lavas in the middle Tertiary (20 to 40 million years ago) accompanied by more faulting along the northwest–southeast faults
- Basin and Range uplift of the Egan Range and faulting along the north–south faults (NBMG 1976; Spencer 1917).

The geologic setting in the area surrounding the Robinson Mine is lithologically and structurally complex (see Figure A-7). Site geology has been shaped through transgressive/regressive ocean sequencing during the Ordovician through Permian age, a series of fold thrusts events during the Sevier Orogeny, volcanic intrusion and mineralization during the Jurassic Period, and more recent tectonic extension and associated volcanic activity during the Tertiary Period (Piteau 2020b). A localized geologic map of the Robinson Mining District is shown in Figure A-8. Geologic cross sections are shown for South Block (Figure A-9, Liberty Pit (Figures A-10 and A-11), Ruth West Pit (Figure A-12) and Ruth East Pit (Figure A-13).

Stratigraphy

The rocks found in the Robinson Mining District and the project area consist of limestones, dolomites, shales, and sandstones of Paleozoic age (245 to 570 million years old). These sedimentary rocks formed in an ancient carbonate bank environment similar to the Florida Keys or the Bahamas of today. The total thickness of the consolidated sedimentary rocks is 16,000 to 18,000 feet (NBMG 1976).

The Paleozoic sedimentary rocks were intruded by plutonic rocks during the Cretaceous (ca. 111 million years ago) and mineralized to form the copper sulfide deposits. Later, during middle Tertiary time (20 to 40 million years ago), the sedimentary rocks, along with the plutonic rocks and the copper sulfide ores, were intruded by rhyolitic volcanic rocks (light-colored, tuffaceous lavas). Basin and Range faulting and uplift of the Egan Range (including the project area) accompanied and followed the Tertiary volcanism (NBMG 1976). Erosion of the Egan Range during uplift from 20 million years ago to present produced the considerable amount of alluvium (sand and gravel) that now fills stream valleys and the alluvial fans shed into the Steptoe and White River Valleys. The alluvial sediments are mostly unconsolidated to poorly consolidated and serve as aquifers (water-bearing rocks) for domestic and farm wells in these valleys. Below the alluvial sediments are lake beds that formed during the early history of the valleys when the climate was still humid and ranges such as the Egan Range were only low hills. Minor amounts of basalt in the form of lava flows are interbedded with these lake beds and alluvial sediments. As the mountain ranges grew in size and the climate became arid, the lake beds were covered by the alluvial sands and gravels. Many of the lake beds contain thick zones of gravel that are good aquifers (NBMG 1976). Sedimentary rocks exposed in the Robinson Mining District and the project area are mainly limestones, shales, and sandstones of Paleozoic age, as well as the alluvial gravels of Giroux Wash. Important mineralized rocks include the plutonic intrusions, the Joana Limestone, Chainman Shale, Ely Limestone, Riepe Spring Limestone, and the Rib Hill Sandstone. These rocks would be affected by the project.

Regional Structure

White Pine County and much of northeastern Nevada have experienced four major tectonic events since the end of the Precambrian (570 million years ago). In the Robinson Mining District, some of the Cretaceous plutonism and associated mineralization took the form of sills and followed older bedding-plane thrusts. Tertiary volcanism swept across northern Nevada from 40 to 25 million years ago and blanketed the land with ash-flow and air-fall tuffs. Large calderas (volcanic collapse structures) formed in the source regions of these huge ash flows. The Robinson Mining District experienced such volcanism and was covered by a layer of volcanic ash flows and intruded by stocks of rhyolitic magma (subcircular bodies of molten lava). During the waning stages of Tertiary volcanism, extensive lake beds filled with volcanic ash covered the valleys between the volcanic centers (NBMG 1976).

Basin and Range faulting began ca. 20 million years ago and continues to present. Large valleys (grabens) formed as major blocks of the earth's crust were down-dropped along north-south-trending faults. Vertical displacements of thousands of feet are common along these Basin and Range faults. Land between these grabens was elevated and today form the long, linear mountain ranges that characterize Nevada. The Egan Range is one of these remnant-elevated blocks, or horsts, as they are commonly called. This period of extensive north-south faulting served to disrupt (offset by fault movement) mineralization in the Robinson Mining District and initiated a period of erosion in horst blocks like the Egan Range that continues to the present (NBMG 1976).

Local Structure

The local structure of the Robinson Mining District and the project area is dominated by a northwest-southeast-trending graben (down-faulted block of sediments) that encompasses the eastern end of the belt of Cretaceous plutons, mainly those near the Ruth and Kimberley Pits. The graben is bounded in part on the south by the Eureka-Nevada fault zone and on the north by the Jupiter fault. These two fault zones dip inward toward the center of the graben. The Cretaceous plutons, called quartz monzonite porphyries in this area, preceded the formation of the graben. Thus, both the monzonite porphyries and their associated mineralization are offset by the graben faults. Prior to Cretaceous time, the Paleozoic sedimentary rocks of the Robinson Mining District were folded and thrust-faulted (one bed of rock shoved along the top of

another) during the Sevier Orogeny. Thrust faults that trend northwest-southeast and verge (direction of movement) to the south are common in the Paleozoic sedimentary rocks of the Robinson Mining District. A large, overturned fold is present in the limestones at the western end of the Robinson Mining District. A south-dipping monocline (inclined warp) is found at the eastern end of the Robinson Mining District with step faults dropping the beds to the south. The overall dip of Paleozoic sedimentary rocks in the Robinson Mining District, however, is to the west (NBMG 1976).

North-trending Basin and Range normal faults (vertical movement downward of one block against another) offset the faults that bound the main graben (Eureka and Jupiter), the porphyritic monzonite intrusives and their associated copper sulfide mineralization, and the thrust faults. Thus, the Robinson Mining District and the project area have three types of faults that may direct groundwater flow (NBMG 1976):

- Bedding plane thrusts
- Large graben faults, such as Eureka and Jupiter
- North-trending Basin and Range normal faults

Seismic Potential

The project area is within the Great Basin section of the Basin and Range physiographic province. This is an area of active crustal extension (i.e., forces pulling the crust apart) that has produced the large valleys or grabens and the intervening uplifted blocks, or horsts, that characterize Nevada (Eaton 1982). This active extension results in frequent seismicity and occasional larger earthquakes, such as the 2008 Wells, Nevada, magnitude 6.0 earthquake event (dePolo et al. 2011; Hammond et al. 2014).

SRK (2017) completed a seismic hazard analysis for the Giroux Wash TSF design using the Probabilistic Seismic Hazard Analysis method. This method uses a Poisson Probability Model to estimate ground accelerations expressed as a percentage chance of exceedance for a given time period, which can also be expressed with a recurrence interval. The probabilistic seismic hazard at the site was obtained from the U.S. Geological Survey's (USGS's) Earthquake Hazards Program's online Unified Hazard Tool (USGS 2020) with potential seismic ground motions expressed as a fraction of acceleration due to gravity (g). The maximum credible earthquake generates a peak ground acceleration (PGA) with a 2% probability of exceedance in 50 years, which is equivalent to a recurrence interval of 2,475 years or a 0.0004 annual rate of exceedance. The maximum credible earthquake PGA was determined to be 0.20 g.

The operating basis earthquake is defined as the PGA for an earthquake with a 10% probability of exceedance in 50 years, which is equivalent to a recurrence interval of 475 years or a 0.002 annual rate of exceedance. The operating basis earthquake PGA was determined to be 0.080 g. To establish the context of this, a PGA of 0.001 g is earthquake movement perceptible by people, and a PGA of 0.020 g can cause people to lose their balance. A PGA of 0.10–0.34 g provides very strong perception of shaking and light damage to structures (Lorant 2016).

3.4.1.2 Mineral Resources

This section summarizes the occurrence and known genesis of mineral resources in and near the project area. Also discussed are the various types of known mineral deposits in the Robinson Mining District, along with a brief history of mining operations to date at the Robinson Mine.

The porphyry copper deposits of the Robinson Mining District are located between Ely and Ruth in the Egan Range and are centered on the Late Cretaceous quartz monzonite intrusives that form an east–west trend across the Egan Range and the Robinson Mining District (see Figure A-7). To date, the Robinson Mining District is the largest non-precious metal producer in Nevada. Between 1908 and 1963,

Consolidated Coppermines Company and Kennecott Copper Corporation mined more than 255 million tons of ore, averaging around 1% copper. This ore was mined underground initially, using stoping and block caving of high-grade pods of ore, and then later from the five open pits (NBMG 1976).

Four principal types of ore deposits are in the Robinson Mining District:

1. Disseminated copper deposits within altered quartz monzonite porphyries
2. Replacement deposits in altered sedimentary rocks around the intrusives
3. Vein deposits within the monzonite intrusive and the sedimentary rocks
4. Supergene copper deposits formed by groundwater percolating through the above three types of deposits

The principal copper sulfide mineral is chalcopyrite (NBMG 1976). Lead, zinc, and silver sulfide deposits, along with gold, manganese, and iron deposits, are peripheral to the copper deposits and are crudely zoned outward from the mineralizing monzonite plutons. Sedimentary rocks adjacent to the plutons are often replaced by high-temperature silicates and sulfides to form mineralized skarns (altered limestone with silica and sulfides replacing the original rock).

Disseminated Copper Deposits

Disseminated copper deposits, the main ore bodies of the district, consist of disseminated chalcopyrite (copper-iron sulfide) in altered stocks and sills of the quartz monzonite porphyries. Six major and several minor deposits of this type occur in a 6-mile-long east–west zone across the Robinson Mining District that is up to 3,000 feet wide and has been mined to depths of 900 feet (NBMG 1976). The main ore bodies in order of size are the Liberty, Tripp, Ruth, Emma, Veteran, and Kimberley.

The disseminated copper deposits are confined to altered quartz monzonite porphyry and silicate (altered to silica and pyrite) sedimentary rocks adjacent to the porphyritic intrusions. Principal ore minerals are chalcopyrite, chalcocite (high-grade copper sulfide), molybdenite, and copper oxides. The average grade of these deposits is 0.8% copper (NBMG 1976). Other metals recovered are molybdenum, zinc, lead, gold, platinum, and silver.

Mineralization in the silicated sedimentary rocks adjacent to the mineralized monzonites is restricted to the Ely Limestone, the Chainman Shale, and the Rib Hill Sandstone. These deposits extend up to 500 feet away from the intrusion and have a mineral assemblage similar to that found in the mineralized monzonite, except that pyrite is more abundant (NBMG 1976).

Replacement Deposits

Replacement deposits are formed by chemical processes that dissolve a rock and deposit new minerals in its place. Replacement copper deposits are found erratically distributed in structural traps within the Ely and Joana Limestones around, above, and locally under the mineralized monzonites. They are zoned outward from the intrusions in an area approximately 8 miles long and 2 miles wide that has been mined to depths of 1,600 feet. Replacement zinc deposits have been limited to the Riepe Spring Limestone along intersecting shear zones at the Wouldard and Monroe mines in the eastern area of the Robinson Mining District. Small bodies consisting of a few thousand tons of hemimorphite (hydrated zinc silicate) and smithsonite (zinc carbonate) have been mined averaging 16% zinc. Lead-silver deposits are also limited to the Riepe Spring Limestone and are usually found above the quartz monzonite porphyries. These are small (few thousand tons), high-grade pods of ore averaging 10% lead and one or more ounces of silver per ton (NBMG 1976).

Manganese deposits consisting of manganiferous carbonate-bedded replacements are found in the Joana and Ely Limestones. These deposits, which are up to 12 feet thick, consisted of supergene blankets of manganese oxides formed by groundwater percolating through the manganese carbonate beds. Several thousand tons of pyrolusite and braunite (manganese oxides) were mined in 1917 to 1918 and again in 1952 to 1959 from ores containing more than 35% manganese. Low-grade manganese ores still remain in the Robinson Mining District (NBMG 1976).

Vein Deposits

Vein deposits carrying gold or lead-silver are commonly localized along northeast-trending faults in the mineralized quartz monzonite porphyries and the surrounding Ely Limestone and the Chainman Shale. Replacement deposits in the limestones are often found adjacent to these veins. The veins can carry as much as 1 ounce of gold and 20 ounces of silver per ton, as in the Chainman gold mine (NBMG 1976).

Supergene Deposits

Supergene copper deposits are of two types in the Robinson Mining District: 1) oxidized deposits above the water table, and 2) chalcocite blankets near and below the water table. The oxidized zone is generally 100 to 400 feet thick and carries copper oxides, hydroxides, and carbonates, such as malachite, azurite (hydrated copper carbonates), and chrysocolla (hydrated copper silicate). Limonite, hematite (iron oxides), and jarosite (hydrated iron sulfate) are often found in the oxide zone along with jasperoid (massive, vuggy silica) replacement of limestones. Oxidation at the Richard and Alpha mines (western part of the district) extends to 1,800 feet (NBMG 1976).

Supergene chalcocite blankets (high-grade secondary copper sulfide) were the source of most of the ore before 1950 (NBMG 1976) and were mined at the Ruth, Liberty, and Kimberley Pits. The chalcocite zone is up to 300 feet thick and is mostly below the present water table. These copper-enriched blankets are found associated with disseminated deposits in the monzonite and replacement deposits in the sedimentary rocks adjacent to the mineralized intrusions. In many places they are restricted to gouge-filled (clay-filled) fault zones (NBMG 1976). Copper grades average 1% to 2% copper but can be as high as 5% copper (Ruth Mine).

Previous Mining of Mineral Deposits at Robinson

The following descriptions of the mining operations at the Robinson Mine are adapted from Piteau (2020b). Open-pit mining in the project area has occurred at several open pits; however, modern mining has been focused in the Ruth, Liberty and Tripp/Veteran Pits. The four active open pits in the project area with a total authorized surface disturbance of 1,852.1 acres as follows:

- Aultman Pit (20.0 acres)
- Liberty Pit (670.6 acres)
- Tripp/Veteran Pit (554.6 acres)
- Ruth Pit, comprising the Ruth West and Ruth East Pits (606.9 acres)

The Liberty Pit was the first large-scale mining operation in the district and was mined from 1908 through 1978 (Piteau 2020b). Mining operations resumed in 1993 and continued until 2000, and again in 2013–2014. Periodic sump pumping has occurred since 1993 to transport water between pits and to remove additional pit water accumulation. The designed pit floor elevation was 6,450 feet; however, a failure in the north wall of the Liberty Main Pit in 2014 displaced rock material and modified the pit geometry. The actual pit floor elevation of the Liberty Main Pit is estimated to be 6,490 feet. During the period when mining was suspended at Liberty Pit (1999 to 2013) two pit lakes were developed. A saddle at the

elevation of 6,600 feet divides the larger Liberty Main Pit lake from the smaller Liberty East Pit and pit lake.

The Ruth ore body was discovered in 1901 and was initially mined by underground methods. In 1951 Deep Ruth Shaft sinking was initiated to allow block caving at deeper levels. The deposit was worked as an open pit from 1971 through 1978. Gold mining from the Ruth Northwest Pit and peripheral deposits surrounding the Ruth Pit were mined periodically from 1986 through 1991.

Mining in the Ruth Pit resumed in 2007 with removal of Alta Gold tailings from the pit. At the present time, active mining is only occurring in the Ruth Pit complex (comprising the Ruth West and Ruth East Pits). Mining in the Ruth Pit complex would continue through 2024 for the Ruth West Pit 5 phase of mining. Mining in the Ruth East Pit would be completed in 2020 (Figure A-14). There are currently no plans to mine Ruth Pit beyond these phases. As stated previously, the Ruth Pit complex comprises two smaller sub-pits, the Ruth West and Ruth East Pits, which are unified above the 6,550-foot elevation. The Ruth West Pit is the larger of the sub-pits would be mined to a final pit floor elevation of 5,700 feet (Ruth West 5 phase). The Ruth East Pit would be mined to a final pit floor elevation of 6,050 feet. Mining in the Ruth Pit complex also included the Kimberley Pit, a small satellite pit northeast of the Ruth East Pit, and the Wedge Pit. Both of these pits have been fully backfilled with non-PAG material.

The permitted Ruth Pit mine intersects a prolific carbonate aquifer to the south known as the “South Block.” The South Block has been actively dewatered since June 2007 to safely mine the Ruth Pit. The South Block dewatering is designed to lower the water table to the 5,900-foot elevation prior to 2024, which corresponds to the intersection of unaltered limestone material and the area of the Ruth West Pit that is mined. Upon mine closure, groundwater would recover and reach an equilibrium elevation of 6,611 feet amsl. This would result in pit lakes in both Ruth East and Ruth West Pits.

3.4.2 Environmental Consequences

3.4.2.1 Analysis Method

Potential issues related to geology and minerals include 1) geologic hazards created or exacerbated by development of the Proposed Action or alternatives, 2) damage to pits and WRDs caused by seismically induced ground shaking, 3) surface subsidence and ground deformation resulting from the lowering of the groundwater table, and 4) exclusion of future mineral resource availability caused by the placement of facility expansion areas (i.e., WRDs, borrow areas, stockpiles).

Environmental impacts to geology and minerals from the Proposed Action or other action alternatives center around the following specific issues:

- Impact to a facility caused by geologic hazards, including landslides and catastrophic slope failures or ground subsidence
- Structural damage or failure of a facility caused by seismic loading from earthquakes
- Restriction of future extraction of known mineral resources
- Alteration of the geologic terrain from a project facility resulting in a geologic hazard

3.4.2.2 Direct and Indirect Impacts

Alternative A: No Action

Under the No Action alternative, the project would not be developed, and associated impacts to mineral or geologic resources would not occur. Geology and associated mineral resources would continue to be

impacted by existing mining for another 2 years. These impacts would continue as currently observed and described for in the Affected Environment section and as disclosed in previous NEPA documents that analyze the existing mine operations (BLM 1994a, 2016a, 2019a). Currently the mine is scheduled to close in 2024, followed by reclamation and ultimate closure in accordance with Nevada and BLM requirements (see Appendix E). Final WRDs closure actions would include regrading the non-PAG side slopes to 2.5 feet horizontal distance per 1 foot of vertical rise (2.5H:1V), regrading top surface to minimize ponding, placing vegetation-supporting soil cover over the regraded top surfaces followed by scarification, and revegetation of dump surfaces. Salvaged growth media would be placed over the regraded WRD areas during reclamation. In addition, safety berms and stormwater BMPs would be used during the construction, as necessary (see Appendix D of Appendix C [2019 Mine Plan Amendment]). Pits would remain as is with the exception of the Ruth Pit, which would likely be partially backfilled with waste rock from the Liberty Pit mining that would occur on private land. Impacts of this backfill would be similar to the backfill impacts described under Alternative D. Upon completion of closure, remaining geological resources would be removed from future development.

Alternative B: King Waste Rock Dump (Proposed Action)

The Proposed Action would include the following project elements as described in the 2019 Mine Plan amendment (KGHM 2019a):

- Extend mine life to 2028.
- New disturbance requested in the Mine Plan amendment would result in a total increase of approximately 1,228 acres of surface disturbance within the project area for a new end of mine life (EOML) total surface disturbance of 10,115 acres. The proposed increase would include 246 acres of new disturbances on private land controlled by KGHM Robinson and 981 acres of new disturbance located on BLM-managed lands.
- Resumption of Liberty Pit mining, including expansion of the existing Liberty Pit footprint to the north and south onto disturbed areas, while reducing the authorized footprint along the eastern pit boundary. The Liberty Pit footprint would expand by approximately 64 acres for a new total EOML 2028 footprint of 703 acres, all of which would be located on private land and within previously authorized disturbances. The proposed expansion would lower the pit floor approximately 280 feet, from approximately 6,580 to 6,300 feet in elevation.
- Resumption of the Liberty Pit dewatering to remove excess water and maintain the pit in a minable condition. KGHM Robinson would reactivate existing pumping and piping facilities including pumps and pipelines to convey Liberty Pit water to the mill for use in the process circuit.
- Construction of the new King WRD south of the Liberty and Ruth Pits to accommodate waste rock mined mainly from the Liberty East Pit. The dump footprint would be approximately 260 acres, with 12 acres located on private and 248 acres located on BLM-managed lands. The approximate dump height would be 700 feet above ground surface.
- Excavation of soils from borrow pits adjacent to the Giroux Wash TSF to construct in previously approved annual vertical rises of the TSF perimeter. This includes expanding borrow areas and growth media stockpiles onto previously undisturbed areas adjacent to the existing TSF disturbances. Site-clearing activities would include vegetation removal and growth media salvage on undisturbed areas. The salvaged material would be placed in growth media stockpiles located around the TSF perimeter. These actions would result in a total of 639 acres of new TSF yard disturbance (545 acres of BLM-managed lands and 94 acres of KGHM Robinson-owned private lands). Where necessary, ditches would be constructed to divert stormwater surface flows around the TSF perimeter (see Appendix D of Appendix C [2019 Mine Plan Amendment]).

Geologic Hazards and Geotechnical Considerations

Geotechnical considerations include potential damage to process and storage facilities due to ground movement during both operation and post-closure periods. Potential ground movement includes slope instability under static and earthquake loads, and settlement and ground deformation of foundation materials resulting from groundwater-induced subsidence.

King Waste Rock Dump

Under the Proposed Action, the King WRD would accommodate waste rock mined mainly from the Liberty East Pit. WRD construction would be consistent with construction design for similar past WRDs (Geomega 2017). The dump footprint would be approximately 260 acres, with 12 acres located on private and 248 acres located on public land. The approximate dump height would be 700 feet above ground surface. It would be constructed in 50-foot lifts. At a minimum, the outer 75 feet horizontally of each lift would be constructed of non-PAG material. The slopes would be designed at an overall angle of 2.5H:1V, with each lift being constructed at 1.5H:1V. This would allow for an easier reclamation process, reducing the amount of material movement required. All haulage access roads are designed at 120 feet in width at a 10% ramp angle. This WRD would contain approximately 140 million tons of waste rock from the Liberty Pit. Site-clearing activities would include vegetation removal and growth media salvage on undisturbed areas. The salvaged material would be placed in growth media stockpiles. If required, ditches would be constructed up-gradient of the stockpiles to divert surface water flows and reduce the potential for erosion. As per the applicant's *Comprehensive Waste Rock Management Plan* (KGHM 2017) (Appendix K), at least 50 feet (horizontal) of non-PAG waste rock would armor side slopes of each WRD. Waste rock would be characterized and separated onto PAG and non-PAG material and placed on active WRDs. Ore and waste rock materials would be hauled via new and existing haul roads with the new haul roads constructed within the pit and WRD footprints, as necessary.

Geotechnical stability analyses were performed for waste rock disposal areas after reclamation to verify that the reclaimed slopes would be stable at the final gradient (KGHM 2016). Both static and pseudo-static cases were analyzed to determine potential failure surfaces and factors of safety. The static analysis was used to model dump slope stability under normal gravity loading conditions, whereas the pseudo-static analysis was used to model the effects of potential earthquake forces on dump slope stability. The analyses were performed using slope stability analysis software Slide (V.5.026).

Material strengths used for the mine waste on existing and proposed dumps and the natural subgrade underlying the dumps were based on test results obtained by Welsh Engineering (1991) during the design of the tailings impoundment and heap leaching facilities. The waste dump material was assumed to have a friction angle of 29 degrees, cohesion of 445 pounds per square foot, and a unit weight of 133 pounds per cubic foot. The direct shear testing for the waste dump material was conducted on a composite sample from three existing waste dumps that had been exposed to weathering for several years.

The natural subgrade was assumed to have a friction angle of 32 degrees, no cohesion, and a unit weight of 125 pounds per cubic foot. Based on a seismic evaluation of the site conducted by Welsh Engineering (1991) during the design of the tailings impoundment and heap leaching facilities, a horizontal ground acceleration of 0.05 g (5% of g) was used for the pseudo-static case and represents a seismic event with a 200-year return period.

The results of the stability analyses for the maximum waste dump height indicate that the critical failure surface has a factor of safety of 1.56 for static conditions and 1.36 for pseudo-static conditions. The results of the stability analyses for both the static and pseudo-static cases indicate that the 2.5H:1V slopes proposed for the final reclaimed waste dumps would be stable under long-term conditions, including potential seismic loading anticipated at the site (KGHM 2016).

The criteria used for the stability evaluations were based on industry standards for the minimum static and pseudo static factors of safety for design of WRDs (1.3 static and 1.1 pseudo static). A factor of safety is used to provide a design margin so that a slope is stable and would not experience critical failure due to slumping or sliding. A computed factor of safety greater than or equal to 1.0 implies that the slope would be stable and is strong enough to support the assumed design loads. The results of the slope stability evaluation indicate adequate factors of safety for both static and pseudo static (i.e., seismic) conditions for the analyzed waste rock facility sections. The computed factor of safety of 1.36 for pseudo-static analysis is well above the minimum recommended value of 1.1. It should be noted that the selected seismic event (200-year return period) used for the stability analysis does not meet current industry practice, which recommends design to an earthquake with return period of 475 years (British Columbia Mine Waste Rock Pile Research Committee 1991; Hawley and Cunning 2017). Based on a review of the available information related to the proposed King WRD construction, as well as the local climatic and seismic conditions, a dump stability rating between 300 and 600 was estimated following guidance from British Columbia Mine Waste Rock Pile Research Committee (1991). This rating suggests the need for thorough site investigations, limited laboratory testing, and stability analyses as part of the design and construction of the WRD and routine visual monitoring post-construction. Accordingly, final design for the King WRD would include this thorough site investigation, design-specific stability analysis, and continual monitoring during operation to identify and rectify any unforeseen stability issues that may arise.

Final King WRD closure actions would include regrading the non-PAG side slopes to 2.5H:1V regrading top surface to minimize ponding, placing vegetation supporting cover over the regraded top surfaces followed by scarification, and revegetation of dump surfaces. Salvaged growth media would be placed over the regraded WRD areas during reclamation. In addition, safety berms and stormwater BMPs would be used during the construction, as necessary (see Appendix D of Appendix C [2019 Mine Plan Amendment]). Consistent with general practice for waste rock disposal areas, the King WRD would be directly revegetated by amending dump surfaces in order to create an acceptable growth media, as described in the reclamation plan description in KGHM (2019a). For new dump expansions, consistent with the 1994 final EIS (BLM 1994a), salvaged growth media would be used first to cover the regraded top surfaces prior to revegetation (KGHM 2016). Run-on diversion for the proposed post-closure topography would not be required for any of the final WRD area configurations.

Liberty Pit

The Liberty Pit comprises two smaller sub-pits; the Liberty Main Pit (Liberty Main) is the largest and furthest west, and the Liberty East Pit is to the east. Neither is being mined at this time; however, mining is proposed for the Liberty East Pit expansion, which is located entirely on private land (see Figure A-14 and Figure A-15). The impacts of this expansion are considered together with the other elements of the Proposed Action.

Pit locations and footprints at the EOML are shown on Figure A-14. No current mining is being conducted in the Aultman, Liberty, or Tripp/Veteran Pits. Authorized mining activities are currently concentrated in the Ruth Pit. The Proposed Action involves resuming mining in the Liberty Pit, requiring expansion of the existing Liberty Pit footprint to the north and south onto disturbed areas, while reducing the authorized footprint along the eastern pit boundary.

The Liberty Pit expansion would be along the north, east, and south sides of the existing Liberty Pit. This expansion would be approximately 1,150 feet tall at the deepest portion of the pit. The expansion will range in elevation from 7,450 to 6,300 feet in elevation. The pit would be constructed in 50-foot benches with bench face angle designed at 65 degrees and overall wall angles that range from 20 to 33 degrees depending on the rock type of the final wall. All haulage access roads are designed at 120 feet in width at a 10% ramp angle. The pit contains approximately 182 million total tons of material, with approximately

48 million tons of ore. The Mine Plan indicates that a total of approximately 38 million short tons of ore and 134 million short tons of waste rock would be mined from the Liberty East Pit through to the planned end of pit mining in 2028. Direct impacts of the Proposed Action on geologic and mineral resources would include: 1) the mining of proven and probable ore reserves of approximately 38 million short tons; and 2) the generation and permanent disposal of approximately 134 million short tons of waste rock.

Open pit walls can experience periodic slope instability problems due to weak geologic materials; adversely oriented geologic structures such as bedding, faults, and jointing; and the presence of groundwater. The Liberty Main Pit experienced a slope failure in 2014; however, the Liberty East Pit has not experienced any slope failures. Current design of the pit expansion, combined with the relatively small size of the Liberty East expansion (64 acres), would minimize this risk. Currently, KGHM Robinson conducts continual stability monitoring of its pits using slope stability mining radar. This provides for real time monitoring and advance warning signals before any slope failures.

As with all of its open pits, KGHM Robinson would close the Liberty Pit in a manner that is protective of the public safety, consistent with Nevada mining regulations (KGHM 2016). Physical barriers (berms) comprising adjacent non-acid-generating natural materials (e.g., soil, rock) would be constructed to restrict access to the pits. The berms would be placed along a 50-foot setback distance from the final pit perimeter and constructed to a height of 6 feet with 2.5H:1V side slopes. The berm height is provided to dissuade off-road vehicular traffic, and the set-back is provided as a “safety bench” in the event that an off-road vehicle traverses the berm. Where potential instability of pit walls may compromise the effectiveness of a berm segment, the berm would be located in a stable area with a setback distance from the edge of the pit as necessary (i.e., greater than 50 feet). The berms would be revegetated, but setback areas between the berms and pit edges would not be revegetated to avoid attracting terrestrial wildlife. Appropriate danger warning signs would be placed and maintained around pit perimeters to dissuade human traffic.

Dewatering-induced Surface Subsidence

The predicted drawdown and potential impacts to water resources associated with the dewatering activities under the Proposed Action are addressed in Section 3.3 Geochemistry and Groundwater Quality and Section 3.11 Water Resources. The dewatering required for the Proposed Action would increase the areal extent and magnitude of drawdown compared to current conditions. This additional dewatering would lower groundwater levels in both fractured bedrock and basin fill sediments. The load born by the basin sediments as a result of groundwater removal and the associated lowering of groundwater levels would increase and result in compaction of the basin sediments, creating a risk of subsidence of the ground surface. Ground subsidence also can result in the development of cracks at the surface that are known as earth fissures. However, past and existing groundwater has not resulted in any known subsidence.

Blasting

Conventional drilling and blasting techniques would continue to be used to facilitate the proposed surface and underground mining. The U.S. Bureau of Mines has done extensive research to quantify the effects of blasting on a variety of structures (Siskind et al. 1980). This research led to the development of acceptable vibration standards and techniques to predict and control blast vibrations that reduce the risk of off-site damage. Blasting vibrations in the project area are monitored with blasting seismographs. The seismographs measure the rate of movement in three separate planes to determine the velocity of vibration. The monitored vibrations are recorded as the peak particle velocity in inches per second. The peak particle velocity is the maximum speed at which a particle in the ground is moving relative to its inactive state. Historical seismograph data from the project area indicate that the peak particle velocities are unlikely to exceed thresholds of 1.0 inch per second at 1,000 feet (site-to-source), 0.25 inch per

second at 2,000 feet, and 0.1 inch per second at 3,000 feet (BLM 2019c). The U.S. Bureau of Mines results establish a minimum safe vibration threshold for residential structures of 0.5 inch per second. Below this threshold, blasting vibration is unlikely to result in cracking or other structural damage. The historical blasting seismograph data for the site indicate that vibrations that exceed the 0.5-inch-per-second threshold are restricted to areas within a site-to-source distance of up to approximately 1,500 feet. Therefore, blasting vibrations are not expected to damage any residential structures at distances of greater than 1,500 feet from the blast locations.

Mineral Resources

Project infrastructure that would be permanently located on potential mineral resources include the open pits, WRDs, and TSF. Robinson has drilled several wells in locations where proposed facilities would be located and has determined that no extractable mineral resources are present in those areas. Geology underneath facility footprints is largely limestone (KGMH 2019b, 2019c, 2019d, 2019e). Accordingly, the Proposed Action would not impede the extraction of marketable mineral resources.

During operation, the Proposed Action would include the mining of proven and probable ore reserves of approximately 113 million pounds of copper, 767,699 pounds of molybdenite, 51,277 ounces of gold, and 67,534 pounds of silver annually. Over the life of the project, this would result in a total of approximately 905 million pounds of copper, 6 million pounds of molybdenite, 410 thousand ounces of gold, and 540 thousand pounds of silver that would be extracted. This recovery of ore resources would be permanent and would directly reduce finite mineral resources. Impacts to mineral resources would therefore be irreversible because the ore would be permanently removed during the mining process. However, this removal would represent a relatively minor impact considering the occurrence of mineral-bearing rock in the region.

In summary, the Proposed Action would result in the permanent alteration of the landscape on approximately 1,228 acres of proposed new disturbance. This would include expansion areas for open pits and WRDs and development of borrow areas, which would permanently alter the natural topographic and geomorphic features in the area and would permanently remove the ore reserves described in the previous paragraph. Mine facilities and operations would not increase risks associated with geologic stability or subsidence.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Alternative C would keep all project elements described in the 2019 Mine Plan amendment, including both the North Tripp and King WRDs; however, the allowable footprint of the King WRD would be substantially reduced. Specifically, the areal extent of the King WRD would be restricted and decreased by approximately 10% from the Proposed Action through elimination of all proposed WRD development east of County Road 44A. The remaining volume of waste rock resulting from a decreased King WRD would be disposed of in the North Tripp WRD, per the 2019 Mine Plan amendment. The total surface disturbance of the reduced King WRD would be 234 acres, of which approximately 12 acres would be private land owned by KGMH Robinson and the remaining 222 acres would be BLM-managed lands. The expansion of the North Tripp WRD would be similar to that described in the 2019 Mine Plan amendment (i.e., an increase in total WRD area by 169 acres, with approximately 102 acres of the new disturbance located on private and 67 acres on public land).

Under this alternative, potential impacts to geology and mineral resources would be the same as described for the Proposed Action, with the following exception. Under this alternative, the project would result in the permanent alteration of the natural topographic and geomorphic features on approximately 1,106 acres of proposed new disturbance for open pits, WRDs, and borrow areas. The impacts associated with the permanent alteration of the natural topographic and geomorphic features would be localized to the project area.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Alternative D would retain all the project elements described in the 2019 Mine Plan amendment (KGHM 2019a) with the exception of North Tripp WRD, and would include a substantially reduced footprint for the proposed King WRD as described under Alternative C. In addition, it would allow for backfilling of the Ruth East Pit as a means of disposing additional waste rock that would exceed the total volume that could fit within the reduced area of the King WRD. This would include backfilling the Ruth East Pit with non-PAG material derived from the East Liberty and Ruth West Pits. The Ruth East Pit is already anticipated to be backfilled with material derived from Ruth West Pit. The project would add non-PAG material from the Liberty East Pit to the backfill, for a total quantity of approximately 97 million tons of non-PAG waste rock emplaced to an elevation of 6,840 feet (Figures A-16 and A-17). Backfilling the Ruth East Pit would eliminate the potential for any future pit lake at that location. However, backfilling the Ruth East Pit would also remove the opportunity for a groundwater sink in a pit lake, with backfilled rock interacting with and potentially impacting groundwater resources as discussed in Section 3.3 Geochemistry and Groundwater Quality.

KGHM Robinson has stated that their operational plan under Alternative D would be to fill the Ruth East Pit to approximately 6,840 feet in elevation, or approximately 600 feet above the current pit floor, with non-PAG waste rock. At least a 50-foot-thick layer of additional non-PAG waste rock would then be placed atop the PAG to act as a cover or cap, thereby reducing the potential for infiltration into the PAG material. Because Alternative D includes partially backfilling the Ruth East, it has differing impacts in comparison to the Proposed Action and Alternative C. These include the following:

- Alternative D could increase final mine reclamation costs because of the need to borrow additional non-PAG rock to close the project area because most available non-PAG material would be used to backfill the Ruth East Pit.
- Alternative D would functionally eliminate the ability to resume mining in the Ruth East Pit under the backfill if that option were to be considered in the future.
- Groundwater quality of the South Block would be more adversely impacted because of the groundwater flow-through in the Ruth East Pit. Once pit dewatering stops, the groundwater level in the Ruth East Pit would rebound and that water would be leaching chemical constituents from the waste material placed in the pit (see Section 3.3 Geochemistry and Groundwater Quality).

Under this alternative, potential impacts to geology and mineral resources would be the same as described for the Proposed Action, with the following exception. Under this alternative, the project would result in the permanent alteration of the natural topographic and geomorphic features on approximately 932 acres of proposed new disturbance for open pits, WRDs, and borrow areas. The reduced disturbance area (as compared with the Proposed Action and Alternative C) is associated with placing waste rock in an existing pit instead of expanding or building new WRDs. The impacts associated with the permanent alteration of the natural topographic and geomorphic features would be localized to the project area.

3.4.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

The action alternatives would have an irreversible alteration of 932 to 1,228 acres of the project area's natural topographic and geomorphic features. Mining disturbance would be reclaimed and revegetated as described above, but would not be fully restored to pre-disturbance topography. Similarly, the mineral extraction described above would be an irreversible loss of those minerals in that they are finite resources that once removed, would not be replaced or restored. The project would not impact the long-term geologic stability of the project area or the region.

3.5 Air Quality and Greenhouse Gas Emissions

3.5.1 Affected Environment

3.5.1.1 Air Quality

Air quality is determined by the quantity and chemistry of atmospheric pollutants in consideration of meteorological factors (i.e., weather patterns) and topography, both of which influence the dispersion and concentration of those pollutants. The presence of air pollutants is due to a number of different and widespread sources of emissions. The Clean Air Act requires the EPA to set National Ambient Air Quality Standards (NAAQS), both primary and secondary, for pollutants considered harmful to public health and the environment. Primary standards provide public health protection, and secondary standards provide for public welfare, including protection against degraded visibility and damage to animals, crops, vegetation, and buildings (EPA 2019a). The primary standards are set at a level to protect public health, including the health of at-risk populations, with an adequate margin of safety (EPA 2019a). The EPA has set NAAQS for six principal pollutants (“criteria” air pollutants): carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter equal to or less than 10 microns in diameter (PM₁₀) and particulate matter equal to or less than 2.5 microns in diameter (PM_{2.5}), sulfur dioxide (SO₂), and lead (Pb) (EPA 2019b).

The Robinson Mine is located in the Steptoe Valley and White River Valley Air Basins and is located in a rural area where gaseous concentrations are low (BLM 2019a). The area is in attainment for NAAQS (EPA 2020a). The Robinson Mine (Facility ID No. A0383) is permitted under the Class II Air Quality Operating Permit No. AP1021-0373.04 issued by NDEP Bureau of Air Pollution Control; this permit was renewed for 5 years in November 2019 (see EIS Appendix J). The 2016 permit application (No. AP1021-0373.03) includes air quality dispersion modeling. As discussed in the *Keystone Overdumping Amendment Final Environmental Assessment*, the total ambient concentrations (sum of modeled and prevailing air pollution from existing sources [i.e., the background concentrations]) resulting from Robinson Mine air emissions were less than the applicable Nevada NAAQS for all pollutants and averaging period (BLM 2019a:Tables 3.4–3.6). As a result, a revised dispersion modeling analysis was deemed unnecessary for permit renewal.

As required by the permit, Robinson adheres to a fugitive dust control plan (BLM 2016a). The three main sources of fugitive dust at the mine are site operations, trucking activities, and material stockpiling. Robinson implements EPMs such as water and/or chemical dust suppression and concurrent and interim reclamation to reduce potential for fugitive dust.

3.5.1.2 Greenhouse Gases

Climate change is a statistically significant and long-term change in climate patterns affected by the sum total of GHGs in the Earth’s atmosphere. The 2013 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report states that the atmospheric concentrations of well-mixed, long-lived GHGs, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), have increased to levels unprecedented in at least the past 800,000 years. Further, human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. It is very likely (95%–100% probability) that human activities have been the dominant cause of the observed warming since the mid-twentieth century (IPCC 2013)². CO₂ is the primary GHG emitted through human activities that contributes to climate change (81% of total United States GHG emissions in 2016); it is followed by CH₄ (10% of total 2016 emissions),

² The 2013 IPCC Fifth Assessment Report is the most recent to have been published. A sixth report is being prepared and is currently due for release in 2022. More information is available here: <https://www.ipcc.ch/assessment-report/ar6>.

N₂O (6% of total 2016 emissions), and fluorinated gases (3% of total 2016 emissions) (EPA 2018). The main human activity emitting CO₂ is the combustion of fossil fuels (including the combustion of coal) for electricity, heat, and transportation (EPA 2018). Global mean surface temperatures have already increased 1.5 degrees Fahrenheit (°F) from 1880 to 2012 (IPCC 2013). Additional near-term warming is inevitable because of the thermal inertia of the oceans and ongoing GHG emissions. However, climate change will impact regions differently, and warming will not be equally distributed. Both observations and computer model predictions indicate that increases in temperature are likely to be greater at higher latitudes, where the temperature increase may be more than double the global average. Models also predict increases in duration, intensity, and extent of extreme weather events. Warming of surface air temperature over land will very likely be greater than over oceans (IPCC 2013). Climate model projections for the Southwest (consisting of Arizona, California, Colorado, New Mexico, Nevada, and Utah) indicate consistently warmer conditions in 2 to 3 decades and temperatures rising steadily into the middle of the century (Gonzales et al. 2018). Since 2000, drought has reduced the flow of the Colorado River, which has reduced the contents of Lake Powell and Lake Mead to their lowest levels. This drought also increases the area burned by regular wildfires (Gonzales et al. 2018).

No national standards have been established regarding GHGs. In addition, the tools necessary to quantify incremental climatic impacts of specific projects or activities are presently unavailable. However, CEQ draft guidance states that NEPA documents for proposed federal actions resulting in direct GHG emissions of 25,000 metric tons (MT) per year should include a GHG emissions analysis of alternatives. The reference point of 25,000 MT of direct GHG emissions is not an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, but serves as a minimum for conducting a quantitative analysis (CEQ 2014). The EPA’s Mandatory Greenhouse Gas Reporting rule requires industrial facilities and suppliers of fossil fuels or industrial gases that result in greater than 25,000 MT of carbon dioxide equivalent (CO₂e) of GHG emissions per year to report their emissions (EPA 2009). Table 3.5-1 lists the industry sector, number of reporting facilities, and total GHG emissions for the United States and the State of Nevada for reporting year 2018 from the EPA’s Facility Level Information on Greenhouse Gases Tool (FLIGHT) (EPA 2019c). These data are useful to understand which large sources of anthropogenic emissions are contributing to GHG emissions both nationally and at the state level.

Table 3.5-1. 2018 Greenhouse Gas Emissions by Industry Sector

Industry Sector	Number of Reporting Facilities (United States)	Number of Reporting Facilities (Nevada)	United States Reported GHG Emissions (million MT of CO ₂ e)	Nevada Reported GHG Emissions (million MT of CO ₂ e)	Global Anthropogenic GHG Emissions (million MT of CO ₂ e)
Power plants	1,389	17	1,815	14	–
Petroleum and natural gas systems	2,319	6	316	0.3	–
Refineries	140	1	181	0.01	–
Chemicals	457	1	191	0.03	–
Other	1,316	6	130	0.7	–
Minerals	383	5	116	1.9	–
Waste	1,498	5	109	0.3	–
Metals	304	1	94	0.02	–
Pulp and paper	218	1	36	0.03	–
Total[†]	7,655	43	2,987	17	49,000[†]

[†] Total reporters shown may be less than the sum of the number of reporters in the selected source categories because some facilities fall within more than one source category.

[†] Data from IPCC (2014).

The two most recent NEPA analyses conducted for the Robinson Mine disclose the calculated amounts of GHGs produced by mine operations on an annual basis. The 2016 *Robinson Mine Expansion Project Final Environmental Assessment* states that the mine produces an estimated 329,614 tons per year of CO₂e (BLM 2016a). The 2019 *Keystone Overdumping Amendment Final Environmental Assessment* states that mine operations generate an estimated 332,547 tons per year of CO₂e (BLM 2019a).

3.5.2 Environmental Consequences

3.5.2.1 Analysis Methods

Impacts to NAAQS criteria pollutants were determined based on the results of the dispersion modeling conducted for the 2016 permit application (No. AP1021-0373.03). Those impacts would continue under all alternatives (including the No Action), but would vary in terms of how many years they would continue.

The incremental contribution to global GHGs from a proposed land management action cannot be accurately translated into effects on climate change globally or in the analysis area of any site-specific action. As a consequence, an assessment of effects of the Proposed Action and alternatives on a global or even regional level cannot be performed. However, it is possible to analyze the incremental contribution of the Proposed Action and alternatives to GHG, which contributes to global climatic impacts. Because of the cumulative nature of GHG emissions on global climate, the BLM identified three analysis areas to best illustrate the context of the project's contributions to GHG and resulting climate change. These are the State of Nevada, the continental United States, and the entire planet.

3.5.2.2 Direct and Indirect Impacts

Alternative A: No Action

Under the No Action alternative, the BLM would not approve the 2019 Mine Plan amendment. Accordingly, KGHM Robinson would not have access to the necessary areas to dispose new waste rock nor access to additional areas around the Giroux Wash TSF to obtain soil material to increase the main dam height or the corresponding elevation of any of the perimeter dams around the TSF. Mining activity at the Robinson Mine would therefore permanently cease in 2024, as currently authorized, with the exception of limited use of vehicles and equipment for closure and reclamation-related activities. Accordingly, air quality would continue as is until 2024, at which point any mine-related emissions would cease.

Impacts Common to all Action Alternatives

If the BLM approves any one of the action alternatives evaluated in this EIS (the Proposed Action, Alternative C, or Alternative D), the Robinson Mine would be able to continue its current rate of ore production and related activities through 2028, with permanent closure and reclamation to follow. Air emissions, including GHGs, would continue to be generated by both stationary (e.g., milling and processing) and mobile sources (e.g., haul trucks and other vehicles) at approximately current levels.

The development of between 863 and 1,065 acres of new surface disturbance and the extension of the life of the mine to 2028 are not anticipated to increase potential emissions; potential emissions are expected to remain the same because the peak mining rate would not change when compared to authorized activities. Impacts would occur for an additional 4 years. The direct effects of the Proposed Action and alternatives would be similar to those of the currently authorized operations. As stated previously, an air quality dispersion modeling analysis conducted in support of the current Class II permit indicates that estimated

impacts would continue to be below the applicable Nevada NAAQS (BLM 2019a:Table 3.4–3.6). Therefore, direct impacts would be negligible to minor, long term, and localized. The indirect impacts of particulate emissions include dust deposited on vegetation, which would lower its productivity; however, the fugitive dust control plan would result in these impacts being minor and localized.

KGHM Robinson has stated that the most recent calculations for mine-related GHG emissions were completed in 2018 during preparation of the *Keystone Overdumping Amendment Final Environmental Assessment* (BLM 2019a). These estimates of approximately 332,547 MT per year of GHGs (in CO₂e) are assumed to be unchanged through the present (Barngrover 2020). The Robinson Mine is not subject to requirements under the EPA’s Mandatory Reporting Rule because mines are not required to report GHG emissions except for stationary fuel combustion source emissions. The mobile source emissions are not included in the mining source category. However, based on the EPA’s FLIGHT data from reporting year 2018 (see Table 3.5-1), the total emissions from the Robinson Mine, including all mobile source emissions, are less than 2% of the total GHG emissions reported in Nevada and approximately 0.011% of the nationwide GHG emission totals for reporting facilities when compared on a 100-year global warming potential basis³. When compared to the global GHG emissions, the emissions from the Proposed Action or other action alternatives would be approximately 0.0006% of the global emission totals based on IPCC data from 2010.

3.6 Recreation

Recreation, as an activity and resource, involves a broad spectrum of pursuits and levels of management, ranging from dispersed and casual recreation to permitted organized group uses. Typical recreation and recreation management in the region include off-highway vehicle (OHV) driving, scenic/historic driving and sight-seeing, hunting, hiking, wildlife viewing, horseback riding, camping, backpacking, mountain biking, geocaching, rock-hounding, picnicking, night-sky viewing, and photography.

The analysis area for recreation is the project area and a 5-mile buffer around the project area (Figure A-18). This buffer is considered an appropriate geographic extent for potential recreational setting, opportunity, and experience impacts because visitors within this area may experience changes to their desired recreation outcome, either physical impacts to recreation areas or noise or visual impacts, that affect recreational experience on adjacent lands.

3.6.1 Affected Environment

The public lands in the analysis area surrounding the town of Ely and the Robinson Mine are known for large-scale undeveloped areas and remoteness, which provide a variety of recreational opportunities for users who wish to experience primitive and undeveloped recreation, as well as those seeking more organized or packaged recreational experiences. Historical and present recreation that have occurred and are occurring in the analysis area include motorized-developed and dispersed recreational activities, motorcycle and OHV riding, mountain biking, camping, hiking, hunting, photographing, and historical/mining sightseeing. The Basin and Range landscapes provide long-distance vistas easily viewed from both paved and unpaved routes. The existing route system in the analysis area includes approximately 85 miles of public routes (i.e., managed by NDOT or the BLM). County Road 44A, north

³ Different GHGs have different effects on the Earth's warming due to their ability to absorb energy (“radiative efficiency”) and how long they stay in the atmosphere (“lifetime”). The global warming potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. For example, although CO₂ has a GWP of 1, the 100-year GWP for CH₄ is estimated to be 28 to 36, meaning that CH₄ will cause 28 to 36 times as much warming as an equivalent mass of CO₂ over a 100-year period (EPA 2017). The GWP for N₂O is estimated to be 265 to 298. The EPA uses measures of CO₂ equivalencies (CO₂e) to account for the difference in each GHG’s GWP.

of the project area, provides OHV access to public routes and lands west of the project area, such as the Egan Range (see Figure A-18).

3.6.1.1 Recreational Setting, Opportunities, and Experiences

The Ward Mountain Recreation Area (separately managed by the U.S. Forest Service [USFS] and the BLM), Egan Crest Trailhead, Garnett Hill Viewpoint and Garnet Hill Rock Hounding Area, Loneliest Highway Special Recreation Management Area (SRMA), and Ely Motorcycle Special Recreation Permit Area are each a designated recreation site and/or area and are within the analysis area (Figure A-19). Table 3.6-1 provides these sites’ total acres (or distance in miles) in the analysis area. The USFS-managed Humboldt-Toiyabe National Forest is located within the analysis area approximately 2 miles south of the proposed project.

Table 3.6-1. Recreational Setting: Designated Recreation Sites or Areas within Analysis Area

Designated Recreation Sites or Areas	Analysis Area (acres or miles)
Ward Mountain Recreation Area	30 miles of hiking, biking, cross-country skiing, equestrian, and winter sports trails; 18-hole disc golf course; and associated facilities
Garnet Hill Rock Hounding Area	1,213 acres
Egan Crest Trailhead	20 miles of signed trail for hiking, biking, cross-country skiing, equestrian, and winter sports trails
Loneliest Highway SRMA	33,981 acres
Ely Motorcycle Special Recreation Permit Area	45,424 acres

Ward Mountain Recreation Area

Ward Mountain Recreation Area North and South trailheads are separately administered by the BLM and the USFS. Wholly within the analysis area, Ward Mountain Recreation Area is a developed recreation site, with a newly renovated campground located at the USFS trailhead on the south side of U.S. Highway 6 (see Figure A-19). This South trailhead accesses a non-motorized trail system that includes 20 miles of trails and spans the slopes of Ward Mountain; it is available for hikers, bikers, winter sports enthusiasts (cross-country skiing, fat-biking, and snowshoeing), and equestrians. Potable water is available in the USFS-managed campground at the South trailhead. Warming-rest shelters are available along several of the South trails. Restrooms are available at both North and South trailheads.

Four trail loops of various lengths providing identical recreational opportunities are available at the North trailhead. These trails total 10 miles and meander through the sagebrush and pinyon-juniper forests of the northern slopes of Ward Mountain. Additionally, there is an interpretive hike (0.4 mile) “Weeds of the Great Basin” with 12 interpretive signs placed at various intervals. An 18-hole disc golf course is available and has recently been improved and upgraded. Other amenities include picnic tables, shade structures, trash cans, and restrooms at the trailhead. No potable water is available at the North trailhead (BLM 2020d).

Bureau of Land Management–Designated Areas

Garnet Hill Rock Hounding Area

Garnet Hill is the only designated rock hounding area in the Ely District and is an internationally known site for gem collectors looking for garnets. This area is wholly within the analysis area (see Figure A-18). Ruby red semi-precious gems are located in the rocky volcanic outcrops. Garnets can be found either

through careful rock breaking or by searching the surface and drainages for the dark colored stones. The area includes four picnic sites with grills and a handicap-accessible restroom. A group barbeque area is also available. There are two informal areas for tents or small campers; no water is available (BLM 2020e).

Egan Crest Trailhead

The Egan Crest Trailhead and trail system are approximately 5 miles north of the project area (Figure A-19). The trailhead consists of a large parking area and shade structures. The trailhead accesses more than 20 miles of signed trail that is open to both motorized and non-motorized uses. Short-term camping is allowed at the trailhead. The trailhead's easy access from U.S. Highway 50 provides a rest area for travelers using the highway. The trailhead is frequently used for a special recreation permitted motorcycle club.

Loneliest Highway Special Recreation Management Area

The Loneliest Highway SRMA is within the analysis area (see Figure A-18) and is along and on each side of U.S. Highway 50. The BLM manages this SRMA to provide recreational opportunities to the public that would otherwise not be available, reduce conflict among users, minimize damage to resources, and reduce visitor health and safety issues (BLM 2008a).

Ely Motorcycle Special Recreation Permit Area

The Ely Motorcycle Special Recreation Permit Area is in the eastern portion of the analysis area. The area is primarily used for a special recreation permitted motorcycle race. There have been other off-road vehicle races in the past in this permit area, and there could more in the future.

Other Recreation

The Northern Nevada Railway Museum, located within Ely, includes a railroad that departs the museum for tours of the Robinson Mine area (see the railroad/ghost train route on Figure A-18). The portion of U.S. Highway 6 within the analysis area is not identified as a Nevada Scenic Byway. There are no BLM-established wilderness areas or wilderness study areas within the analysis area.

Pilot Knob, a hilltop adjacent and north of the existing Robinson Mine, is a popular hiking area for locals of Ruth and Ely. Although no formal trail system or designated routes exist, there are numerous unnamed two-track roads that provide non-motorized recreational opportunities.

Hunting

The project area intersects with NDOW-managed Game Management Units (GMU) 121, 131, and 221 (see Figure A-19). Big game hunting in these GMUs primarily focuses on mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus canadensis*), pronghorn (*Antilocapra americana*), and desert bighorn sheep (*Ovis canadensis nelson*). Hunting seasons for these species range from late summer to fall for archery, fall for muzzleloader, and fall through winter for modern rifle hunting. No designated or established undesignated shooting areas have been identified in analysis area; however, target shooting is practiced in the analysis area. Upland birds and small-game species such as mourning dove (*Zenaida macroura*), Gambel's quail (*Callipepla gambelii*), chukar (*Alectoris chukar*), American crow (*Corvus brachyrhynchos*), black-tailed jackrabbit (*Lepus californicus*), and general varmint can legally be taken in the analysis area. Trapping for fur-bearing animals and the practice of falconry for game animals are allowed in the analysis area (NDOW 2020a).

3.6.2 Environmental Consequences

3.6.2.1 Analysis Method

This section analyzes the issue of how the proposed expansion of the mine and mining-related activities would impact existing recreational opportunities. The indicators used to analyze this issue include 1) the acres of management recreation prescriptions on BLM-managed land that would intersect the project, and 2) the length of public travel routes (e.g., roads, trails) that would be impacted by the project. The quantitative indicators are combined with a detailed qualitative description of how project elements would impact recreational experiences (e.g., noise, changes to landscape character).

The analysis relies on existing data, knowledge of mine layout and activities, and professional judgment. Spatial data were gathered from the BLM and from online resources. These data were overlain with spatial data for the Proposed Action and alternatives, and intersecting acreages were calculated using GIS. Most of the approximately 10,115-acre project area is already closed to public recreation. This analysis focuses on proposed disturbances (see Figure A-18 for an illustration of these areas: approximately 1,228 acres) in areas that are currently available for public recreation.

Recreational activities are interrelated and connected to other natural resources and resource uses. Therefore, changes in allowable uses and restrictions on other resources can affect recreational opportunities and use. This analysis was completed using the best available information, including state and federal agency information and recreation visitation numbers.

3.6.2.2 Direct and Indirect Impacts

Alternative A: No Action

Under the No Action alternative, KGHM Robinson would not develop the project, and existing recreational settings, access, opportunities, and experiences would continue under current conditions. The settings, landscape, recreation sites, roads, and trails within the analysis area would continue to be affected by current conditions and ongoing actions.

Impacts Common to all Action Alternatives

A direct decrease of acreage available for recreational activities would occur under all action alternatives. Each of the action alternatives would result in making differing amounts of acres unavailable for public entry, which represents the area that would be enclosed by perimeter fencing for public safety purposes. As a result of mining operations under all action alternatives, non-motorized, dispersed recreational opportunities on public land would be unavailable for public use; the acres unavailable for public use are provided in Table 3.6-2. No public routes, trails, or designated recreation sites would be lost.

Table 3.6-2. Acreage Unavailable for Public Recreational Use per Alternative

Impact Type	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Public dispersed recreational opportunities lost due to new disturbance	0 acre	793 acres	834 acres	767 acres
Miles of existing trails indirectly impacted	0 acre	4.7 miles	3.7 miles	3.7 miles

Foreseeable mining operations would decrease opportunities for dispersed recreation, including hunting, OHV driving, and hiking. These impacts would occur largely due to additional physical disturbance leading to a reduction in acres available for recreational opportunities. In addition to the direct loss of acreage available for recreational activities and opportunities, an expansion to the existing undeveloped, setting of the project area (particularly the Giroux Wash and King WRD vicinity) and surrounding area to a more developed, industrialized setting would occur under all action alternatives.

The portion of County Route 44A that would be closed to accommodate the King WRD would not impact existing recreation because there is currently a gate across County Road 44A prohibiting public access into the southern portion of the existing Robinson Mine. The current turn-around on County Road 44A at this location would remain in place.

The Garnett Hill Viewpoint and Garnet Hill Rock Hounding Area, Loneliest Highway SRMA, Ely Motorcycle Special Recreation Permit Area, and the recreational opportunities and setting include the existing Robinson Mine. None of the action alternatives would change the recreational setting or outcomes for any of these areas when compared with existing conditions.

Alternative B: King Waste Rock Dump (Proposed Action)

Under the Proposed Action, the King WRD would be constructed within 0.25 mile of one of the trails in the Ward Mountain Recreation Area North trail system (see Figure A-19). From this distance, a user on this portion of the trail would see and experience the industrialized setting of the King WRD for up to approximately 4.7 miles of the North trail system (approximately 16% of the total miles of trails in the North trail system) (see Table 3.6-2). These impacts include changes to the characteristic landscape views (see Section 3.10 Visual Resource), increased industrial noise from blasting, mine-related traffic, and equipment operation (including backup alarms). These increased noise levels associated with mining construction and operations would be audible to campers, hikers, mountain bikers, disc golfers, winter sports users, and equestrians. Additionally, under this alternative, approximately 793 acres of lands that provide recreational opportunity for hunting and other general recreational activities would no longer be available to the public.

The degree of impact from noise on the surrounding landscape is largely dependent on terrain shielding, open landscapes, and mining noise dispersion. The proposed waste rock and tailings facilities, combined with natural topographic shielding, would reduce impacts from mine operation noise. Existing mine lighting currently impacts the nighttime recreational setting on lands surrounding the project area, and the Proposed Action would not introduce new increasing sky glow (indirect glow in night sky from unseen light sources) or direct glare from visible light sources.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Impacts under Alternative C would be similar to those described under the Proposed Action, except that the King WRD would be reduced in size by approximately 10%. This reduction would have indirect impacts to both the recreational setting and experience on 3.7 miles (12%) of the entire Ward Mountain Recreation Area trail system (approximately 4% less impact than the Proposed Action). The indirect impact to recreationists on the trail system would be less than under Proposed Action because the King WRD would not be constructed east of County Road 44A, and the changes to the recreational setting would be commensurately less. Additionally, under this alternative, approximately 834 acres of lands that provide recreational opportunity for hunting and other general recreational activities would no longer be available to the public. These lands include 67 acres of public land on Pilot Knob that would be impacted by the expansion of the of the Tripp WRD.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Impacts under Alternative D would be the same as described under Alternative C, with the exceptions that acres unavailable to public dispersed recreation would total 767 acres rather than 834, and that the Pilot Knob area would not be impacted.

3.6.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

There would be irretrievable impacts on recreation with all action alternatives through decreases in public land available for dispersed recreation, as well as indirect impacts affecting the recreational experience on adjacent lands. Noise and disturbance impacts would be irretrievable until cessation of mine operations (approximately 8 years). Visual impacts to recreationists would be irreversible in that reclaimed mining areas would still be visible and would contrast with the surrounding landscape. These visual impacts would lessen when these areas are reclaimed within 1 to 7 years (depending on revegetation success). Because recreationists have been subject to the existing mine disturbance since the BLM field office has managed recreation in the area, neither the small amount of public land impacts nor the increased irreversible visual impacts to recreationists would eliminate the long-term sustainable recreational experience currently provided in the vicinity of the mine. Because of the long history of mining in the area, there is an opportunity for KGHM Robinson to work with BLM to provide for interpretive signage at the Ward Mountain trailhead or along the trail to describe past mining history and current mining operations in segments of the trail from which mine facilities are visible.

3.7 Socioeconomics and Environmental Justice

Socioeconomics is a broad category that encompasses social and economic topics such as employment and labor income, housing and population trends, spending on goods and services, tax revenues, public services, and community values. The socioeconomic analysis issues and the indicators used to quantify effects of the Proposed Action and alternatives are provided below. The temporal scale of analysis for these socioeconomic issues comprises two distinct timeframes, one being the extended mine life to 2028 and the second being post-mine closure. The analysis area for direct, indirect, and cumulative effects is White Pine County, Nevada, including the communities of Ely and Ruth. This analysis area is the area most likely to be affected by project-related changes in social and economic factors because most project spending and employment is localized to this area. Socioeconomic data for the State of Nevada as a whole are also provided for context to the community and county-level effects.

Baseline socioeconomic data were obtained from the U.S. Census Bureau, BLM's Economic Profile System, Nevada Department of Taxation, White Pine County Treasurer's Office, City of Ely, and employment estimates from the 2019 Mine Plan amendment (KGHM 2019a). Additionally, baseline project-related employment and economic output for the existing mine operations were generated by the BLM using the Economic Impact Analysis for Planning (IMPLAN) modeling tool (IMPLAN Group 2020). The IMPLAN model estimates existing economic impacts using current localized economic data and mine-related output estimates. The IMPLAN modeling identifies the number of employees needed per million in production output.

Impact indicators for socioeconomics are as follows:

- Change in total (direct, indirect, and induced) mine operations employment
- Dollar amount of direct and indirect project spending
- Changes in tax revenues
- Changes in housing occupancy/vacancy
- Change in need for public services

3.7.1 Affected Environment

White Pine County, located in east-central Nevada, has a total population of approximately 10,678. This rural county is roughly 8,897 square miles and is characterized by open space, with most lands being federally owned and undeveloped. The county seat is Ely, Nevada, a town with a population of approximately 4,149 located 9 miles east of the Robinson Mine. The census-designated place Ruth, originally built as a company town for the Robinson Mine, is located 2 miles from the mine with an estimated population of 448. Population trends in the analysis area are presented in Table 3.7-1. White Pine County experienced the most growth in the analysis area from 2012 to 2018, with a 6.46% population increase. Populations in the Cities of Ely and Ruth experienced minimal change, with a -2.49% decrease in Ely and a 1.82% increase in Ruth. In Nevada as a whole, population increased by 13.22% from 2010 to 2018.

Table 3.7-1. Analysis Area Population, 2010 and 2018

Analysis Area	Population, 2010 [*]	Population, 2018 [†]	Percentage Change 2010 to 2018
White Pine County, Nevada	10,030	10,678	6.46%
Ely, Nevada	4,255	4,149	-2.49%
Ruth census-designated place, Nevada	440	448	1.82%
State of Nevada	2,700,551	3,057,582	13.22%

^{*} Data from U.S. Census Bureau (2010).

[†] Data from Nevada Department of Taxation (2018).

3.7.1.1 Economic History

White Pine County’s economic history includes boom-bust cycles that are typical of mining and other natural resource-based industries. Boom-bust cycles are characterized by times of economic growth when commodity prices and demand for materials are high, and by times of economic contraction when prices fall and demand decreases. The analysis area experienced several of these boom-bust cycles throughout the 1980s, 1990s, and early 2000s (White Pine County 2012). During each downturn, the analysis area experienced notable job losses, declining tax revenues, and funding shortages for public services. After mining operations at the Robinson Mine (then owned by BHP Billiton) were shuttered in 1999, the county lost more than 900 direct and indirect jobs, or 25% of total employment. Other effects of the closure included a 12% reduction in revenues for public schools, average of 37% decline in taxable business sales, home foreclosures and bankruptcies, and a 27% decline in residential home values (White Pine County 2012). Gradual economic recovery in the county followed each downturn, with growth fueled at first by oil and gas exploration, mineral exploration ventures, and tourism. Additional growth followed the construction of a new state prison facility in 1990. The largest driver of economic growth, however, has always been associated with an increase in mining activity (White Pine County 2012). White Pine County has worked to diversify its economy to include growth in agriculture, tourism and recreation, manufacturing, and renewable energy. Both the county and the City of Ely are working on economic resiliency planning, including mine closure planning and job retraining (White Pine County 2020a).

3.7.1.2 Industry and Employment

The mining industry is the largest employer in the county, with approximately 26% (1,380) employed by this industry (Table 3.7-2) (U.S. Department of Commerce 2019a). The next largest industries are government (25%), accommodation and food services (10%) and retail trade (8%). Industry estimates for Ely follow a similar distribution pattern as White Pine County (U.S. Census Bureau 2018a). Reliable employment estimates for the small rural community of Ruth are unavailable; however, because of the

proximity of the mine, it is assumed that some employment is also mining, food services, and retail trade related. As compared to the overall State of Nevada where the mining industry represents just 1.1% of total employment, the mining industry has an outsized influence on employment in rural counties like the analysis area.

In 2018, the annual average unemployment rate in White Pine County was 3% (U.S. Department of Labor 2020). The unemployment rate declined by 6.1% from 2010 when the unemployment rate was 9.1%. Unemployment is lower in White Pine County compared to the State of Nevada, where the 2018 unemployment rate was 3.9% (down from 13.5% in 2010).

The Robinson Mine current employment is a combination of 670 full-time, part-time, and seasonal direct employees, and contracted employees. For every one direct mine job, it is estimated that there are 0.58 indirect or induced jobs in mine-related industries and support businesses (including grocery stores, retail shops, and restaurants) (Table 3.7-3). The Robinson Mine total employment effect is 868⁴ (IMPLAN Group 2020). This total employment effect represents approximately 16% of White Pine County employment. The total annual output from the Robinson Mine is estimated to be \$418 million⁵ (Table 3.7-3) (IMPLAN Group 2020). This output value includes estimated labor income (employee compensation and proprietor income), intermediate inputs (spending on materials and equipment), taxes on products and imports, and other property income.

⁴ IMPLAN employment estimates represent an annualized count of full-time, part-time, and seasonal jobs and are not the same as full-time equivalent jobs.

⁵ Production output is estimated based on the Robinson Mine's reported mineral commodity production and a 3-year annual average of commodity prices.

Table 3.7-2. White Pine County Industry Employment, 2018

Industry	White Pine County, NV			State of Nevada		
	Employment, 2018	Percentage of Total Employed	Percentage Change, 2001 to 2018	Employment, 2018	Percentage of Total Employed	Percentage Change, 2001 to 2018
Non-services related	1,806	34.1%	65%	196,561	10.7%	14%
Farm	188	3.5%	-12%	5,093	0.3%	-4%
Forestry, fishing, and agricultural services	–	–	–	1,948	0.1%	38%
Mining (including fossil fuels)	1,380	26.0%	87%	19,810	1.1%	64%
Construction	171	3.2%	-12%	107,829	5.8%	0%
Manufacturing	67	1.3%	16%	61,881	3.4%	34%
Services related	2,362	44.6%	25%	1,472,599	79.9%	51%
Utilities	–	–	–	4,391	0.2%	-5%
Wholesale trade	51	1.0%	6%	40,854	2.2%	7%
Retail trade	431	8.1%	-18%	180,682	9.8%	33%
Transportation and warehousing	124	2.3%	94%	117,807	6.4%	177%
Information	27	0.5%	7%	21,841	1.2%	-1%
Finance and insurance	70	1.3%	-40%	87,208	4.7%	35%
Real estate and rental and leasing	187	3.5%	55%	107,764	5.8%	84%
Professional and technical services	142	2.7%	23%	102,072	5.5%	61%
Management of companies	50	0.9%	80%	32,723	1.8%	252%
Administrative and waste services	100	1.9%	80%	133,029	7.2%	63%
Educational services	12	0.2%	33%	18,034	1.0%	199%
Health care and social assistance	406	7.7%	41%	147,706	8.0%	96%
Arts, entertainment, and recreation	58	1.1%	53%	58,853	3.2%	42%
Accommodation and food services	532	10.0%	14%	331,566	18.0%	17%
Other services, except public admin.	172	3.2%	23%	88,069	4.8%	74%
Government	1,324	25.0%	-4%	174,655	9.5%	29%
Total Employment	5,307	–	25%	1,843, 815	–	43%

Source: U.S. Department of Commerce (2019a).

Note: Employment reported by place of work.

Table 3.7-3. Robinson Mine, IMPLAN Modeled Impact Summary

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct effect*	550.0	\$60,072,870	\$234,654,385	\$349,999,995
Indirect effect†	145.8	\$10,428,320	\$24,664,605	\$43,146,696
Induced effect‡	172.1	\$4,873,150	\$14,062,326	\$24,895,304
Total Effect§	868.0	\$75,374,340	\$273,381,316	\$418,041,995
Multiplier	1.58	1.25	1.17	1.19

* Direct effects are the immediate result of the direct spend of the project.

† Indirect effects stem from the project's purchase of goods and services from other local industries.

‡ Induced effects stem from household spending of labor income, after removal of taxes, savings, and commuters.

§ Intermediate inputs (spending on materials and equipment) are included in the total effect.

Source: IMPLAN Group (2020).

3.7.1.3 Housing

Housing demand and home values have historically fluctuated with rapid declines and increases following changes in the mining industry (White Pine County 2020a). During previous downturns, however, two housing trends emerged that helped to buoy housing recovery. Miners retained their homes in the analysis area while working mining positions elsewhere in the state, and low housing prices drew increased demand for second homes for southern Nevada residents (White Pine County 2012).

Housing units and vacancy rates in the analysis area are shown in Table 3.7-4. From 2010 to 2018, the total number of vacant housing units in the analysis area has increased. The 2018 vacancy rates were 22% in White Pine County, 17.3% in Ely, and 57.6% in Ruth. In the State of Nevada, the 2018 vacancy rate was 12.9% (U.S. Census Bureau 2018b). Despite the high vacancy rate, the county passed a resolution in 2019 declaring a critical housing need due to a lack of available and affordable housing (White Pine County 2019a). Fluctuations in the mining industry are viewed as a barrier to investment by housing developers. The lack of housing is also a known barrier to employment and business recruitment (White Pine County 2020a).

Home density in the analysis area is concentrated within the City of Ely and surrounding unincorporated areas of the county. The current distribution of Robinson Mine employees is not known, but it is assumed that most reside in the Ely area.

Table 3.7-4. Housing Units and Vacancy Rates

	White Pine County		City of Ely		Ruth Census Designated Place		State of Nevada	
	2018	Percentage Change, 2010 to 2018	2018	Percentage Change, 2010 to 2018	2018	Percentage Change, 2010 to 2018	2018	Percentage Change, 2010 to 2018
Housing Units								
Total	4,525	< 1	2,100	- 4	184	- 37	1,235,096	5
Occupied	3,529	- 5	1,736	- 6	78	- 53	1,075,930	7
Vacant	996	21	364	10	106	32	159,166	- 5
Total vacancy rate (%)	22.0	-	17.3	-	57.6	-	12.9	-
Vacancy Rate by Type (%)								
Homeowner units	3.3	-	1.9	-	-	-	2.1	-
Rental units	11.1	-	10.9	-	-	-	8.0	-

Source: U.S. Census Bureau (2012, 2018b).

3.7.1.4 Tax Revenue

Nine active mining operations, including the Robinson Mine, are in White Pine County. In fiscal year (FY) 2019, these active mining operations paid \$9.1 million in net proceeds tax and royalty tax to the county, of which \$3.5 million went to the general fund (Nevada Department of Taxation 2019). The Robinson Mine's portion of this general fund tax total was \$899,519 (26%). The total net proceeds of mining for FY2020 were estimated at \$3 million, which is approximately 20% of the White Pine County general fund revenues (White Pine County 2019b). In FY2020, the county estimates they will have a general fund balance of 27%, which is slightly above the 25% balance target required by County Resolution 2016-02 (White Pine County 2019b).

From 2017 to 2018, the annual gross proceeds from mining across Nevada declined by 4.1%, and mineral production decreased by 40% (Nevada Mining Association 2019). In 2018, the State of Nevada mining gross domestic product was \$3.2 billion, down from a high of \$6.3 billion in 2012. The Nevada Mining Association predicts an increase in commodity prices and production from 2019 to 2020 (Nevada Mining Association 2019). However, the White Pine County tentative FY2121 budget anticipates a 50% decrease in net proceeds of minerals due to reduction in mineral prices. An additional 20% revenue shortfall is anticipated due to effects of the ongoing public health pandemic and shelter-at-home orders (White Pine County 2020b).

The City of Ely receives tax revenue from mining via sales tax, which is accounted for in the modeled total economic output estimate above. The city's consolidated tax revenue, which is primarily sales tax, totaled \$1.4 million in 2019 (City of Ely 2019). The city budgeted expenses for 67% of this general fund revenue. City budgeting practices consider expected fluctuations in this tax revenue source and does not expect fluctuations to affect financial health in the short term (City of Ely 2019).

3.7.1.5 Public Services

The need for public services in the analysis area is based on current population, employment, and housing trends. Public services in the analysis area include the following county and municipal services:

- Public utilities (water, sewer, stormwater), regional landfill (with private disposal collection), and local rural electric cooperative
- Law enforcement, jail, and court system
- Fire protection, including both employed and volunteer departments
- Recreational facilities, libraries, and cultural facilities
- White Pine County School District
- Great Basin College, Ely Branch
- Variety of health care, emergency services, and social services

The county general fund provides funding for a variety of public services, including general government, public safety, judicial, health and sanitation, cultural and recreation, intergovernmental expenses. General fund budgeted expenses totaled more than \$13.4 million in FY2020 and are estimated at \$12.8 million for FY2021 (White Pine County 2020b).

Major improvement projects funded by the FY2020 general fund included upgrades to data processing systems for county government offices, replacement of an emergency dispatch center, and digitizing court records (White Pine County 2019b). The tentative FY2121 general fund has yet to identify proposed general fund capital improvements (White Pine County 2020b).

Funding for water, sewer, and landfill services in the City of Ely are funded via separate enterprise funds. Revenue for maintenance and capital improvements of these public services comes from these enterprise funds. The city’s general fund covers expenses for government administration; judicial services; public safety, health, and sanitation; cultural and recreation; and highway and streets. In FY2019, budgeted expenses for the enterprise funds and the general funds were each \$3.2 million (total of \$6.4 million) (City of Ely 2019). Public service improvement needs identified by the city include upgrading the water system, replacing aging sewer line infrastructure, and improving the landfill (City of Ely 2019).

3.7.1.6 Environmental Justice

Environmental justice is intended to promote the fair treatment and meaningful involvement of all people—regardless of race, ethnicity, or income level—in federal environmental decision-making. Executive Order (EO) 12898 (Clinton 1994) requires federal agencies to address disproportionate environmental impacts on minority and low-income populations. Should potentially significant and adverse impacts attributable to the project fall disproportionately on these populations, environmental justice impacts would result.

The project area was screened for the presence of potential environmental justice populations (EPA 2020b; U.S. Department of Commerce 2019b). The percentage of the population classified as low income in multiple block groups analyzed is equal to or greater than 50%, or it is more than 10 percentage points higher than that of the State of Nevada, which has a poverty rate of 14.2%. A low-income environmental justice population, therefore, is present for the purposes of this analysis (Table 3.7-5).

The percentage of the population identified as belonging to a minority group in each of the block groups analyzed is neither equal to or greater than 50%, nor is it more than 10 percentage points higher than that of the State of Nevada, which has a minority population of 49.5%. A minority environmental justice population, therefore, is not present for the purposes of this analysis (see Table 3.7-5).

Concentrated populations of American Indians live within one or more of the census block groups included in the analysis area. An American Indian environmental justice population, therefore, is present for the purposes of this analysis (see Table 3.7-5).

Table 3.7-5. Percentage of Low-Income and Minority Populations within the Analysis Area

Census Geography	Low Income	Minority	American Indian
Block Group 9702-002	44%	35%	22%
Block Group 9702-003	15%	16%	0%
Block Group 9702-004	28%	46%	3%
Block Group 9703-001	51%	32%	10%
Block Group 9703-003	21%	17%	5%
State of Nevada	14%	50%	1%

3.7.2 Environmental Consequences

3.7.2.1 Analysis Method

This analysis assumes that under all alternatives, including the No Action alternative, mine closure would occur in three phases, one initial layoff of most mine employees in 2028 (596 employees), with approximately 50 employees maintained for the first 2 years of reclamation; 20 employees for years 2

through 5 of reclamation; and four employees for years 5 through 30 of monitoring. The analysis for direct and indirect effects assumes that no other industries or markets are available in the analysis area to absorb mine employees. In the absence of other local opportunities, there would inevitably be some emigration from the analysis area post mine-closure. Any reasonably foreseeable future projects with local employment opportunities are analyzed in the cumulative effects section.

3.7.2.2 *Direct and Indirect Impacts*

Alternative A: No Action

Under the No Action alternative, mining operations would not be extended beyond 2024 and the effects of mine closure would occur 4 years sooner than under the action alternatives.

The socioeconomic affected environment described above would continue until mine closure in 2024. After 2024, the long-term effects of mine closure would include a reduction in employment, annual economic output, and tax revenue generation in the analysis area. The effects of mine closure would be similar to those experienced previously in the analysis area during mining downturns.

Industry and Employment

The Robinson Mine's annual output of approximately \$418 million (not accounting for inflation) and 868 total employment effect would continue until the EOML in 2024. The total employment effect attributed to the mine represents 16% of total employment in the analysis area (see Table 3.7-2) (IMPLAN Group 2020). If general employment trends persist through 2024, and in the absence of available alternative employment options, the analysis area's unemployment rate of 3% could sharply increase because of the mine closure. The length of time this unemployment rate increase would last depends on several factors, including whether there are alternative mining or similar skill-level jobs available in the analysis area and the rate at which job seekers accept employment outside of the analysis area.

Housing

The No Action alternative would continue current employment levels to 2024 and is therefore not expected to affect housing trends in the analysis area. After mine closure, housing vacancy rates could increase from foreclosures or job seekers moving outside of the analysis area. An increase in housing availability is unlikely to improve current housing needs in the absence of other employment or economic opportunities.

Tax Revenue

Mining tax revenue payments to White Pine County, representing 6% of the general fund, and sales taxes revenues to the City of Ely, reported as part of the total economic output above, would continue until 2024. Tax revenues from mining net proceeds are subject to fluctuations in the mineral commodity prices. Based on projections for the Nevada Department of Taxation, White Pine County is tentatively planning for a 50% reduction in overall mining net proceeds tax revenue in FY2021 due to low commodity pricing.

After mine closure in 2024, mining tax revenues and sales tax contributions from the Robinson Mine would stop. Without a reduction in budgeted expenses or alternative revenue sources, the county and city may encounter funding shortfalls due to the decline in revenues. The county and the city implement conservative budgeting measures to account for fluctuations in tax revenues; however, a long-term reduction in tax revenues would have long-term effects on these government's finances.

Public Services

Demand for existing public services would continue until mine closure in 2024. After mine closure, a reduction in employment, emigration from the analysis area, and increase vacancy rates would reduce the demand for public services. At the same time, a reduction in tax revenues to the county and City of Ely would also decrease available funding for public services.

Environmental Justice

Impacts associated with socioeconomic conditions resulting from mine closure would affect all populations within the analysis area, and therefore would not disproportionately affect environmental justice populations.

All Alternatives

Under all action alternatives, mine closure would be delayed until 2028. The socioeconomic benefits of mine operations would continue for an additional 4 years. Following mine closure, the socioeconomic losses would be similar to those described under the No Action alternative.

As compared to the No Action alternative, the extended mine life under all action alternatives would provide additional time for employees to seek out alternative employment opportunities. The extended mine life would also provide additional time for local governments to complete mine closure planning, including further economic diversification, replacement of lost general fund revenues, and improved housing stock resiliency.

Table 3.7-6 provides a summary comparison on the alternative impacts on socioeconomics.

Table 3.7-6. Summary Comparison of Alternative Impacts

Project Elements	Alternative A: No Action	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Change in total (direct, indirect, and induced) mine operations employment	<p>Mine operations to 2024 Continued total employment effect of 868 employees, or 16% of analysis area employment</p> <p>Post-Mine Closure Reduction in analysis area employment by 16% post-mine closure</p>	Similar to the No Action alternative, with the exception of extending mine life until 2028	Same as the Proposed Action	Same as the Proposed Action
Dollar amount of direct and indirect project spending	<p>Mine operations to 2024 \$418 million annual economic output continued</p> <p>Post-mine closure Loss of annual economic output</p>	Similar to the No Action alternative, with the exception of extending mine life until 2028	Same as the Proposed Action	Same as the Proposed Action
Change in tax revenues	<p>Mine operations to 2024 Continued 6% contribution to the county general fund and sales tax removes to the city</p> <p>Post-mine closure Loss of mine-related tax revenues</p>	Similar to the No Action alternative, with the exception of extending mine life until 2028	Same as the Proposed Action	Same as the Proposed Action
Change in housing occupancy/vacancy Change in need for public services	<p>Mine Operations to 2024 Continued current vacancy rates and current demand for housing</p> <p>Post-Mine Closure Increased housing vacancy rates Reduced demand for public services Reduced funding for public services from loss of tax revenues</p>	Similar to the No Action alternative, with the exception of extending mine life until 2028	Same as the Proposed Action	Same as the Proposed Action

3.7.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

Mine closure under all alternatives would result in irretrievable socioeconomic impacts related to the aforementioned loss of employment, tax revenue, and economic output. This irretrievable loss would be similar to the boom and bust experienced in 1999 (see Section 3.7.1.1 Economic History). As with this previous boom and bust cycle, these impacts would continue until this or another mine of comparable size opens, or when alternative economic generators and/or job sources become available in the area. The level at which these economic impacts would be irreversible would depend up on the type and amount of alternative economic generators. If such alternatives sources do not develop, the impacts of mine closure on the economy of the City of Ely and White Pine County would be irreversible. However, other economic drivers such as tourism, ranching, and mining in other mines near the city, would maintain a smaller sustainable economy, which, in turn, would provide for the social sustainability of the community.

3.8 Soils and Reclamation

This section describes the soils resources that would be affected by the proposed project as described in the *Robinson Plan of Operations Amendment for Expansion of Mining Activities* (KGHM 2019a). This section also discusses KGHM Robinson's plans for ongoing and future closure and reclamation at the Robinson Mine, and how those activities could affect soil resources.

3.8.1 Affected Environment

The analysis area for impacts to soils is the hydrologic unit code (HUC)-12 subwatersheds (NRCS 2020a) within which the proposed mining activities would occur. These subwatersheds are Giroux Wash (HUC 150100110101), Lower Gleason Creek (HUC 160600081202), and Town of Ely-Murry Creek (HUC 160600081203), and make up a total of 50,561 acres (Figure A-20). Temporally, the analysis considers impacts from project construction through achievement of final reclamation, which is anticipated to be within 5 years of end-of-mine permanent closure and WRD capping. The analysis methodology includes consideration of the NRCS-mapped soils types that would be disturbed, their recorded erodibility, and their applicability for use as reclamation growth medium. The proposal to create additional growth medium for reclamation purposes due to lack of growth medium from the historic mining operations is also considered. Affected Environment

The 50,561-acre analysis area includes 1,006 acres of farmland of statewide importance and 849 acres of areas that could be prime farmland if irrigated and reclaimed of excess salts and sodium.

Soils in the analysis area are generally within the taxonomic soil orders of aridisols (dry soils of the desert) and mollisols (fertile soils of grasslands), with small areas of entisols (young soils with little/no profile development) and alfisols (fertile, high base saturation, clay-enriched) (NRCS 2015). The project's biological baseline report provides a listing of dominant soil map units within these soil orders that occur within the proposed disturbance areas (Stantec 2019).

According to the NRCS, a soil's K factor is an index that quantifies the relative susceptibility of the soil to sheet and rill erosion. K factors range from 0.02 for the least water-erodible soils to 0.64 for the most water-erodible soils. As shown in Table 3.8-1, the analysis area contains soils that tend toward highly water erodible, with nearly two-thirds of the area having a K factor greater than 0.4. NRCS also provides a wind erodibility index for soils, which is a rough indication of the tons of soil per year estimated lost to wind erosion within each soil type. The wind erodibility index ranges from up to 310 for soils most likely

to be eroded by wind down to 0 for soils that are unlikely to be eroded by wind. The analysis area contains soils toward the less wind-erodible end of the scale, ranging from 0 to 86.

Table 3.8-1. Analysis Area Soil Characteristics

K Factor	Area (acres)	Percentage of Analysis Area	Wind Erodibility Index	Area (acres)	Percentage of Analysis Area
0.00–0.02	0	0%	0	6,074	12%
0.02–0.30	8,474	17%	38	1,372	3%
0.30–0.40	5,857	12%	48	35,215	70%
0.40–0.50	17,118	34%	56	2,973	6%
0.50–0.64	15,415	30%	86	1,231	2%
undefined	3,697	7%	undefined	3,697	7%
Total	50,561	100%	Total	50,561	100%

Source: NRCS (2020a).

3.8.2 Environmental Consequences

3.8.2.1 Analysis Method

Disturbances to soils increases their susceptibility to erosion. Highly erodible soil types have increased erosion rates. Long-term productivity of soil is decreased as the soil profile erodes. The area of soils with a K factor greater than 0.4 that would be disturbed is used as an indicator for level of impact from water erosion, and the area of soils with a wind erodibility index value greater than 55 is used as an indicator for level of impact from wind erosion.

The proposed project would not impact designated prime farmlands. However, it would impact areas designated as “Prime Farmland if irrigated and reclaimed of excess salts and sodium” (NRCS 2020b). These areas are associated with the entisol soil order. The acreage with this prime farmlands designation that would be disturbed is used as an indicator for level of impact to prime farmlands.

3.8.2.2 Direct and Indirect Impacts

Impacts to soils would occur through the disturbance and reclamation process, with steps that include growth media salvage, active mining disturbance and capping, growth media placement over recontoured and capped facilities, soil amendments, seedbed preparation, seeding for revegetation, and reclamation success monitoring. Discussion of these steps is included below to highlight measures to avoid and minimize impacts to soils. Detailed plans for these steps are included in KGHM Robinson’s reclamation plan (see Appendix G; KGHM 2019f).

Reclamation activities that would be required on mine facilities being permanently closed at end-of-mine life, such as capping of WRDs, would necessitate the reuse of topsoil stripped from disturbed areas to be used as growth medium on the closure areas. Because historic mining practices did not include reclamation planning (and topsoil stripping specifically), there would not be enough soil removed to meet the demand for reuse of growth medium on all reclamation areas; this shortcoming has required KGHM Robinson and past mine operators to develop a plan to use appropriate overburden along with amendments to create suitable growth medium.

KGHM Robinson would salvage topsoil to a depth of up to 12 inches from new areas of disturbance, creating temporary stockpiles to store the soil until needed for reclamation. The stockpiles would be seeded with BLM-approved seed mixes of fast-growing ground covers that would establish cover and

roots for erosion control while stockpiled. Topsoil would be stockpiled as berms along linear features like access roads, and non-linear features like TSF or WRD would be stockpiled in larger piles.

Facilities near the end of their life would begin to be prepared for final reclamation. Each type of facility has specific plans that generally include hydrologic isolation of acid-creating materials accomplished through surface water drainage diversions and material capping, contouring of exterior slopes for stability, and placement of growth media.

As long-term reclamation progresses and end-of-mine life approaches, the topsoil stockpiles would be redistributed as growth media. Once spread over facilities that have been capped and are ready for final reclamation, the soil would be prepared through amendments (where necessary), loosening, and roughening. The soils would then be seeded with BLM-approved seed mixes for final reclamation. Because there would not be enough topsoil salvaged to complete all necessary reclamation, KGHM Robinson would use non-acid producing (NPAG) subsurface overburden amended with organic material and fertilizer as a supplemental source of final reclamation growth medium. KGHM Robinson is currently using test plots within the project area to verify selection of specific soil amendments.

Areas of final reclamation would be subjected to the same reclamation standards regardless of growth medium source. Criteria would include establishment (types, densities, self-propagation) of desired vegetative cover, lack of noxious weeds, and effective erosion control measures.

Alternative A: No Action

Under the No Action alternative, the existing conditions and trends would remain within the analysis area. Because the Proposed Action or action alternatives would not occur, no additional impacts beyond what has been previously disclosed and authorized would be expected. The work being performed under current authorizations would continue, including additional disturbance and reclamation as defined in the past. Reclamation and closure under the No Action alternative would be identical to that described for the action alternatives (see Appendix G).

Alternative B: King Waste Rock Dump (Proposed Action)

Approximately one-third of the disturbance under the Proposed Action would be to soils with K factors that are greater than 0.4. However, this disturbance represents less than 1% of the analysis area. Areas of higher wind erodibility index and potential future prime farmlands also make up a very small proportion of the analysis area (< 1%). Table 3.8-2 lists impacts to soils by action alternative, comprising impacts to areas with a K factor 0.4 or greater, wind erodibility index over 55, and prime farmland if irrigated and reclaimed.

Table 3.8-2. Impacts to Soils by Action Alternative

Factor	Alternative B: King Waste Rock Dump (Proposed Action)		Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump		Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump	
	Area	Percentage of Analysis Area	Area	Percentage of Analysis Area	Area	Percentage of Analysis Area
K factor of 0.4 or greater	353	0.70%	494	0.98%	327	0.65%
Wind erodibility index over 55	25	0.05%	137	0.27%	25	0.05%
Prime farmland if irrigated and reclaimed	16	0.03%	16	0.03%	16	0.03%

Source: NRCS (2020a).

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Alternative C would disturb a larger area of soils with a K factor greater than 0.4 when compared to the Proposed Action. This alternative has a higher proportion of soils with increased wind erosion potential when compared to the Proposed Action. The same area of potential prime farmland as the Proposed Action would be disturbed. However, as with the Proposed Action, this disturbance would still be relatively low (< 1% of analysis area).

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Alternative D would disturb a smaller area of soils with a K factor greater than 0.4 when compared to the other action alternatives, and it would be a smaller proportion of the analysis area. The area of higher wind erodibility index is the same as the Proposed Action and less than Alternative C. The same area of potential farmland as the other alternatives would be disturbed.

3.8.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

Mine operations that would occur on previously undisturbed soil would create an irretrievable impact to the existing soil structures that would last until that soil is stabilized, reclaimed, and begins to form new structure (approximately 20 years). With successful reclamation, these impacts would not be irreversible. In addition, the planned conversion of overburden to growth media via soil amendment would provide for an increase in productivity over the current situation through the reclamation of currently (and historically) disturbed areas. The relatively low proportion of this project area's disturbed soil within the analysis area (< 1%), combined with reclamation would prevent impacts to the long-term sustainability of soils in the impacted watersheds.

3.9 Vegetation

This section describes the potentially affected environment and the environmental consequences (direct, indirect, and cumulative) of implementing the Proposed Action or the alternatives as they pertain to vegetation resources. Vegetation resources are vegetation communities, forest products, noxious and invasive plant species, and special-status plants (including cactus).

Special-status plants are those granted additional protections by federal and state agencies because they are either scarce on a regional level, face clearly defined threats, or are in a position within the regional landscape to potentially become scarce. Noxious weeds are plants defined by the Nevada Revised Statutes (NRS) as "any species of plant which is, or likely to be, a public nuisance, detrimental or destructive and difficult to control" (NRS 555.005). Plant species are determined to be noxious by the State Quarantine Officer and are regulated by the Nevada Department of Agriculture. Invasive weeds are not formally defined by Nevada state, but typically refer to any nonnative plant species with the propensity to invade, suppress, or otherwise negatively affect native plant communities. Forest products include plant species managed by the BLM for harvest and include commercial pine nut areas, fence posts, and firewood collection areas.

The analysis area for vegetation resources is approximately 1,333 acres and comprises the project area and all lands surveyed during the previous botanical surveys. To establish the context of project impacts, impacts within the project area were compared with the analysis area, which comprises four HUC-12 subwatersheds: Giroux Wash (150100110101), Upper and Lower Gleason Creek (16060081201 and 16060081202, respectively), and Town of Ely-Murry Creek (16060081203) (Figures A-21 and A-22).

Impacts resulting from construction, operation, and decommissioning activities occurring within the project area have the potential to affect resources located outside the project area. As a result, NEPA requires an evaluation of resources within the geographic area where the project impacts are anticipated to accrue and within the time frame in which the effects of the proposed project would occur.

3.9.1 Affected Environment

In 2019, Stantec conducted surveys within the analysis area (1,333 acres). These surveys included special-status plant surveys, an invasive and noxious weed inventory, and vegetation community observations. Stantec conducted surveys on May 20 and June 5 and 6, 2019, following BLM requirements and protocols (Stantec 2019).

3.9.1.1 Vegetation Communities

Nineteen LANDFIRE National Vegetation Classification (NVC) groups form the analysis area. Thirteen of those groups, hereafter referred to vegetation cover types, are typical of eastern Nevada and the Great Basin, with the remaining vegetation cover types classified as ruderal or introduced exotic species and as Quarries-Strip Mines-Gravel Pits-Energy Development, which represent portions of the previous surface disturbances within the project area (Figure A-23). Acreages of the vegetation cover types for the project area by each alternative are listed in Table 3.9-1 in Section 3.9.2 Environmental Consequences.

3.9.1.2 Special-Status Plants, Including Cactus

No federally threatened, endangered, or proposed plant species occur in or near the project area (Stantec 2019). Stantec conducted site-specific special-status species vegetation surveys on May 20, June 5, and June 6, 2019 (Stantec 2019). A single species of cactus was observed within the project area, the mountain ball cactus (*Pediocactus simpsonii*). The Nevada Natural Heritage Program (NNHP) identifies this species as an S5 species, which indicates it is a subnational (state) population that is at low risk of extirpation because of its extensive range and/or many populations or occurrences, but with potential concerns related to recent declines or threats (NNHP 2020). A NNHP data request revealed no other sensitive plant species within 5 kilometers of the project area.

3.9.1.3 Forest Products

The project area contains approximately 1,028 acres of pinyon-juniper woodland (Stantec 2019). Although these areas would be available for firewood, fencepost, and pine nut collection, they are currently within the project area and would not be available to the public for harvest until after mine closure.

3.9.1.4 Noxious and Invasive Plant Species

Surveyors observed several nonnative plant species during the biological surveys in the project area (Stantec 2019). These species include three plant species identified by the Nevada Department of Agriculture as noxious: Russian knapweed (*Acroptilon repens*), musk thistle (*Carduus nutans*), and hoary cress (*Cardia draba*). The Nevada Department of Agriculture lists both Russian knapweed and musk thistle as Category B weeds (i.e., noxious weeds that are generally established in scattered populations within some counties of the state, and lists hoary cress as a Category C weed (i.e., noxious weeds that are generally more established and widespread throughout the state). Additionally, surveyors identified several invasive weed species in the project area, including halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola tragus*), and cheatgrass (*Bromus tectorum*).

Noxious and invasive plant species are prevalent within the local watershed. All three noxious plant species identified in the project area have been observed within the local watershed. In total, 247 occurrences of hoary cress, 15 occurrences of Russian thistle, and 30 occurrences of musk thistle have been observed within the local watershed. Additionally, SRK Consulting observed both spotted knapweed (*Centaurea maculosa*) and squarrose knapweed (*Centaurea virgata*) (both noxious species) within a 1 mile of the project area (SRK 2016). Most of these infestations are located along roadways (Figure A-24).

Disturbance Response

The project area lies within the Major Land Resource Area (MLRA) 28B, Central Nevada Basin and Range, which covers more than 15 million acres. MLRAs are divided into several Disturbance Response Groups (DRGs), five of which make up the project area: 28 2B, 28 3B, 28 7B, 28 21AB, and 28 23AB (Figure A-25). DRGs consider the soil, precipitation, slope and elevation, plant productivity, dominant vegetation type, and historic responses to various disturbances in order to determine an area's resilience to disturbance and resistance to invasive species (Stringham et al. 2015). Each DRG within the project area is listed as having Low to Moderate resilience and resistance with the exception of 28-3B, which is listed as Low. Disturbance to areas listed as Low are difficult to recover and may settle into a lesser stable state.

3.9.2 Environmental Consequences

3.9.2.1 Analysis Method

Vegetation resources within the project area were identified through literature review, resource agency correspondence, and LANDFIRE data from the USGS. These data were further supported by the results of site-specific vegetation surveys conducted on May 20, June 5, and June 6, 2019 (Stantec 2019).

Project impacts are analyzed as short- and long-term impacts. As they apply to vegetation resources, short-term impacts include those acres of disturbance that can be reclaimed. Long-term impacts include those acres of disturbance that cannot be reclaimed. Comparison of alternatives and environmental changes are described here in terms of the temporal scale, spatial extent, and intensity where appropriate. NEPA analysis determines whether direct or indirect effects on biological resources would result from the project and explains the degree of those effects in the project area using quantifiable indicators of acres of impact. To establish the context of these impacts, the level quantified impact is compared to the existing watershed area.

3.9.2.2 Direct and Indirect Impacts

Impacts to vegetation communities, including sensitive plant species, are indicated either by a direct physical removal of plant species or a change in vegetation community types that support plant species. Impacts related to noxious and invasive plant species are also created by physical surface disturbance of existing vegetation community types. Surface disturbances create ideal habitat for invasive species to establish and spread.

3.9.2.3 Alternative A: No Action

Under the No Action alternative, the expansion project would not be developed. No project-related ground disturbance would cause changes or alterations to sensitive and invasive plant species. Existing invasive and noxious weeds would persist or expand over time unless otherwise treated. Existing vegetation management at the landscape scale would continue.

3.9.2.4 *Alternative B: King Waste Rock Dump (Proposed Action)*

Under the Proposed Action, construction of various project components would result in the permanent disturbance of approximately 963 acres, of which approximately 793 acres is managed by the BLM (see Section 2.2.2).

Construction Impacts

The Proposed Action would result in direct and indirect impacts on vegetation communities through direct removal of plants and soil where the land is graded or cleared for project components. Construction of the project components would result in a long-term impact on previously undisturbed vegetation communities through the disturbance of approximately 853 acres. Construction of the King WRD and the expansion of the Giroux Wash TSF would result in most of the disturbance to vegetation. Vegetation within these areas would be clear-and-cut, and topsoil would be removed and stored in growth media stockpiles.

During construction and operations, dust accumulation on plants would reduce photosynthesis. Dust accumulation hinders growth and reproduction and suppresses a plant's ability to compete with nonnative invasive plant species. Effects of dust on plants along roadways are compounded because vehicles are common vectors for invasive transmission. Dust-related effects on vegetation near the project disturbance areas would be minimized with ongoing implementation of dust control measures (KGHM 2019a). Dust-related effects would be short term and would cease following mine reclamation.

Long-term impacts are anticipated throughout direct impact areas. Where soil disturbance is incorporated into site preparation, long-term impacts would persist well past the anticipated end-of-mine life. Depending on precipitation, reclamation activities would bring back grasses and forbs within 1 to 5 years. For shrub species, including sage-brush, restoration of the mature community would be an estimated 50 to 60 years. Pinyon-juniper woodland communities would take an estimated 100 years or more, depending on the edge habitat. Until this occurs, project implementation would alter the existing function and diversity of the vegetative community, with mature shrub and pinyon-juniper woodland communities being replaced with understory grasses and forbs until shrub and woodland communities recover.

Implementation of reclamation activities and EPMS, including soil stabilization, noxious weed monitoring and control, and revegetation (KGHM 2019a) would reduce the effects from these short-term and long-term impacts; however, project impacts would remain moderate (approximately 2% of the existing watershed).

Vegetation Communities

Construction impacts on vegetation communities would occur through direct removal of plants as well as soil disturbance and soil removal. Most of the project-related impacts would occur within the Great Basin Pinyon - Juniper Woodland vegetation community, accounting for approximately 77% of the project impacts. Some species within this vegetation community may re-sprout after clear-cutting; however, high mortality of trees and perennial shrubs is anticipated from this method. As described above, construction impacts would alter vegetation communities throughout the project area, especially where soil disturbance takes place. See Table 3.9-1 for acres of vegetation community types impacted by each alternative action.

Table 3.9-1. Acres of LANDFIRE National Vegetation Classification Groups (Vegetation Cover Types) in the Project Area Directly Impacted by Action Alternative

Vegetation Cover Types	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump
Central Rocky Mountain Lower Montane Foothill & Valley Grassland	0	0	0
Colorado Plateau - Great Basin Juniper Woodland & Savanna	1	1	1
Great Basin & Intermountain Introduced Annual Grassland	0	0	0
Great Basin & Intermountain Introduced Perennial Grassland and Forbland	1	1	1
Great Basin & Intermountain Ruderal Shrubland	1	1	1
Great Basin Pinyon - Juniper Woodland	657	775	648
Interior Western North American Temperate Ruderal Shrubland	0	0	0
Intermountain Basins Cliff Scree & Badland Sparse Vegetation	1	1	1
Intermountain Dry Tall Sagebrush Shrubland	62	62	62
Intermountain Low & Black Sagebrush Shrubland & Steppe	92	93	92
Intermountain Mountain Big Sagebrush Shrubland & Steppe	17	52	17
Intermountain Semi-Desert Grassland	0	0	0
Intermountain Semi-Desert Shrubland & Steppe	19	19	19
Intermountain Shadscale - Saltbush Scrub	1	1	1
North American Desert Alkaline-Saline Shrub Wetland	0	0	0
Rocky Mountain Subalpine-Montane Mesic Herbaceous Meadow	0	0	0
Southern Rocky Mountain Montane-Subalpine Grassland	0	0	0
Western North American Montane Sclerophyll Scrub	1	2	1
Total	853	1,008	844

Note: Alternative A, the No Action alternative, would not disturb any vegetation community types and is not included within this table.
Source: U.S. Department of the Interior and USDA (2020).

Special-Status Plants, Including Cactus

Construction impacts on special-status plants would be low because no special-status plant species were recorded during surveys of the analysis area and only marginally suitable habitat was observed (Stantec 2019). Impacts to cactus would be the direct removal of an estimated six individuals of mountain ball cactus found near the Giroux Wash TSF. This removal would be a permanent loss of these cactus but is considered a low impact because it would have a negligible effect to the regional population or the species as a whole.

Forest Products

Construction and operation would disturb or remove approximately 658 acres of pinyon-juniper woodland (Colorado Plateau - Great Basin Juniper Woodland & Savanna and Great Basin Pinyon - Juniper Woodland). The surface disturbance of this habitat within the project area represents less than 1.6% within the local watershed (Figure A-26). The 658 acres of pinyon-juniper woodland would remain permanently disturbed because any reclaimed acres would be reclaimed as a sagebrush-dominated habitat

and not pinyon-juniper woodlands. Outside the proposed surface disturbance areas, forest products would continue to be available for harvest by the public, pursuant to BLM regulations.

Changes in vegetation from pinyon-juniper woodlands to herbaceous vegetation communities and the associated long-term loss of woodland productivity on areas that would be reclaimed would not result in a substantial impact to woodland products because the Proposed Action is located in an area where abundant pinyon-juniper woodlands exist on public lands (see Figure A-23). Because of the very small percentage of disturbance to existing pinyon-juniper woodland, the Proposed Action would result in a low level of impact to this cover type.

Noxious and Invasive Plant Species

Construction and operation of the project would disturb approximately 853 acres of previously undisturbed vegetation. Areas that have been subject to surface disturbance are susceptible to infestations by noxious and invasive plant species. Once introduced, these species can infect large areas and spread by wildlife, water, wind, humans, and mud-laden vehicles. In addition to the project disturbance areas, several noxious weed species have been observed within the project area, including Russian knapweed, musk thistle, and hoary cress. Of the three noxious weeds present within the project area, hoary cress is the most prevalent with 25 observations covering approximately 2.3 acres. Additionally, several invasive species were observed throughout the project area: smooth brome (*Bromus inermis*), cheatgrass, yellow salsify (*Tragopogon dubius*), halogeton, Russian thistle, and redstem stork's bill (*Erodium cicutarium*).

Indirect impacts from the spread and establishment of noxious and invasive plants would include decreased resilience in native plant communities. Decreased resilience reduces the ability of native plant communities to withstand disturbance (e.g., wildland fire, drought) and increases susceptibility for transition to less desirable vegetative states (e.g., weed dominated). Decreased resilience makes long-term restoration of the invaded communities more difficult.

Implementation of the project's noxious weed management plan (SRK 2016) in conjunction with the reclamation plan (KGHM 2019a) would reduce the potential for noxious weed and invasive plants establishment in the project-related disturbance areas. However, small populations of weedy annual species (e.g., halogeton, cheatgrass, Russian thistle) may become established in localized disturbance areas for short periods of time.

Project implementation is anticipated to result in a moderate level of impacts to vegetative communities because nonnative species would be managed throughout the life of the project.

3.9.2.5 *Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump*

Under Alternative C, construction of various project components would result in the permanent disturbance of approximately 1,008 acres (see Table 3.9-1), of which approximately 893 acres is managed by the BLM.

Construction Impacts

Construction impacts under Alternative C would be similar to the Proposed Action. The addition of the Liberty Pit expansion, construction of the North Tripp WRD, and the Reduced King WRD would result in 156 more acres of surface disturbance. Implementation of project design features would occur for all project alternatives to reduce potential risks caused by construction activities to manageable levels. All construction-related effects are expected to be high because although the vegetation communities are widespread and relatively common throughout the region, impacts would be long term; the plant

communities would lose large amounts of both perennial and annual plant diversity, and vegetation structure may take decades to recover.

Vegetation Communities

Similar to the Proposed Action, construction impacts on vegetation communities would occur through direct removal of plants as well as soil disturbance and soil removal. Most of the project-related impacts would occur within the Great Basin Pinyon – Juniper Woodland vegetation community, accounting for approximately 77% of the project impacts. Construction impacts would alter vegetation communities throughout the project area, especially where soil disturbance takes place. See Table 3.9-1 for acres of vegetation community types impacted by action alternative.

Special-Status Plants, Including Cactus

Under Alternative C, construction impacts on special-status plants and cacti would be nearly identical to the Proposed Action. The direct removal of cactus would be a permanent loss but is considered a low impact because it would have a negligible effect to the regional population or the species as a whole.

Forest Products

Construction and operation would disturb or remove approximately 776 acres of pinyon-juniper woodland (Colorado Plateau - Great Basin Juniper Woodland & Savanna and Great Basin Pinyon - Juniper Woodland), 118 more acres than the Proposed Action. The surface disturbance of this vegetation community type within the project area would be 1.8% of this vegetation cover type in the local watershed (see Figure A-26). Similar to the Proposed Action, although these impacts would be permanent, changes in vegetation from pinyon-juniper woodlands to herbaceous vegetation communities and the associated long-term loss of woodland productivity in areas that would be reclaimed would not result in a substantial impact to woodland products because direct disturbances would occur in an area where abundant pinyon-juniper woodlands exist on public lands (see Figure A-23). Because of the very low percentage of impact to existing pinyon-juniper woodlands, Alternative C would result in a low level of impact to this cover type.

Noxious and Invasive Plant Species

Impacts to noxious and invasive plant species would be as described for the Proposed Action. Potential impacts would be similarly minimized under the noxious weed management plan (SRK 2016) in conjunction with the reclamation plan (KGHM 2019a).

3.9.2.6 *Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump*

Under Alternative D, construction of various project components would result in the permanent disturbance of approximately 844 acres (see Table 3.9-1), of which approximately 793 acres is managed by the BLM (see Table 2.41).

Construction Impacts

Construction impacts under Alternative D would be nearly identical to the Proposed Action. The construction of the Reduced King WRD would result in 10 less acres of surface disturbance. Implementation of project design features would occur for all project alternatives to reduce potential risks caused by construction activities to manageable levels. All construction-related effects are expected to be high because although the vegetation communities are widespread and relatively common throughout the

region, impacts are anticipated to be long term; the vegetation communities would lose large amounts of both perennial and annual plant diversity, and vegetation structure could take decades to recover.

Vegetation Communities

Similar to the Proposed Action, construction impacts on vegetation communities would occur through direct removal of plants as well as soil disturbance and soil removal. Most of the project-related impacts would occur within the Great Basin Pinyon – Juniper Woodland vegetation community, accounting for approximately 77% of the project impacts. Construction impacts would alter vegetation communities throughout the project area, especially where soil disturbance takes place. See Table 3.9-1 for acres of vegetation community types impacted by each action alternative.

Special-Status Plants, Including Cactus

Under Alternative D, construction impacts on special-status plants and cacti would be nearly identical to the Proposed Action. The direct removal of cactus would be a permanent loss but is considered a low impact because it would have a negligible effect to the regional population or the species as a whole.

Forest Products

Construction and operation would disturb or remove approximately 649 acres of pinyon-juniper woodland (Colorado Plateau - Great Basin Juniper Woodland & Savanna and Great Basin Pinyon - Juniper Woodland), 9 less acres than the Proposed Action. The surface disturbance of this habitat within the project area would be similar to the Proposed Action at approximately 1.5% of the local watershed (see Figure A-26). Similar to the Proposed Action, although these impacts would be permanent, changes in vegetation from pinyon-juniper woodlands to herbaceous vegetation communities and the associated long-term loss of woodland productivity in areas that would be reclaimed would not result in a significant impact to woodland products because direct disturbances are located in an area where abundant pinyon-juniper woodlands exist on public lands (see Figure A-23). Because of this low percentage of impact to existing pinyon-juniper woodlands, Alternative D would result in a low level of impact on this cover type.

Noxious and Invasive Plant Species

Impacts to noxious and invasive plant species would be as described for the Proposed Action. Potential impacts would be similarly minimized under the noxious weed management plan (SRK 2016) in conjunction with the reclamation plan (KGHM 2019a).

3.9.2.7 *Impacts, and Short-Term Uses Versus Long-Term Productivity*

The acreage of vegetation disturbance described above for each alternative would be irretrievable until revegetation occurs in approximately 1 to 7 years. Most of this disturbance would happen to pinyon-juniper woodland and sagebrush steppe. These areas would transition to a perennial grassland and saltbush, depending on the final seed mixture used for reclamation. Because most of the area would be reclaimed and revegetated (with the exception of the 64 acres of proposed disturbance for the Liberty East Pit), the regional pinyon-juniper woodland would incur a slight loss in productivity. The relatively low amount of disturbance combined with reclamation would not eliminate the long-term vegetation productivity in the project area.

3.10 Visual Resources

The term *visual resources* refers to the composite of basic terrain, geological and hydrological features, vegetative patterns, and built features that influence the visual appeal of a landscape. The BLM uses its

VRM System to classify and manage visual resources on lands under its jurisdiction. The VRM System involves inventorying scenic values, establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether they conform to the management objectives (BLM 1984). The BLM’s VRM System incorporates scenic quality, viewer sensitivity, and distance zones to identify Visual Resource Inventory (VRI) classes. These classes represent the relative value of the existing visual landscape, as well as the visual resource baseline from which to measure impacts that a proposed project may have on these values. In its planning process, the BLM weighs visual and competing resource values and designates VRM Classes I–IV and associated management objectives for a given area’s visual setting. Table 3.10-1 and Figure A-27 in Appendix A identify the VRM classes that occur within the project area (BLM 2008a).

Table 3.10-1. Visual Resource Management Classes within the Project Area

VRM Class	Description	Acres
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.	7,882
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.	5,219

Note: VRM Class I or IV does not occur within the project area.

Based on existing land uses within the project area, information from the Ely District 2011 VRI (BLM 2011) and associated Ely District RMP VRM class objectives are applicable to the general area near the project area. However, these classifications are not applicable to the visual landscape in the project area because the project area has been heavily developed for open pit mining since the late 1800s.

Accordingly, to ensure accurate disclosure of impacts, this visual resource analysis focuses on project impacts when compared with the baseline existing landscape and visual conditions in the project area. The analysis area for visual resources comprises the project area (i.e., the Mine Plan boundary) and identified sensitive viewing areas called Key Observation Points (KOPs). The analysis area has been determined based on proposed project elements, the existing landscape characteristics, and visibility of project elements from selected KOPs, and represents the area in the surrounding landscape where potential visual effects from the project may be discerned by the casual observer (i.e., KOPs).

3.10.1 Affected Environment

3.10.1.1 Visual Resource Inventory Process

Existing visual conditions (i.e., values) relate to the components of the landscape, both natural and manmade, that contribute to the overall visual character associated with an area of land. These conditions are documented as part of the BLM VRI process. The information collected during the process provides descriptions and analysis of the landscape and viewer sensitivity associated with the project and is broken down into three categories: scenic quality, visual sensitivity, and distance zones (BLM 1986a). The Ely District 2011 VRI (BLM 2011) identifies the project area as having higher than average scenic quality (scenic quality Classes A and B) as well as high visual sensitivity (Figures A-28 and A-29).

Scenic Quality

A scenic quality evaluation measures the visual appeal of a landscape. Public lands are rated as Class A (19 points or more), Class B (12 to 18 points), or Class C (11 points or less) areas based on the apparent scenic quality. Lands are reviewed and rated using seven key factors, and the total score determines the rating (BLM 2011). The seven key factors are landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications. This review is done systematically by dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiography or land use and ranking scenic quality within each SQRU based on these seven factors.

The project area intersects the Egan Range (Unit 42) SQRU and the Cooper Flat (Unit 41) SQRU. The Egan Range SQRU is 149,826 acres and is rated a Scenic Quality Class A. The Cooper Flat SQRU is 21,542 acres and is rated a Scenic Quality Class B (BLM 2011). There is 8,977 acres of the project area that occurs within Scenic Quality Class A and approximately 212 acres that occurs in Scenic Quality Class B.

The Egan Range SQRU is defined in the inventory as a large mountain range with a variety of landforms and vegetation types. This unit is highly visible from U.S. Highway 93 north of Ely. The Cooper Flat SQRU is defined in the inventory as a series of low ridges and rolling hills, covered with pinyon pine except for exposed rock escarpments and knobs. The Cooper Flat SQRU is defined in the inventory as a mostly enclosed higher-valley area in the Egan Range west of Ely. U.S. Highway 50, a Scenic Byway designated as a SRMA, is within the Cooper Flat SQRU (BLM 2011).

The Ely District 2011 VRI SQRU rating forms for units within and or adjacent to the analysis area do not identify the historic and current surface disturbances associated with mining activities either in cultural modification scores nor do they identify adjacent scenery scores; therefore, these SQRU rating forms do not provide an accurate basis for a comparative analysis to determine the change in overall scenic quality. Accordingly, as stated previously, this visual analysis uses the existing scenic quality of the area as a baseline for comparison for visual impacts from project alternatives.

Visual Sensitivity

Visual sensitivity reflects attitudes and perceptions held by people regarding the landscape and in general reflect the public's level of sensitivity for noticeable change to the landscape. This visual sensitivity classification, recorded in 2010, was determined by assessing the BLM Field Office planning area's number of viewers, level of interest, and types of viewers (BLM 2011). Four identified Sensitivity Level Rating Units (SLRU) either intersect or border the analysis area.

The Lincoln Highway SLRU (Unit 11) is in a high classification zone. This unit is classified as having a high visual value because of general public interest in historic roadways and Nevada statewide. The Garnet Hill SLRU (Unit 19) is in a moderate classification zone. This unit is classified as having a moderate visual value because it is not a well-known or frequently visited site. The Heritage Railroad Excursion Train (Unit 20) SLRU is in a high classification zone. This unit is classified as having a high visual value because BLM-managed lands are visible from parts of the route outside of Ely. The US 6 - Ely to South of Currant (Unit 34) SLRU is in a high classification zone. This unit is classified as having a high visual value because the highway traverses a scenic landscape but has low to moderate usage (BLM 2011).

Similar to the SQRU information above, the Ely District 2011 VRI SLRU rating forms for units in or adjacent to the analysis area do not identify the historic and current surface disturbances associated with mining activities that could influence SLRU classifications; therefore, a comparative analysis to

determine the change in overall sensitivity level score cannot be accurately determined, and the visual analysis is based on comparison with the existing baseline conditions in the project area.

3.10.1.2 Sensitive Viewers

Sensitive viewing platforms represent specific places, areas, and features that have visual importance relative to one’s home, social, business, and recreation environment. Sensitive viewing platforms represent viewing locations (i.e., KOPs) where the public would view the analysis area both from a stationary location (e.g., residential area) or a linear (e.g., major roadway) location. Identification of KOPs associated with travelers and recreational users identified in coordination with BLM Ely Field Office staff and are defined below.

- Travelers: Origin/destination travelers that use roadways from which the landscape is viewed.
- Recreational users: Local and seasonal residents engaged in recreational activities, and tourists and recreational users visiting from out of the local area.

Five KOPs were selected to represent the views of the project (Table 3.10-2), and the rationale for selection is provided below. A field assessments at each KOP was conducted, implementing protocols and methods for contrast rating evaluation in BLM Manual 8431 *Visual Resource Contrast Rating* (BLM 1986b). Data collected at each KOP included the following: global positioning system (GPS) location, a digital photographic panorama of the viewshed (which is used for visual simulations), and required information to complete the BLM’s Visual Contrast Rating Worksheet.

Table 3.10-2. Key Observation Point Sensitive Viewer Types and Rationale for Inclusion

KOP Number	KOP Name	Sensitive Viewer Group	Approximate Distance from Closest Project Component (miles)
1	U.S. Highway 50	Travelers	3.0
2	U.S. Highway 50 and White Pine County Road	Travelers	5.0
3	Ward Mountain Recreation Area	Recreationists	0.3
4	U.S. Highway 6 and Ward Mountain Recreation Area	Travelers and recreationists	1.7
5	U.S. Highway 6	Travelers	5.0

Source: Stantec (2020).

Distance Zones

The BLM typically defines distance zones as foreground/middle ground (to a distance of 3 to 5 miles), background (to a distance of 3 to 5 miles to a maximum of 15 miles based on atmospheric conditions), and seldom seen (portions of the landscape that are not visible or distances greater than 15 miles). These definitions are used as a framework for the contrast analysis. The contrast analysis assesses the level of visual change associated with the project and evaluates the fundamental design elements (form, color, texture, and scale) and the influence of environmental factors that can influence the level of contrast based on the casual viewers perspective and distance.

3.10.2 Environmental Consequences

3.10.2.1 Analysis Method

The analysis supports preliminary issues identified for analysis in Table 3.10-3 and follows the following four steps to assess the existing visual environment and impacts to the visual environment from the project: 1) define analysis area and locations from where the project may be visible, 2) describe existing visual resources (i.e., values identified as part of VRI) within the analysis area to identify impacts to visual values resulting from the introduction of project components, 3) identify viewing locations (KOPs) from which the project may be viewed, 4) complete contrast rating worksheets based on field observations incorporating environmental factors with supporting photographic simulations from each KOP to assess conformance with VRM objectives.

Table 3.10-3. Issues Identified for Analysis

Preliminary Issue	Impact Indicator	Spatial Analysis Area	Temporal Scale
How would the project impact viewers and VRM conformance?	Level of visibility and contrast of project when viewed from KOPs Conformance with VRM Class objectives	Project area and identified KOPs	Throughout the life of the project, from the start of the project construction, through operations, and through completion of reclamation activities
How would project impact scenic quality within the analysis area?	Acres of change or no change in scenic quality	Project area	Throughout the life of the project from the start of the project construction, through operations, and through completion of reclamation activities.

Table 3.10-4 defines the threshold of the visual resources impacts on casual observers at KOPs and to the existing landscape's scenic quality and associated landscape character. Overall, the magnitude of impact of the project on visual resources ranges from no impacts to high within the analysis area.

Table 3.10-4. Criteria for Assessing Level of Impacts on Visual Resources

Level of Impacts	Contrast Perceived by Viewers (KOPs)	Magnitude of Change to Landscape Character and Scenic Quality
No	Project components would repeat elements and/or patterns common in the landscape. Project components would not be visually evident.	Landscape would appear to be intact and not attract attention Project components would repeat form, line, color, texture or scale common in the landscape and not be visually evident (no contrast) No change in scenic quality score
Low	Project components would introduce elements and/or patterns common in the landscape that would be visually subordinate. Project components would create weak contrast compared with other features in the landscape.	Landscape would be noticeably altered and begin to attract attention. Project components would introduce form, line, color, texture, or scale common in the landscape and would be visually subordinate (weak contrast). There would be a negative change in scenic quality rating of 0.5 from existing conditions.
Moderate	Project components would introduce elements and/or patterns not common in the landscape. Project components would be visually prominent in the landscape and would create moderate contrast compared with other features in the landscape.	Landscape would appear substantially altered. Project components would introduce form, line, color, texture, or scale not common in the landscape and would be visually prominent in the landscape (moderate contrast). Project components would attract attention. Project components would begin to dominate the visual setting. There would be a negative change in scenic quality rating of 1.0 from existing conditions.

Level of Impacts	Contrast Perceived by Viewers (KOPs)	Magnitude of Change to Landscape Character and Scenic Quality
High	Project components would introduce elements and/or patterns that would be visually dominant and create strong contrast compared with other features in the landscape.	Landscape would appear severely altered. Project components would introduce form, line, color, texture, or scale not common in the landscape and would be visually dominant in the landscape (strong contrast). Project components would demand attention. Project components would dominate in the visual setting. There would be a negative change in scenic quality rating of 1.5 or more from existing conditions.

The following assumptions have been included as part of the analysis of visual resources:

- Visibility of project components (WRDs, pits, borrow areas and TSFs) would continue to be visible in the landscape beyond the life of the project.
- The re-establishment of vegetation following mine closure would not completely eliminate exposed light-colored soils post-closure.
- Applicant-committed EPMs as described in the 2019 Mine Plan amendment would be implemented to reduce visual contrast.
- Viewers within the area have become accustomed to the visual change in the landscape over time resulting from large-scale surface disturbances

3.10.2.2 Direct and Indirect Impacts

Alternative A: No Action

Under the No Action alternative, the BLM would not approve the proposed Mine Plan amendment. Although KGHM Robinson could continue mining on their own private lands, no additional expansion onto BLM-managed lands would be permitted. There would be no construction of the King WRD or additional expansion onto public lands of the North Tripp WRD. The total volume of tailings stored at the Giroux Wash TSF would be restricted to those areas that had been previously granted approvals.

Alternative B: King Waste Rock Dump (Proposed Action)

Construction and Operation

Landscape Character and Scenic Quality

Under the Proposed Action, the project would introduce modifications in landform and expose additional contrasting material associated with construction and operation activities. However, because these introduced elements and/or patterns are already common in the landscape (and would be visually subordinate), the impacts to the existing scenic quality in the analysis area would be low (see Table 3.10-4). However, because of the scale of the landform modifications associated with the King WRD in comparison to the existing landscape where it occurs, there would be a perceived change in the area's scenic quality in the southern portion of the analysis area. In all, 8,977 acres of change in scenic quality would occur within the Egan Range SQRU as a result of a change in the cultural modification score associated with the scenic quality rating component of the VRI. This numeric change in scenic quality score would reduce the overall rating of the unit from a Scenic Quality Class A (current score 18.5) to a Scenic Quality Class B (18.0).

Mining activities in the analysis area are not documented or characterized as part of the Eagan Range SQRU, and changes in the scenic quality score associated with cultural modifications are for comparison purposes only.

Vehicle Travel Routes

Impacts to vehicle travel routes from the introduction of project components within the landscape would range from none to moderate based on proximity and dominance of project components in the landscape. Table 3.10-5 identifies the level of impacts associated with KOPs 1, 2, 4, and 5; these impacts are further defined earlier in Table 3.10-4.

Table 3.10-5. Vehicle Travel Route Impacts by Key Observation Point

KOP Number	KOP Name	Level of Impact	Contrast Perceived by Viewers
1	U.S. Highway 50	Low	Project components would create weak contrast compared with other features in the landscape.
2	U.S. Highway 50 and White Pine County Road	No	Project components would not be visually evident.
4	U.S. Highway 6 and Ward Mountain Recreation Area	Moderate	Project components would be visually prominent in the landscape and would create moderate contrast compared with other features in the landscape.
5	U.S. Highway 6	Low	Project components would create weak contrast compared with other features in the landscape.

Recreational Users

Impacts to recreational users from the introduction of project components within the landscape would range from moderate to high based on proximity and dominance of project components in the landscape. Table 3.10-6 identifies the level of impacts associated with KOPs 3 and 4; these impacts are further defined earlier in Table 3.10-4. For additional details regarding project impacts to recreation users, see Section 3.6 Recreation.

Table 3.10-6. Recreational User Impacts by Key Observation Point

KOP Number	KOP Name	Level of Impact	Contrast Perceived by Viewers
3	Ward Mountain Recreation Area	Strong	Project components would introduce elements and/or patterns that would be visually dominant and create strong contrast compared with other features in the landscape.
4	U.S. Highway 6 and Ward Mountain Recreation Area	Moderate	Project components would be visually prominent in the landscape and would create moderate contrast compared with other features in the landscape.

Reclamation

The effects of project reclamation on visual resources would be similar in nature to the impacts discussed above associated with construction and operation. Impacts from reclamation would differ in that project components previously visible during the remaining 7-year active operation period would likely become less visible as a result of reclamation activities and removal of associated infrastructure (minus WRDs, mine pits, and borrows pits) over the post-closure management period. These remaining project

components would continue to be visible past the post-closure management period. Once project infrastructure is removed and reclamation is implemented, visual impacts from disturbance would diminish from the landscape over time. However, because of the extensive historic and proposed development of the project area, the landscape would never be fully returned to a pre-development condition. Landform modifications associated with WRDs, pits, and associated ground disturbance would continue to be visible as part of the future landscape. Vegetation recovery to aid in reducing the visibility of exposed soils would take an undetermined amount of time to re-establish. This visible difference would allow for the project footprint and contrast of exposed soils of remaining project components to be visible from KOPs indefinitely beyond the project completion.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Construction and Operation

Landscape Character and Scenic Quality

Impacts associated with Alternative C would be similar to impacts associated with the Proposed Action.

Vehicle Travel Routes

Impacts to vehicle travel routes from the introduction of project components within the landscape would range from low to moderate as compared to the Proposed Action. Table 3.10-7 identifies the level of impacts associated with KOPs 1, 2, 4, and 5; these impacts are further defined earlier in Table 3.10-4.

Table 3.10-7. Vehicle Travel Route Impacts by Key Observation Point

KOP Number	KOP Name	Level of Impact	Contrast Perceived by Viewers
1	U.S. Highway 50	Low	Project components would create weak contrast compared with other features in the landscape.
2	U.S. Highway 50 and White Pine County Road	Low	Project components would create weak contrast compared with other features in the landscape.
4	U.S. Highway 6 and Ward Mountain Recreation Area	Moderate	Project components would be visually prominent in the landscape and would create moderate contrast compared with other features in the landscape.
5	U.S. Highway 6	Low	Project components would create weak contrast compared with other features in the landscape.

Recreational Users

Impacts to recreational users from the introduction of project components within the landscape would be similar to impacts associated with the Proposed Action.

Reclamation

Impacts associated with Alternative C would be similar to impacts associated with the Proposed Action.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Impacts associated with Alternative D would be similar to impacts associated with the Proposed Action

3.10.2.3 Conformance with Visual Resource Management Class Objectives

Methodology provided in BLM Manual H-8431-1 (BLM 1986b) was used to evaluate the visual contrast created by the alternatives on the existing landscape as seen from the identified KOPs. This evaluation provided the basis for assessing potential visual resource impacts on BLM-managed lands. The degree to which a management activity affects the visual quality of a landscape largely depends on the visual contrast created between a project and the existing landscape. The contrast can be measured by comparing the project features or components with the major features in the landscape from previously identified KOPs. Completed contrast rating worksheets and photorealistic simulations associated with each KOP within the analysis area relating to BLM-managed lands are in Appendix B. Table 3.10-8 identifies each alternative, the associated VRM class not in conformance, as well as the project acres not in conformance with VRM objectives.

Table 3.10-8. Conformance with Visual Resource Management Objectives by Action Alternative

Alternative	VRM Class Not in Conformance	Acres Not in Conformance
Alternative B: King Waste Rock Dump (Proposed Action)	II	323
Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	II	313
Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump	II	313

Although the alternatives would not meet VRM Class II objectives, this non-conformance with existing VRM objectives is not reflective of the actual visual impacts of the project. The project visual impacts would be similar to the existing visual landscape conditions resulting from the current and historical land uses within the project area. Based on the incongruity between this land use and the current VRM classifications on these lands, the BLM would eventually be performing land use plan maintenance to revise the current VRM classifications to be consistent with the current land use.

3.10.2.4 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

All action alternatives would result in irretrievable impacts on visual resources as a result of previously undisturbed lands within the project area being used to support future mining activities that would reduce the overall acres of Scenic Quality Class A lands (as currently inventoried) where those activities occur. These irretrievable impacts would be lessened by the revegetation and soil stabilization activities associated with mine closure and reclamation (see simulations in Appendix B). However, the visual landscape in and surrounding the project area would continue to show evidence of the existing and future landform and vegetation modifications. This would continue indefinitely beyond mine life and post-closure. These impacts would be irreversible because of the scale and geographic area of disturbance and because these areas would not be taken back to pre-disturbance contours. These irreversible impacts would occur under all alternatives, including the No Action alternative. It should be noted that viewers within the landscape are accustomed to the landform modifications and visual disturbances that have occurred in the area over the last 150 years.

3.11 Water Resources

Water resources include surface water features such as perennial, intermittent, and ephemeral streams; springs; wetland areas and floodplains; groundwater; water quantity; and water quality.

3.11.1 Affected Environment

3.11.1.1 Analysis Area

The project area and the hydrogeologic analysis area (Figure A-30) are within the Great Basin hydrographic region of the Basin and Range physiographic province. The Great Basin hydrographic region is characterized by north-south-trending mountain ranges separated by arid to semi-arid alluvial basins. Surface waters within the Great Basin are internally draining with both surface and groundwater eventually lost to evapotranspiration.

Specifically, the hydrogeologic analysis area lies within portions of the White (HUC 15010011), Spring-Steptoe Valleys (HUC 16060008), and Long-Ruby Valleys (HUC 16060007) USGS HUC-8 subbasins (see Figure A-30). The analysis area partially encompasses the following HUC-10 watersheds: Jakes Wash (HUC 1501001101), Lower Illipah Creek (HUC 1606000702), Murry Creek (HUC 1606000812), Upper Duck Creek (HUC 1606000814), Steptoe Creek (HUC 1606000811), and the northern half of Willow Creek (HUC 1606000810) (see Figure A-30).

The Nevada Division of Water Resources defines 14 hydrographic regions and 232 administrative hydrographic basins within Nevada. The project area lies at the topographic divide of the Egan Range with Steptoe Valley to the east and the White River Valley to the west. The Steptoe Valley Hydrographic Basin (179) is in the Central Region Hydrographic Region (10), whereas the White River Valley Hydrographic Basin (207) is the northernmost basin within the Colorado River Hydrographic (13) (see Figure A-30). A portion of the analysis area is within the Jakes Valley Basin Hydrographic Region (174), the southern portion of the Steptoe Valley Hydrographic Basin (179), and the northernmost portion of the White River Valley Hydrographic Basin (207) (see Figure A-30), which totals approximately 1,050 square miles (674,000 acres).

3.11.1.2 Climate

Precipitation and Groundwater Recharge

Precipitation data from six different meteorological stations were analyzed. All six station locations are shown in Figure A-31 with annual precipitation data from 2012 to 2019 listed in Table 3.11-1. Three of the six stations, Admin (7,250 feet amsl), Giroux Wash (6,625 feet amsl), and Ruth Overlook (7,250 feet amsl originally and at 7,400 feet amsl in the new location), are within the project area. Monthly average precipitation varies from 0.25 to 1.42 inches (Table 3.11-2).

Table 3.11-1. Annual Meteorological Station Precipitation Data (2012–2019)

Year	Admin (7,250 feet amsl) Precipitation (inches)	Giroux Wash (6,625 feet amsl) Precipitation (inches)	Ruth Overlook (7,250 & 7,400 feet amsl) Precipitation (inches)	Ruth COOP (6,840 feet amsl) Precipitation (inches)	Ely WBO (6,2550 feet amsl) Precipitation (inches)	Cattle Camp (7,300 feet amsl) Precipitation (inches)
2012	8.91	–	9.50	13.53	12.24	7.29
2013	7.22	–	8.55	8.87	8.54	5.75
2014	7.83	5.28	9.15	11.45	9.26	11.62
2015	10.22	7.20	10.76	11.94	9.86	9.71
2016	9.96	5.87	9.56	17.94	10.98	12.23
2017	7.09	5.55	10.93	11.34	9.68	12.43

Year	Admin (7,250 feet amsl) Precipitation (inches)	Giroux Wash (6,625 feet amsl) Precipitation (inches)	Ruth Overlook (7,250 & 7,400 feet amsl) Precipitation (inches)	Ruth COOP (6,840 feet amsl) Precipitation (inches)	Ely WBO (6,2550 feet amsl) Precipitation (inches)	Cattle Camp (7,300 feet amsl) Precipitation (inches)
2018	3.25	3.79	8.32	9.05	7.83	4.56
2019	14.43*	11.42*	15.14†	15.12	14.55	-
Average	8.61	6.52	10.24	12.41	10.37	9.08

Source: Piteau (2020a).

* Sensor not working October–December 2019.

† Sensor not working July–October 2019.

Table 3.11-2. Average Monthly Precipitation (2012–2019)

Month	Admin (7,250 feet amsl) Precipitation (inches)	Giroux Wash (6,625 feet amsl) Precipitation (inches)	Ruth Overlook (7,250 & 7,400 feet amsl) Precipitation (inches)	Ruth COOP (6,840 feet amsl) Precipitation (inches)	Ely WBO (6,2550 feet amsl) Precipitation (inches)	Cattle Camp (7,300 feet amsl) Precipitation (inches)
January	0.86	0.34	1.02	1.17	1.14	0.65
February	0.71	0.36	0.96	1.00	1.10	0.77
March	0.78	0.66	1.28	1.34	1.16	0.82
April	0.64	0.62	1.04	1.42	1.15	1.07
May	0.83	1.02	1.07	1.20	0.69	0.85
June	0.37	0.37	0.34	0.48	0.48	0.61
July	1.00	0.95	0.86*	1.02	0.48	0.78
August	0.71	0.61	0.82*	0.95	1.02	0.91
September	1.07	0.76	1.23*	1.32	1.01	0.89
October	0.76*	0.52*	0.76*	0.72	0.69	1.02
November	0.46*	0.25*	0.66	0.58	0.59	0.59
December	0.67*	0.25*	0.64	1.20	0.98	0.51
Total	8.85	6.69	10.70	12.40	10.49	9.48

Source: Piteau (2020a).

* Sensor not working 2019.

Groundwater recharge from precipitation for the analysis area was estimated using the Maxey Eakin method (Maxey and Eakin 1949; Piteau 2020a). The method estimates recharge as a function of elevation and annual precipitation, as follows:

- Elevations with < 8 inches per year in precipitation, no groundwater recharge.
- Elevations with 8–12 inches per year in precipitation, 3% of precipitation becomes groundwater recharge.
- Elevations with 12–15 inches per year in precipitation, 7% of precipitation becomes groundwater recharge.
- Elevations with 15–20 inches per year in precipitation, 15% of precipitation becomes groundwater recharge.
- Elevations with > 20 inches per year in precipitation, 25% of precipitation becomes groundwater recharge.

The 1971 Hardman precipitation map (Huntington 2007) was used instead of the original 1936 version (Hardman 1936) as it is the latest available version. The estimated recharge across the analysis area is 46,440 acre-feet per year (af/yr) (Piteau 2020a). Additionally, approximately 18% of agricultural pumping was returned as groundwater recharge (Piteau 2020a).

The analysis area recharge rates are shown in Figure A-31.

Evapotranspiration

Most of the precipitation (see Table 3.11-1) is consumed by evapotranspiration. In areas with shallow groundwater, groundwater discharge as evapotranspiration occurs. These areas of groundwater evapotranspiration coincide with areas of phreatophytes (Figure A-31; Piteau 2020a). Phreatophytes are plants with deep root systems that draw their water supply from near the water table. Groundwater evapotranspiration from these phreatophyte areas in the analysis area is estimated at 6,880 af/yr (Piteau 2020a).

3.11.1.3 Surface Water

Primary surface water drainages within the analysis area (see Figure A-30) are Gleason Creek, Giroux Wash, and Murry Creek. Gleason Creek, which drains most of the project area, is ephemeral and flows in response to heavy snowmelt or high precipitation events (Piteau 2020a). The Giroux Wash and the tributary White River Wash are ephemeral streams that flow in response to storm runoff. Before the construction of the Giroux Wash TSF, the White River Wash joined the Giroux Wash in the area beneath the TSF. As part of the approved construction of the TSF, Giroux Wash's stormwater runoff is routed around the facility. Below the TSF, as it flows south, Giroux Wash is joined by several small intermittent streams coming off Ward Mountain. Downstream, Giroux Wash flows south through White River Valley before ultimately converging with Jakes Wash north of Lund.

Murry Springs historically fed into Murry Creek, and its discharge from 1970 to 1995 varied between 2,000 and 4,000 gallons per minute (gpm) (Piteau 2020b). Murry Springs provided the City of Ely's municipal drinking water until 2010 when KGHM Robinson's dewatering impacted the springs so it no longer flows (BLM 2016). To mitigate these impacts, Robinson Mine installed two wells (RW-6P and RW-7P) in 2009 to supply water to the City of Ely.

Throughout the analysis area, approximately 150 seeps and springs have been identified (Figure A-32). Most springs have discharges of a few gpm or less (Enviroscientists 2008; PTI Environmental Services 1994; Piteau 2020c). Of these, Robinson Mine monitors eight springs as part of their water rights approval permit (Permit 78-185 for mining and milling and Permit 78-186 for dewatering pumping). The results of this monitoring are provided to the Nevada State Engineer. Robinson Mine is required to provide monitoring results to the Nevada State Engineer's Office quarterly and annually. If monitoring shows any impacts, Robinson Mine is required to mitigate those impacts, which may include drilling of new wells to provide alternative supply for any impacted water supply. A full description of the groundwater monitoring program is provided in Appendix H of Appendix C (2019 Mine Plan Amendment). Monitoring locations are shown in Figure A-43.

3.11.1.4 Groundwater

Hydrogeology within the analysis area is consistent with the geology of the area (see Section 3.4 Geology and Mineral Resources), which generally dictates groundwater flow (and quantity) and availability (permeability). The analysis area lies within a regional carbonate flow system with valley fill alluvial flow systems present in the valley floors (Heilweil and Brooks 2011). The groundwater system comprises

aquifers and confining units in unconsolidated basin fill and volcanic deposits in the basins, and carbonate and other bedrock in the mountain ranges that separate the basins (Heilweil and Brooks 2011). Robinson Mine is located within a mountain range with a thick sequence of carbonate rocks that dominate the groundwater availability and flow, with other sedimentary units, and with mineralized zones generally impeding the flow of groundwater.

Hydrostratigraphy

The oldest stratigraphic unit within the analysis area is the Devonian Guilmette Limestone. The entire Paleozoic section within the analysis area is part of the regional carbonate flow system, which, on a regional scale, flows south (Welch et al. 2007). The Guilmette Limestone can have relatively high permeability. The Guilmette Limestone is overlain by the Mississippian Pilot Shale, Joana Limestone, and Chainman Shale, all of which are of lower permeability and tend to impede the flow of groundwater (Piteau 2020b). The Ely Limestone overlays the Chainman Shale and is the principal water-bearing unit in the project area. Above the Ely Limestone are the Permian Reipe Springs Limestone, Rib Hill Sandstone, Upper and Lower Arcturus Formations, and the Kaibab Limestone.

The Devonian Guilmette Limestone is 2,100 to 2,500 feet thick and can be very permeable where solution channels (0.01 to > 2,500 feet per day) are present (Welch et al. 2007). Above the Guilmette is a series of Mississippian sedimentary rocks comprising the Pilot Shale (350 feet thick), Joana Limestone (400 feet thick), and the Chainman Shale (400–1,500 feet thick), which generally have lower permeability and tend to impede groundwater flow. Above the Chainman Shale is the Mississippian-Pennsylvanian Ely Limestone (up to 2,000 feet thick), which is a highly transmissive unit (Piteau 2020b). The overlying Reipe Springs Limestone, the oldest Permian unit in the project area, is approximately 250 feet thick, and is similar to the underlying Ely Limestone (Piteau 2020b). The Reipe Springs Limestone is overlain by the Rib Hill Sandstone (approximately 1,100 feet thick) and the Arcturus Formation. The Arcturus is subdivided into an Upper Arcturus sandstone (approximately 1,500 feet thick) and a Lower Arcturus carbonate (approximately 1,200 feet thick). A greater abundance of relatively impermeable siltstone with interbedded limestone and sandstone in the Upper Arcturus is thought to be the cause for multiple perched water zones in the project area (Piteau 2020b). The Lower Arcturus has more permeable limestone and fractured units resulting in relatively higher permeability (Piteau 2020b). The Kaibab Limestone is the youngest Permian unit in the analysis area and is 90 to 150 feet thick. The Kaibab Limestone is unconformably overlain by the Tertiary Sheep Pass Formation, which comprises ash-flow and ash-fall tuffs and the Quaternary terrace deposits and alluvium (approximately 1,100 feet thick) (Piteau 2020b; NBMG 1976).

A quartz monzonite porphyry was emplaced into the Paleozoic section in Early Cretaceous time as stocks, dikes, sills, and irregularly shaped plutons (Piteau 2020b). Skarn and hornfels alteration are associated with contact metamorphism between the quartz monzonite porphyry and the Ely Limestone and Chainman Shale. Beginning in the Tertiary period, rhyolite (as both intrusive and extrusive rocks) forms plugs, dikes, sills, diatremes, ash-flow, and ash-fall tuffs, which are generally low permeability (Piteau 2020b).

Hydrogeologic Structure

Structures across the analysis area and project area result in juxtaposing transmissive units (i.e., the Ely Limestone) with less transmissive units (i.e., the Chainman Shale). The most notable structural feature across the project area is the east-west alignment of intrusion, mineralization, and alteration (i.e., the quartz monzonite porphyry, rhyolite, and the skarn and hornfels) (Piteau 2020b). This east-west alignment is associated with Mesozoic faulting likely related to the Sevier Orogeny (Piteau 2020b). Later, Tertiary faulting of the once continuous sulfide deposit resulted in series of east-west fragmented deposits (Piteau

2020a). These Tertiary faults are thought to have been initiated as normal faults that were rotated and cut by later sets of faults to produce the present, complex array of orientations (Piteau 2020b).

This complex structure has led to the compartmentalization of the hydrogeology into hydrogeologic blocks. These blocks are delineated by the hydraulic conductivity of the rocks, the presence of structural features, the amount of recharge and discharge, and hydrogeologic boundaries (Piteau 2020b). Figure A-33 shows the hydrogeologic blocks (Piteau 2020b). Of significance to the project are the South Block, West Mineralized Block, West Ruth Block, Keystone Block, and the Arcturus Block.

The South Block is dominated by transmissive carbonates, primarily the Ely Limestone. The South Block is bounded hydrologically where the transmissive carbonates are in contact with mineralized zones, low permeable faults, and low permeable units. The East and West Mineralized Blocks form the northern boundary of the South Block (Piteau 2020b). The eastern boundary of the South Block is defined by the narrow north-south-trending band of well-indurated volcanoclastic rocks of the Sheeps Pass Formation present along the western boundary of the Steptoe Valley alluvium and coincident with the range front fault (Piteau 2020b). A large band of low permeability rocks and Giroux Wash fault zone (associated with the Kaibab Thrust Fault) bounds the South Block to the west (Piteau 2020b). To the south, the South Block extent is not as well defined but is believed to be bounded by a Cretaceous intrusion beneath Ward Mountain (Piteau 2020b). Because of its low permeability, the Chainman Shale beneath the Ely Limestone is believed to be the bottom boundary separating the flow system in the project area from the underlying Guilmette Limestone.

The South Block is conceptualized as one inter-connected block of transmissive carbonates. Throughout the South Block, many faults juxtapose transmissive carbonates (Ely Limestone, Lower Arcturus, or Rib Hill) with each other and do not compartmentalize the block. However, when the carbonates are juxtaposed against lower transmissive units (i.e., the Chainman Shale or mineralized zones), compartmentalization occurs and the block is bounded due to flow being impeded in the lower transmissive units.

Because the South Block is in hydraulic connection to the south pit wall of the Ruth Pit, it is being actively dewatered. The higher permeability of the inter-connected carbonates causes approximate uniform drawdown across the block. Prior to the initiation of dewatering of the block in 2007, water levels were approximately 6,642 feet amsl. Near-pit piezometers in the Ruth Pit in quarter 4 of 2019 show that the South Block has been drawn down approximately 500 feet to between 6,144 and 6,186 feet amsl (Piteau 2020b). The 2019 dewatering rate of 13,600 gpm from the South Block has produced approximately 6 feet of drawdown per month (72 feet/year) and an additional 360 feet of drawdown is planned through 2024 to meet expected mining depths in the permitted Ruth Pit.

The Liberty Pit lies within the West Mineralized Block (see Figure A-33). To the south, the West Mineralized Block is defined by the extent of alteration and the quartz monzonite porphyry associated with the High Grade and Minnesota faults (Piteau 2020b). To the east, the West Mineralized Block is bounded by the Ruth West Block and the Eureka Fault and/or Keystone Fault (Piteau 2020b). The northern boundary of the West Mineralized Block coincides with the extent of the quartz monzonite porphyry and the Chainman Shale. The block almost entirely comprises low transmissive units (hornfels, quartz monzonite porphyry, skarn, and rhyolite) with only small windows of Ely Limestone, which is silica altered or skarn (Piteau 2020b) effectively lowering its relative permeability.

Low permeability of the units within the West Mineralized Block lead to water levels across the block varying considerably. Along the north wall of the Liberty Pit and into the Tripp/Veteran Pit the water levels range from 6,900 to 7,100 feet amsl. Water levels in the south wall of the Liberty Pit in the Ely Limestone (6,350–6,540 feet amsl) are 200 to 300 feet higher than water levels in the South Block (6,144

and 6,186 feet amsl) and tend to decline at smaller rates than those observed in the South Block (Piteau 2020b).

The East Mineralized Block and the Ruth West Block are composed primarily of low transmissivity units including quartz monzonite porphyry, skarn, and Chainman Shale (Piteau 2020b). The East Mineralized Block appears to form a hydraulic boundary between the Keystone Block to the north and the South Block to the south. There is, however, evidence of some connection between the Keystone Block and the South block through the Keystone Fault (in the Ruth West Block) (Piteau 2020b). Because of the mining of the Ruth East and Ruth West Pits, dewatering of the South Block and the relatively low permeabilities within the East Mineralized Block and the Ruth West Block, water levels vary spatially (Piteau 2020b). Generally, groundwater flow is towards the Ruth East and West Pits.

The Arcturus Block is composed primarily of the Upper and Lower Arcturus Formations with water levels ranging from 6,680 to 6,900 feet amsl (Piteau 2020b). The interbedded nature of the siltstones, sandstones, and limestones of the Arcturus Formations lend the Arcturus Block to have varying water levels, perched water levels, and low transmissivity across the block (Piteau 2020b). It is bounded below by the Ely Limestone of the Keystone Block, which has a comparatively higher permeability. The Keystone Block is primarily composed of carbonates similar to the South Block and for this reason is more transmissive (Piteau 2020b).

Water levels in and near the Liberty Pit vary because it is within the West Mineralized Block. Because of the low permeability of the West Mineralized Block, it is not greatly influenced by pumping in the South Block or in the Keystone block. Groundwater gradients in and near the Liberty Pit are also steep because of the low permeability of the West Mineralized Block. Because of the low permeability of the West Mineralized Block, pumping from this block would tend to create steep gradients and low yields.

Groundwater Budget

A water budget for the analysis area for the end of 2019 is presented in Table 3.11-3.

Table 3.11-3. Estimated Water Budget (End of 2019) in the Analysis Area

Budget Component	Value (af/yr)	Value (gpm)
Inflows		
Precipitation recharge	46,440	28,840
Inflow from South Steptoe Valley	1,930	1,200
Inflow from North Jakes Valley	8,000	4,970
Irrigation returns	2,150	1,340
Return flow from Gleason Creek	7,870	4,890
Murry Creek overflow	220	140
Total Inflows	66,610	41,380
Outflows		
Evapotranspiration (Steptoe Valley)	6,880	4,270
Water supply pumping	340	210
Dewatering pumping	22,090	13,720
Agricultural pumping	12,200	7,580

Budget Component	Value (af/yr)	Value (gpm)
Groundwater outflow to Northern Steptoe Valley	15,110	9,390
Groundwater outflow to Southern White River Valley	24,200	15,030
Total Outflows	80,590	50,050
Change in Storage	-14,220	-8,830

Source: Piteau (2020b).

Note: Values are rounded to the nearest 10 af/yr or 10 gpm.

As described above, recharge is approximately 46,440 af/yr and groundwater evapotranspiration is approximately 6,880 af/yr. Piteau (2020b) estimated groundwater inflow into the analysis area along the southern boundary in Steptoe Valley (approximately 1,930 af/yr) and along the northwestern boundary from Long Valley into Jakes Valley (8,000 af/yr). Piteau (2020b) also estimated groundwater outflow from the analysis area along the northern boundary in Steptoe Valley (15,110 af/yr) and along the southwestern boundary in White River Valley (24,200 af/yr).

Groundwater recharge from agriculture (2,150 af/yr) is estimated at approximately 18% of agricultural pumping (12,200 af/yr). Mining and milling require approximately 16,100 af/yr of water to sustain mining, depending on throughput volumes of ore (Piteau 2020b). Water supply for mining and milling operations is provided from the South Block dewatering system, the Ruth Mine Impacted Water system, reclaim from the TSF, and water supply wells WF-1P and NRC-1P. During 2019, water supply wells produced approximately 340 af/yr. Mine dewatering (primarily from the carbonates of the South Block) is approximately 22,090 af/yr. Excess dewatering water not consumed in mining operations is discharged to Gleason Creek with Robinson Mine permitted to discharge up to 15,000 gpm (24,200 af/yr). Discharge to Gleason Creek in 2019 was 4,890 gpm (7,870 af/yr). The discharged water to Gleason Creek recharges the groundwater system along the streambed.

Because of past mine dewatering of carbonates in the South Block, Murry Springs have dried up. The City of Ely had used water from Murry Springs for municipal supply. Robinson Mine installed wells RW-7P and RW-6P (near Murry Springs) to replace the water supply. When city demand is low, excess water pumped from these two wells is discharged to Murry Creek. In 2019, 140 gpm (220 af/yr) was discharged to Murry Creek. Similar to water discharged to Gleason Creek, the water discharged to Murry Creek recharges the groundwater system along its streambed.

Because of mine dewatering, there is an estimated 14,220 af/yr groundwater deficit within the estimated water budget from 2019 (see Table 3.11-3). This deficit is primarily from the carbonates in the South Block and represents a change in groundwater storage in the system (i.e., lowering of the water levels within the South Block).

3.11.2 Environmental Consequences

3.11.2.1 Analysis Method

Calibrated three-dimensional numerical groundwater flow models were developed to estimate effects to groundwater and surface water resources for all alternatives (including the No Action alternative). The numerical model was used to evaluate or estimate 1) mine dewatering rates required for the proposed Liberty East Pit expansion, 2) drawdown and recovery of groundwater levels resulting from the total estimated groundwater pumping, and 3) groundwater recovery in pits.

Piteau (2020d) conducted the numerical groundwater modeling using modeling code MODFLOW-SURFACT (Hydrogeologic 2012) to simulate the groundwater system response to estimated groundwater pumping requirements under the two scenarios. The groundwater model domain is shown in Figure A-34.

The groundwater modeling included the development of a conceptual model of the groundwater flow systems as presented in Piteau (2020b) and Piteau (2019). The conceptual model of the study consists of hydrogeologic units based on the groupings of geologic and stratigraphic units with similar hydraulic characteristics. Hydrogeologically significant structures and faults were included in the model as either separate model zones or as horizontal flow barriers (i.e., the HFB MODFLOW package). Recharge to the groundwater system was estimated using the Maxey-Eakin method as defined above and applied using the MODFLOW recharge package. Groundwater evapotranspiration in the phreatophyte zones was simulated in the model using the MODFLOW evapotranspiration package.

The numerical model domain was discretized into 587,232 active model cells covering approximately 122 square miles (21 miles north–south and 7.3 miles east–west) (Piteau 2019). To provide more detailed flow information in the project area, the grid cell dimensions vary horizontally from 100 × 100 feet at the pit nodes to 2,000 × 5,000 feet at the outer margins of the model (Piteau 2019). The more detailed grid cells in the mining area allow the model to more accurately match observed hydrogeologic and groundwater conditions in the project area.

Groundwater outflow to Giroux Wash along the northwestern boundary of the project area was through a general-head boundary (i.e., a GHB MODFLOW boundary package). Another GHB boundary was applied along the northern boundary to simulate inflow and outflow. The remaining proximal boundaries were all no-flow (Piteau 2019).

Model calibration incorporated a water level dataset of 4,441 from 246 locations and used both manual methods and automated calibration software. A detailed explanation of the conceptual hydrogeologic model, modeling approach and setup, steady-state and transient calibration, sensitivity analysis, water budget, and model predictions are presented in the groundwater model technical reports (Piteau 2018, 2019, 2020d, 2020e).

The numerical groundwater flow model was used to assess the groundwater and surface water quantity consequences for each of the two scenarios discussed above. The changes in groundwater levels represent the incremental difference in water level change between the second scenario (with the Liberty East Pit expansion, i.e., all action alternatives) and the first scenario (No Action alternative).

The area that is predicted to experience an incremental reduction (drawdown) under the action alternatives compared to the No Action alternative in groundwater elevation of 10 feet or more as a result of mine groundwater pumping and pit dewatering activities of the Liberty East Pit expansion is the area of concern regarding potential impacts to water resources. This approach is consistent with current industry standards and analogous to approaches taken in evaluating impacts at other nearby mines: Bald Mountain Mine (BLM 2016b), Cortez Gold Mines Deep South Expansion Project (BLM 2019e). Changes in groundwater levels of less than 10 feet are typically difficult to distinguish from natural seasonal and annual fluctuations in groundwater levels. Springs located outside but near (< 0.25 mile) the perimeter of the incremental 10-foot drawdown area were also evaluated to identify surface water resources that may be at risk of impacts from drawdown by examination of the model predicted drawdown at those specific points.

Potential impacts to perennial streams and springs were evaluated by identifying perennial surface waters within or near the predicted drawdown area.

3.11.2.2 Direct and Indirect Impacts

Alternative A: No Action

The maximum extent of the 10-foot drawdown contour under the No Action alternative is shown in Figure A-35. Under the No Action alternative, the Liberty East Pit would not be expanded, and there would be no predicted dewatering for the pit. The drawdown predicted under the No Action alternative would be limited to the Liberty Main and Liberty East Pits with no surface waters (seeps, springs or streams) and water rights (not owned by Robinson Mine) within 0.25 mile of its extent.

The numerical groundwater model was used to simulate pit lakes developing in the pits across the project area under all alternatives (with and without the Liberty East Pit expansion); see Table 3.11-4. As described above, pit lakes would form as water levels rebound, subsequent to dewatering termination. Under the No Action alternative, this would result in pit lakes with a total pit lake evaporation at equilibrium of 891 gpm (1,437 af/yr). This represents approximately 1.7% of the total groundwater depletions (80,590 af/yr and 50,050 gpm) in the analysis area (see Table 3.11-3).

Through water level recovery (year 2327), compared to conditions at the end of 2019, an additional four springs and seeps (existing springs and seeps in analysis area total 57), and one water rights and users (existing water right in analysis area total 54) could be impacted (see Figures A-35 and A-37 and Appendix I) under the No Action alternative.

Under the No Action alternative and all action alternatives, the Giroux Wash TSF would be closed per NDEP Bureau of Mining Regulation and Reclamation requirements. Analyses of this closure were completed using infiltration and water balance modeling. Based on the results of the analyses, placement of a 1-foot-thick alluvial cover over the TSF impoundment basin and cycloned main embankment would limit the infiltration of precipitation into the TSF. The results of the updated comprehensive water balance model also predict that post-closure TSF draindown would decline exponentially with time. At closure, the predicted seepage rate would be approximately 2,500 gpm. Within 10 years of closure, most of the tailings would become unsaturated and the simulated seepage rate would decline to approximately 700 gpm. The predicted TSF seepage rate at 100 years is 70 gpm and the predicted long-term ET cover system net percolation rate is 11 gpm (GeoSystems 2017).

For a comparison of alternative impacts on water resources, see Table 3.11-4 below.

All Action Alternatives

Table 3.11-4 provides a comparison of alternative impacts. For the purposes of contrasting the action alternative impacts, all action alternative impacts are discussed in comparative format in this section.

Evaluation of the maximum extent of the 10-foot drawdown contour for the action alternatives showed no measurable difference from the No Action alternative (Piteau 2020d). No differences in the maximum extent of the 10-foot drawdown contours between alternatives results in predicted, potential impacts to surface water (seep, spring, or stream) or water rights being the same regardless of alternative, i.e. the extent of the cone of depression does not change between alternatives but the magnitude of the drawdown does. Likewise, the incremental maximum extent of the 10-foot contour—which is the difference between the drawdown predicted in the action alternatives and the drawdown predicted in the No Action alternative—is limited to the Liberty Main and Liberty East Pits with no surface waters (seeps, springs or streams) and water rights (not owned by Robinson Mine) within 0.25 mile of its extent. The incremental drawdown (as seen in the inset figure in Figure A-35) represents additional drawdown due to the Liberty East Pit expansion (drawdown under the action alternatives). However, the incremental drawdown contours show that for the action alternatives, the vicinity of the Liberty East Pit experiences an additional

250 feet of drawdown compared to the No Action alternative. Because the additional drawdown for the action alternatives would be limited to the Liberty Main and Liberty East Pits, there is no predicted change to the maximum extent of the 10-foot drawdown contour between the action alternatives and the No Action alternative (Piteau 2020d).

Under the action alternatives, a predicted annual dewatering of 85 to 125 gpm (137–202 af/yr) is estimated.

The numerical groundwater model was used to simulate pit lakes developing in the pits across the project area under all alternatives (with and without the Liberty East Pit expansion); see Table 3.11-4. Under the action alternatives, a pit lake would develop in the Liberty Main Pit with an equilibrium elevation (i.e., the elevation of water levels/pit lake stage when water level recovery has occurred) of 6,550 feet amsl in approximately 20 years after dewatering operations cease. Under the action alternatives, the elevation of 6,550 feet amsl coincides with the lowest elevation along the saddle or lip between the Liberty Main Pit and the Liberty East Pit and once the water level in the Liberty Main Pit lake reaches this elevation, any additional inflow into the pit will spill over into the Liberty East Pit. The Liberty East Pit lake will fill to an equilibrium elevation of 6,423 feet amsl after approximately 150 years.

As water levels recover under Alternative D, groundwater would recover into the Ruth East Pit backfill and would reach an equilibrium elevation of 6,611 feet amsl after approximately 120 years, which is also the elevation of the adjacent Ruth West Pit Lake. At equilibrium, groundwater would flow through the backfill and into the Ruth West Pit.

As described above, pit lakes (Table 3.11-4) would form as water levels rebound subsequent to dewatering termination resulting in pit lakes with a total pit lake evaporation at equilibrium of 889 gpm (1,433 af/yr) and 671 gpm (1,082 af/yr) under the Proposed Action/Alternative C and Alternative D, respectively. The predicted evaporation from the Liberty Main Pit lake is 45.1 gpm (73 af/yr) less under the action alternatives than under the No Action alternative. The predicted evaporation from the Liberty East Pit lake is 43.5 gpm (70 af/yr) less under the action alternatives than under the No Action alternative. The timing to equilibrium (i.e., the time at which the pit lake flows and stage reach equilibrium) varies by pit lake and alternative (see Table 3.11-4).

Under all alternatives (including the No Action alternative), the Liberty East Pit Lake is predicted to be a groundwater sink. Any flow-through of the Liberty Main Pit Lake is predicted to discharge to the Liberty East Pit resulting in the Liberty Pit lake system being a sink. Likewise, under all alternatives, the Ruth West Pit lake would be a flow-through pit lake. Under Alternatives A–C, the Ruth West flow-through to groundwater in the Keystone and North Robinson Blocks is predicted at approximately 118 gpm (190 af/yr) at equilibrium. Under Alternative D, the Ruth West flow-through to groundwater in the Keystone and North Robinson Blocks is predicted at approximately 122 gpm (197 af/yr) at equilibrium. The flow-through is predicted to flow toward the town of Ruth's water supply (Ruth GID well) and could degrade water quality (Piteau 2019) For details on water quality impacts, see Section 3.3 Geochemistry and Groundwater Quality. The Ruth East Pit lake, for Alternatives A–C is predicted to be a sink. The Ruth East backfill under Alternative D is predicted to be a flow-through into the Ruth East Pit Lake of approximately 33 gpm (53 af/yr) at equilibrium.

At equilibrium, the evaporation rates for the combined Liberty Main and Liberty East Pits is approximately 12 gpm (19 af/yr) less under the action alternatives than under the No Action alternative (see Figure A-36). Likewise, the predicted groundwater inflow into the combined Liberty Main and Liberty East Pits is approximately 3 gpm (5 af/yr) greater under the action alternatives than under the No Action alternative. These small relative differences in evaporation rates and groundwater inflow rates indicate minimal differences in impacts to groundwater quantity between the various alternatives.

In Ruth, the backfilling of Ruth East would result in approximately 218 gpm (352 af/yr) less evaporation and approximately 129 gpm (208 af/yr) less South Block groundwater inflow than in the alternatives without Ruth East Backfill (Alternatives A–C) (see Figure A-36). The addition of the Ruth East Backfill would reduce evaporation from groundwater and also reduce the inflow of groundwater from the South Block.

At equilibrium, the South Block is predicted to discharge to the Ruth West and Ruth East Pit lakes approximately 625 gpm (1,008 af/yr) under Alternatives A–C and 496 gpm (800 af/yr) to the Ruth West Pit lake and Ruth East Backfill under Alternative D. This discharge from the South Block at equilibrium could result in an equivalent decrease in other South Block discharges (Murry Springs, etc.).

As with the No Action alternative A, the action alternatives through water level recovery (year 2327) would continue to impact the same four springs and seeps (total of 57) and one water right and users (total of 54). The action alternatives would have no additional impacts to seeps and springs and water rights (see Figure A-35 and Appendix I) in the analysis area in comparison with the No Action alternative. Total depletions from evaporation under the action alternatives would be similar to that under the No Action alternative. For the Proposed Action and Alternative C, these depletions would be approximately 1.7% of the total depletions in the analysis area, and for Alternative D, they would be approximately 1.3% of the total depletions in the analysis area.

Table 3.11-4. Pit Lake and Backfill Information

Pit Lake/Backfill	Alternative A Pit Bottom (feet amsl)	Alternatives B–D Pit Bottom (feet amsl)	Alternative A Equilibrium Pit Lake Stage or Backfill Water Level (feet amsl)	Alternatives B–D Equilibrium Pit Lake Stage or Backfill Water Level (feet amsl)	Alternative A Time to Equilibrium ¹ (years)	Alternatives B–D Time to Equilibrium ¹ (years)	Alternative A Pit Lake Evaporation (gpm)	Alternatives B–C Pit Lake Evaporation (gpm)	Alternative D Pit Lake Evaporation (gpm)
Liberty Main	6,490	6,490	6,593	6,550	90	20	79	33.9	33.9
Liberty East	6,490	6,300	6,571	6,423	25	150	9	52.5	52.5
Ruth West	5,700	5,700	6,610	6,611	120	120	537	537	585
Ruth East Pit lake	6,050	6,050	6,610	6,610	120	120	266	266	--
Ruth East Backfill	6,050	6,050	--	6,611	--	120	--	--	0
Kimbley Backfill	6,400	6,400	6,615	6,622	200	150	0	0	0

Source: Piteau (2017, 2020b, 2019, 2020d, 2020e).

¹The time to equilibrium is the time the hydrologic system takes to recover such that the pit lake or water levels are at equilibrium

3.11.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

All impacts described above for all alternatives would be irreversible. Because of their relatively small contribution to existing groundwater depletions (less than 2%), they would not impact the long-term sustainability of groundwater in the analysis area. However, estimated cumulative long-term depletions from all water users in the area are resulting in depletions exceeding recharge by approximately 14,220 af/yr. Depending on the storage volume of the aquifer, if these cumulative depletions continue, it could impact long-term aquifer recharge.

3.12 Wildlife

This wildlife resource evaluation considers impacts to general wildlife, big game species managed by NDOW, migratory birds protected under the Migratory Bird Treaty Act (MBTA), and special-status species, that is, species that are deemed sensitive or have extra state or federal protections. NDOW manages wildlife populations in the project area, which includes the establishing wildlife management goals and objectives. The BLM manages wildlife habitats, including big game species and migratory bird habitats, that occur on BLM-managed lands and coordinates closely with NDOW on issues related to wildlife habitat management.

NDOW manages populations of big game species within geographic areas known as GMUs. The analysis area for big game species is the extent of the NDOW-delineated GMU that contains the project area (GMU 131). The analysis area for general wildlife and migratory birds is the extent of the three HUC-12 subwatersheds that overlap the project area (Lower Gleason Creek, Giroux Wash, and Town of Ely-Murry Creek) (see Figures A-21 and A-22). These analysis areas were selected because they represent the areas within which changes to wildlife populations could be observed resulting from management changes in those areas. Indicators used to evaluate the existing condition and potential impacts on wildlife species include habitat quality, acreage of habitat types (i.e., vegetation cover types) present, and acreage of habitat removed by potential surface-disturbing activities.

The analysis area for special-status wildlife species was determined on a species-by-species basis (see Section 3.12.1.4 Special-Status Wildlife Species). The indicators used for the analysis of potential effects to special-status species and their habitats are similar to those for wildlife and include habitat quality, acreage of special-status species habitats present, and acreage of special-status species habitat removed by potential surface-disturbing activities. Other potential impacts on special-status species are assessed qualitatively.

3.12.1 Affected Environment

Wildlife in the project area includes mammalian predators; upland game birds; reptiles; non-game and small mammal species; big game species; and migratory birds. Special-status wildlife species guilds described in this section are bats, raptors, and sagebrush species.

Past and current impacts to wildlife populations within the project area include regular climatic variation and extreme weather events, including drought; recreation; mineral development and exploration; development of roads and OHV use; livestock grazing management; vegetation management; and impacts related to noise from anthropogenic sources. Wildlife in the project area can be grouped by guild based on their response to these disturbances; the impacts from management actions are expected to be similar throughout a guild. For the purposes of this analysis, the species guilds discussed are general wildlife species, big game species, migratory bird species, and special-status wildlife species. Although other

wildlife may be present throughout the project area, potential impacts on these species can be inferred based on these guilds.

3.12.1.1 General Wildlife

The project area includes 853 acres of general wildlife habitat within the project area. LANDFIRE data, which define NVC groups on a regional scale, were used to quantify and depict habitat (LANDFIRE 2020). These groups from the LANDFIRE dataset, referred to here as vegetation cover types, were used as a standard data source to reliably determine the type and amount of habitat outside the areas surveyed for biological resources. Figure A-26 presents the vegetation cover types within the project area, which consist primarily of pinyon-juniper woodland with interspersed areas of sagebrush shrubland.

A variety of wildlife species occur in the project area and are described in detail in the *Robinson Mine Expansion Project Final Environmental Assessment* (BLM 2016a). Upland game birds that may occur in the project area include greater sage-grouse, chukar, mourning dove, and dusky grouse (*Dendragapus obscurus*). Chukar, mourning dove, and dusky grouse occur in a variety of vegetation cover types but generally require surface water features. Several small mammal species may inhabit the project area, including rodents such as Townsend's ground squirrel (*Urocitellus townsendii*), least chipmunk (*Tamias minimus*), and Great Basin pocket mouse (*Perognathus parvus*), and lagomorphs such as black-tailed jackrabbit and mountain cottontail (*Sylvilagus audubonii*), which occur in both sagebrush and pinyon-juniper woodland communities. Larger mammalian predator species known to occur in the project area include bobcat (*Lynx rufus*) and mountain lion (*Felix concolor*), which use various habitats, including steep, rocky areas, and coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and badger (*Taxidea taxus*), which primarily use sagebrush habitat in this part of their ranges. Reptile species such as western fence lizard (*Sceloporus occidentalis*), sagebrush lizard (*Sceloporus graciosus*), and Great Basin gophersnake (*Pituophis catenifer*), which are known to use sagebrush and pinyon-juniper woodland communities, may also occur in the project area. Two small ephemeral springs (Giroux Springs and an unnamed spring) located in the North Tripp WRD may provide surface water for various wildlife species (Figure A-32). The project area does not contain any natural perennial water features or suitable habitat for fish or other aquatic species.

3.12.1.2 Big Game

The project area is located within NDOW GMU 131, which is 998,955 acres. Big game species that occur or could occur in the project area include pronghorn, mule deer, and elk. Areas managed by the BLM as priority big game habitat include calving and fawning grounds, crucial summer range, and crucial winter range (BLM 2008a). Bighorn sheep are not known to use the project area.

Within GMU 131, elk occur primarily between 6,500 and 9,000 feet in elevation. In the summer and fall, elk generally use higher elevation areas (dominated by sagebrush, bitterbrush, serviceberry, and/or mountain mahogany) for calving and mating, and they migrate to mid-elevation areas, often dominated by pinyon-juniper woodland, in the winter. They will also use pinyon-juniper woodland in the summer and fall if there are surface water sources available (NDOW 2009). Elk sign (i.e., droppings, rubs, and bedded areas) were observed within the project area during natural resource surveys (BLM 2016a). The entire project area is mapped as elk habitat; however, there is no elk crucial summer habitat within or near the project area (Figure A-38) (BLM 2008a). Elk herd trends are variable from year to year based on several factors, including drought conditions and the severity of winters; however, overall, their population within GMU 131 in 2020 was considered stable and within NDOW population objectives (NDOW 2020c).

Mule deer occupy a variety of habitats in the western United States. Within GMU 131, mule deer occur between 4,000 and 11,300 feet in elevation. In the summer, mule deer within Unit 131 are known to use

areas dominated by big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), and Utah serviceberry (*Amelanchier utahensis*) (upon which they browse), and they also occur in pinyon-juniper woodland. Mule deer migrate to lower elevation areas in the winter, which are generally characterized by sagebrush, bitterbrush, and Stansbury cliffrose (*Purshia stansburiana*) (NDOW 2009).

A portion of the eastern half of the project area is located within mule deer summer range, and the western portion of the project area is mapped as year-round mule deer range (Figure A-39) (BLM 2008a). Mule deer and their sign (i.e., droppings, rubs, and bedded areas) were observed within the project area during natural resource surveys (BLM 2016a). The project area is within a mule deer movement corridor, which connects Gleason and Bothwick Creeks with the West Egan Range to the south (NDOW 2017a) (see Figure A-39). Mule deer in the GMU were radio collared in 2017–2018 to better understand seasonal movement patterns and the effects of pinyon-juniper encroachment and of mineral, oil, and gas development and exploration. Relative to the 2019 estimate, the 2020 mule deer population estimate exhibited a slight decrease but remains consistent with the previous 5-year average (NDOW 2020c).

Pronghorn are generally found within open, gently sloping terrain in the grasslands and cold deserts of the western United States. Within GMU 131, pronghorn use valleys characterized by sagebrush and desert scrub and benches dominated by pinyon-juniper woodland between 5,000 and 6,500 feet in elevation (NDOW 2009). The southwestern portion of the project area is mapped as year-round pronghorn habitat (Figure A-40) (BLM 2008a). Pronghorn sign was observed in sagebrush habitat within the project area during natural resource surveys (BLM 2016a). NDOW reported a decline in the GMU 131 pronghorn herd in 2020, which is being impacted by concentrations of feral horses in the surrounding valleys, as well as drought and pinyon-juniper encroachment (NDOW 2020c).

3.12.1.3 Migratory Birds

Migratory bird species known to occur within the project area (Stantec 2019) are commonly found within the Great Basin ecoregion. Nineteen migratory bird species were documented within the project area during bird point-count surveys performed in June 2019: American robin (*Turdus migratorius*), ash-throated flycatcher (*Myiarchus cinerascens*), black-headed grosbeak (*Pheucticus melanocephalus*), black-throated gray warbler (*Setophaga nigrescens*), blue-gray gnatcatcher (*Polioptila caerulea*), Brewer's sparrow (*Spizella breweri*), chipping sparrow (*Spizella passerina*), common raven (*Corvus corax*), gray flycatcher (*Empidonax wrightii*), gray vireo (*Vireo vicinior*), great horned owl (*Bubo virginianus*), green-tailed towhee (*Pipilo chlorurus*), juniper titmouse (*Baeolophus ridgwayi*), mountain bluebird (*Sialia currucoides*), mountain chickadee (*Poecile gambeli*), northern flicker (*Colaptes auratus*), sage thrasher (*Oreoscoptes montanus*), spotted towhee (*Pipilo maculatus*), and Woodhouse's scrub-jay (*Aphelocoma woodhouseii*). These migratory bird species are known to use pinyon-juniper woodland and sagebrush shrubland vegetation communities (which make up most of the vegetation in the project area) as breeding, nonbreeding, and/or foraging habitat. Brewer's sparrow was the most abundant migratory bird species observed during bird surveys, followed by green-tailed towhee and black-throated gray warbler. Brewer's sparrow and sage thrasher are both listed by NDOW as Species of Conservation Priority (Wildlife Action Plan Team 2012). The USFWS identified Brewer's sparrow, green-tailed towhee, pinyon jay (*Gymnorhinus cyanocephalus*), and sage thrasher as Birds of Conservation Concern that may be present within the project area (USFWS 2019).

3.12.1.4 Special-Status Wildlife Species

Some species of wildlife are accorded special status by federal and state agencies largely because they are either scarce on a regional level, facing clearly defined threats, or in a position within the regional

landscape to potentially become scarce. For the purposes of this EIS, special-status wildlife species comprise the following designations:

- **Federally listed species as threatened, endangered, proposed, or candidates for listing under the ESA or state equivalents.** An endangered species is any species that is in danger of extinction throughout all or a substantial portion of its range. A threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a substantial portion of its range. Candidate species are those which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
- **At-risk taxa tracked by the NNHP within the Nevada Department of Conservation and Natural Resources.**
- **Bird species protected under the Bald and Golden Eagle Protection Act**
- **Wildlife species identified by NDOW as Species of Conservation Priority**

Analysis areas for special-status wildlife species are defined by species. For species with habitats that have been identified and delineated or modeled, the analysis area comprises the extent of those habitats overlapped by the project area. The analysis area for potential impacts to greater sage-grouse is the extent of the NDOW-delineated population management unit (PMU) that contains the project area (the Butte/Buck/White Pine PMU). For evaluation of special-status species where habitats have not been identified or delineated, the analysis area consists of the extent of the HUC-12 subwatersheds present within the project area (Lower Gleason Creek, Giroux Wash, and Town of Ely-Murry Creek) (see Figures A-21 and A-22). The analysis areas were selected because they represent the areas within which changes to special-status species populations could be observed resulting from management changes in the project area.

Data obtained from the USFWS, BLM, NNHP, and NDOW indicate that habitats in the analysis area may be suitable for, or are within the potential range of, approximately 119 different special-status wildlife species. Based on a review of habitat requirements and historic and recent observations, 32 of these special-status wildlife species have the potential to occur within the analysis area and/or have been observed during site-specific biological field surveys. These species comprise 11 bird species, 16 mammal species, and five reptile species. Stantec (2019) provides detail on the individual special-status species that may be present within the project area; bats, raptors, and sagebrush species are each discussed as a group in separate sections below.

No ESA-listed species are likely to occur within the project area. The project area does not provide suitable habitat for any special-status aquatic species. The USFWS Information for Planning and Consultation (USFWS 2019) identified three endangered fish species that may be affected by the project: Hiko White River springfish (*Crenichthys baileyi grandis*), White River springdace (*Lepidomeda albivallis*), and White River springfish (*Crenichthys baileyi baileyi*). This USFWS report also provides species occurrence records from different geographic areas if there is the potential to impact those species, i.e., if they occur downstream of the project (USFWS 2019). Native populations of these fish species all occur more than 50 miles downstream of the project area; as a result, no impacts to these species from the project would occur because there would be no net loss of surface waters or groundwater resulting from the Proposed Action that would affect these species.

Bats

Stantec performed acoustic bat surveys at four locations within the King WRD and North Tripp WRD areas in June and August 2019 (Stantec 2019). Surveyors placed acoustic detectors at two abandoned

mine features (one adit in the King WRD area [WP-0311] and one shaft in the North Tripp WRD area [WP-0301]) and deployed two additional detectors to document general habitat use of the area by bats (one in sagebrush shrubland in the King WRD area and one in pinyon-juniper woodland in the North Tripp WRD area). In all, ten bat species were identified through acoustic data analysis (Table 3.12-1). Sufficient data are lacking to determine the population status of many of the bat species that occur in Nevada; however, several bat species that occur in the project area are exhibiting population declines throughout the western United States for a variety of natural and anthropogenic factors, including white-nosed syndrome, habitat loss and modification, wind energy development, and toxic water impoundments associated with mining (Bradley et al. 2006; Wildlife Action Plan Team 2012).

Table 3.12-1. Bat Species Acoustically Detected within the Project Area

Scientific Name	Common Name	Habitat Use within Project Area [*]	Project Location
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	Mi, PJ	King WRD area, North Tripp WRD area
<i>Eptesicus fuscus</i>	Big brown bat	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Lasionycteris noctivagans</i>	Silver-haired bat	Sb	King WRD area
<i>Lasiurus cinereus</i>	Hoary bat	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Myotis californicus</i>	California myotis	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Myotis ciliolabrum</i>	Western small-footed myotis	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Myotis evotis</i>	Long-eared myotis	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Myotis lucifugus</i>	Little brown myotis	Mi, PJ, Sb	King WRD area, North Tripp WRD area
<i>Myotis volans</i>	Long-legged myotis	Mi, PJ	King WRD area, North Tripp WRD area
<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat	Mi, PJ, Sb	King WRD area, North Tripp WRD area

Source: Stantec (2019).

^{*} Mi = mine feature; Sb = sagebrush shrubland; PJ = pinyon-juniper woodland

Nevada Division of Minerals Abandoned Mine Lands data indicate that the shaft in the North Tripp WRD area (Wp-0301) was backfilled and does not provide suitable bat roosting or overwintering habitat; Adit WP-0301 in the King WRD area remains open (NDOM 2020) and provides potential day and night roosting habitat for species such as Townsend's big-eared bat and western small-footed myotis. Mines are also known to be used by several bat species as winter hibernacula. Pinyon-juniper woodland within the project area may provide suitable habitat for tree-roosting bat species such as silver-haired bat and hoary bat. Species such as big brown bat, California myotis, long-eared myotis, little brown myotis, long-legged myotis, and Brazilian free-tailed bat may use buildings in the project area for roosting habitat. Several bat species likely forage within the project area; in particular, surface water within the Giroux Wash TSF may serve as an attractant feature from which bats can drink and feed on flying insects.

Raptors

Raptor species, including eagles, hawks, falcons, and owls, are covered under the MBTA. Additionally, golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) are further protected under the Bald and Golden Eagle Protection Act.

Golden Eagle

The golden eagle occurs throughout Nevada and is generally found in open country, particularly in mountainous areas. Nesting habitat consists of rock ledges, cliffs, and large trees at elevations between

4,000 and 10,000 feet amsl. This species is known to nest within the project area. Long-term studies indicate a population decline in this species across the western United States (Kochert et al. 2020).

Aerial raptor nest surveys of the project area and 10-mile buffer (collectively referred to hereafter as the survey area) were completed in 2019 (Stantec 2019) and followed standard USFWS and NDOW protocols for the detection of golden eagle nesting territories and nests. Thirty golden eagle nests, associated with 16 territories, were observed within the survey area. No eagle nests were found within the project area. Two golden eagle territories (Liberty Pit and Saxton Peak), containing a total of five nests, were identified within the mine plan boundary. One nest within the Saxton Peak territory was occupied, and the remaining four nests within these territories were unoccupied (Stantec 2019). Two golden eagle nests within the Liberty Pit territory were active in 2017 (Nest LP-01A) and 2018 (Nest LP-04A) with nestlings observed by surveyors (Stantec 2018). Golden eagle use of the project area is described in detail in the *2018 Golden Eagle Nesting Survey Report* (Stantec 2018) and the *2019 Biological Baseline Report* (Stantec 2019).

Bald Eagle

The bald eagle primarily nests in mature, old-growth forests within 2 kilometers of large waterbodies; they will feed on a variety of prey types but specialize on fish and other aquatic species (Buehler 2020). There is no suitable bald eagle breeding habitat within the project area, and no bald eagles or their nests were observed during aerial raptor surveys (Stantec 2019). However, this species has been observed within 4 miles of the project area (NDOW 2019) and may be observed within the project area during migration or winter periods. Bald eagle populations in Nevada are considered stable to increasing (Wildlife Action Plan Team 2012).

Other Raptors (including Owls)

The project area provides potential nesting and/or foraging habitat for several raptor species. Raptor species directly observed in the project area include Cooper's hawk (*Accipiter cooperi*), ferruginous hawk (*Buteo regalis*), great horned owl, northern goshawk (*Accipiter gentilis*), peregrine falcon (*Falco peregrinus*), prairie falcon (*Falco mexicanus*), and rough-legged hawk (*Buteo lagopus*) (NDOW 2019). Ferruginous hawk, northern goshawk, peregrine falcon, and prairie falcon, are listed as Species of Conservation Priority by NDOW (Wildlife Action Plan Team 2012). Aerial raptor nest surveys of the survey area performed in 2019 did not identify any raptor nests within the project area (Stantec 2019). Within the larger survey area, nests of two additional raptor species were observed: one occupied peregrine falcon nest and one occupied prairie falcon nest (Stantec 2019).

Sagebrush Species

Greater Sage-grouse

Greater sage-grouse are known obligates of sagebrush habitats, meaning they require sagebrush for some part of their life cycle. Greater sage-grouse use sagebrush for roosting, cover, and food. During Nevada winters, they select wind-swept ridges with vegetation dominated by short, scattered black sagebrush (*Artemisia nova*) or low sagebrush (*Artemisia arbuscula*) as winter feeding areas (Connelly et al. 2011). Although this species occurs widely in sagebrush throughout the west, it has undergone a decline in numbers due to a variety of interrelated impacts, from fire, invasive species encroachment, habitat fragmentation, and increased predation (Connelly et al. 2011). The greater sage-grouse has periodically been reviewed for federal listing under the ESA, and measures enacted by federal and state agencies across their range have prevented listing. Currently, the greater sage-grouse is considered a game bird in Nevada. Within Nevada, habitat alteration has been implicated as a major factor in the species decline (Connelly et al. 2011).

Greater sage-grouse court and mate on traditional communal display grounds called leks. Between March and May, male birds establish territories on the lek and display and vocalize to hold these territories and to attract female birds. Greater sage-grouse use springs, streams, and wet meadow habitats as brood-rearing sites, where young birds can find insects and nutritious green vegetation.

The project area is located within the greater sage-grouse Butte/Buck/White Pine PMU (NDOW 2017b). Greater sage-grouse habitat management areas within Nevada and northeastern California were mapped as part of an amendment to the 2015 greater sage-grouse RMP (BLM 2015) and were further revised in a second 2019 amendment (BLM 2019c). Habitat for greater sage-grouse is defined as Priority Habitat Management Areas (PHMA), which are areas that have been identified as having the highest conservation value to maintaining sustainable populations. These areas would include breeding, nesting, early brood-rearing, late brood-rearing, and winter concentration areas. General Habitat Management Areas (GHMA) are areas of occupied seasonal or year-round habitat outside of PHMA. Other Habitat Management Areas (OHMA) are lands previously identified as unmapped habitat but that contain seasonal or connectivity habitat areas (BLM 2015, 2019c). Under the 2015 RMP amendment, approximately 68 acres of the project area is mapped as OHMA; there are no portions of the project area mapped as PHMA or GHMA (Figure A-41). Under the 2019 RMP amendment, there are no portions of the project area mapped as greater sage-grouse habitat (BLM 2019c) (Figure A-42). Approximately 171 acres of vegetation within the project area is classified as containing a dominant sagebrush component and may provide habitat for greater sage-grouse. The nearest known lek site is approximately 7.3 miles southwest of the project area.

Pygmy Rabbit

The pygmy rabbit (*Brachylagus idahoensis*) is considered a Species of Conservation Priority by NDOW (Wildlife Action Plan Team 2012; NDOW 2020b). Pygmy rabbits occur in areas of old-growth sagebrush and burrow in loose, deep soils. Approximately 171 acres of sagebrush habitat within the project area may provide suitable pygmy rabbit habitat; however, pygmy rabbit surveys conducted in June 2019 did not detect any individuals, their burrows, or sign within the project area (Stantec 2019).

3.12.2 Environmental Consequences

3.12.2.1 Analysis Method

For the evaluation of potential impacts, wildlife species with similar life histories and habitat requirements are grouped together for discussion to eliminate redundancy. Impacts to wildlife species may occur because of effects on their potential habitats, which may serve as important foraging and/or breeding habitat necessary for their success at the population level. The BLM and NDOW would implement BMPs and stipulations for actions authorized by the agencies that may impact wildlife under all alternatives. These BMPs and stipulations would help avoid or minimize impacts to these species.

Assumptions

- Wildlife habitat extent and location can be represented by NDOW-delineated habitats (for big game and sagebrush species) and vegetation throughout the project area.
- The vegetation cover types analyzed using the LANDFIRE dataset are representative of the on-the-ground vegetation cover types.
- KGHM Robinson would work with the State of Nevada Sagebrush Ecosystem Technical Team (SETT) to ensure the project is in compliance with state-required compensatory mitigation measures (NRS 232.162).

3.12.2.2 *Direct and Indirect Impacts*

Alternative A: No Action

The proposed project would not take place under the No Action alternative, and impacts to wildlife would not occur. For this reason, no direct habitat loss or alteration would occur and human activity and noise levels would remain the same as they are currently.

Alternative B: King Waste Rock Dump (Proposed Action)

General Wildlife

Project activities under the Proposed Action would have direct and indirect impacts on wildlife habitat within the project area. The Proposed Action would result in the long-term removal of up to 853 acres of general wildlife habitat, which is approximately 2% of the total available wildlife habitat within the analysis area (the extent of the three HUC-12 subwatersheds that overlap the project area) (Table 3.12-2). These impacts would primarily occur within five vegetation cover types (Great Basin Pinyon – Juniper Woodland [657 acres], Intermountain Low & Black Sagebrush Shrubland & Steppe [92 acres], Intermountain Dry Tall Sagebrush Shrubland [62 acres], Intermountain Semi-Desert Shrubland & Steppe [19 acres], and Intermountain Mountain Big Sagebrush Shrubland & Steppe [17 acres], which together account for 99% of the undisturbed wildlife habitat in the project area.

General wildlife species in the project area would be indirectly impacted by continued mining activities in the project area; these impacts include increased noise and traffic, which may result in displacement or harassment, increased mortality risk, or reduced reproductive success. Application of EPMS would reduce impacts to general wildlife species. These include development of wildlife escape ramps, fencing around collection ponds, and monitoring and adapting as necessary to determine and maximize EPM effectiveness (see Appendix E for EPMS).

Table 3.12-2. Acres of Wildlife Habitat in the General Wildlife Analysis Area Directly Impacted by the Action Alternatives

Vegetation Cover Types	Alternative (percentage of analysis area)			Total in Analysis Area*
	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump	
Central Rocky Mountain Lower Montane Foothill & Valley Grassland	0 (0%)	0 (0%)	0 (0%)	41
Colorado Plateau - Great Basin Juniper Woodland & Savanna	1 (<1%)	1 (<1%)	1 (<1%)	118
Great Basin & Intermountain Introduced Annual Grassland	0 (0%)	0 (0%)	0 (0%)	92
Great Basin & Intermountain Introduced Perennial Grassland and Forbland	1 (3%)	1 (3%)	1 (3%)	31
Great Basin & Intermountain Ruderal Shrubland	1 (<1%)	1 (<1%)	1 (<1%)	125
Great Basin Pinyon - Juniper Woodland	657 (2%)	775 (3%)	648 (2%)	29,668
Interior Western North American Temperate Ruderal Shrubland	0 (0%)	0 (0%)	0 (0%)	2
Intermountain Basins Cliff Scree & Badland Sparse Vegetation	1 (<1%)	1 (<1%)	1 (<1%)	221
Intermountain Dry Tall Sagebrush Shrubland	62 (3%)	62 (3%)	62 (3%)	2,153
Intermountain Low & Black Sagebrush Shrubland & Steppe	92 (2%)	93 (2%)	92 (2%)	5,171
Intermountain Mountain Big Sagebrush Shrubland & Steppe	17 (1%)	52 (2%)	17 (1%)	2,108
Intermountain Semi-Desert Grassland	0 (0%)	0 (0%)	0 (0%)	18
Intermountain Semi-Desert Shrubland & Steppe	19 (4%)	19 (4%)	19 (4%)	455
Intermountain Shadscale - Saltbush Scrub	1 (3%)	1 (3%)	1 (3%)	34
North American Desert Alkaline-Saline Shrub Wetland	0 (0%)	0 (0%)	0 (0%)	57
Rocky Mountain Subalpine-Montane Mesic Herbaceous Meadow	0 (0%)	0 (0%)	0 (0%)	3
Southern Rocky Mountain Montane-Subalpine Grassland	0 (0%)	0 (0%)	0 (0%)	30
Western North American Montane Sclerophyll Scrub	1 (<1%)	2 (1%)	1 (<1%)	152
Total	853 (2%)	1,008 (2%)	844 (2%)	40,479

Source: LANDFIRE (2020)

* Lower Gleason Creek, Giroux Wash, and Town of Ely-Murry Creek HUC-12 subwatersheds

Big Game

The Proposed Action would result in direct impacts to big game through the removal of up to 853 acres of potential big game habitat (Table 3.12-3), which is less than 1% of the available habitat for big game species within the analysis area (the extent of the NDOW-delineated GMU that contains the project area). The project area is within a mule deer movement corridor (see Figure A-39), which may restrict movement for this species to periphery habitat. Impacts could include localized, long-term disturbance to the mule deer corridor by fragmentating habitat resulting from increased noise, surface disturbance and additional fence lines. At a regional scale, impacts to mule deer populations due to mining activities are currently being investigated by NDOW. Application of EPMS, on coordination with BLM and NDOW, would minimize impacts to big game (KGHM 2019a). These measures include following of BLM specifications for fencing to facilitate big game movement through mining plan area and reclamation to provide post-closure habitat for big game. Once mining activities cease and reclamation has begun, mule deer may begin using the portions of their movement corridors within the project area.

Table 3.12-3. Acres of Disturbance to Big Game Habitat in the Big Game Species Analysis Area by Action Alternative

Big Game Habitat Layer	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump	Total in Analysis Area¹
Elk Habitat				
Year-round	853 (< 1%)	1,008 (< 1%)	844 (< 1%)	627,743
Mule Deer Habitat				
Year-round	639 (< 1%)	805 (< 1%)	639 (< 1%)	592,191
Crucial Summer	213 (< 1%)	203 (< 1%)	203 (< 1%)	173,422
Pronghorn Habitat				
Year-round	329 (< 1%)	329 (< 1%)	329 (< 1%)	560,201

Source: BLM (2008a).

¹ NDOW GMU 131

Migratory Birds

Direct impacts to migratory birds comprises up to 853 acres of disturbance to foraging and nesting habitat, which accounts for less than 1% of the available habitat for migratory bird species within the analysis area. Disturbances would include both direct habitat removal (see Table 3.12-2) and an indirect disturbance from an increase in noise pollution, human activity, and anthropomorphic structures on the landscape (Nenninger and Koper 2018; Ortega 2012). After reclamation activities and return of suitable habitat conditions, migratory birds should recolonize the project area. Direct mortality to nesting individuals could occur through surface-disturbance activities. To avoid direct mortality, KGHM Robinson would adhere to project EPMS, which include conducting nesting surveys during the breeding season prior to surface-disturbance activities and providing appropriate buffers around active nests (KGHM 2019a). After reclamation activities, migratory birds could recolonize this habitat for breeding. Impacts to migratory birds would be minor and localized but with long-term habitat disturbance.

Special-Status Wildlife Species

Bats

Direct impacts to bats would include minor, localized, and long-term disturbance to 853 acres of potential foraging habitat; this includes the permanent loss of 657 acres of Great Basin Pinyon - Juniper Woodland, which may provide roosting habitat for tree-roosting bat species known to use the area (i.e., hoary bat and silver-haired bat). The Proposed Action may permanently destroy or disturb an adit mine feature (WP-0311) located within the King WRD, potentially causing direct mortality to any bats roosting within the adit. Because there are no known concentrations of bats in the project area, other than within the mine feature, impacts to bat populations would be minor, localized, and long term because densities of bats being displaced are low and the surrounding habitat is similar in terms of roosting and foraging habitat. Direct mortality of bats potentially using the mines during their collapse or removal would be a moderate short-term, and local impact to bats and is prohibited by NDOW. Application of EPMS, which require that KGHM obtains permission from BLM and NDOW prior to sealing any mine opening within the project area (KGHM 2019a), would minimize impacts to bats. An NDOW-approved biologist must perform exclusion protocols and closure techniques prior to destruction of existing mine features that may support roosting bats. An example of this protocol is to install a one-way exit exclusion feature outside of maternity and hibernation seasons, followed by internal or exit surveys to confirm absence before closure occurs (Bat Conservation International 2020).

Raptors

The project area primarily represents foraging habitat for golden eagle; however, suitable nesting habitat is located within the project area, and three golden eagle nests were documented within Liberty Pit in 2019. These nests may be indirectly impacted through noise, disturbance, and human activities associated with the Proposed Action. This may result in nest abandonment and an indirect take of the nest during mine operations. Likewise, should disturbance activities occur while golden eagles are nesting, they may abandon their nesting effort. This impact could result in a long-term major impact to golden eagles through a reduction in nesting productivity. KGHM is committed to yearly monitoring of eagles and their nests, which could assist with determining and minimizing project effects to nests. KGHM updated their existing eagle conservation plan in December 2019 (KGHM Robinson 2019) to minimize or address direct and indirect impacts to golden eagles and nests associated with the 2019 Mine Plan amendment (KGHM 2019a).

The project area may also provide suitable nesting habitat for a variety of other raptor species; however, no raptor nests were observed within the project area during aerial raptor nest surveys in 2019. Direct impacts to raptors would include removal of approximately 657 acres of raptor nesting habitat and approximately 853 acres of raptor foraging habitat. Direct mortality of nests and eggs, or fledgling raptors, could occur if project disturbance occurs during the nesting season. Direct mortality to adults is unlikely because adults would be able to leave areas of disturbance and relocate to suitable habitat outside the project area. Indirect impacts to raptors could occur from project-related disturbance, including noise and human presence, which could result in nest abandonment. These impacts would be short term and negligible following implementation of EPMS, which include avian nest clearance surveys and application of avoidance buffers (KGHM 2019a).

Sagebrush Species

Greater Sage-Grouse

Direct and indirect long-term effects to greater sage-grouse would occur under the Proposed Action. These impacts would include increases in habitat loss and fragmentation, invasive species, edge effect

(which creates additional travel corridors for predators), and traffic (which increases collision risk and noise disturbance), and noise from construction, drilling, and operations. Direct impacts to greater sage-grouse habitat, calculated as acres of greater sage-grouse habitat removed, is presented for each action alternative in Table 3.12-4. Under the 2015 RMP amendment, approximately 68 acres classified as other (OHMA) habitat would be directly impacted under the Proposed Action, which is less than 1% of the total available habitat classified as OHMA within the analysis area (the Butte/Buck/White Pine PMU) (BLM 2015). Under the 2019 RMP amendment, greater sage-grouse habitat would not be directly impacted by the Proposed Action (BLM 2019c).

Table 3.12-4. Acres of Greater Sage-Grouse Habitat Impacted by Action Alternative

BLM Greater Sage-Grouse RMP Amendment	Sage-Grouse Habitat	Alternative B: King Waste Rock Dump (Proposed Action)	Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump	Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump	Total in Analysis Area
2015	OHMA	68 (<1%)	234 (<1%)	68 (<1%)	432,453
	GHMA	0 (0%)	0 (0%)	0 (0%)	753,578
	PHMA	0 (0%)	0 (0%)	0 (0%)	695,870
	Total	68 (<1%)	234 (<1%)	68 (<1%)	1,881,901
2019a	OHMA	0 (0%)	51 (<1%)	0 (0%)	432,453
	GHMA	0 (0%)	0 (0%)	0 (0%)	753,578
	PHMA	0 (0%)	0 (0%)	0 (0%)	695,870
	Total	0 (0%)	51 (<1%)	0 (0%)	1,881,901

Sources: BLM (2015, 2019c); NDOW (2017b)

¹ Butte/Buck/White Pine PMU

Indirect impacts to greater sage-grouse habitat could occur by anthropogenic disturbances and noise related impacts from the project. The BLM (2019c) requires limiting or minimizing project-related noises near leks, particularly during lekking season, to not exceed 10 A-weighted decibels dB(A) above the L₉₀ baseline noise. Lekking occurs in early morning hours during the spring when, apart from wind, ambient noise is generally very low. The distance from the project area to the nearest lek is 7.3 miles (11.7 kilometers), and there is intervening topography throughout this distance, which attenuates noise from the mining operations. Additionally, the project would not change operational or construction noise in relation to that which is currently experienced and has been experienced by the lek as long as mining operations have been conducted at the Robinson Mine. This is demonstrated by the continued presence of the lek even though heavy equipment use and blasting have been occurring at the mine site for its entire period of mine operations (113 years; since 1907).

State of Nevada regulation R024-19 requires, with limited exception, a person or entity that proposes an activity or project on public land that will cause an adverse impact to the greater sage-grouse or habitat of the greater sage-grouse to: 1) submit to the SETT certain information about the proposed activity or project; 2) work with the SETT to avoid and minimize disturbances prior to mitigation; and 3) have a verifier quantify such impact in the form of debits. Once the impact to the greater sage-grouse or to greater sage-grouse habitat is quantified and approved by the SETT program manager, the person or entity is required to mitigate the adverse impact on the greater sage-grouse or on the greater sage-grouse habitat by 1) acquiring from or transferring a sufficient number of credits in the Nevada Conservation Credit System established by the Sagebrush Ecosystem Council to offset the number of debits or 2) developing a mitigation plan that would generate enough credits to offset the debits.

The Nevada Conservation Credit System uses a Habitat Quantification Tool to evaluate and quantify habitat function. Habitat function refers to the role of the habitat in providing life history requirements for greater sage-grouse and includes the direct effects of anthropogenic disturbance (State of Nevada 2020). The Nevada Conservation Credit System uses the Habitat Quantification Tool to quantify functional acres for both credit (mitigation) and debit (impact) sites and generates a percent function and number of functional acres for each seasonal habitat type within an analysis area. Credits and debits represent the difference between baseline functional acres and post-project functional acres.

Impacts to greater sage-grouse and their habitat would be avoided, minimized, and/or mitigated by the requirements established in the State of Nevada compensatory mitigation regulations (NRS 232.162; R024-19) as well as application of EPMs (KGHM 2019a) and BLM-required sage-grouse design features (BLM 2019a). KGHM Robinson has submitted initial Habitat Quantification Tool data to the SETT to calculate the total amount of debits generated from project-related activities. As of the date of this publication, the SETT is currently reviewing that information. When the SETT makes a final determination on the results, KGHM Robinson will work with a Nevada Conservation Credit System–authorized credit provider to offset, at a minimum, 1/3 of the debit obligation prior to project construction. Pursuant to requirements established in R024-19, KGHM Robinson will work with the SETT to formalize all debit calculations and associated credit transactions. This mitigation process would result in project compliance with State of Nevada policies (NRS 232.162).

Pygmy Rabbit

Pygmy rabbit surveys detected no individuals or sign within the project area; therefore, the anticipated impact risk to this species from project implementation is low. However, suitable pygmy rabbit habitat is present within the project area. Direct impacts to pygmy rabbit resulting from the Proposed Action include the removal of 171 acres of sagebrush habitat and increased risk of mortality resulting from proposed disturbance activities. Indirect impacts include disturbance resulting from noise and various anthropogenic activities within 0.5 mile of suitable pygmy rabbit habitat.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Relative to the Proposed Action, impacts to wildlife species resulting from Alternative C would be similar; however, they would differ in the spatial extent and location of those impacts. Approximately 1,008 acres of suitable habitat for general wildlife species, migratory birds, bats, and raptors would be disturbed, which includes 207 acres of suitable habitat for sagebrush species and up to 1,008 acres of big game habitat (see Tables 3.12-2 through 3.12-4). Where impacts would be more specific to species groups or individual species, they are discussed in detail below.

General Wildlife

Alternative C would result in the long-term removal of up to 1,008 acres of general wildlife habitat, which is approximately 2% of the total available wildlife habitat within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to general wildlife under Alternative C would be similar to those described under the Proposed Action.

Big Game

Alternative C would result in the long-term removal of up to 1,008 acres of big game habitat, which is approximately 2% of the total available habitat for big game species within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to big game under Alternative C would be similar to those described under the Proposed Action.

Migratory Birds

Alternative C would result in the long-term removal of up to 1,008 acres of migratory bird habitat, which is approximately 2% of the total available habitat within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to migratory birds under Alternative C would be similar to those described under the Proposed Action.

Special-Status Species

Bats

Alternative C would result in the long-term removal of up to 1,008 acres of bat foraging habitat (approximately 2% of the total available habitat within the analysis area) (see Table 3.12-2) and the permanent loss of 775 acres of bat roosting habitat. Overall, direct and indirect impacts to bats under Alternative C would be similar to those described under the Proposed Action.

Raptors

Alternative C would result in the long-term removal of up to 1,008 acres of raptor foraging habitat (approximately 2% of the total available habitat within the analysis area) (see Table 3.12-2) and the permanent loss of 775 acres of raptor nesting habitat. Overall, direct and indirect impacts to bats under Alternative C would be similar to those described under the Proposed Action.

Sagebrush Species

Greater Sage-Grouse

Overall, direct and indirect impacts to greater sage-grouse under Alternative C would be similar to those described under the Proposed Action. Under the 2015 BLM greater sage-grouse RMP amendment, Alternative C would result in the long-term removal of 234 acres of OHMA habitat, or less than 1% of the total available habitat classified as OHMA within the analysis area (BLM 2015) (see Table 3.12-4). Under the 2019 BLM greater sage-grouse RMP amendment, Alternative C would result in the long-term removal of 51 acres of OHMA habitat, which is less than 1% of the total available habitat classified as OHMA within the analysis area (BLM 2019c) (see Table 3.12-4).

Indirect impacts to greater sage-grouse habitat from anthropogenic disturbances and noise-related impacts from Alternative C (including blasting and mine operations) would be similar to those described for the Proposed Action.

Pygmy Rabbit

Alternative C would result in the long-term removal of up to 207 acres of potential suitable sagebrush habitat for pygmy rabbit (approximately 2% of the total available habitat within the analysis area [see Table 3.12-2]). Overall, direct and indirect impacts to pygmy rabbit under Alternative C would be similar to those described under the Proposed Action.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Relative to the Proposed Action, impacts to wildlife species resulting from Alternative D would be similar; however, they would differ in the spatial extent and location of those impacts. Approximately 844 acres of suitable habitat for general wildlife species, migratory birds, bats, and raptors would be disturbed, which includes 170 acres of suitable habitat for sagebrush species and up to 844 acres of big game habitat

(see Tables 3.12-2 through 3.12-4). Where impacts may be more specific to species groups or individual species, they are discussed in more detail below.

General Wildlife

Alternative D would result in the long-term removal of up to 844 acres of general wildlife habitat, which is approximately 2% of the total available wildlife habitat within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to general wildlife under Alternative D would be similar to those described under the Proposed Action.

Big Game

Alternative D would result in the long-term removal of up to 844 acres of big game habitat, which is approximately 2% of the total available habitat for big game species within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to big game under Alternative D would be similar to those described under the Proposed Action.

Migratory Birds

Alternative D would result in the long-term removal of up to 844 acres of migratory bird habitat, which is approximately 2% of the total available habitat within the analysis area (see Table 3.12-2). Overall, direct and indirect impacts to migratory birds under Alternative D would be similar to those described under the Proposed Action.

Special-status Species

Bats

Alternative D would result in the long-term removal of up to 844 acres of bat foraging habitat (approximately 2% of the total available habitat within the analysis area) (see Table 3.12-2) and the permanent loss of 648 acres of bat roosting habitat. Overall, direct and indirect impacts to bats under Alternative D would be similar to those described under the Proposed Action.

Raptors

Alternative D would result in the long-term removal of up to 844 acres of raptor foraging habitat (approximately 2% of the total available habitat within the analysis area) (see Table 3.12-2) and the permanent loss of 648 acres of raptor nesting habitat. Overall, direct and indirect impacts to raptors under Alternative D would be similar to those described under the Proposed Action.

Sagebrush Species

Greater Sage-Grouse

Overall, direct and indirect impacts to greater sage-grouse under Alternative D would be similar to those described under the Proposed Action. Under the 2015 BLM greater sage-grouse RMP amendment, Alternative D would result in the long-term removal of up to 68 acres of OHMA habitat, which is less than 1% of the total available OHMA habitat within the analysis area (BLM 2015) (see Table 3.12-4). Under the 2019 BLM greater sage-grouse RMP amendment, Alternative D would not result in direct impacts to any areas classified as greater sage-grouse habitat (BLM 2019c) (Table 3.12-4). Indirect impacts to greater sage-grouse habitat from anthropogenic disturbances and noise related impacts from Alternative D (including blasting and mine operations) would be similar to those described for the Proposed Action.

Pygmy Rabbit

Alternative D would result in the long-term removal of up to 170 acres of potential suitable sagebrush habitat for pygmy rabbit (approximately 2% of the total available sagebrush habitat within the analysis area [see Table 3.12-2]). Overall, direct and indirect impacts to pygmy rabbit under Alternative D would be similar to those described under the Proposed Action.

3.12.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

Removal of wildlife habitat associated with all action alternative would be irretrievable until revegetation occurs in approximately 20 years. Because the area would be reclaimed and revegetated, none of this disturbance would be irreversible and the relatively low amount of disturbance combined with short-term impact would not affect the long-term vegetation productivity or long-term wildlife population sustainability in the analysis area.

3.13 Lands and Realty

3.13.1 Affected Environment

Land use within the 21,636-acre project area is characterized by historic and present mining activities. There are no parcels identified for BLM disposal or acquisition within the analysis area. Numerous land use authorizations have been granted on public lands within the project area; locations based on BLM LR2000 database and Master Title Plats are summarized in the 2016 *Robinson Mine Expansion Project Final Environmental Assessment* (BLM 2016a) and include ROWs for communication sites; telephone cables; transmission lines; water pipelines; irrigation and water facilities; highways, county, and mine access roads; railroads; and monitoring wells. Identified ROW holders include KGHM Robinson, BLM, USFS, U.S. Army Corps of Engineers, American Tower Corporation, Kennecott, AT&T, Los Angeles Department of Water and Power, McGill Ruth Conservation District, BCST Inc., Mt. Wheeler Power Inc., Nevada Department of Transportation, SBC/NV Bell, and Sierra Pacific Power Company (BLM 2016a). The 2018 *Keystone Overdumping Amendment Final Environmental Assessment* updated ROW information in the 2016 EA to clarify that two of the previously identified land use authorizations (a ROW for a weather station held by KGHM Robinson, and a ROW for telephone cables held by SBC/NV Bell) were closed (BLM 2019a). No additional land use authorizations have been identified.

Within the area of proposed development, the Nevada Department of Transportation holds a ROW for U.S. Highway 44A ROW (BLM 2016a). County Road 44A (also known as County Road 1146) crosses the active mining area of the Robinson Mine and connects County Road 44 (the highway to Ruth) and U.S. Highway 6. KGHM Robinson, in coordination with White Pine County, closed this section of road to public traffic in 2014 to alleviate safety concerns at the intersection of County Road 44A and the mine haul road. A road closure request was approved by the White Pine County Commission on December 17, 2014, and two traffic turnarounds were constructed at the northern and southern limits of the closed road section (BLM 2016a). The road can be opened for emergency vehicles as needed per agreement with the county. In the event that emergency travel is needed, all mining operations would cease, and vehicles would be escorted through the Robinson Mine. County Road 44A would be open for public travel after the mine closure (BLM 2018a).

3.13.2 Environmental Consequences

3.13.2.1 Analysis Method

This section analyzes the issue of how the proposed expansion of the mine and mining-related activities would impact existing land authorizations. The indicators used to analyze this issue are the linear distances of any ROW that would intersect the project area. The analysis relies on existing data from previous EA-level NEPA documents addressing modifications to the approved Mine Plan, as well as knowledge of mine layout and activities. Spatial road data from online resources were overlain with spatial data for the Proposed Action and alternatives, and intersecting acreages were calculated using GIS.

3.13.2.2 Direct and Indirect Impacts

Alternative A: No Action

Under the No Action alternative, the BLM would not approve the 2019 Mine Plan amendment (KGHM 2019a) as written. Although KGHM Robinson could continue mining on their own private lands, no additional expansion onto BLM-managed lands would be permitted. There would be no construction of the King WRD or additional expansion onto BLM-managed lands of the North Tripp WRD. The total volume of tailings stored at the Giroux Wash TSF would be restricted to those areas that had been previously granted approvals. No existing ROWs or realty decisions would be affected.

Alternative B: King Waste Rock Dump (Proposed Action)

Under the Proposed Action, the construction of the 260-acre King WRD would remove a 0.55-mile portion of County Road 44A (see Figure A-2). Of this mileage, approximately 0.35 mile is currently open for emergency use only; the remaining 0.2-mile segment is still open to the public and includes the turnaround area developed to address the 2014 road closure.

Under the Proposed Action, if County Road 44A is not rerouted around the King WRD, the road would no longer be contiguous through the project area. Emergency access to the mine from the south would be limited to other routes and roads. In either case, the existing vehicular turnaround area would need to be relocated a minimum of 700 feet further south (to be outside of the King WRD). Existing disturbed areas directly adjacent to County Road 44A may be suitable for development of a new turnaround area approximately 1,500 feet and 2,000 feet south of the current turnaround area (on the east side and west side of County Road 44A, respectively).

All other existing land use authorizations within the project area would continue as permitted. No realty decisions would be affected.

Alternative C: Reduced King Waste Rock Dump and North Tripp Waste Rock Dump

Under Alternative C, the areal extent of the King WRD would be decreased by approximately 10.6% through elimination of all proposed WRD development east of County Road 44A. The current location of County Road 44A would be outside of the reduced King WRD, and emergency access via this route would be maintained; however, the existing turnaround area would need to be moved to allow for development of the King WRD up to the edge of the road. Existing disturbed areas directly adjacent to County Road 44A may be suitable for development of a new turnaround area approximately 1,500 feet and 2,000 feet south of the current turnaround area (on the east side and west side of County Road 44A, respectively).

Alternative C would not impact any other land use authorizations within the project area. All existing land use authorizations within the project area would continue as permitted and no realty decisions would be affected.

Alternative D: Ruth East Pit Backfill and Reduced King Waste Rock Dump

Impacts to lands and realty would be the same as Alternative C.

3.13.2.3 Irretrievable and Irreversible Impacts, and Short-Term Uses Versus Long-Term Productivity

There would be no irretrievable or irreversible impacts to lands and realty under the Alternatives A, C, or D. Impacts to County Road 44A ROW under the Proposed Action would be irretrievable for the life of the project or until the road the road is relocated. Relocating and opening the road to public travel after mine closure would effectively restore public use of the road and county maintenance.

CHAPTER 4 CUMULATIVE IMPACTS

4.1 Cumulative Impact Assessment Methodology

This section analyzes the cumulative impacts of the project alternatives discussed in Chapter 2 and past, present, and RFFAs affecting the same resources as these alternatives (40 CFR 1508.7). As defined in 40 CFR 1508.7 (CEQ regulations for implementing NEPA), a *cumulative impact* is an effect on the environment that results from the incremental effect of the action when added to other past, present, and future actions regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts may result from individually minor but collectively significant actions occurring over a period of time.

The cumulative impact of past and present actions in this EIS is represented through the description of the affected environment for each resource as discussed in Chapter 3.

The RFFAs identified by the BLM as potentially contributing to cumulative impacts in the greater vicinity of the Robinson Mine, as listed in Appendix F, include ongoing or proposed implementation-level projects, future management from state and local government plans, and future management from federal land use plans. The RFFAs include current projects that are expected to continue into the future, are part of clearly documented management plans, or are actively proposed. They do not include speculative actions (not proposed or developed at a level to allow analysis) or pending management plans that have not progressed enough to develop proposed management.

The locations and areal extents of the RFFAs in relation to the Robinson Mine are shown in Figure F-1 in Appendix F. Consistent with CEQ guidance on cumulative impacts analysis (CEQ 1997), the BLM deliberately chose not to select an arbitrary distance (such as 20 miles or 50 miles from the mine) as a cumulative impact assessment area, but rather to identify any future projects or agency actions that had a reasonable potential to cumulatively affect individual resources in conjunction with the proposed expansion of the Robinson Mine analyzed in this EIS. Certain resources, such as tribal values and concerns or GHG emissions, may be affected by human activities well beyond the map boundaries shown in Figure F-1. These unique issues are described in the sections below.

4.2 Cultural Resources

The list of RFFAs in Appendix F includes both projects involving surface-disturbing activities that have a higher potential to result in impacts to cultural sites and cultural settings (such as the TransCanyon Cross-Tie transmission line or Western Oil Exploration Company's proposal before the BLM Ely District to drill a pair of exploration oil wells on public lands approximately 40 miles west of Ely) and projects that are unlikely to result in measurable surface disturbance and consequent impacts to cultural sites or settings (such as the Humboldt-Toiyabe National Forest's intent to implement revised treatment plans for noxious and invasive plant species). Of the known future actions included in Appendix F that are likely to involve surface disturbance, a total of approximately 3,528 acres (including a possible maximum of 1,106 acres of new disturbance of the Robinson Mine proposed expansion) may result in adverse impacts to cultural sites and settings.

The TransCanyon Cross-Tie transmission line and the Western Oil Exploration Company's exploration wells both have the potential to cause noise impacts during construction, as well as visual impacts within their respective viewsheds. Both noise and visual impacts pose a risk to cultural setting of any cultural sites that are within the viewshed or the noise attenuation range of either project.

These future proposed projects with the potential to contribute to impacts to cultural resources would be required to comply with the Section 106 consultation process as mandated by the NHPA. Through this process, the BLM and consulting parties would determine on a project-by-project basis how to avoid, minimize, or mitigate impacts to those resources.

4.2.1 Tribal Values and Concerns

As described in Section 3.2 Cultural Resources, development such as large-scale mining and agricultural projects, transportation infrastructure, construction of pipelines and power lines, and other human-induced construction in the region may contribute cumulatively to adversely affecting traditional tribal cultural practices and places that have significance to tribal cultural identities. For the purposes of analysis, it is assumed that any surface-disturbing activities associated with placement of these types of facilities pose a risk to these values. As noted above in Section 4.2, out of the list of RFFAs included in Appendix F that are likely to involve surface disturbance, a total of approximately 3,528 acres (including a possible maximum of 1,106 acres of new disturbance of the Robinson Mine proposed expansion) may result in adverse impacts to tribal values and concerns, as described in Section 3.2 Cultural Resources. However, the actual type and extent of such impacts, if any, can only be determined through government-to-government consultation between the BLM and the respective tribes with the potential to be impacted. The consultation is currently ongoing on this project and will be required for the other RFFAs described above.

4.3 Geochemistry and Groundwater Quality

The cumulative impacts of past and present actions on geochemistry and groundwater quality in the immediate vicinity of the Robinson Mine are represented by the description of the existing affected environment, as are the potential impacts of future activities at the mine, including remediation activities. There are no identified RFFAs in the project area or White Pine County generally (see Appendix F) that are anticipated to cumulatively contribute to project impacts on the geochemical properties of area soils or minerals.

4.4 Geology and Mineral Resources

None of the identified RFFAs listed in Appendix F would result in the condemnation of locatable (i.e., hard-rock) mineral reserves or affect future mineral resource extraction within the analysis area. As a result, with the exception of the Proposed Action and alternative impacts described in Chapter 3, there would be no additional cumulative impacts to mineral resources from past actions, present actions, or RFFAs.

4.5 Air Quality and Greenhouse Gas Emissions

With the exception of the Robinson Mine, there are no other existing or RFFAs that would substantively impact cumulative air quality in the analysis area. This is supported by recent analyses conducted for mine expansions analyzed in 2016 and 2019 (BLM 2016b; 2019a). Accordingly, the air quality impacts described in Section 3.5 are representative of direct, indirect, and cumulative impacts.

In terms of GHG impacts, as noted in Section 3.5 Air Quality and Greenhouse Gas Emissions, CEQ draft guidance proposes that direct GHG emissions by any individual facility or action of 25,000 MT per year or more should be identified in a NEPA analysis of project alternatives. The reference point of 25,000 MT of direct GHG emissions is not an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, but serves as a minimum for conducting a quantitative analysis (CEQ

2014). The Robinson Mine produces approximately 332,547 MT per year of GHGs, as measured in CO₂e (Barngrover 2020). This represents less than 2% of the total GHG emissions reported in Nevada and approximately 0.011% of the nationwide GHG emission totals for reporting facilities (i.e., facilities meeting or exceeding the 25,000-MT-per-year reporting threshold). Of the RFFAs identified as applicable to the proposed Robinson Mine expansion (see Appendix F), none are known to meet or exceed the reporting threshold for GHG emissions; these RFFAs are thus considered to have a lower overall potential to contribute to cumulative local, regional, or national GHG emissions.

4.6 Recreation

The cumulative impacts of past and present actions on recreation in the project area are disclosed in the description of the existing affected environment. RFFAs with potential to impact recreation (see Appendix F) include any project developments that would prevent or adversely affect existing recreational opportunities, either through direct loss of public recreation areas or loss of access to lands currently open to recreation, or through visual or noise impacts.

The total cumulative disturbance that could impact recreational experience, as identified in Appendix F, includes areas that may be directly disturbed either in the short term, such as through private exploratory drilling, or in the long term, such as through construction of the TransCanyon Cross-Tie transmission line and associated access and maintenance roads. Agency-managed vegetation treatments may also create short-term loss of recreational access, but the specific areas that may be selected for treatment in any given year are unknown at this time. The potential cumulative disturbance acreage for quantifiable RFFAs (i.e., RFFAs for which a discrete surface disturbance area is currently known) is 3,528 acres, which represents approximately 0.4% of the total public-managed lands available for recreation in White Pine County.

4.7 Socioeconomics and Environmental Justice

The cumulative impacts of past and present actions on socioeconomics and their associated settings in the analysis area are represented by the description of the existing affected environment. Anticipated socioeconomic effects of the proposed expansion of operations at the Robinson Mine (and thus an extension of the life of the mine) are described in the environmental consequences analysis. As noted in Section 3.7 Socioeconomics and Environmental Justice, although there are environmental justice communities in the analysis area, they would not be expected to experience any disproportionate impacts from the Proposed Action or alternatives. The Chapter 3 analysis also looks into the future, permanent closure of Robinson Mine operations in 2028. As described, the permanent loss of economic activity from Robinson operations would have socioeconomic repercussions for the City of Ely and neighboring communities, as well as for White Pine County and, to a lesser extent, the State of Nevada. The RFFAs (see Appendix F) do not include any projects or other actions that would provide comparable employment opportunities on the scale of a large, open pit mining operation. Although some small proportion of the current 600-plus full-time employees of the Robinson Mine may be expected to permanently retire from the workforce in or around 2028, or to seek wholly different types of employment in this same part of east-central Nevada, the greater proportion are likely to leave the area for similar mining-related jobs elsewhere in Nevada, in the western United States generally, or possibly elsewhere.

4.8 Soils and Reclamation

The RFFAs with the potential to impact soils include any actions that would remove surface vegetation, disturb soils, and/or create the potential for soil erosion and subsequent sedimentation. The amount of potential disturbance associated with quantifiable RFFAs (i.e., RFFAs for which a discrete surface

disturbance area is currently known) is 3,528 acres, which does not include any of the approximately 359,094 acres of RFFA lands managed by the BLM, the Humboldt-Toiyabe National Forest, or other agencies that are listed as eligible for vegetation treatments for noxious or invasive species, fuel reduction, and watershed restoration and habitat improvement (see Appendix F). This is because even though these very large management areas may be eligible for treatment, the specific portions of each area that may be treated in any given year would be determined on a case-by-case basis, and would only involve small fractions of the larger area. Also, it is unknown how many of these future actions may occur on highly erodible soils because project-specific locations have not yet been identified. The current BLM RMPs and forest plans require specific stipulations for site-specific projects to prevent cumulative long-term loss of soils or soil productivity through disturbance and subsequent erosion.

4.9 Vegetation

The RFFAs with potential to impact vegetation include any future actions that would remove trees and other plants through surface-disturbing activities. Agency-managed vegetation treatments would also alter the existing profile of vegetation in specific areas, but the specific areas that may be selected for treatment in any given year are unknown at this time. The potential cumulative disturbance acreage for quantifiable RFFAs (i.e., RFFAs for which a discrete surface disturbance area is known) is approximately 3,528 acres, which represents less than 0.1% of the total federally managed vegetation and habitat resources in White Pine County. This disturbance would primarily occur in pinyon-juniper woodlands, sagebrush shrubland, and/or sagebrush shrubland/steppe vegetation communities. As noted in Section 4.8 Soils and Reclamation, this total does not include the approximately 359,094 acres that may be eligible for vegetation treatments for noxious or invasive plant species, fuel reduction, and watershed restoration and habitat improvement by the BLM, the Humboldt-Toiyabe National Forest, or other management agencies, because even though very large management areas may be eligible for treatment (see Appendix F), the specific portions of each area that may be treated in any given year would be determined on a case-by-case basis, and would only involve small fractions of the larger area.

4.10 Visual Resources

Anticipated visual impacts of the proposed expansion of operations at the Robinson Mine, as well as alternatives to these actions, are described in the environmental consequences analysis. None of the identified RFFAs (see Appendix F) are expected to result in visually dominant, long-term visual effects with the exception of the proposed TransCanyon Cross-Tie transmission line, which as proposed would cross most of White Pine County from east to west with four to five steel lattice, H-frame, or monopole structures (depending on needs at any particular location) per mile, each approximately 105 to 165 feet in height, for the entire 78-mile length of the transmission line route. The transmission line would be co-located with two existing H-frame transmission lines, which occur approximately 8 miles north of the Robinson Mine. The proposed alignment then diverges from a co-located alignment east of Ely, Nevada, to a new right-of-way as it continues east to its terminus north of Nephi, Utah. Like the Robinson Mine, the TransCanyon power line corridor would result in visually dominant alterations of the existing landscape because of right-of-way clearing and structural elements where it diverges from similar transmission line infrastructure. Based on bare earth visibility analysis, assuming a worst case scenario of a 165-foot transmission line structures for the length of the alignment, it is anticipated that the TransCanyon Cross-Tie transmission line would have 397,122 acres of visibility within the foreground/middleground area (within 5 miles) of the project alignment. This development when not consistent with similar, form, line, color or texture elements in the landscape, would result in permanent and visually dominant changes to the existing visual character of central White Pine County where discernable.

4.11 Water Resources

Of the RFFAs listed in Appendix F, only the proposed White Pine Pumped Storage hydropower facility is likely to have a substantial effect on area waters (both surface and subsurface). The proponents state the facility would require 3,640 acre-feet of water prior to start-up, as well as up to 300 af/yr to compensate for evaporation losses. It should be noted, however, that this energy generation facility would be located approximately 10 miles east-northeast of the Robinson Mine, in a subwatershed (HUC 160600081402) that has no direct hydraulic connection to waters in the Robinson Mine area (see Section 3.11 Water Resources). However, it does constitute a cumulative nearby loss of available water within White Pine County.

4.11.1 Groundwater

Cumulative impacts to groundwater in the hydrogeologic analysis area are summarized in Table 3.11-3 in the Section 4.11 Water Resources. These cumulative impacts from past and existing agricultural pumping, water supply pumping, and mine dewatering have resulted in cumulative outflows to groundwater in the area. This cumulative pumping, combined with natural events such as evapotranspiration and groundwater outflow, have resulted in a cumulative outflow of 80,590 af/yr (50,050 gpm). This creates a groundwater deficit of 14,220 af/yr (8,830 gpm). The project would contribute a maximum of 1,433 af/yr (889 gpm) to this outflow (approximately 1.3 to 1.7%) to these depletions. Mining in the area has been ongoing for more than 100 years. Mining effects and stresses on the hydrogeologic system throughout this time have contributed to the existing system. Specifically, since mid-2007, dewatering of the South Block for Ruth Pit mining has impacted the water supply for the nearby Town of Ely with the drying up of Murry Springs. The existing extent of drawdown from dewatering and mine-related groundwater pumping has encompassed and potentially impacted 53 springs and seeps and 53 water rights (see Figure A-37 and Appendix I). Under the No Action alternative, the existing mining operations would continue to contribute to the cumulative groundwater withdrawals by 1,437 af/yr (891 gpm).

4.12 Wildlife

RFFAs with a potential to impact vegetation and, consequently, wildlife habitat include all actions that would remove habitat through surface-disturbing activities (see Appendix F). The total amount of potential long-term disturbance or elimination of existing vegetation associated with quantifiable RFFAs (i.e., RFFAs for which a discrete surface disturbance area is known) is approximately 3,528 acres, including a possible maximum of 1,106 acres of new disturbance of the Robinson Mine proposed expansion. This represents less than 0.1% of the total federally managed vegetation and habitat resources in White Pine County. This disturbance would primarily occur in pinyon-juniper woodlands, sagebrush shrubland, and/or sagebrush shrubland/steppe vegetation communities. Wildlife species that could be cumulatively impacted include big-game species, non-game species, migratory bird species (including greater sage-grouse), and raptors.

4.13 Lands and Realty

Past and present actions affecting land uses within the project area are described in Section 3.13.1. The oil and gas development and transmission line projects identified in Appendix F would result in land authorizations ROW grants. However, none of them would affect existing land use or authorizations within the project area. As a result, except for the Proposed Action and alternative impacts described in Chapter 3, there would be no additional cumulative impacts to lands and realty within the project area.

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CHAPTER 5 CONSULTATION AND COORDINATION

5.1 Public Outreach and Public Involvement

The BLM conducted public involvement activities throughout development of this EIS. On May 28, 2020, at the outset of the project, an NOI was published in the *Federal Register* that initiated a 30-day formal public scoping period, which concluded on June 29, 2020. Concurrent with publication of the NOI, project announcement materials were mailed to individuals and organizations on the project mailing list and informational materials were posted on the project website. Legal notices were also published in two newspapers of record, the *Ely Times* and the *Humboldt Sun*.

The BLM's goal during the scoping period was to actively seek public comment on issues of concern related to the Proposed Action and preliminary alternative concepts (40 CFR 1501.7), including other potential project alternatives that might also achieve the stated Purpose and Need (see Chapter 1, Section 1.3 Purpose of and Need for the Action) and possible resource conflicts that had not already been identified.

A virtual (i.e., internet-based) public scoping meeting was held on June 17, 2020. The BLM made the decision to hold the meeting online rather than as a customary in-person gathering in response to safety concerns related to the coronavirus pandemic, and in accordance with guidance from national and state health officials. The virtual meeting consisted of two 1-hour sessions that each began with a brief statement of introduction followed by an approximately 15-minute video presentation on the main features of KGHM Robinson's proposed expansion of operations at the Robinson Mine, as well as the NEPA process and the decisions pending before the BLM.

The BLM received a total of 27 unique comment submittals during the project scoping period. These included comments from individuals, government agencies, businesses, and organizations. The BLM has considered these submitted comments during development of the project alternatives and the impact analyses included in this EIS.

Even though the formal scoping period had defined start and end dates, the BLM has continued to be available for public input throughout the EIS process.

The draft EIS will be available for a 45-day public comment period.

5.2 Tribal Consultation

The BLM is conducting ongoing consultation with the Ely Shoshone Tribe, the Duckwater Shoshone Tribe, and the Confederated Tribes of the Goshute Reservation. As part of the government-to-government consultation efforts, the BLM conducted correspondence and field visits.

The BLM sent consultation letters to three tribes to inform them of the Proposed Action. These letters were sent to the Confederated Tribes of the Goshute Reservation, the Duckwater Shoshone Tribe, and the Ely Shoshone Tribe.

The BLM conducted field visits on February 27, 2020, with the Ely Shoshone Tribe and the Duckwater Shoshone Tribe, and on July 2, 2020, with the Ely Shoshone Tribe and the Duckwater Shoshone Tribe. The consultation is ongoing and will continue through the end of the project.

5.3 Coordination Agencies

The BLM invited several federal, state, and local government agencies having jurisdiction or special expertise to become cooperating agencies and actively participate in the preparation of this EIS. The following agencies agreed to formally participate in this EIS process:

- EPA Region IX
- NDOW
- SETT, a specific entity within NDOW
- White Pine County Board of Commissioners

MOUs were developed between these agencies and the BLM to formalize the relationship and provide a framework for cooperation and coordination, as well as to provide details of the respective roles, responsibilities, and expertise of each entity in the EIS process.

In addition to these cooperating agencies, the BLM is currently in consultation with the Nevada SHPO to make final determinations on eligibility of potentially impacted cultural resources for listing on the NRHP, and if necessary, to develop a historic properties treatment plan and associated mitigation to address any potential adverse impacts to those cultural resources. This consultation is being conducted in compliance with NHPA requirements and the 2016 programmatic agreement between the BLM and the Nevada SHPO (2016). For details regarding culture resource impacts, see Section 3.2.

5.4 List of Preparers

The BLM established an interdisciplinary team made up of the BLM staff specialists listed in Table 5.4-1 to develop the EIS environmental analysis. The BLM also worked with the representatives of the cooperating agencies shown in Table 5.4-2 and with a third-party contractor, SWCA Environmental Consultants and its subcontractors, as shown in Table 5.4-3, to assist in development of the content and analysis in the EIS.

Table 5.4-1. BLM Interdisciplinary Team

Name	Project Role
Tiera Arbogast	Project manager
Concetta Brown	Assistant project manager
Ian Collier	Special-status vegetation resources, livestock grazing
Andrew Gault	Air resources, soil resources, floodplains, water quality: surface/ground, wetlands-riparian zones
Chris Hanefeld	Public affairs/public communications
Alicia Hankins	Lands and realty
Nancy Herms	Migratory birds, threatened and endangered species, special-status fish and wildlife
Stacy Holt	Human health and safety, geology and mineral extraction, engineering
Randall Johnson	Wastes, hazardous or solid
John Miller	Lands with wilderness characteristics, visual resources management, recreation
Robert Nash	Cultural resources, Native American and religious concerns, paleontological resources

Name	Project Role
Ben Noyes	Wild horses
Julie Suhr Pierce, Ph.D.	Socioeconomics, environmental justice
Sheryl Post	Nonnative invasive and noxious plant species

Table 5.4-2. Cooperating Agencies

Name	Agency
Connell Dunning	EPA Region IX
Moira Kolada	NDOW
Kelly McGowan	SETT
Laurie L. Carson	White Pine County Board of Commissioners

Table 5.4-3. Third-Party Contractor: SWCA Environmental Consultants

Name	Project Role, Responsibility
Chris Bockey	Visual resources
Charles Coyle	Assistant project manager
David Fetter	Soils and reclamation
Jill Grams	Human resources lead/public involvement
Andrew Harley, Ph.D.	Geochemistry lead
Ken Houser	Principal-in-charge
Don Kelly	Socioeconomics, environmental justice
Kim Lyons	GIS specialist
Cody MacDonald	Biological resources – greater sage-grouse
Ian McCowen	Biological resources – vegetation
Matt Petersen	Project manager
Ryan Rausch	Recreation
Alexandra Shin	Socioeconomics, environmental justice
Brad Sohm, P.E.	Air quality
Mike Swink	Biological resources – wildlife
Linda Tucker Burfitt	Technical editor
Mary Ann Vicari	Cultural resources
Richard Villagran	Project coordinator/biological resources lead
Victor Villagran	Tribal consultation assistance
Nathan Wojcik	Biological resources – greater sage-grouse
BGC Engineering	
Robert (Nick) Enos, C.P.G.	Geology and mineral resources
Mike Henderson	Geotechnical specialist
Troy Meyer	Geotechnical specialist
Warren Newcomen	Geology and mineral resources

Name	Project Role, Responsibility
Montgomery & Associates	
Chris Cottingham	Hydrology/hydrogeology/surface water
Paul Pettit	Groundwater hydrology
Gregory Nelson	Hydrogeology

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