Final Environmental Impact Statement
Thacker Pass Lithium Mine Project

Appendix L

Analysis Methods

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APPENDIX L. ANALYSIS METHODS

Table L.1. Geology and Minerals

Analysis Assumptions
The following assumptions were used to guide the impacts analysis for geology and minerals: • Available geologic and mineral resource data adequately represent the existing baseline conditions for the project area and CESA. • Results from the geotechnical stability analysis developed for the project are based on a reasonable interpretation of the site foundation conditions.
Analysis Area
The analysis area for direct and indirect effects for geology and minerals is the Project area. The CESA for geology and minerals includes the southern portion of the McDermitt Caldera and adjacent areas of Kings Valley and Quinn River Valley as shown in Figure 4.2-1 (**Appendix A**).
Effect Indicators
Resource effects indicators used to assess potential effects on geology and mineral resources include the following: • Resources to be mined. • Acres of disturbance that permanently alter the topography /geomorphology of the area. • Factor of safety for design of the Clay Tailings Filter Stack, WRSFs, Coarse Gangue Storage facility, and open pit.
Methods of Analysis
The following methods of analysis were used to evaluate and describe potential effects to geology and mineral resources. • Calculate the acres of disturbance for facilities that would permanently alter the topography /geomorphology of the area. • Review and evaluate the stability of the open pit, WRSFs and CGS using the results of the geotechnical stability analysis for project facilities.
Types of Effects
Types of direct and indirect effects include: (1) tons of ore to be mined; (2) acres of disturbance from major facilities that will alter the topography and geomorphology of the area.

Table L.2. Water Quality and Quantity

Analysis Assumptions
The following assumptions were used to guide the impacts analysis for water resources: • Available water resource data (including groundwater elevation data, seep and spring inventories and monitoring, and stream flow monitoring, and surface water and groundwater quality) adequately represent the existing baseline conditions for the project area and CESA. • Results from the groundwater model and hydrogeochemical models developed for the project provide the best available information for estimating effects to water resources.
Analysis Area
The analysis area for the evaluation of direct and indirect effects and cumulative effects to water resources consists of the Plan boundary and adjacent areas within portions of the Kings River Valley and Quinn River Valley hydrographic basins as shown in **Figure 4.3-1** (**Appendix A**). The CESA for water quantity and water quality includes the project area and large portions of the Kings River Valley and Quinn River Valley Hydrographic Basins (HAs) that were included in the numerical groundwater flow model developed for the Project.
Effect Indicators
The following resource indicators were used to assess potential effects on water resources. • Groundwater Quantity: Reduction in groundwater quantity for current users and water-dependent resources (acre-feet/year). • Groundwater Quality: Degradation of groundwater quality associated with downgradient migration of leachate from project facilities. • Surface Water Quantity: Measurable reduction of baseflow of streams, springs, and seeps caused by mine-induced drawdown. Determined by model simulations. • Surface Water Quality: Degradation of surface water quality. Determined by comparison of predictive results with applicable water quality standards. • Water Rights: Effects on surface or groundwater rights.
Methods of Analysis
• Identify streams, spring and water rights located within the model simulated mine-induced drawdown area. • Evaluate the potential for measurable reduction of baseflow of perennial streams, springs, and seeps caused by mine-induced drawdown using groundwater model simulations. • Evaluate the potential for exceedance of one or more numerical water quality standards established to protect applicable beneficial uses for surface and groundwater resources. Adverse effects to water quality determined using geochemical characterization, hydrochemical analysis, and numerical flow modeling.
Types of Effects
Types of effects to water resources include the following: • Reduction in groundwater availability for water dependent users. • Potential reduction in baseflow (streams and springs) resulting from mine-induced groundwater drawdown. • Potential adverse effects to water rights • Potential degradation of surface or groundwater quality.

Table L.3. Vegetation and Wetlands

Analysis Assumptions
A range of plant communities and ecological sites and disturbance response groups occur in the Project area. Wetland and riparian areas occur along Thacker Creek, Crowley Creek, and Pole Creek within the Project area. Calculations used to estimate the acres of vegetation communities and wetland and riparian areas affected by surface-disturbing activities are based on a landscape-level analysis and represent a worst-case scenario. The acreages presented assume even distribution of impacts across the Project area and do not take into account geological, topographical, or environmental construction limiting factors. The impact analysis for vegetation and wetland and riparian areas incorporates the following assumptions: • All short and long-term surface disturbances would result in the removal of vegetation. • As the area of surface disturbance increases, loss of vegetation cover and productivity, changes in plant community composition, and establishment of invasive plant species and noxious weeds also increases while native species diversity decreases. • As surface disturbance increases, traffic and associated dust increases and, as a result, plant productivity and wetland and riparian area health decreases. • Linear crossings, especially roads, can cause the channel to be cut to a greater degree since road construction will increase disturbance and channel depth both upstream and downstream by the road, causing the riparian areas and wetlands to decrease. As surface disturbance increases, loss and alteration of wetlands and riparian areas also increases in areas where avoidance of riparian areas and wetlands is not possible. • Reclamation would not precisely replicate native plant communities or riparian areas and wetlands. Successful reclamation, as outlined in Thacker Pass Project – Plan of Operations and Reclamation Plan, do not require or guarantee that full restoration be achieved. • All wetland and riparian areas within the Project area are isolated with no interstate commerce use. Streams and wetlands within the Project area lack a connection to the Quinn and Kings Rivers. The Project area is an isolated watershed that is internally drained into the Black Rock Desert.
Analysis Area
The analysis area for direct and indirect effects to vegetation, wetlands, and riparian areas is the Project area. Also included is areas where fugitive dust reaches vegetation communities and areas downstream of wetlands and riparian areas found in the Project area.
Effect Indicators
Direct and indirect impacts to vegetation and wetland and riparian areas would result from mining and exploration activities and surface disturbance that would remove established and native plant communities and wetland and riparian areas.
Methods of Analysis
Presence and potential for occurrence of vegetation communities and ecological sites and wetland and riparian areas within the Project area were determined using the following methods: • Natural Resources Conservation Service (NRCS) Ecological Site Descriptions and soil mapping data • U.S. Geological Survey (USGS) Landcover data • U.S. Department of Agriculture (USDA) NRCS Land Resource Regions (LRR) and Major Land Resource Area (MLRA) • NRCS Ecological Site Descriptions and soil mapping data • National Wetland Inventory data • Field surveys
Types of Effects
• Surface disturbance • Vegetation removal • Changes in hydrologic regimes

Table L.4. Wildlife and Special Status Species

Analysis Assumptions

The following assumptions will guide the impacts analysis for wildlife and special status species resources:

- Effects on terrestrial and aquatic wildlife resources in the Project area are described qualitatively and, where possible, quantitatively. Quantitative analyses were conducted based on distributions and proximity of known wildlife features (e.g., nests, leks) and/or the extent of delineated suitable wildlife habitats (e.g., GRSG habitat, big game ranges) in relation to the known amounts of surface disturbance that are estimated to occur within or near these areas. Direct effects to wildlife habitat would likely be proportional to surface disturbance and the depletion of water resources; however; effects to wildlife would also result from the type, duration, and frequency of human activities resulting from the Proposed Action and alternatives. These effects could vary based on several factors, including the spatial pattern of surface disturbance and associated human activity (e.g., fragmented or clustered), species tolerance for human activity or human-altered habitat, the quality of habitat, seasonal use patterns, and fluctuations in natural processes (e.g., precipitation) that may improve or degrade habitat conditions.

Analysis Area

The general terrestrial wildlife and special status species analysis area for direct effects is the Mine Plan and Exploration Plan boundaries (the PoO). The analysis area for indirect effects on terrestrial wildlife includes the PoO plus additional buffers as follows:

- A 3.73 (6 km)-mile buffer for GRSG (*Centrocercus urophasianus*)
- A 4-mile buffer for big game species
- A 1-mile buffer for raptors and other special status species

The CESA for general terrestrial wildlife is NDOW Hunt Unit 031. The CESA for migratory birds and raptors is a 10-mile buffer from the PoO. The CESAs for special status species varies depending on the species and were determined based on important habitat and species use within the Project region.

The aquatic wildlife analysis area for direct and indirect effects is hydrographic basins 33A and 30A within the Crowley Creek-Quinn River watershed and the Kings River watershed, which are identified as USGS hydrologic unit code (HUC) 10 units 1604020106 and 1604020110, respectively. The CESA for aquatic resources is the Crowley Creek-Quinn River watershed and the Kings River watershed.

Effect Indicators

The occurrence potential for the following specific effects to wildlife were evaluated for the Project:

- A substantial, long-term reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species.
- Injury or mortality to common wildlife species, such that species populations would not recover within 5 years.
- Mortality to a listed species or species proposed for listing that could result in a "take" under the Endangered Species Act (ESA).
- A reduction in the population, habitat, or viability of a species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing.
- Any loss of birds, eggs, or nesting habitat critical to migratory birds under the Migratory Bird Treaty Act (MBTA) in the Project area.

Methods of Analysis

Presence and potential for occurrence of wildlife and special status species within the Project area were determined using the following methods:

- Consultation with USFWS and NDOW
- USFWS Information for Planning and Consultation (IPaC) online tool
- NDOW wildlife occurrence database
- Nevada Division of Minerals abandoned mine workings database
- Nevada Natural Heritage Program species information
- NatureServe Explorer
- U.S. Geological Survey (USGS) Landcover data
- National Wetland Inventory data
- BLM geospatial database for GRSG habitat
- 2015/2019 GRSG ARMPA
- 2018 Nevada GRSG Plan
- Field surveys

Types of Effects

Effects to terrestrial and aquatic wildlife resources could include direct or indirect effects. Direct effects on wildlife would result from project activities that affect individuals or populations of species, such as loss of habitat and injury or mortality from vehicle collisions and construction zone hazards (e.g., open pits, pipeline trenches); and a reduction in young survival rates. Indirect effects would result if project activities affect the quality or availability of suitable wildlife habitat through surface disturbance, invasive species establishment, or alterations in vegetation communities; avoidance or displacement of wildlife species from suitable habitat; increased sedimentation to streams and water depletions reducing the quantity or quality of aquatic habitat; and changes in predator-prey dynamics.

The potential duration of effects of the proposed project on terrestrial wildlife and aquatic biological resources can be classified as short-term (temporary), long-term, or permanent. Short-term effects result from temporary activities (e.g., noise from exploration drilling, water withdrawals) and short term surface disturbance associated with construction or exploration activities. Long-term effects result from activities occurring during the active life of the mine and until reclamation is successfully completed. Long-term effects would cease upon mine closure and completion of successful reclamation. Permanent effects include permanent changes to habitats and the wildlife and aquatic populations that depend on those habitats, regardless of reclamation success, such as the removal of seeps and springs within the Project area.

The intensity of effects on wildlife species could vary and depends on a wide range of variables including, but not limited to, the sensitivity of the species, species distribution, seasonal use patterns, the type and timing of project related activity, and physical parameters (e.g., topography, cover, forage, and climate). The level of intensity of effects for this analysis is classified as follows:

- Negligible: Either wildlife would not be affected, or effects would be limited to a few individual organisms, and no population-level effects would occur. Effects on habitat would not be readily discernable.
- Minor: Effects on wildlife may result in the loss of a few individuals but population- level effects would not be discernable, and effects would be localized. The overall viability of the population or subpopulation would not be affected, and the population would recover. Effects on wildlife habitat would be discernable but localized. Effects to wildlife and their habitats would be minimized with implementation of ACEPMs of the proposed Project.
- Moderate: Effects would be sufficient to cause a change in the population or subpopulation (e.g., abundance, distribution, quantity, or viability), but the effect would remain localized. The change would be measurable and perceptible, but the negative effects could be reversed. Mitigation beyond the ACEPMs may be necessary, but these measures would most likely be effective.
- Major: Effects would be substantial, highly discernable, and could be permanent in their effect on population or subpopulation survival without active management. Mitigation beyond the ACEPMs may be necessary to reduce adverse effects, and these measures would need to be monitored to determine their effectiveness.

Table L.5. Soils

Analysis Assumptions
The following assumptions will guide the impacts analysis for soil resources: • Effects on soils are described qualitatively and, where possible, quantitatively. Quantitative analyses were based on soils data from the Natural Resources Conservation Service (NRCS), including soil map unit and evaluation of suitability as growth media for use in reclamation and susceptibility to wind and water erosion. • Sufficient volumes of suitable growth media likely exist within the project area to reclaim mine infrastructure (see the proposed Mine Plan of Operations in **Appendix B**, p.89). Therefore, offsite borrow areas where soils might be harvested to provide growth media for reclamation are not considered in the analysis of effects below.
Analysis Area
The study area for soil resources includes the proposed Project area. The CESA for soils resources includes the boundaries of HUC 10 watersheds that overlap the proposed Project area.
Resource Indicators and Measures for Assessing Effects
The following indicators were used in describing the affected environment and analyzing potential effects on soils: **Direct** • Loss of soil function due to mixing, crushing, and compaction • Loss of soils due to wind and water erosion, leading to loss of growth media and loss of Prime Farmland • Soil contamination • Suitability of growth media for revegetation (due to original source and due to handling, including conditions in stockpiles) **Indirect** • Dust and sediment generation due to wind and water erosion, causing offsite deposition of dust and sediment • In addition, leaks, spills, or runoff of hazardous materials could result in adverse effects on soils. Leaks, spills, and runoff of hazardous materials are discussed in Section 4.16, *Wastes, Hazardous and Solid.*
Methods of Analysis
Analysis was based primarily on a GIS analysis of soils within the project area and CESA (Natural Resources Conservation Service 2020) as well as on review of summary reports created for the project: Soils Baseline Report (Lithium Nevada Corporation 2018a), Soils Baseline Summary (Bureau of Land Management n.d.), Growth Media Assessment (Lithium Nevada Corporation 2018b), and Growth Media Assessment Addendum (Lithium Nevada Corporation 2020). Soils data in these reports were based on soil surveys performed by the Natural Resources Conservation Service Soils Survey Staff (Natural Resources Conservation Service 2018).
Types of Effects
Effects related to soils and reclamation could include direct or indirect effects. Direct effects would result from project activities that would affect soil resources at the time and location of disturbance. Indirect effects would result from project activities that would change the environment leading to effects on soil resources removed in either time or location from the disturbance. Potential direct effects on soils include changes to structure, physical, and chemical alterations that could result in the potential for decreased soil function, including a decrease in quality of topsoil. Loss of soil function can lead to increased susceptibility to wind and water erosion, which in turn would lead to the indirect effect of dust and sediment generation due to wind and water erosion, causing off-site deposition of dust and sediment. In addition, potential direct effects on soils include soil contamination. Direct and indirect effects are also related to the suitability of the harvested and stockpiled media for successful reclamation. **Specific effects on soils are listed below.** • Excavation and compaction during mine construction, installation of ancillary and support facilities, and exploration could lead to increased wind and water erosion and dust and sediment deposition. • Leaks and accidental spills of contaminants during mine construction, mining operations, mineral processing, ancillary and support facilities such as storage of fuel and other substances, and exploration

could contaminate surrounding soil, causing the soil to lose the capacity to support plant growth and organic matter decomposition. These effects could lead to increased wind and water erosion and dust and sediment deposition.

- Placement of ore and ROM, coarse gangue, and waste rock into stockpiles during mining operations could generate dust from wind erosion. Compaction and mixing that would take place during storage and placement of salvaged growth media could impair soil function by decreasing aeration, porosity, permeability, and water-holding capacity, all of which could lead to increased wind and water erosion and associated deposition.

Table L.6. Non-native and Invasive Plants

Analysis Assumptions

A range of plant communities and ecological sites and disturbance response groups occur in the Project area. Wetland and riparian areas occur along Thacker Creek, Crowley Creek, and Pole Creek within the Project area. Calculations used to estimate the acres of vegetation communities and wetland and riparian areas affected by surface-disturbing activities are based on a landscape-level analysis and represent a worst-case scenario. The acreages presented assume even distribution of impacts across the Project area and do not take into account geological, topographical, or environmental construction limiting factors. The impact analysis for vegetation and wetland and riparian areas incorporates the following assumptions:

- All short and long-term surface disturbances would result in the removal of vegetation.
- As the area of surface disturbance increases, loss of vegetation cover and productivity, changes in plant community composition, and establishment of invasive plant species and noxious weeds also increases while native species diversity decreases.
- As surface disturbance increases, traffic and associated dust increases and, as a result, plant productivity and wetland and riparian area health decreases.
- Linear crossings, especially roads, can cause the channel to be cut to a greater degree since road construction will increase disturbance and channel depth both upstream and downstream by the road, causing the riparian areas and wetlands to decrease. As surface disturbance increases, loss and alteration of wetlands and riparian areas also increases in areas where avoidance of riparian areas and wetlands is not possible.
- Reclamation would not precisely replicate native plant communities or riparian areas and wetlands. Successful reclamation, as outlined in Thacker Pass Project – Plan of Operations and Reclamation Plan, do not require or guarantee that full restoration be achieved.
- All wetland and riparian areas within the Project area are isolated with no interstate commerce use. Streams and wetlands within the Project area lack a connection to the Quinn and Kings Rivers. The Project area is an isolated watershed that is internally drained into the Black Rock Desert.

Analysis Area

The analysis area for direct and indirect effects to vegetation, wetlands, and riparian areas is the Project area. Also included is areas where fugitive dust reaches vegetation communities and areas downstream of wetlands and riparian areas found in the Project area.

Effect Indicators

Direct and indirect impacts to vegetation and wetland and riparian areas would result from mining and exploration activities and surface disturbance that would remove established and native plant communities and wetland and riparian areas.

Methods of Analysis

Presence and potential for occurrence of vegetation communities and ecological sites and wetland and riparian areas within the Project area were determined using the following methods:

- Natural Resources Conservation Service (NRCS) Ecological Site Descriptions and soil mapping data
- U.S. Geological Survey (USGS) Landcover data
- U.S. Department of Agriculture (USDA) NRCS Land Resource Regions (LRR) and Major Land Resource Area (MLRA)
- NRCS Ecological Site Descriptions and soil mapping data
- National Wetland Inventory data
- Field surveys

Types of Effects

- Surface disturbance
- Changes in hydrologic regime
- Introduction of noxious or non-native plant species

Table L.7. Rangeland Management

Analysis Assumptions
The following assumptions will guide the impacts analysis for rangeland management: • Currently permitted AUMs are set at a desired level for the BLM. • Although variations in vegetation communities exist within allotments, the impact analysis will assume uniform production for quantifying reductions to forage vegetation based on acreage of disturbance and average AUMS per acre.
Analysis Area
The study area for range resources includes the proposed Project area and the CESA includes the three existing grazing allotments, in their entirety (Crowley Creek allotment, Pole Creek allotment, and Kings River allotment), that overlap the proposed Project area. (**Figure 4.9-1 and Figure 4.9-2, Appendix A**).
Resource Indicators and Measures for Assessing Effects
• Effects to existing access routes to adjacent private property and public lands for livestock grazing permittees and private landowners. • Effects to local and regional traffic volumes, traffic patterns, and public access from Project Activity. • Effects of exploration activities along Pole Creek Road. • Effects to Water Quality and Quantity.
Methods of Analysis
The analysis will be based on allotment data provided through GeoCommunicator (2019), Cedar Creek Associates, Inc. (2019), and personal communication with the BLM (2010). Average acres per AUM are derived by dividing total acres by active AUMs within the allotment. Active AUMs within Allotments and the Study Area are derived by dividing acres within the study area by active AUMs within the study area.
Types of Effects
Primary issues related to range management include actions that impact livestock operations as a result of surface disturbance and activities that could pose a threat to livestock health.

Table L.8. Air Quality and Greenhouse Gas Emissions

Analysis Assumptions

The following assumptions will guide the impacts analysis for air resources:

- Available data on the affected environment adequately represent the project area.
- Calculation techniques and models approved by EPA and NV DEP are appropriate for the project.

Analysis Area

The area of analysis for air quality and greenhouse gases (GHGs) is the area within a 50-kilometer (31-mile) radius of the project boundary and, for assessment of air quality-related values (AQRVs), the nearest Class I[1] areas. **Figure 4.2-1 in Appendix A** depicts these features. No designated Class I areas are located within 100 kilometers of the Project area. The closest Class 1 areas are the Jarbidge Wilderness, which is the only designated Class 1 area in Nevada, and the South Warner Wilderness in Modoc County, California. The Jarbidge Wilderness is located approximately 200 kilometers (124 miles) to the east of the Project area. The South Warner Wilderness is the nearest Class I area to the project and is located approximately 170 kilometers (106 miles) to the west of the Project area. The proposed Project is located within the EPA-designated Nevada Intrastate Air Quality Control Region.

Resource Indicators and Measures for Assessing Effects

- Pollutant emissions (tons per year) and GHG emissions (metric tons per year) compared to No Action Alternative
- Criteria pollutant concentrations (micrograms per cubic meter or parts per million) compared to National and Nevada Ambient Air Quality Standards
- Assessment of Air Quality Related Values

Methods of Analysis

The effects analysis was conducted using emissions data provided to the BLM by LNC for the construction and operation of the project. The modeling scenarios were designed to capture the maximum impacts for each pollutant for each phase of the project.

Project Emissions

The project will generate air pollutant and GHG emissions from construction equipment, mining equipment, process operations, trucks, and worker vehicles. An emissions inventory was developed for all project components including the following activities:

- Mine Construction
- Exploration
- Mining Operations
- Mineral Processing
- Ancillary and Support Facilities
- Closure and Reclamation
- Downstream GHG emissions

As discussed in Section 2.3, Phase 2 of commercial production would have the highest production rates and hence the highest potential emissions rates. Therefore, to be sure the maximum potential impacts of the project were captured, the emissions inventory was developed using Phase 2 emission rates. For each project component, emissions were calculated based on process data, projected activity rates for equipment and vehicles, and EPA-approved models and emission factors. Combustion, process, and fugitive[2] emissions were included. **Appendix K** provides a detailed description of the assumptions and methods used to develop the emissions inventory.

[1] Class I air quality areas, as defined by the Clean Air Act, include national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that existed or were authorized as of August 7, 1977. They receive the highest degree of air quality protection under the Clean Air Act.

[2] Fugitive means emissions that could not reasonably pass through a vent, stack, or similar opening but are emitted directly to the atmosphere. For example, windblown dust is fugitive particulate matter.

Ambient Concentrations (dispersion modeling)

Air quality impacts were evaluated using the American Meteorological Society and EPA Regulatory Model Improvement Committee Model (AERMOD). The latest version of AERMOD (version 19191) along with the latest versions of all supporting software were used for this application. AERMOD accounts for source characteristics, locations, and emission rates; locations of potential impacts (known as receptors); and meteorology, land use, and topography in the analysis area. **Appendix K** provides a detailed description of the assumptions and methods used in the dispersion modeling.

Criteria pollutants: The modeling focused on the criteria pollutants, including carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). Concentrations were compared to the NAAQS and Nevada standards. The total concentration that is compared to the standards is the sum of the modeled impact and a background concentration. The background level reflects the combined effects of existing emission sources in the region, independent of the Project.

HAPS: Hazardous air pollutants from the project alone and in combination with current operations have a maximum potential to emit levels that are below the levels to be considered a "major source" of hazardous air pollutants. Therefore, no ambient air quality modeling analysis of hazardous air pollutants was conducted, other than for hydrogen sulfide (H_2S). There are no NAAQS or Nevada ambient air quality standards for HAPs, except for the Nevada standard for hydrogen sulfide. Similarly, a health risk analysis was not conducted, as NDEP does not require health risk analysis for non-major sources of HAPs.

Ozone: Ozone is not emitted directly but is formed in the atmosphere through a series of complex photochemical reactions involving precursor chemicals, primarily volatile organic compounds (VOCs) and nitrogen oxides (NOx). The potential for ozone impacts was assessed by comparing the levels of VOC and NOx emissions associated with the project with the VOC and NOx emissions for all of Humboldt County.

AQRVs

Impacts on AQRVs in Class I areas were assessed using the FLAG screening method (USFS 2010) known as the Q/D test. The Q/D test relates the level of emissions to the distance from the source. The total quantity of SO_2, NO_X, PM_{10}, and sulfuric acid (H_2SO_4) annual emissions (Q) is divided by the distance (D) to the nearest Class I area. If the emissions source is located more than 50 kilometers from a Class I area and has a Q/D value of less than 10, the source is considered to have negligible impacts on Class I AQRVs, and no further analysis is required. If the Q/D test is not met then further analysis would be warranted.

Types of Effects

- Air pollutants in sufficiently high concentrations can cause human health effects and impacts on AQRVs.
- GHG emissions can contribute incrementally to climate change.

Table L.9. Cultural Resources

Analysis Assumptions

The National Historic Preservation Act (NHPA) is the primary regulatory framework guiding cultural resources compliance. The NHPA's implementing regulations under 36 CFR, Part 800, require all federal agencies to consider effects of federal actions on cultural resources eligible for listing or listed on the National Register of Historic Places (NRHP). Unevaluated resources are treated as NRHP-eligible until an evaluation of the resource's significance can be completed. In Nevada, the State Protocol Agreement between the BLM and the Nevada State Historic Preservation Offices (SHPOs) guide compliance and define how the BLM and SHPO provide direction for implementing the NHPA (BLM 2014; BLM and Nevada SHPO 2014). Federal agencies must also comply with these laws:

- NEPA of 1969
- Archaeological and Historic Preservation Act (AHPA) of 1974
- FLPMA of 1976
- Archaeological Resources Protection Act (ARPA) of 1979
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (Public Law 101-601)
- Indian Sacred Sites, Executive Order 13007 of 1996
- Consultation and Coordination with Indian Tribal Governments; Executive Order 13175 of 2000
- Applicable state laws

Analysis Area

The cultural resources analysis area includes the 18,195-acre direct effects Project area divided between the 10,469-acre Mining PoO Boundary and the 7,727-acre Exploration PoO Boundary (**Figure 4.11-1, Appendix A)**. An 18,731-acre indirect APE surrounds the Mining and Exploration boundaries, and all impact areas fall within an expansive 166,346-acre (containing approximately 68,000 acres of discontiguous source locales) cultural resources CESA encompassing the Double H/Whitehorse Obsidian Procurement District (DHWOPD; **Figure 4.11-2, Appendix A**).

Resource Indicators and Measures for Assessing Effects

Impacts on cultural resources are assessed based on the degree the Proposed Action could adversely affect the following:

- Cultural resources listed on the NRHP
- Cultural resources eligible for listing on the NRHP
- Cultural resources unevaluated for listing on the NRHP

Cultural resources contributing to the NRHP-eligibility of the Thacker Pass Component of the DHWOPD

Methods of Analysis

The following methods guide the impacts analysis for cultural resources:

- Comprehensive review of the results of Class III field inventories meeting the data adequacy standards of the Nevada BLM
- Consultation and concurrence on data sets, coupled with BLM correspondence/results of SHPO consultation

Consideration of the direct, indirect, and cumulative effects to historic properties based on the most recent NRHP evaluations for resources that could be affected by the Proposed Action.

Types of Effects

- Destructive, ground disturbing activity directly affecting NRHP aspects of integrity (Criteria A and D).
- Non-destructive, indirect effects (visual, etc.) affecting NRHP aspects of integrity (Criterion A).

Table L.10. Social and Economic Conditions

Analysis Assumptions
The following assumptions will guide the impacts analysis for socioeconomic resources: • Data to describe existing conditions in the study area were obtained through the U.S. Census Bureau, Humboldt County, the State of Nevada, Lithium Nevada, and the EPA's EJSCREEN tool.
Analysis Area
The area of analysis and CESA for social values and economics includes the entirety of Humboldt County, Nevada. Key communities of interest include the communities of Orovada, McDermitt, the city of Winnemucca, and Native communities of Fort McDermitt Indian Reservation, Summit Lake Indian Reservation, and Winnemucca Indian Colony. The proposed project area resides centrally in Humboldt County and it is expected that the project's socioeconomic effects would be limited to Humboldt County. **Figure 4.4-1 (Appendix A)** illustrates the study area and CESA for social and economic conditions.
Effect Indicators
Economic impacts of the proposed action were analyzed using a Humboldt County IMpact Analysis for PLANning (IMPLAN) economic impact model (IMPLAN Group. LLC 2016). IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. For this analysis, the region is Humboldt County, Nevada. To model impacts, primary data was collected from Lithium operations to create two IMPLAN sectors: Lithium Mining and Lithium Processing.
Methods of Analysis
The project's social, economic, and fiscal impacts were primarily analyzed quantitatively. Population, housing, and education impacts were analyzed by projecting project-related changes in the SESA population, and by assessing increased demands for housing and education services from such population changes in relation to the quantity of available housing and schools. Fiscal impacts were analyzed by projecting project-related tax revenues accruing to various levels of government. Quality-of-life impacts were analyzed qualitatively by assessing the scale and scope of project-related changes in conditions contributing to residents' wellbeing relative to well-established regional trends. Refer to the University of Nevada, Reno's Center for Economic Development's "Social, Economic and Fiscal Impact Assessment for New Lithium Operations in Humboldt County, Nevada" for the methodology, data, and application of the estimation of impacts as well as key assumptions underlying the socioeconomic impact analysis (University of Nevada, Reno Center for Economic Development 2018/19).
Types of Effects
Types of effects reported include: • Direct – Direct effects represent the impacts due to the initial operating expenses and employment. • Indirect – Indirect effects represent the impacts due to the inter-industry linkages caused by the iteration of industries purchasing from other industries, brought about by the changes in final demands. • Induced – Induced effects represent the impacts on all local industries due to consumers' consumption expenditures arising from the new household incomes that are generated by the direct and indirect effects of the final demand changes. • Total – Summation of direct, indirect, and induced effects.

Table L.11. Environmental Justice

Analysis Assumptions
The following assumptions will guide the impacts analysis for environmental justice: • Data to describe existing conditions in the study area were obtained through the EPA's EJSCREEN tool, Headwaters Economics' Economic Profile System (EPS), and the University of Nevada, Reno Center for Economic Development. For the purposes of this analysis, a community is considered an environmental justice community if the total minority or low-income population, as defined by the U.S. Census Bureau, is 50 percent or more of the community or is "meaningfully greater" than the reference community (the State of Nevada). To provide a conservative assessment, this analysis applied a standard of ten percentage points higher than in the comparison area.
Analysis Area
The study area and CESA for environmental justice is the entirety of Humboldt County. The proposed project area resides centrally in Humboldt County and it is expected that the project's socioeconomic effects would be limited to Humboldt County. Key communities of interest include the city of Winnemucca, the communities of Orovada, McDermitt, and the Native communities of Fort McDermitt Indian Reservation, Summit Lake Indian Reservation, and Winnemucca Indian Colony.
Effect Indicators
EPA's EJSCREEN tool is an environmental justice mapping and screening tool that presents environmental and demographic information. The environmental justice analysis examines the analysis area at the census block group level, the smallest geographic area of evaluation by EJSCREEN.
Methods of Analysis
The CEQ issued guidance for considering environmental justice within the National Environmental Policy Act process that will be used in this analysis. The CEQ suggests the following approach for identifying potential minority and low-income populations (CEQ 1997): • Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. • Low-income population: Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. In practice, "meaningfully greater" is often interpreted to identify an environmental justice population if the percentage of population in minority and/or poverty status in an area is at least ten percentage points higher than in the comparison area (e.g., greater than or equal to 19 percent population in poverty in a SESA geography compared with 9 percent population in poverty in the comparison area). This threshold has been used in many BLM resource management plans and EISs, and is based on experience evaluating environmental justice indicators, the potential for adverse impacts on environmental justice populations from BLM decisions, and the sense that this threshold represents a meaningful difference between the affected and comparison populations.
Types of Effects
Low-income and minority populations are identified whenever either of the following criteria was met: where the population is greater than 50 percent of the area's total population, or where the percentage of the minority population is meaningfully greater (generally considered to be ten percentage points higher) than the percentage in the general population or an appropriate comparison area. EJSCREEN's environmental justice indicators examined include low-income populations, total minority populations, as well as American Indian and Hispanic populations at the census block group level.

Table L.12. Lands and Realty

Analysis Assumptions
The following assumptions will guide the impacts analysis for lands and realty: • The BLM Winnemucca RMP decisions reflect the current desired use of public lands in and around the Project area. • The proposed mine would be developed and operated under the authority of the Nevada Revised Statutes (NRS) 445A.300-NRS 445A.730 and the Nevada Administrative Code (NAC) 445A.350-NAC 445A.447. • The proposed mine would be developed and operated to be consistent with the goals, objectives, and strategies related to mining and land use policy of the 2012 Humboldt County Master Plan.
Analysis Area
The study area and CESA for lands and realty is the proposed Project area and a one-mile buffer to account for adjacent private property.
Resource Indicators and Measures for Assessing Effects
• Effects to Existing Access Routes to Adjacent Private Property and Public Lands. • Effects on Adjacent Private Property Values from Project Activity. • Effects to Local and Regional Traffic Volumes, Traffic Patterns, and Public Access from Project Activity. • Effects of Exploration Activities along Pole Creek Road.
Methods of Analysis
The analysis will be based on information provided by the BLM HRFO, Cedar Creek, Inc. (2019).
Types of Effects
• Impacts to lands and realty would result from the preclusion of, or desired use of, other uses of the land occupied by the Mine and Exploration PoO.

Table L.13. Noise

Analysis Assumptions
• The analysis and thresholds assumed in the analysis are based on information provided in the *Wildlife Noise Impact Assessment, Lithium Nevada Corporation, Thacker Pass Project*, prepared by Cedar Creek (2019), and • Blasting would occur at a rate of up to 25 blasts per year. During mining, up to 6 blasts per year may be required.
Analysis Area
The study area and CESA for noise resources includes the PoO area and a 10-mile buffer area. A buffer of this size is used to account for the sensitivity of GRSG to noise from human activities, and the distance that noise levels would attenuate from the PoO boundary to existing ambient levels in the surrounding area.
Resource Indicators and Measures for Assessing Effects
• At sage grouse leks, construction and operation of the project would result in noise levels exceeding the ARMPA guideline of 10 dBA above existing ambient levels. • Noise levels during construction and operation would exceed EPA standards for human exposure to noise (55 Ldn). • Groundborne vibration from the project would be readily perceptible to receptors outside the mining and exploration boundary.
Methods of Analysis
The analysis and thresholds assumed in the analysis are based on information provided in the *Wildlife Noise Impact Assessment, Lithium Nevada Corporation, Thacker Pass Project* report prepared by Cedar Creek (2019), and the *Thacker Pass Project – Predicted Project Noise Levels* report prepared by Saxelby Acoustics (2019).
Types of Effects
Project-related noise levels that could potentially result in abandonment of sage grouse leks or interfere with outdoor activities of human receptors. Project-related vibration that would potentially result in disturbance to receptors.

Table L.14. Visual Resources

Analysis Assumptions
The following assumptions will guide the impacts analysis for visual resources: • The seven selected KOPs represent the most critical viewpoints, where there is public sensitivity to visual change due to the type of user, level of use, orientation to proposed project, etc. • LNC would implement mitigation measures to ensure the quality of night skies and the dark environment is protected for scientific, natural, educational, cultural heritage, and/or public enjoyment. This night sky lighting plan is currently under development.
Analysis Area
The study area for visual resources is the viewshed that includes the Project area, which is roughly within 30 miles of the Project area. This geographic region was selected as the study area because beyond approximately 30 miles from the proposed Project area, the proposed project facilities and mining site would either not be visible or would be considered as a minor element in the visual landscape.
Resource Indicators and Measures for Assessing Effects
The following indicators were considered when analyzing the potential impacts that each alternative would have on visual resources: • Degree of consistency or conflicts with established BLM VRM class objectives; and • Change in the scenic quality of the existing characteristic landscape from KOPs due to visibility of components from the action alternatives
Methods of Analysis
Each of the alternatives considered in this EIS were analyzed for its potential to result in impacts on visual resources. Visual impacts were analyzed using the methodology outlined in the BLM Handbook H8431-1, Visual Resource Contrast Rating (BLM 1986b), which analyze the levels of visual contrast created between a project and the existing, characteristic landscape. The management standards and allowable contrasts for the Project area are those primarily under the VRM Class II objective, with an exception to the east end of the Project area which falls under VRM Class III.
Types of Effects
Changes in the landscape character from the Thacker Pass Project would result in short-term strong contrast during construction, long-term strong contrast during mining operations, and long-term weak contrast in final reclamation. Concurrent reclamation would take place during mining operations to minimize the overall visual contrast of the existing landscape. Overall, the construction and operation of the Proposed Alternative would not meet the current VRM Class II objectives.

Table L.15. Wastes, Hazardous and Solid

Analysis Assumptions
The following assumptions will guide the impacts analysis for hazardous and solid waste: • Materials would be transported to/from the site from an existing rail terminal in Winnemucca. Operation of existing materials loading/unloading rail facilities in Winnemucca are not included in the scope of the EIS. Hazardous materials, wastes, and products would be transported offsite on public roads by Nevada Department of Transportation (NDOT)-licensed transportation contractors.
Analysis Area
The analysis area includes the mine site and processing areas within the PoO area, including areas where hazardous materials are stored, processed, and used on site. The analysis area also includes associated access roads and potential transportation routes to the mine site and processing areas from/to which materials would be transported.
Effect Indicators
The following indicators were used in describing the affected environment for hazardous materials and wastes: • Proposed on-site storage locations and on-site management areas for hazardous materials and wastes; • Proposed on-site transportation routes (access roads) for hazardous materials and wastes; • Potential off-site transportation routes for hazardous materials and wastes in the project vicinity; • Capacity of existing off site hazardous and solid waste recycling/disposal facilities in the project vicinity for management of wastes generated from proposed project construction, operation, closure, and decommissioning.
Methods of Analysis
Each of the alternatives considered in this EIS were analyzed for its potential to result in impacts on wastes, hazardous and solid. The types and amounts of hazardous and solid wastes and methods of waste generation, on-site management, transportation, and on-site and off-site transportation were analyzed and capacity of off-site facilities to management waste were analyzed.
Types of Effects
Potential releases of hazardous and solid wastes to the environment, potential exposure to hazardous materials, potential limitations of capacity for on-site and off-site management of wastes.

Table L.16. Recreation

Analysis Assumptions
The following assumptions will guide the impacts analysis for recreation: • Decisions contained within the Winnemucca RMP reflect the desired condition of public lands within the Field Office. • Due to distance and geographic barriers, the proposed mine development and operation would not affect recreational activities in the Montana Mountains.
Analysis Area
The study area and CESA for recreation is the proposed Mine Plan and Exploration Area (Project area), which totals 18,016 acres and the CESA is the NDOW Hunt Unit 031.
Resource Indicators and Measures for Assessing Effects
• Development and presence of project infrastructure. • Exploration activities along Pole Creek Road.
Methods of Analysis
The analysis will be based on BLM recreation information (including Special Recreation Permits) presented in the Winnemucca District ROD and Approved RMP and BLM Manual 8320 and BLM Handbook H-8320-1. Hunt data is provided by NDOW.
Types of Effects
Primary issues related to recreation include actions that would impact the feeling of naturalness and the presence of wildlife and adequate methods to access the Montana Mountains.

Table L.17. Native American Religious Concerns

Analysis Assumptions
The BLM coordinates NEPA and NHPA Section 106 compliance by using the NEPA scoping process to partially fulfill NHPA public notification requirements to seek input from the public and other consulting parties on the Project and its effects on historic properties. The following laws direct the BLM to make its best efforts to identify sites, resources, and activities of religious, traditional, or cultural importance during government-to-government consultation with tribal organizations: • NHPA of 1966 (previously 16 U.S.C., Section 470 et seq.; now 54 U.S.C., Section 300101 et seq.) • NEPA of 1969 • FLPMA of 1976 • AIRFA of 1978 (Public Law 95-341) • ARPA of 1979 • NAGPRA of 1990 (Public Law 101-601) • Executive Orders 13007 (1996, Indian Sacred Sites) and 13175 (2000, Consultation and Coordination with Indian Tribal Governments) • Secretarial Order 3317 (2011, Department of the Interior Policy on Consultation with Indian Tribes)
Analysis Area
The assessment area for Native American Religious Concerns is Humboldt County consistent with Social and Economic Conditions. This area is the traditional territory of the Northern Paiutes and Western Shoshone.
Resource Indicators and Measures for Assessing Effects
The BLM engages government-to-government tribal consultation as it relates to the Proposed Action.
Methods of Analysis
Consultations regarding historic properties and locations of Native American Religious Concern were conducted by the BLM via mail and personal correspondence in 2018 and 2019 pursuant to the National Historic Preservation Act (NHPA) and implementing regulations at 36 CFR 800 in compliance and accordance with the BLM-SHPO 2014 State Protocol Agreement. The following consultation episodes are relevant to the Proposed Action: • BLM consultation letters transmitted in December 2019 to tribal representatives at the Fort McDermitt Paiute and Shoshone Tribe, Summit Lake Paiute Tribe, and Winnemucca Indian Colony; • BLM in-field meeting and project discussion at Thacker Pass with tribal members of the Fort McDermitt Paiute and Shoshone Tribe on October 3, 2018; • Ethnographic background derived from BLM literature searches and ethnographic studies considered important by the regional Native American communities presented in Young et al. (2019:43-45). • Consultation between the BLM and the Fort McDermitt Paiute and Shoshone Tribe and the Summit Lake Paiute Tribe during the Kings Valley Clay Mine (KVCM) Project Environmental Assessment (EA; DOI-BLM-NV-W010-2013-0046-EA) in 2014 (BLM 2014).
Types of Effects
Destructive, ground disturbing activity and non-destructive, indirect effects (visual, etc.).