Rio Algom Mining LLC

August 23, 2023

Mr. David Pals
Bureau of Land Management, Moab Field
Office 82 East Dogwood Avenue
Moab, UT 84532

Re: **Modification of the Plan of Operations, RAML Lisbon Facility, Utah Radioactive Material License Number UT 1900481**

Dear Mr. Pals:

Rio Algom Mining LLC (RAML) has prepared this Modification to the Plan of Operations for the RAML Lisbon Facility in Utah in accordance with 43 CFR 3809.401(b), adapted from Format 4.3-1 – Plan of Operations, provided in the BLM Handbook. This modification is required to address data gaps identified in the Corrective Action Assessment Work Plan (CAAWP) submitted to the Utah Division of Environmental Quality, Division of Waste Management and Radiation Control (DWMRC) dated November 16, 2022.

The CAAWP reflects RAML's focus to supplement characterization of the site hydrogeology (i.e., the hydrogeological supplemental site assessment work culminating in the HSSA4 Report) to develop and implement a Groundwater Corrective Action Plan (GCAP) in accordance with Utah Administrative Code (UAC) R317. The HSSA4 Report established that a new groundwater corrective action is necessary; the CAAWP presents RAML's roadmap to a DWMRC-approved GCAP and describes the field and laboratory data collection needed to support this stage of corrective action site characterization and planning.

The Phase 2 field program on BLM-administered lands includes core hole drilling and sampling, installation of new monitoring wells, collection of groundwater samples, construction of new drill pads and associated access roads, expansion of two existing well pads, and maintenance of existing roads. Figure 1 shows the existing monitoring well pads (2) that require expansion, the proposed new pads (22), core holes (12) and monitoring wells, and new access road locations. The total disturbance is expected to be less than 8.62 acres consisting of 7.71 acres of new/expanded drill pads, and 0.91 acres of new roads. In addition, there will be installation/application of stormwater BMPs as required by the site Stormwater Pollution Prevention Plan (SWPPP). The locations of proposed pads and access roads are shown on Figure 1 in the Modified Plan of Operations.

If you have any questions regarding this modification to the Plan of Operations, please contact me by phone at 916-947-7637 or by email at sandra.ross@bhp.com.

Sincerely,
Rio Algom Mining LLC

Sandra L. Ross, P.G.
Site Manager

Cc: Kent Applegate

1. Background

This document is adapted from the Bureau of Land Management's (BLM) Format 4.3-1 – Plan of Operations (43 Code of Federal Regulations [CFR] 3809.401 (d)). Rio Algom Mining LLC (RAML) has adapted this form to describe the proposed activity under the Surface Management Regulations at 43 CFR 3809.

The Lisbon Facility (Site) has undergone four phases of hydrogeological site assessment in the last decade. Phases 1 and 2 were completed in 2013 and 2014 by Montgomery & Associates. The third phase was a field program executed in 2017 by RAML and INTERA. The data was submitted to the Utah Division of Waste Management and Radiation Control (DWMRC) in two reports in August 2018: a *Tailings Impoundments Water Balance Modeling Report* and a *Hydrogeological Supplemental Site Assessment*. The fourth phase consisted of field activities completed by RAML and INTERA from 2018 through 2020, with the data and findings submitted to DWMRC on October 29, 2021, in three reports as follows:

1. Hydrogeological Supplemental Site Assessment, Phase 4 Report (INTERA 2021a).
2. Natural Recharge and Water Balance Modeling Report: Performance Assessment of Upper and Lower Tailing Impoundment Covers (INTERA 2021b).
3. Background Groundwater Quality Report: Lisbon Facility (INTERA 2021c).

RAML prepared and submitted a Corrective Action Assessment Work Plan (CAAWP) (INTERA 2022) to DWMRC on November 16, 2022. The CAAWP field program is anticipated to require two seasonal field phases, typically from May through November of a given year. Phase 1 is expected to begin in August 2023 after attaining DWMRC approval and will consist of work on RAML land, non-RAML privately owned land, and land within the restricted area associated with the tailing impoundments. Phase 2 is anticipated to begin in the Spring of 2024 and will largely consist of work on public land administered by the BLM following their approval of this Modified Plan of Operations. To avoid and/or minimize impacts to sensitive cultural and biological resources, RAML commissioned, in coordination with BLM, block surveys of the Site in 2022 and 2023 to plan site characterization activities to minimize impacts to these resources.

The CAAWP field investigation will be adaptively implemented to fulfill project objectives. As the field program progresses, the collected data will be evaluated to confirm that it satisfies project objectives and is useful in filling data gaps. Data collection efforts not useful for corrective action assessment may be modified, truncated, or eliminated.

The CAAWP field effort intends to gather the data needed to develop a Groundwater Corrective Action Plan per Utah Administrative Code (UAC) R317. The purpose of the CAAWP field program is to collect field and laboratory data to address data gaps in the Conceptual Site Model (CSM) pertinent to

groundwater corrective action that will inform an evaluation of a diverse range of potential groundwater corrective action activities in a future corrective action alternatives analysis.

The regulations at 43 CFR 3809.40l(b) require the operator to describe the proposed operations at a level of detail sufficient for the BLM to determine that the proposed operations would prevent unnecessary or undue degradation. The following sections will provide operator information, descriptions of operations and reclamation, the proposed monitoring plan, interim management plan, and reclamation cost estimate.

2. Part 1 – Operator Information

Mailing Address Rio Algom Mining LLC P.O. Box 218 Grants, NM 87020
Phone Number (520) 719-4167
Email address Kent.kc.Applegate@bhp.com
Taxpayer Identification Number 73-1623282
Unpatented Mining Claims (list the name and BLM serial number(s) of any unpatented mining claim(s) where disturbance would occur)
Other Federal, State, or Local Authorizations *other permits or licenses either applied for or issued for this project:* • *Categorical Exclusion issued DOI-BLM-UT-Y0I0-2020-0064 CX for Modified Plan of Operations, March 2020* • *Determination of NEPA Adequacy, DOI-BLM-UT-Y010-2016-0194-DNA, December 2016* • *Finding of No Significant Impact, Environmental Assessment, DOI-BLM-UTY010- 2013-00273-EA, June 2013* • *Amendment to Right-of-Way Grant, Serial Number UTU-80472, August 2013* • *Right-of-way grant UTU-80472 issued for the Lisbon Facility Site* • *DWMRC Source Materials License* • *DWMRC approval of the CAAWP* • *State of Utah Multi-Sector General Permit (MSGP) for Storm Water Discharges Associated with Industrial Operations* • *State of Utah well drilling permits*
Point of Contact Kent Applegate (520) 719-4167

3. Part 2a – Description of Operations

This section provides a complete description of all equipment, devices, or practices proposed to use during operations.

Project Area Maps Included: The project features are included in Figures 1-8.	X Exploration location X Drill site/drill hole location(s) X Access routes, new and existing NA Mineral process facility layout NA Mining areas/underground workings NA Waste rock/tailing location NA Support facilities/building location/utility service NA Other: Staging Area
Operating Plans Included: *Operating plans are described in the following paragraphs.*	NA Mining areas/underground workings NA Mineral processing facilities X Waste disposal X Water management plans X Rock characterization and handling plans X Quality assurance plans X Access route construction and use (Traffic Management) NA Pipelines, power lines, or utility services NA Other:

NA = Not applicable.

3.1 Operating Plan

The Phase 2 field program is on BLM-administered lands and includes core hole drilling and sampling, installation of new monitoring wells, collection of groundwater samples, construction of new drill pads and associated access roads, expansion of two existing well pads, and maintenance of existing roads. **Figure 1** shows the existing monitoring well pads (2) that require expansion, the proposed new pads (22), core holes (12) and monitoring wells, and new access road locations. Depending upon volumes of artesian water encountered while drilling, it may be necessary to lay temporary poly pipe along access roads to move water to containment facilities on private lands.

The primary purpose of this work is to conduct additional hydrogeological and geochemical evaluations to collect field and laboratory data to address data gaps in the CSM pertinent to groundwater corrective action that will inform an assessment of a diverse range of potential groundwater corrective action activities in a future corrective action alternatives analysis.

3.1.1 Exploration Location

The Site is located approximately 3.5 miles southeast of La Sal, Utah, in Sections 17, 18, 20, and 27 of T. 29 S., R. 24 E. The proposed investigation locations on BLM-administered lands in San Juan County are shown in **Figure 1, Attachment A.**

Locating Drilling Locations to Minimization Resource Conflict

In 2022, RAML contracted Ecosphere Environmental Services, Inc. (Ecosphere) to complete cultural and biological resources block surveys of all lands (BLM and private) within the CAAWP field program data collection area. Follow-up, year 2 biological species-specific surveys were completed in 2023. These baseline block surveys are intended to ensure resource avoidance of sensitive resources during CAAWP planning and data collection activities. The cultural and biological resources reports describing these baseline surveys were prepared and provided for BLM review with this Modification of the Plan of Operations (MPO).

3.1.2 Drilling Locations and Disturbance

The area of disturbance for the proposed well pads in this field program is expected to be approximately 7.71 acres (**Attachment A**). Each monitoring well (27 total) requires a well pad during drilling and testing activities that will be approximately 120 feet by 100 feet, or 12,000 square feet each, as depicted in the diagrams in Section 3.1.4. A maximum pad size of 15,000 square feet is proposed to provide construction flexibility. The well pads will be removed of vegetation and graded. A portion of the well pad will be reclaimed after the well is drilled, and a portion will remain cleared of vegetation and obstacles to allow for access during subsequent groundwater monitoring events. Reclamation (to Part 2b – Description of Reclamation and Schedule of Operations) will entail ripping compacted soils and applying a native seed mix approved by the BLM.

Table 3-1. Proposed Well and Core Hole Locations and Disturbance Areas

Well ID	Pad Size (ft^2)	New Road Length (ft)	UTM X	UTM Y
PC-101	3,000		649507	4237796
PC-RL-3	15,000		648969	4238073
PC-119	existing		648480	4238046
PW-143	3,000		649966	4237390
PC-144/PW-144	15,000		650239	4237307
PW-145	15,000	200	650436	4237407
PW-146	15,000	600	649861	4237492
PW-149	15,000	300	648991	4238127
PW-150	15,000	200	648474	4237978

Well ID	Pad Size (ft^2)	New Road Length (ft)	UTM X	UTM Y
PC-151/PW-151	15,000	200	648476	4238110
PW-152	15,000		648362	4238186
PW-153	15,000		648195	4238134
PC-113	existing		649084	4236947
PW-136M	existing		648531	4237473
PC-154/PW-154D	15,000	400	649369	4236732
PC-155/PW-155D	15,000	100	649309	4236977
PW-156D	15,000		649033	4236923
PC-157/PW-157D	15,000	200	649143	4236996
PC-158/PW-158D	15,000		648610	4237515
PW-159	15,000	200	648497	4237519
PC-167/PW-167S/PW-167D	15,000	750	646559	4239753
PC-168/PW-168S/PW-168D	15,000		646643	4239763
PW-162	15,000		649168	4238987
PW-163	15,000		648539	4238632
PW-124D	existing		647916	4238300
PW-160M/PW-160D	15,000	200	647725	4238274
PW-169	15,000	600	647449	4238105
PW-170	15,000		648323	4237040
Totals	**336,000**	**3,950 linear feet**		

The area of disturbance for new roads may be up to approximately 0.91 acre (3,950 feet x 10 feet). The total area of new disturbance for the monitoring wells and core holes will be approximately 7.71 acres (336,000 $feet^2$).

3.1.3 Access Routes

Temporary access roads will be constructed to allow the drilling rig and support trucks access to the new well sites (**Figure 1**). Existing roads, where present, will be used to minimize the need for creating new roads. The roads will have a 10-foot-wide driving surface. A maximum of approximately 3,950 feet of new temporary access roads will be constructed. The new roads will not be engineered; however, up to five culvert crossings may be required to prevent washouts of access roads. Culverts will be no larger than 36 inches.

3.1.4 Monitoring Well Drilling and Installation

The Phase 2 monitoring well installation program will consist of 27 monitoring wells with drill depths ranging from 71 to 380 feet below ground surface (bgs) with total estimated drilling footage of 4,744 feet. A summary of the anticipated specifications for each monitoring well is provided in **Attachment B**. The 27 monitoring wells will be drilled on 22 new pads, 2 expanded pads, and 2 existing pads (PW-124D and PW-136M).

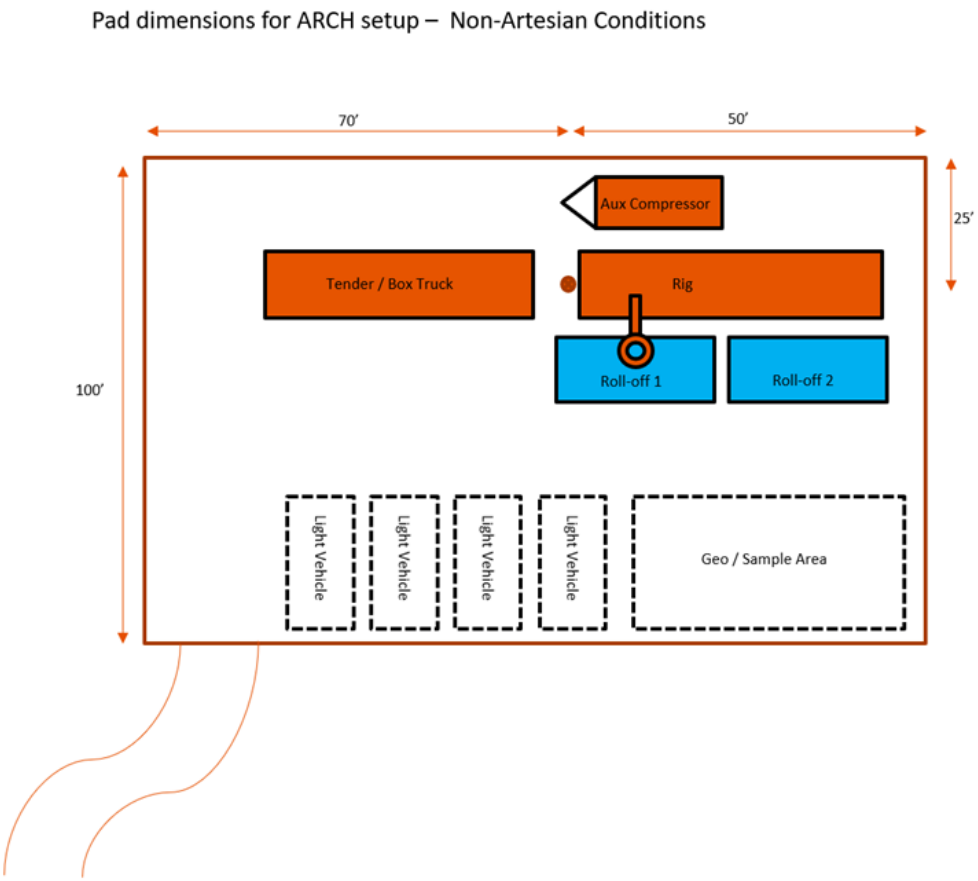
The monitoring wells will be drilled using a 50K air rotary drilling rig or equivalent type of drill rig. All drilling will be conducted by a state-approved well driller licensed in Utah. The drilling operations will include a support truck and at least one other pickup truck. Plastic will be placed beneath the drill rig and roll-off bins to protect the ground surface from incidental spills. Rock cuttings and drill fluid will be contained in a lined roll-off bin.

The wells will be designed and constructed in accordance with the Utah Division of Water Rights 2011 State of Utah Water Well Handbook and U.S Environmental Protection Agency (USEPA 1986) RCRA Ground Water Monitoring Technical Enforcement Guidance Document.

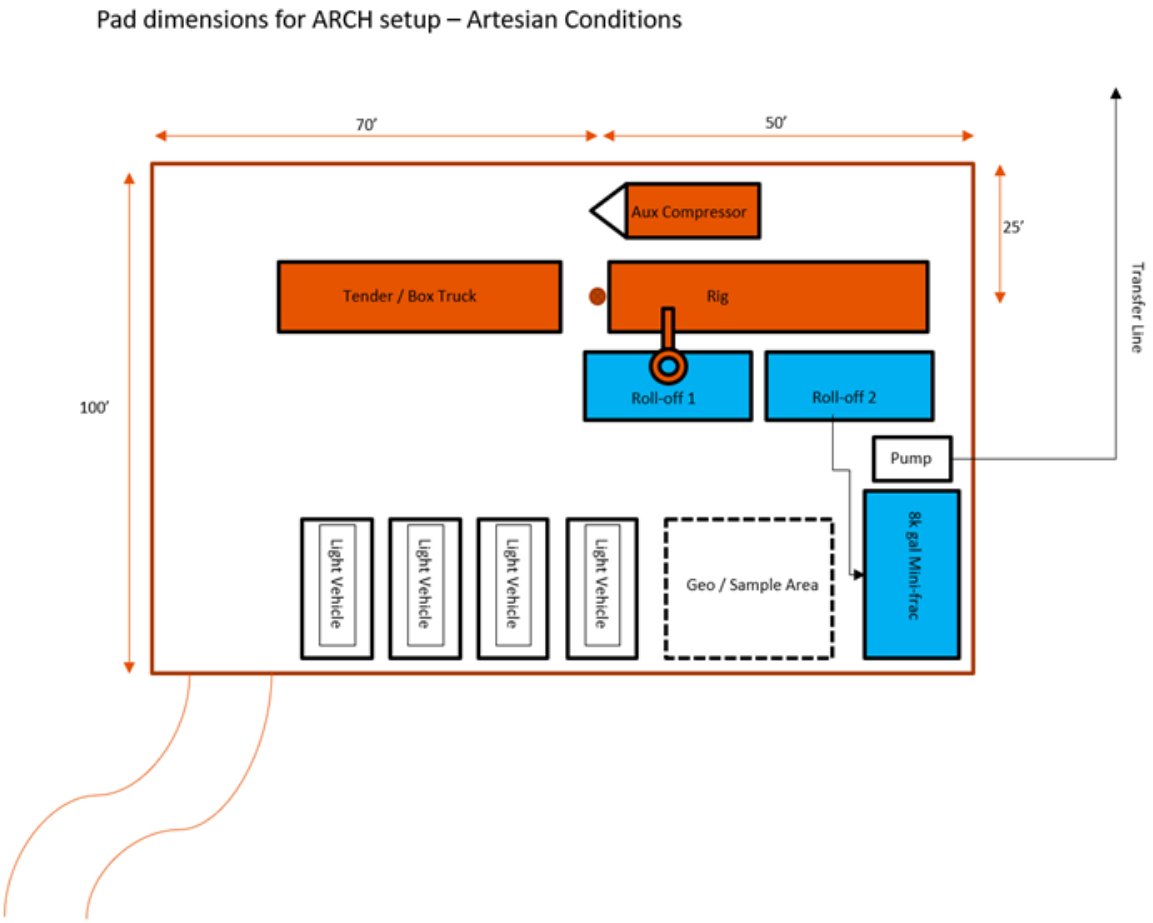
An air rotary casing hammer (ARCH) rig will be used to drill and install bedrock monitoring wells. Reviewing core and/or geophysical logs will determine well construction specifications. The ARCH rig will drill a twin hole within 5 to 15 feet of the previously drilled coring location and then be used to drill into bedrock to facilitate the construction of a 4-inch (nominal) diameter monitoring well.

If the location is known or likely to be non-artesian, the drive casing will be advanced to bedrock, and the boring will be completed "open hole" with a Down-the-Hole bit. If the location is known to be or has the potential to be artesian, the drive casing will be advanced into competent bedrock above the confining layer. Once at the desired depth, a permanent conductor casing will be grouted in place, and a flanged wellhead assembly will be installed at the surface. The remainder of the boring will be drilled open hole to the target depth. Clean (uncontaminated) water will be injected, as needed, downhole or through the cyclone to control fugitive dust. Investigation-derived waste (IDW) will be transferred to roll-off bins, frac tanks, or poly tanks for temporary on-pad storage.

All monitoring wells will be developed using a development rig, consisting of pumping, swabbing, airlifting, surging, and bailing techniques or a combination of these techniques. All produced water will be containerized and managed per the Water Management Plan (refer to Section 3.1.8). Example drill pad layouts for ARCH drilling in artesian and non-artesian conditions are included below.



All drill cuttings and fluid will be managed under the direction of RAML and the DWMRC (see Waste Disposal section below for details). The table in **Attachment B** summarizes the drilling information, and core-hole and well construction details.



3.1.5 Aquifer Testing

Aquifer tests will determine formation hydraulic properties to help identify preferential groundwater flow paths and local-scale control on groundwater flow in target zones. Pneumatic testing methods will be implemented since they do not require extraction and disposal of groundwater.

3.1.6 Rock Coring Program

The Phase 2 rock coring program will consist of 12 core locations with depths ranging from 92 to 279 feet bgs with total estimated drilling footage of 2,128 feet. A summary of the anticipated specifications for each rock coring location is provided in **Attachment B**. There will be 8 core locations on new wells co-located on pads with monitoring wells, 2 on new pads, and 2 on existing pads.

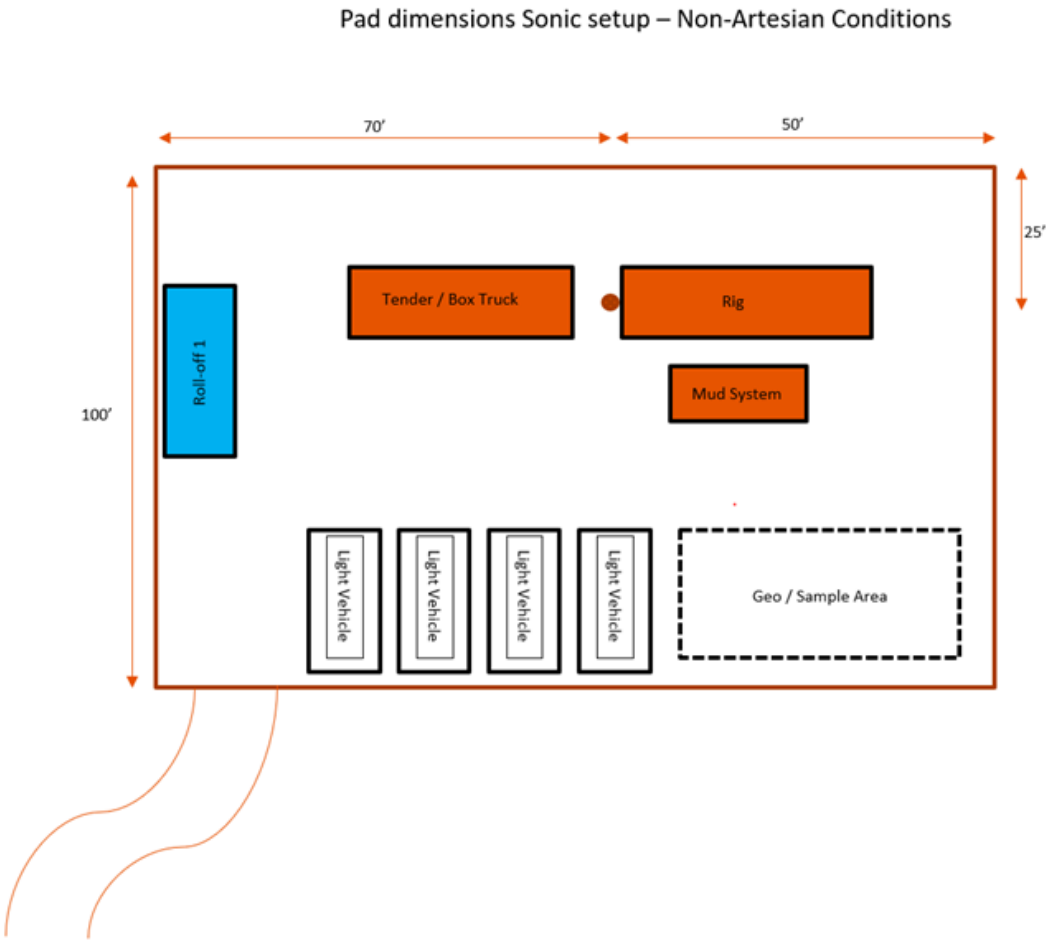
The rock cores will be collected to document the geologic, structural, and geochemical characteristics of the Burro Canyon Formation. The methods for collecting, describing, and handling rock cores described

here are based on the geologic literature, including U.S. Department of the Interior, Bureau of Reclamation (1998), and ASTM (1999, 2008).

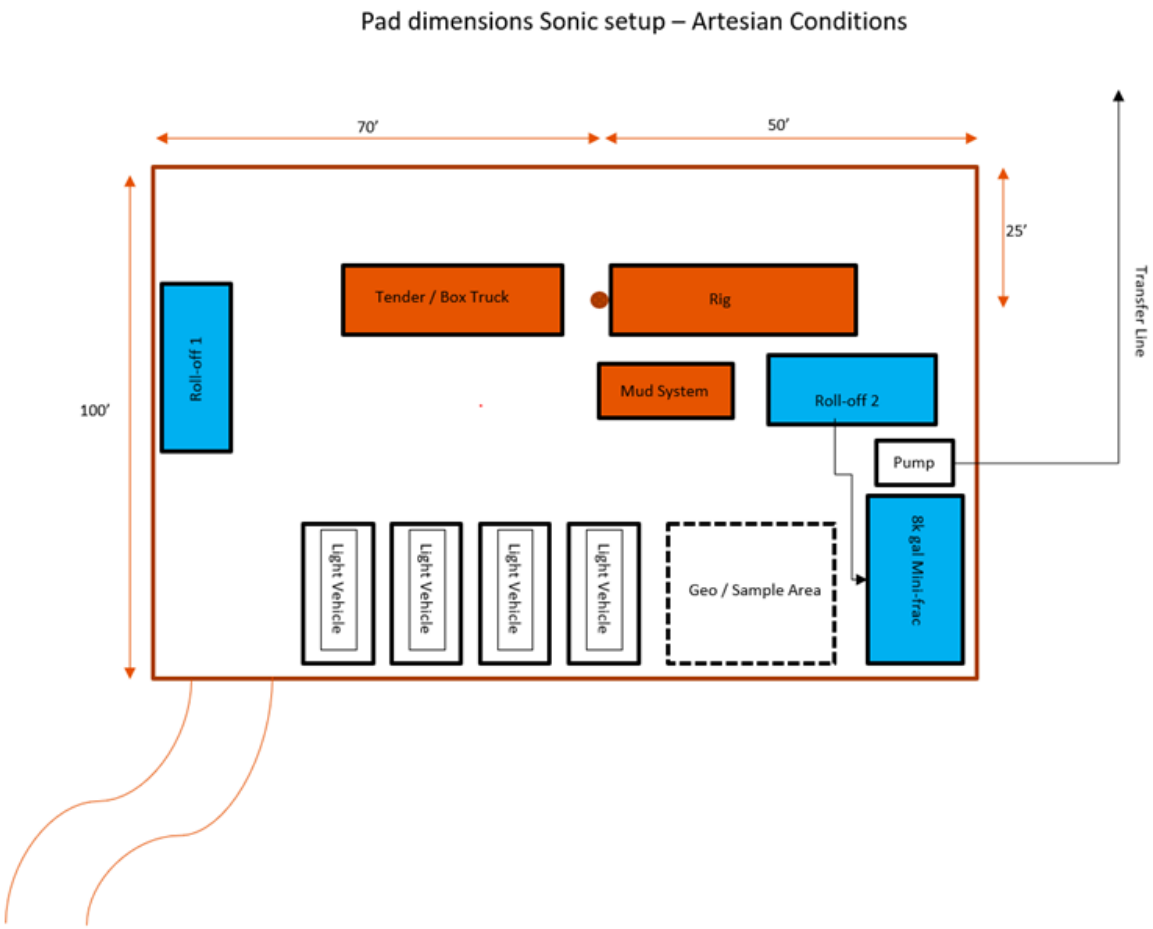
A sonic rig equipped with a diamond core head and wireline retrieval package will be used to obtain the rock core for the Phase 2 field program. Potable water will be used as drilling fluid during rock coring activities. If additives (e.g., mud) are necessary to maintain borehole stability, the viscosity of the drilling fluid will be minimized to the extent possible. The drilling fluid will be circulated through a system to separate fines and cuttings from the drilling fluid. Solids will be transferred via the mud system into a lined super-sack and stored in the Byproduct Area of the Lisbon Mill laydown yard (private property). After boring completion, drilling fluids will be pumped into a roll-off bin, frac tank, or poly tanks. Procedures for rock coring activities are as follows:

- Sonic drill 6-inch casing through alluvium (if present) and into bedrock. Bag the alluvium samples for the geologist of record. Alluvium and bedrock samples are anticipated to be 4-inch (nominal) diameter.
- Convert rig to coring head and water/mud system.
- Advance core barrel in 5- or 10-foot runs and extract core barrel via wireline until the target depth/zone has been reached.
- Core is field logged, photographed, boxed, and prepped for shipping off site for additional screening and analyses.
- In areas where flowing or non-flowing artesian conditions are present, install and grout in a permanent conductor casing with a flanged head (well control). Neat cement and sand cement grouts will be allowed to cure a minimum of 24 hours before well drilling, construction, or testing may resume.
- Complete downhole geophysical logging.
- Vibrating wire piezometers may be installed at some core locations for continuous pore water pressure monitoring.
- When all data from rock coring locations has been collected, the coring locations will be plugged and abandoned. Plugging and abandonment will consist of pressure grouting via tremie pipe from total depth to surface using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout in accordance with Section R655-4 of the UAC (DWMRC 2019). Vibrating wire piezometers, if installed, will be grouted in place.
- Containerize all IDW in super-sacks, totes, bins, frac tanks, or 55-gallon drums in accordance with the IDW Management Plan (**Attachment C**).
- IDW generated from rock coring outside the restricted area will be temporarily staged on the drill pad inside pop-up high-density polyethylene (HDPE) containments and moved to the newly constructed IDW storage yard along Coyote Wash Road.

Example drill pad layouts are included below for sonic drilling (as general examples) in artesian and non-artesian conditions:



The cores will be logged for rock type, fracturing, and mineralization. For petrography and whole rock chemistry, core samples from selected intervals near and in the fault zone will be analyzed. This data will be used to identify potential chemical impacts on groundwater from minerals within the fault zone.



3.1.7 Investigation Derived Waste Management

IDW will be contained and transported off-site to an approved facility. Some IDW may remain on-site in secure bins on private land until a determination is made about the possibility of adding the material to the existing tailings piles. The rock cuttings and drilling fluids produced during drilling operations will be contained in a lined roll-off bin. All cuttings and fluids will be managed and disposed of at an authorized facility following DWMRC requirements and other applicable regulations. Plastic will be placed beneath the drill rig and roll-off bins to protect the ground surface from incidental spills.

Trihydro has prepared an IDW Management Plan (**Attachment C**) specific to the CAAWP Field Execution drilling program, which details the means, methods, and strategy for on-site IDW management. All drill cuttings and fluids will be captured and contained on the drill pads in 20-CY roll-off bins, lined supersacks, frac tanks, or poly tanks. The bins will be equipped with an interior plastic liner, sealed, and placed inside an HDPE liner with pop-up sidewalls. The poly tanks and/or frac tanks will also be placed inside HDPE pop-up containments to catch incidental spills or leaks.

Drill cuttings and fluids from the ARCH drill rig will be discharged into roll-off bins during drilling operations. Excess fluids (water) will be decanted from the bins via a vacuum truck or transfer pump for storage in the poly or frac tanks on the drill pad. The solids (cuttings) will remain in the bins. If the liquid storage capacity of an active drill pad is reached, drilling operations will be suspended until the tanks are dewatered or additional tanks are mobilized to the pad. Full-size frac tanks will be staged at the laydown yard and designated storage areas on private lands.

Roll-off bins, frac tanks, and poly tanks will remain on the various drill pads until sufficiently dewatered for relocation to the laydown yard or storage area(s). Roll-off bins should not be moved until dewatered to minimize the risk of the contents sloshing and spilling. Poly tanks and frac tanks must be empty before moving.

IDW Storage Yard

Previously, IDW containers were transported from the drill sites to the laydown yard along West Coyote Wash Road (private land). However, due to the amount of equipment, supplies, and volume of IDW expected to be produced, the size of the laydown yard is likely insufficient. Therefore, a new IDW storage yard, also on private land, will be constructed to ensure adequate storage capacity and avoid overcrowding of the laydown yard.

The long-term storage yard will comprise an area of approximately 2 to 2.5-acres. The area will be fenced in per regulations and divided into sections for byproduct material and Resource Conservation and Recovery Act (RCRA) Hazardous Waste material as outlined in the IDW Management Plan. RAML does not anticipate generating RCRA Hazardous Waste but must manage certain wastes as if they were hazardous until demonstrating otherwise. The enclosure will have proper signage denoting the waste area as required by regulations.

3.1.8 Water Management Strategy

Water for drilling and road dust suppression will be supplied by a local water contractor from a clean water source and transported to the Site by a water hauling service. The water will be stored in a "clean" frac tank or similar, and located on private property. Clean water use will be monitored, and the Site manager will be responsible for maintaining an adequate supply.

The water management strategy for this program is driven primarily by three components: (1) the volume of water produced, (2) the speed at which it is produced, and (3) the cost of off-site disposal. When ARCH drilling in artesian and high-recharge conditions, the water's volume and speed produced is substantial. A vacuum truck can be used to shuttle water off the pad to a storage area; however, this will likely result in rig delays as the production rate will likely exceed the haulage rate. Having a sufficient on-site or adjacent storage capacity is the ideal way to allow drilling to continue uninterrupted.

Poly or frac tanks with 5,000 to 10,000-gallon capacities will be staged on the drill pad(s) to contain the produced water. Roll-off bins are not ideal for storing large volumes of liquids as their volume-to-space ratio is low, and adding additional roll-off bins to the pad results in congested work areas. At least one

roll-off bin will be needed at each location to store the drill cuttings, and the water will be decanted off and pumped into the poly or frac tanks. This combination of tanks and roll-off bins should provide sufficient on-pad capacity to allow the wells to be drilled and completed without significant delays. Each well pad will start with approximately 20,000 gallons of IDW liquid storage capacity.

Installation of a 4-inch DR11 (or similar) polyline may be installed from the artesian drilling locations to one or more "tank farms," which will be constructed at strategic locations around the Site. The tank farms will have a leveled pad for 2 to 8 20,000-gallon frac tanks. The tanks will be daisy-chained together as needed for storage capacity in a manner that precludes discharge from multiple tanks should one tank fail (e.g., isolation valves or interlinking at the tip of each tank). Water produced from drilling operations will be pumped from the frac tanks or poly tank on the drill pad(s) to the tank farm via an axle-mounted diesel pump via the polyline. The pipeline will be inspected for damage before each pumping event, and each event will be monitored by Site personnel via radio communications at each end of the pipeline (as a condition of the Stormwater Pollution Prevention Plan).

Full sized frac-tanks may be staged at the laydown yard or Rattle Snake Ranch storage pad. These tanks will be used to consolidate the water held in the on-pad storage tanks and bins so they can be moved between drill pads or relocated to the laydown yard.

The produced water will be temporarily stored in the frac tanks, then eliminated by evaporation or discharge to the environment if found to meet the requisite water quality requirements.

3.1.9 Traffic Management Plan

The Site work will involve vehicular traffic on narrow roads. Traffic management and call-in procedures will be implemented on a location-by-location basis. Traffic management plans will document one-way haulage patterns, radio call-in procedures, and work-zone restrictions. As appropriate, signage will be placed along the public roads to advise commuters that operations are underway. Spotters with high-visibility clothing, radios, and pilot vehicles may be used during equipment moves.

3.1.10 Quality Assurance Plans

Qualified and trained personnel will perform all drilling, testing, and sampling procedures. All drilling will be conducted by a well driller licensed in Utah. All wells will be designed and constructed per the Utah Division of Water Rights 2011 *State of Utah Water Well Handbook* and U.S Environmental Protection Agency (USEPA 1986) *RCRA Ground Water Monitoring Technical Enforcement Guidance Document.* RAML will provide written notice at least 14 days before commencing drilling to allow DWMRC representatives to observe drilling, well installation, testing, and/or sampling activities.

All hydrogeological and geochemical evaluations will be conducted using approved methods. The methods for collection, description, and handling of rock core described here are based on the geologic literature, including U.S. Department of the Interior, Bureau of Reclamation (1998), *Engineering Geology Field Manual*, Second Edition, Volume 1 (1998), and ASTM (1999, 2008). Groundwater sampling will follow the Sampling and Analysis Plan (**Attachment D**). The groundwater low-flow sampling will be conducted

in accordance with the USEPA low-flow guidelines and ASTM guidelines. All equipment used for testing and sampling will follow the supplier's operations and calibration specifications and be documented in the quality assurance records.

Quality assurance/quality control (QA/QC) procedures include data quality objectives for data measurement, sampling procedures, sample and document custody procedures, laboratory analytical methods, internal quality control checks, data validation, reporting procedures, and corrective action procedures. QA/QC procedures will be conducted in the field and laboratory. Field procedures will include field documentation, blind code labeling, and collection of quality control samples, including sample duplicates, sampling equipment blanks, and transport blanks. Laboratory QA/QC procedures will include completing laboratory performance criteria, including sample holding times, matrix spike/matrix duplicate recoveries, and laboratory method blank results.

RAML Technical Consultants (contractors) will be on-site throughout the field program and will be responsible for overseeing the technical aspects of drilling, data collection, waste management, and sampling. Technical Consultant will be responsible for ensuring the work is executed to enable the completion of the subsequent technical study work.

4. Part 2b – Description of Reclamation and Schedule of Operations

Reclamation Plan Elements:	X Drill hole plugging procedures NA Closure of mine openings and reclamation X Regrading and reshaping plans NA Isolation & control of acid-forming/toxic materials X Topsoil salvage, handling, and replacement X Vegetation re-establishment/weed control NA Wildlife habitat/riparian area rehabilitation NA Removal/stabilization of buildings and support facilities NA Post-closure management NA Pit backfilling feasibility where pits are to be left open

NA = Not applicable.

4.1 Details of Reclamation Plan

The reclamation plan for the Site will follow the standards set forth in 43 CFR 3809.420. Reclamation will begin at the earliest feasible time after activities have ceased.

4.1.1 Drill Hole Plugging Procedures

The core holes not converted to monitoring wells will be plugged and abandoned after field testing or installation (grouting in place) of vibrating wire piezometers. Groundwater monitoring will be required for an extended period of time. When DWMRC approves the cessation of groundwater monitoring, monitoring wells will be plugged and abandoned according to the requirements set forth in the *State of Utah Water Well Handbook*, which are based on Utah Administrative Code R655-4 (Utah Division of Water Rights, 2011).

4.1.2 Regrading and Reshaping Plans

The area of disturbance for the well pads in this field program is expected to be approximately 7.71 acres (**Attachment A, Figure 1**). Each monitoring well and core hole will have a well pad during drilling and testing activities that will be approximately 100 feet by 120-150 feet, or 12,000 to 15,000 square feet each (**Table 1**). The well pads will be removed of vegetation and graded. After drilling is completed, a portion of the well pad will be reclaimed. The well pad will be ripped, covered with native soil, and seeded. The well pad directly around the well will be left to ensure safe access to the well during the ongoing groundwater monitoring events.

Temporary access roads to the new monitoring wells and core holes will be constructed to allow the drilling rig and support trucks access to the well sites (**Attachment A, Figure 1**). Existing roads, where

present, will be used to minimize the need for creating new roads. The access roads may require periodic grading to maintain access for ongoing groundwater monitoring activities. The roads will have a 10-foot-wide driving surface to allow for safe access by drilling equipment. The new temporary roads will be constructed following natural contours and will not be engineered. A maximum of approximately 3,950-feet of new roads will be constructed. The area of disturbance for new roads would be approximately 0.90 acre.

The total area of new disturbance for this field program, well installation, and associated access will be no more than approximately 8.61 acres.

4.1.3 Topsoil Salvage, Handling, and Replacement

The BLM Moab Field Office will be notified at least 48 hours before any reclamation activities begin. Cleared vegetation debris and topsoil from the road and well pad work will be stockpiled for use during reclamation.

4.1.4 Vegetation Re-Establishment

After the 2024 site characterization is complete, a portion of the well pads will be reclaimed (refer to Section 4.2), and a portion will remain cleared of vegetation and obstacles to allow for safe access during groundwater monitoring events. Reclamation will entail ripping compacted soils and applying a native seed mix approved by the BLM Moab Field Office. When ongoing groundwater sampling activities are complete, all remaining well pads and roads will be ripped and seeded with a seed mix approved by the BLM Moab Field Office.

4.2 Schedule of Operations

The anticipated schedule of activities for the hydrogeologic investigation at the Site is as follows:

- Submit Plan of Operations Modification – August 2023
- Drilling, construction, and testing activities – May - November 2024
- Seeding/mulching well pads and roads not needed for the ongoing groundwater monitoring events – Fall 2024 or Spring 2025, depending on soil moisture conditions
- Sampling monitoring wells – Ongoing

5. Part 3 – Monitoring Plan

The following section provides a plan to monitor the effects of the operation. According to the BLM Handbook, the monitoring plan should be designed to do the following: (1) demonstrate compliance with the Plan of Operations and other environmental regulations, (2) provide early detection of potential problems, and (3) supply information that will assist with any needed corrective actions.

Resource Conditions to Monitor:	X Surface or groundwater quality/quantity NA Air quality X Vegetation or reclamation conditions NA Process facility containment performance NA Stability conditions NA Wildlife Mortality NA Noise or Light Levels NA Other: (include state requirements
Monitoring Plan Elements:	X Type and location of monitoring devices X Sampling parameters and frequency X Analytical methods X Reporting procedures X Adverse monitoring result thresholds and procedures NA Other:

NA = Not applicable.

5.1 Monitoring Plan

Groundwater sampling will continue according to the procedures in the Sampling and Analysis Plan (SAP) (RAML 2015) (**Attachment D)**. The new monitoring wells will be added to the list of existing monitoring wells and will be sampled using the techniques from the SAP. Arcadis will provide groundwater sampling services and will field-supervise all comprehensive sampling events. Analytical services will continue to be provided by a State-licensed analytical laboratory.

Arcadis will manage field parameters, water level, and geochemical data in the existing RAML Lisbon database. Field parameters and water levels supplied by Arcadis will be checked for accuracy and entered into the database. Electronic data deliverables (EDDs) provided by the analytical laboratory will similarly be checked for accuracy against provided lab reports and imported into the database in a format consistent with the current database structure.

Data compiled in the database will be used to generate the annual groundwater monitoring report for the Site. The annual report will contain (per the DWMRC Radioactive Materials License #UT1900481, Amendment 7, Condition 29F) sampling methodology; field parameter measurements; laboratory information; a data evaluation; data tables; concentration vs. time plots for the compliance wells;

groundwater elevation contour maps; contaminant concentration contour maps for arsenic, molybdenum, selenium, and uranium; and a comparison of measured uranium concentrations to predicted concentrations in compliance wells. Information obtained from the field program will be used to update the CSM and the Site groundwater flow and transport model. The CSM and numerical groundwater model will be used to evaluate compliance with License conditions and evaluate potential corrective action alternatives to address mill-related constituents in groundwater.

The sampling parameters and frequency, analytical methods, adverse monitoring result thresholds and procedures, and groundwater sampling reporting procedures are all described in the SAP (**Attachment D**).

5.1.1 Reporting Procedures

Documentation of the 2023 Phase 1 (private lands) and the 2024 Phase 2 field activities (BLM) will be provided in a CAAWP Field Investigation Report. The Field Investigation Report will include documentation of well completion, as-built drawing, and completion reports for the new wells and will be submitted to the DWMRC. The as-built reports will be developed with the direct supervision of a Professional Geologist licensed by the State of Utah. The completion report will include the following information:

- Detailed report of the field activities, including:
  - Drilling
  - Collection of core
  - Well installation
  - Development
  - Testing
  - Sampling
- Geologic logs with detailed lithology
- Physical properties of subsurface material
- Geophysical logs
- As-built drawings of each well

5.1.2 Vegetation or Reclamation Conditions

The reclamation conditions will be monitored following the requirements of 43 CFR 3809.420 to determine whether successful measures have been taken to plug and abandon drill holes, reshape the landscape, mitigate erosion, and establish native vegetation. After reclamation and revegetation activities have been completed, the BLM Moab Field Office will be notified to inspect the area.

6. Part 4 – Interim Management Plan

All Plans of Operations must include an Interim Management Plan describing how the project area will be managed during periods of temporary closure (including seasonal closure).

Interim Management Plan Elements:	NA Schedule of anticipated periods of closure NA Provisions to notify the BLM of unplanned or extended closures NA Measures to stabilize excavations and workings NA Measures to isolate or control toxic materials NA Provisions to store or remove equipment, supplies, or structures NA Measures to maintain the project area in a safe and clean condition NA Plans for monitoring site conditions during non-operation NA Other:

NA = Not applicable.

6.1 Interim Management Plan

The RAML Lisbon facility is currently closed and in the long-term monitoring phase. An Interim Management Plan is not applicable for this Site.

7. Part 5 – Reclamation Cost Estimate

A reclamation cost estimate (RCE) is required to process the Plan of Operations (43 CFR 3809.401 (d)). The RCE may be submitted with the Plan of Operations or later at a time to be determined in consultation with the BLM. The following are general RCE requirements. RAML understands that BLM staff are available to assist in developing the cost estimate.

Reclamation Cost Estimate Elements:	
	X The RCE must cover the Reclamation Plan at any point in the project life
	X Calculate the RCE based on the BLM's cost to contract for the reclamation
	X Include all equipment use, supplies, labor, and power in direct costs
	X Include fluid management of any mill process solutions in direct costs
	X Allow for a contingency cost (10% of direct costs)
	X Allow for contractor profit (10% of direct costs)
	X Include contractor liability insurance (1.5% of total labor cost)
	NA For direct costs over $100,000 add 3% for payment & performance bonds
	X Add 10% of direct costs for BLM contract administration & indirect costs

NA = Not applicable.

7.1 Reclamation Cost Estimate

The reclamation cost estimate is for the proposed Site investigation, which includes installing and testing up to 24 groundwater monitoring wells, drilling 12 coreholes, and the associated access roads and drill pads. The reclamation cost estimate was developed using the BLM bond calculator. The reclamation cost estimate total for this Site investigation is $255,334.00 (**Attachment E**).

The proposed Modification of the Plan of Operations is submitted this date by:

Kent Applegate, BHP RAML	August 23, 2023
(Signature of operator or agent)	Date
 Ecosphere Environmental Services (Agent)	August 23, 2023
(Signature of co-operator or agent)	Date

8. Abbreviations and Acronyms

bgs	below ground surface
BLM	Bureau of Land Management
CAAWP	Corrective Action Assessment Work Plan
CFR	Code of Federal Regulations
CSM	conceptual site model
DWMRC	Utah Division of Waste Management and Radiation Control
Ecosphere	Ecosphere Environmental Services, Inc.
IDW	investigation-derived waste
MPO	Modification of the Plan of Operations
QA/QC	quality assurance and quality control
RAML	Rio Algom Mining LLC
SAP	Sampling and Analysis Plan
Site	Lisbon Facility
UAC	Utah Administrative Code

9. References

American Society for Testing and Materials (ASTM) International, 1999. *Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation*. Designation: D 2113- 99.

ASTM. 2008. *Standard Practices for Preserving and Transporting Rock Core Samples,* Designation D 5079-08.

INTERA. 2021a. *Hydrogeological Supplemental Site Assessment, Phase 4, Lisbon Facility, Rio Algom Mining LLC, Radioactive Material License Number UT 190048, San Juan County, Utah.* October 29.

INTERA. 2021b. *Natural Recharge and Water Balance Modeling Report: Cover Performance Assessment of Upper and Lower Tailings Impoundments, Rio Algom Mining LLC, Lisbon Facility, San Juan County, Utah, Radioactive Material License Number UT 190048.* October 29.

INTERA. 2021c. *Background Groundwater Quality Report: Lisbon Facility, Radioactive Material License Number UT 190048, San Juan County, Utah.* October 29.

INTERA. 2022. *Corrective Action Assessment Work Plan, Rio Algom Mining LLC Lisbon Facility, San Juan County, Utah Radioactive Materials License Number UT 190048.* November 16.

Rio Algom Mining LLC (RAML), 2015. *Site-Wide Groundwater Sampling and Analysis Plan, Rio Algom Mining LLC, Lisbon Facility*.

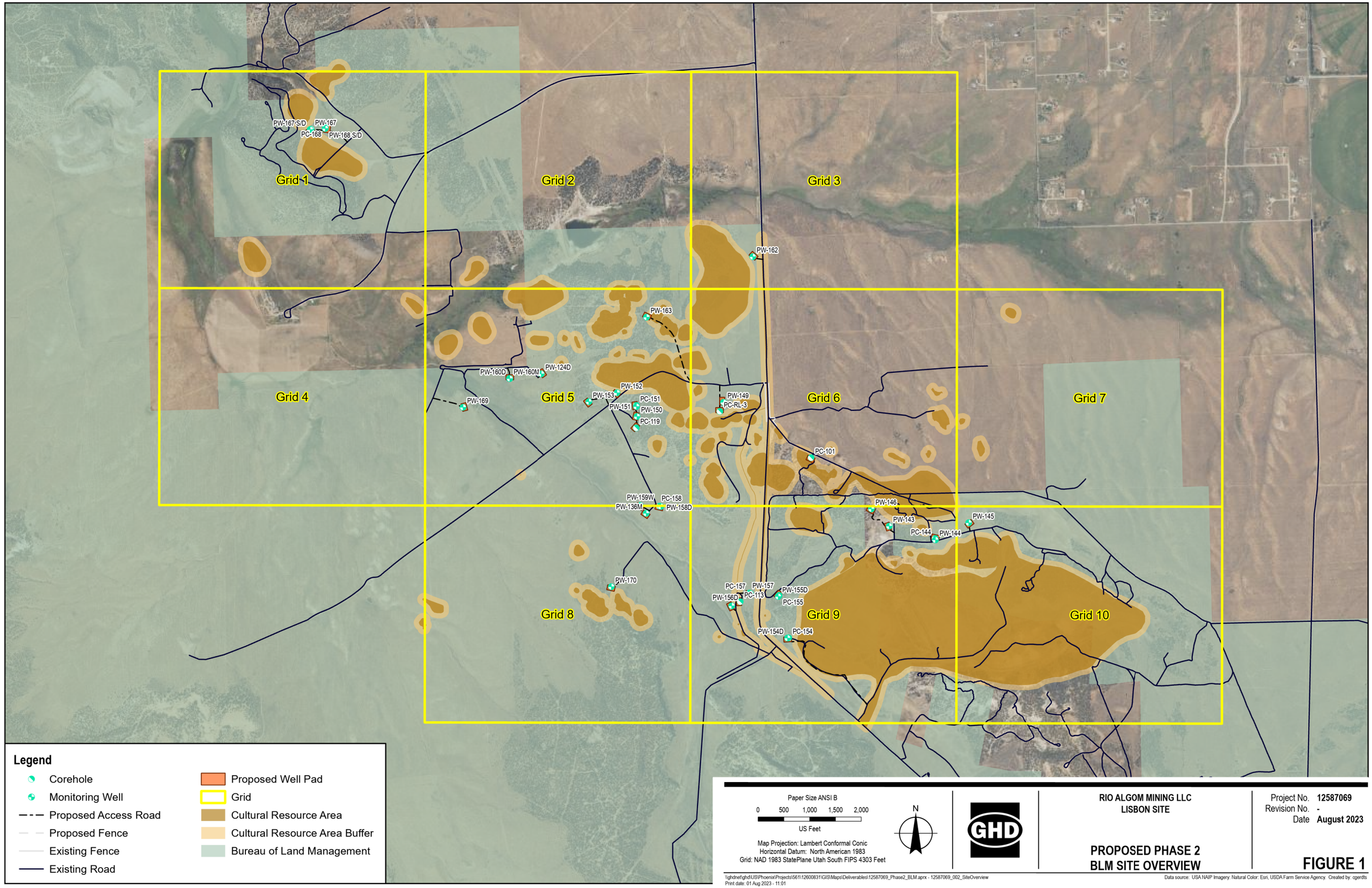
United States Environmental Protection Agency (USEPA), 1986. *Ground-Water Monitoring Technical Enforcement Guidance Document*, September 1986.

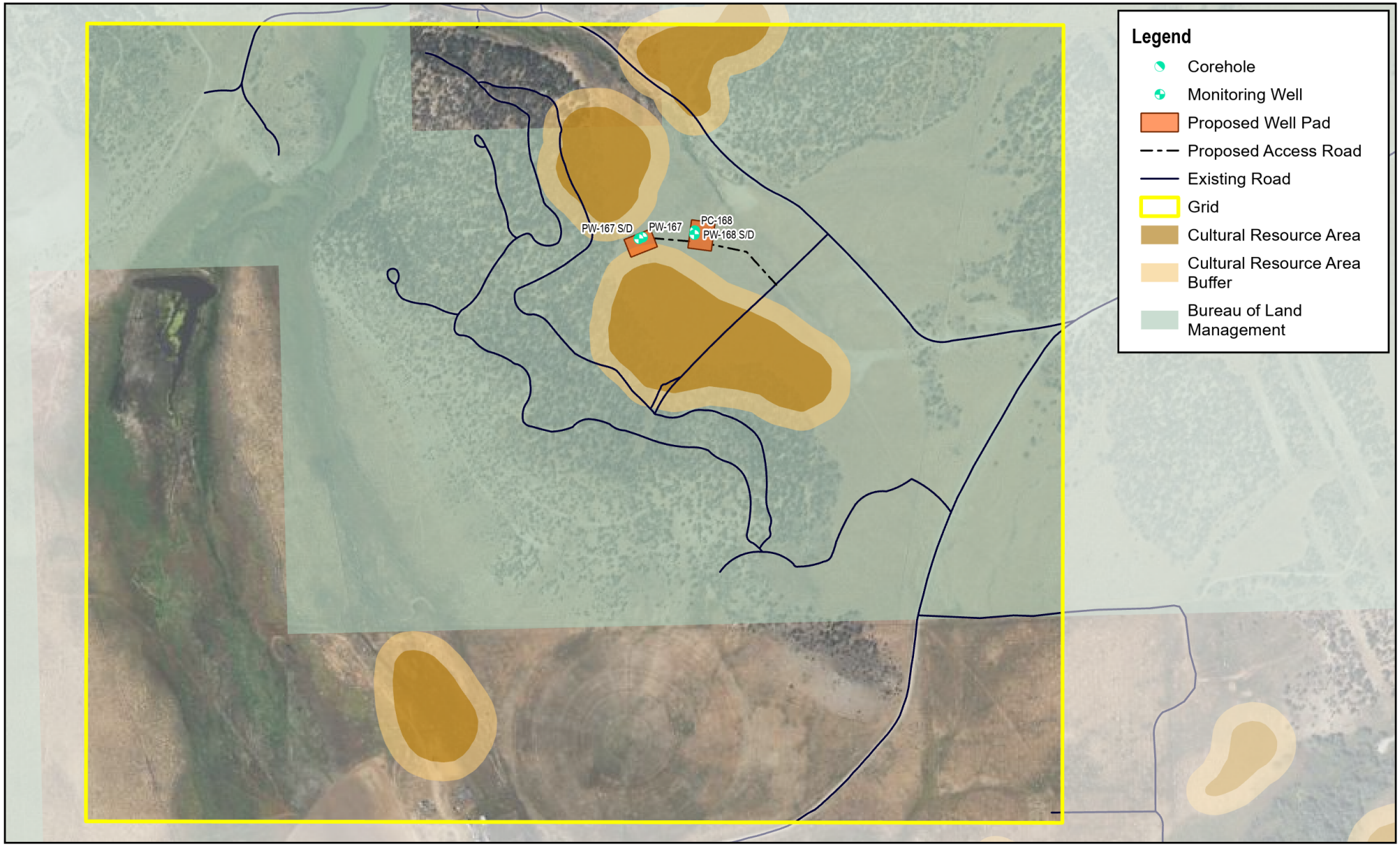
United States Department of Interior, Bureau of Reclamation, 1998. *Engineering Geology Field Manual*, Second Edition, Volume 1.

Utah Division of Waste Management and Radiation Control (DWMRC), 2019. Summary of Review Findings and Request for Additional Information Regarding the Rio Algom Mining LLC August 30, 2018, Hydrogeological Supplemental Site Assessment and Tailing Impoundments Water Balance Modeling Report prepared by Ty L. Howard, DWMRC, April 11, 2019.

Utah Division of Water Rights, 2011. *State of Utah Water Well Handbook.* Adopted April 2011.

Attachment A – Figures


PW-167 S/D
PW-167
PC-168
PW-168 S/D
Grid 1
Grid 2
Grid 3
PW-162
PW-163
PW-160D
PW-160M
PW-124D
Grid 4
PW-169
Grid 5
PW-152
PW-153
PW-151
PC-151
PW-150
PC-119
PW-149
PC-RL-3
Grid 6
Grid 7
PC-101
PW-159W
PW-136M
PC-158
PW-158D
PW-146
PW-143
PW-145
PC-144
PW-144
PW-170
PC-157
PW-157
PW-155D
PW-156D
PC-113
PC-155
Grid 8
Grid 9
Grid 10
PW-154D
PC-154
Legend
Corehole
Monitoring Well
Proposed Access Road
Proposed Fence
Existing Fence
Existing Road
Proposed Well Pad
Grid
Cultural Resource Area
Cultural Resource Area Buffer
Bureau of Land Management
Paper Size ANSI B
0 500 1,000 1,500 2,000
US Feet
Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet
N
GHD
RIO ALGOM MINING LLC
LISBON SITE
PROPOSED PHASE 2
BLM SITE OVERVIEW
Project No. 12587069
Revision No. -
Date August 2023
FIGURE 1
\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_002_SiteOverview
Print date: 01 Aug 2023 - 11:01
Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts



Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

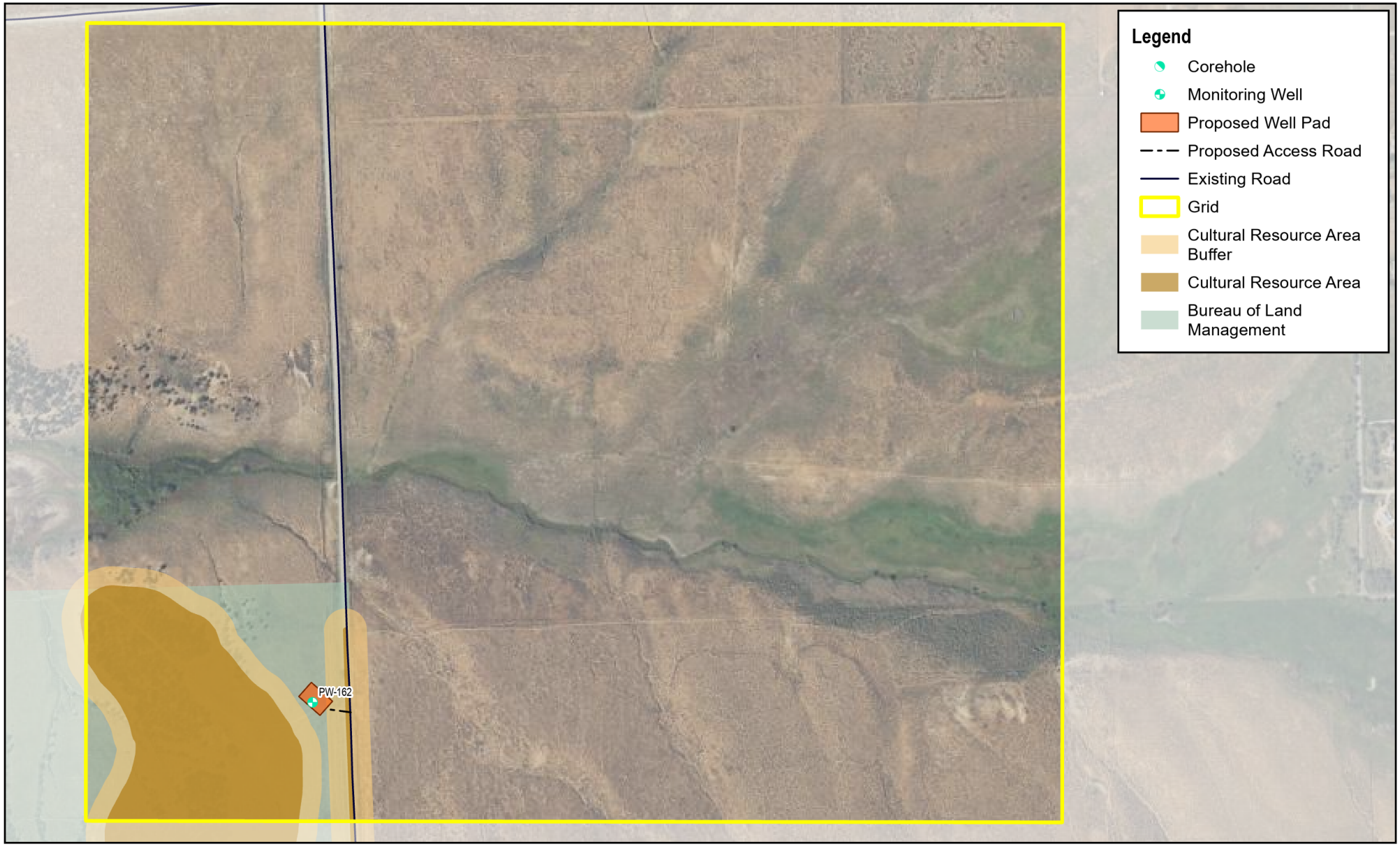
GRID 1
PROPOSED PHASE 2 BLM
BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 2

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_003_PH2_Grid1
Print date: 01 Aug 2023 - 10:21

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts



Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

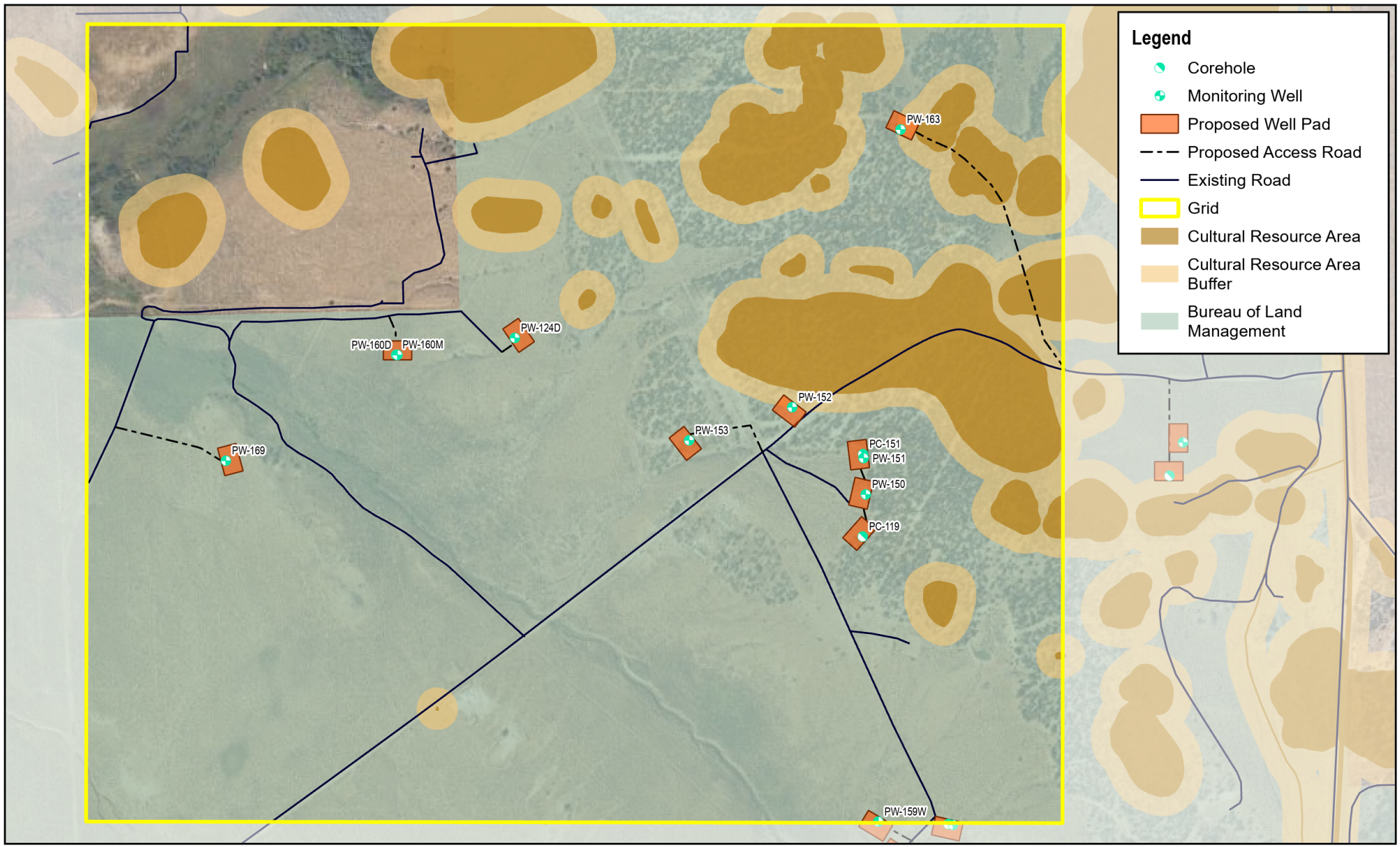
GRID 3
PROPOSED PHASE 2 BLM
BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **July 2023**

FIGURE 3

N:\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_005_PH2_Grid3
Print date: 31 Jul 2023 - 17:04

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts



Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

GRID 5
PROPOSED PHASE 2 BLM BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 4

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_007_PH2_Grid5
Print date: 01 Aug 2023 - 11:02

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts

Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

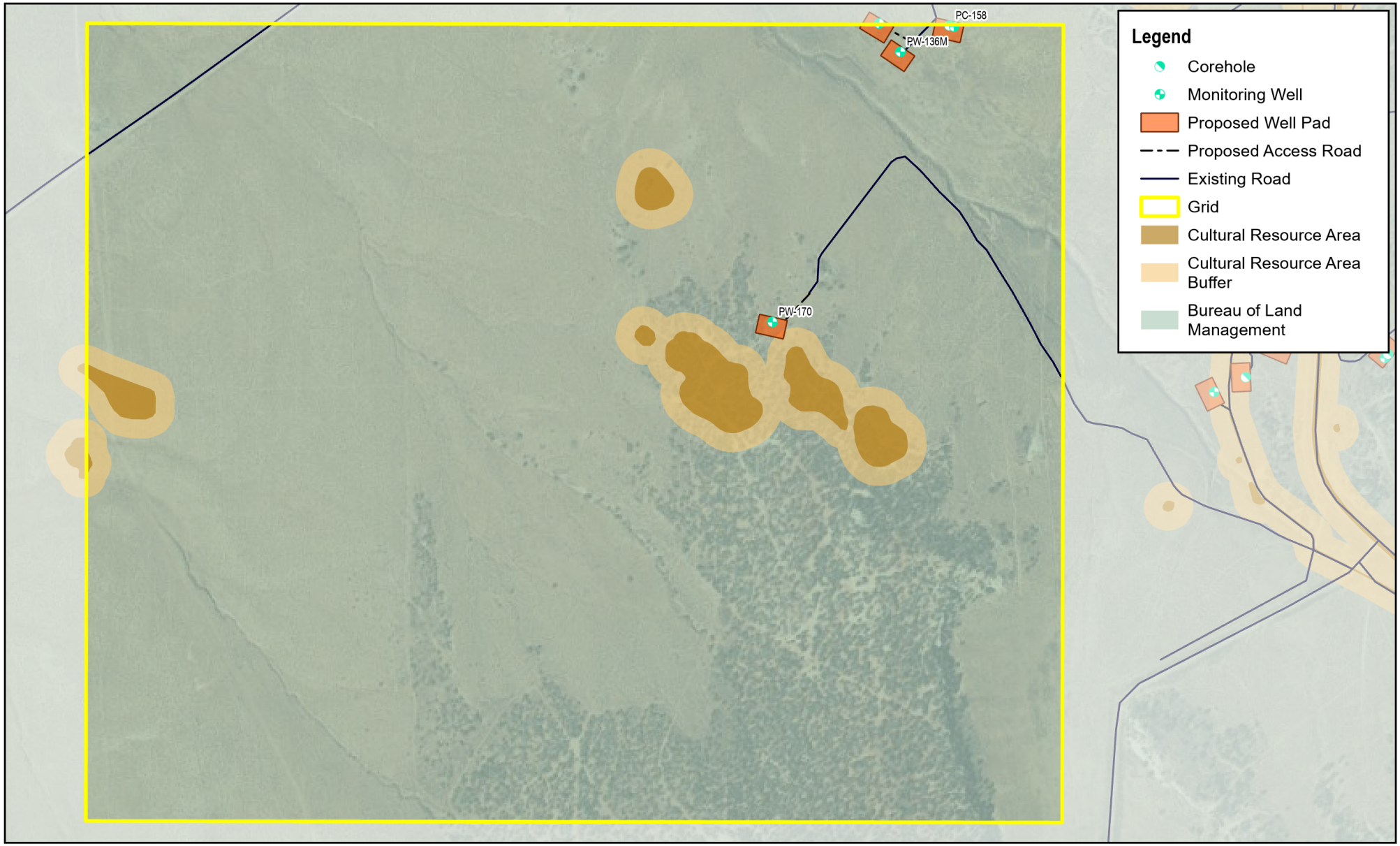
GRID 6
PROPOSED PHASE 2 BLM BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 5

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_008_PH2_Grid6
Print date: 01 Aug 2023 - 10:18

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts



Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

GRID 8
PROPOSED PHASE 2 BLM
BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 6

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_010_PH2_Grid8
Print date: 01 Aug 2023 - 10:27

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts

Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

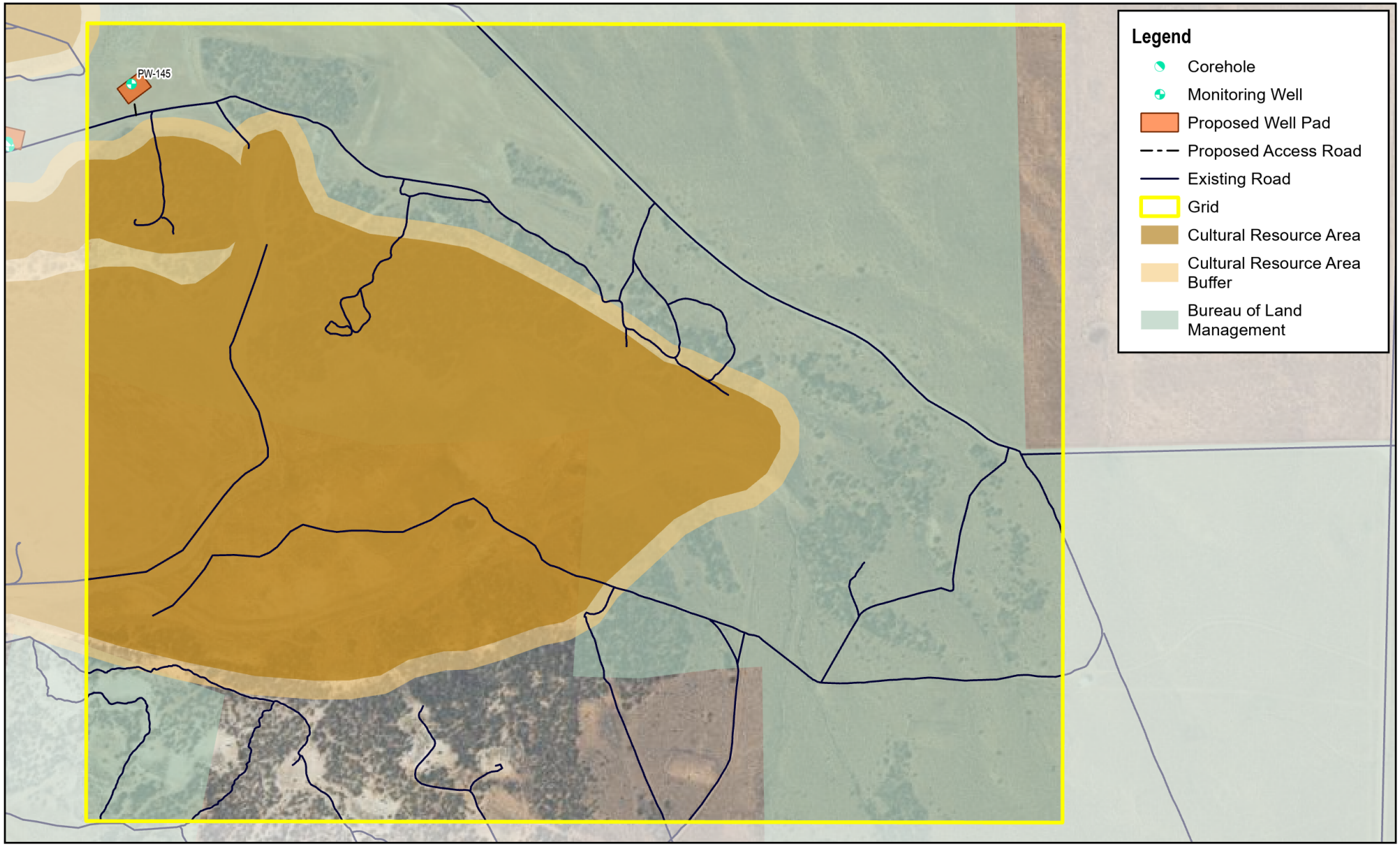
GRID 9
PROPOSED PHASE 2 BLM BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 7

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_011_PH2_Grid9
Print date: 01 Aug 2023 - 10:29

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts



Paper Size ANSI A

0 210 420 630

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Utah South FIPS 4303 Feet

N

GHD

RIO ALGOM MINING LLC
LISBON SITE

GRID 10
PROPOSED PHASE 2 BLM
BORROW AREA BORING LOCATIONS

Project No. **12587069**
Revision No. **-**
Date **August 2023**

FIGURE 8

\\ghdnet\ghd\US\Phoenix\Projects\561\12600831\GIS\Maps\Deliverables\12587069_Phase2_BLM.aprx - 12587069_012_PH2_Grid10
Print date: 01 Aug 2023 - 11:04

Data source: USA NAIP Imagery: Natural Color: Esri, USDA Farm Service Agency. Created by: cgerdts

Rio Algom Mining LLC

P.O. Box 218, Grants, NM USA 87020 - Tel: 520.719.4167

Attachment B – Monitoring Well Specifications

CORE(HQ2.5)	Est. Total Depth (ft)	Assume Artesian?	Drilling Method	Alluvium Thickness (ft) (estimated)	Estimated Depth to Bedrock(ft)	Estimated Depth to Water (ft)	Sonic Casing Diameter (in)	Blank Interval (ft)			20-Slot Screen Interval (ft)			Sand Pack			Bentonite Seal			Cement Bentonite Grout			Bentonite Pellet Backfill			Anticipated Liquid IDW (gallons)
Corehole ID								k Interval	To	Length	From	To	Length	From	To	Length	From	To	Length	From	To	Length	From	To	Length	
North Near-Field Area (5)																										
PC-144	247	N	Sonic	8	8	195	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-101	168	N		0	0	145	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-RL3	198	N		3	3	161	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-119	92	N		9	9	80	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-151	102	N		0	0	89	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
South Near-Field Area (5)																										
PC-154	153	N	Sonic	2	2	73	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-155	152	N		1	1	102	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-113	153	N		13	13	69	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-157	136	N		2	2	75	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
PC-158	169	N		70	70	53	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
Northwest Area (2)																										
PC-167	279	Yes	Sonic	0	0	21	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20,000
PC-168	279			0	0	22	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20,000
TOTALS (12 coreholes)	**2,128**																									

4" PVC - Monitoring We	Est. Total Depth (ft)	Assume Artesian?	Drilling Method	Alluvium Thickness (ft) (estimated)	Estimated Depth to Bedrock(ft)	Estimated Depth to Water (ft)	Nominal Borehole Diameter (in)	Blank Interval (ft)			20-Slot Screen Interval (ft)			Sand Pack			Bentonite Seal			Cement Bentonite Grout			Bentonite Pellet Backfill			Anticipated Liquid IDW (gallons)
Well Location ID								From	To	Length	From	To	Length	From	To	Length	From	To	Length	From	To	Length	From	To	Length	
North Near-Field Area (9)																										
PW-143	165	No	Rotary	0	0	133	10	0	145	145	145	150	5	143	151	8	138	143	5	0	138	138	151	165	14	500
PW-144	246			10	10	194	10	0	211	211	211	231	20	209	232	23	204	209	5	0	204	204	232	246	14	500
PW-145	267			4	4	195	10	0	232	232	232	252	20	230	253	23	225	230	5	0	225	225	253	267	14	500
PW-146	164			6	6	135	10	0	129	129	129	149	20	127	150	23	122	127	5	0	122	122	150	164	14	500
PW-149	195			3	3	160	10	0	170	170	170	180	10	168	181	13	163	168	5	0	163	163	181	195	14	500
PW-150	117			4	4	85	10	0	92	92	92	102	10	90	103	13	85	90	5	0	85	85	103	117	14	500
PW-151	102			0	0	79	10	0	67	67	67	87	20	65	88	23	60	65	5	0	60	60	88	102	14	500
PW-152	124			6	6	77	10	0	89	89	89	109	20	87	110	23	82	87	5	0	82	82	110	124	14	500
PW-153	157			0	0	52	10	0	122	122	122	142	20	120	143	23	115	120	5	0	115	115	143	157	14	500
South Near-Field Area (7)																										
PW-154D	153	No	Rotary	2	2	75	10	0	118	118	118	138	20	116	139	23	111	116	5	0	111	111	139	153	14	500
PW-155D	147			10	10	106	10	0	112	112	112	132	20	110	133	23	105	110	5	0	105	105	133	147	14	500
PW-156D	166			19	19	63	10	0	131	131	131	151	20	129	152	23	124	129	5	0	124	124	152	166	14	500
PW-157D	134			1	1	74	10	0	99	99	99	119	20	97	120	23	92	97	5	0	92	92	120	134	14	500
PW-136M	116			24	24	38	10	0	95	95	95	115	20	93	116	23	88	93	5	0	88	88	116	116	0	500
PW-158D	161			76	76	52	10	0	126	126	126	146	20	124	147	23	119	124	5	0	119	119	147	161	14	500
PW-159D	176			26	26	36	10	0	141	141	141	161	20	139	162	23	134	139	5	0	134	134	162	176	14	500
Northwest Area (4)																										
PW-167S	71	Yes	Rotary	0	0	45	14 (10)	0	50	50	50	70	20	48	71	23	43	48	5	0	43	43	71	71	0	20,000
PW-167D	279			0	0	45	14 (10)	0	244	244	244	264	20	242	265	23	237	242	5	0	237	237	265	279	14	20,000
PW-168S	71			0	0	38	14 (10)	0	50	50	50	70	20	48	71	23	43	48	5	0	43	43	71	71	0	20,000
PW-168D	279			0	0	38	14 (10)	0	244	244	244	264	20	242	265	23	237	242	5	0	237	237	265	279	14	20,000
Northern Area (2)																										
PW-162	154	No	Rotary	0	0	71	10	0	119	119	119	139	20	117	140	23	112	117	5	0	112	112	140	154	14	500
PW-163	162			18	18	126	10	0	132	132	132	147	15	130	148	18	125	130	5	0	125	125	148	162	14	500
Far-Field Area (3)																										
PW-160M	131	Yes	Rotary	23	23	14	14 (10)	0	110	110	110	130	20	108	131	23	103	108	5	0	103	103	131	131	0	20,000
PW-160D	183	Yes		23	23	14	14 (10)	0	148	148	148	168	20	146	169	23	141	146	5	0	141	141	169	183	14	20,000
PW-124D	201	No		27	27	46	10	0	166	166	166	186	20	164	187	23	159	164	5	0	159	159	187	201	14	20,000
Lisbon Valley Fault Area (2)																										
PW-169	243	No	Rotary	3	3	76	10	0	203	203	203	223	20	201	224	23	196	201	5	0	196	196	224	243	19	500
PW-170	380	No		0	0	107	10	0	340	340	340	360	20	338	361	23	333	338	5	0	333	333	361	380	19	500
TOTALS (27 wells)	**4,744**									**3,885**			**500**			**581**			**135**			**3,696**			**332**	

*Assume 50 foot of conductor casing for artesian wells; however, actual depth to be determined in the field based on depth of confining layer. Based on previous well construction data, conductor casing was 45 foot or less.

Attachment C – IDW Management Plan

(Phase 2 only Figures/Tables)

INVESTIGATION DERIVED WASTE MANAGEMENT PLAN

CORRECTIVE ACTION ASSESSMENT WORK PLAN

RIO ALGOM MINING LLC FORMER LISBON MILL

SAN JUAN COUNTY, UTAH

May 19, 2023

Revised August 22, 2023

Project #: 0084Z-010-0010

SUBMITTED BY: Trihydro Corporation

645 7th Street Arcata, CA 95521

Table of Contents

1.0 INTRODUCTION 1-1

1.1 Scope of Technical Program & Overview of Field ACtivities 1-1

2.0 INVESTIGATION DERIVED WASTE 2-1

2.1 IDW Classification 2-1

2.2 Estimated Volumes of IDW 2-1

2.3 IDW Generating Drilling Methodologies 2-3

2.4 IDW Handling 2-5

2.5 IDW Record Keeping Requirements 2-6

3.0 BYPRODUCT MATERIAL IDW 3-1

3.1 Containers 3-1

3.2 Labeling 3-1

3.3 Storage 3-1

3.3.1 Decontamination Pad 3-2

4.0 RCRA IDW AND MUNICIPAL SOLID WASTE 4-1

4.1 Containers 4-1

4.2 Labeling 4-1

4.3 Storage 4-2

4.4 Municipal Solid Waste 4-2

4.5 Unintentionally Generated Waste 4-2

5.0 RCRA WASTE CHARACTERIZATION 5-1

5.1 Criteria for Waste Classification 5-2

5.2 RCRA IDW Disposal 5-3

List of Tables

1. Phase 1 Estimated Total Volume of IDW
2. Phase 2 Estimated Total Volume of IDW
3. Phase 1 Drilling Location Details & IDW Summary
4. Phase 2 Drilling Location Details & IDW Summary
5. RCRA 8 Metals Hazardous Waste Thresholds Table
6. Analytes of Interest and Associated Analytical Methods

List of Figures

1. Site Location Map
2. Phase 1: Drilling Locations & Waste Classification
3. Phase 2: Drilling Locations & Waste Classification
4. Proposed Borrow Area Locations
5. Lisbon Mill Frac Tank Farm
6. On-Tailings Sonic & HQ Drilling
7. ARCH Set Up – Byproduct Material Non-Artesian Conditions
8. ARCH Set Up – Byproduct Material Artesian Conditions
9. Sonic & HQ Set Up – Byproduct Material Non-Artesian Conditions
10. Sonic & HQ Set Up – Byproduct Material Artesian Conditions
11. ARCH Set Up – RCRA Material Non-Artesian Conditions
12. ARCH Set Up – RCRA Material Artesian Conditions
13. Sonic & HQ Set Up – RCRA Material Non-Artesian Conditions
14. Sonic & HQ Set Up – RCRA Material Artesian Conditions

List of Appendices

A. SOP RCRA SOLID WASTE (POTENTIALLY HAZARDOUS) MANAGEMENT

B. WASTE TRACKING FORM

1.0 INTRODUCTION

Rio Algom Mining LLC (RAML) is preparing for the implementation of the *Corrective Action Assessment Work Plan*[1] (Intera, 2022; referred to herein as the 'CAAWP') at the RAML Lisbon Facility in San Juan County, Utah (the "Site"), where generation of Investigation Derived Waste (IDW) is expected. This *Investigation Derived Waste Management Plan* (IDWMP) provides the applicable regulatory frameworks and on-site guidance for characterization and management of IDW generated during the CAAWP field program. This IDWMP addresses only the drilling and monitoring well development activities proposed in the CAAWP and does not address the subsequent in-situ pilot testing components of the CAAWP. A future, and supplemental addendum to this IDWMP will be prepared to address IDW characterization and management of the in-situ pilot testing components of the CAAWP Field program.

1.1 SCOPE OF TECHNICAL PROGRAM & OVERVIEW OF FIELD ACTIVITIES

The CAAWP outlines an extensive field investigation that will be adaptively implemented over the course of multiple field seasons; Phase 1 and 2, respectively (a typical field season ranges from approximately April through November each year). The investigation will take place in and around RAML's former Lisbon mill facility located in San Juan County in southeastern Utah (Figure 1), including land within the restricted area associated on the tailing impoundments. The purpose of the CAAWP field investigation is to collect data necessary for the selection of a preferred groundwater corrective action at the Site.

The fieldwork will be completed in two distinct phases, as follows:

- **Phase 1 (2023 –** *see Figure 2***)**[2]:
  - Advancement of 11 coreholes ranging from approximately 60 feet below ground surface (ft bgs) to 220 ft bgs
  - Installation and development of up to 18 monitoring wells (MWs) ranging from approximately 60 ft bgs to 400 ft bgs
- **Phase 2 (2024 –** ***see*** *Figure 3***)**:
  - Advancement of 11 coreholes ranging from approximately 90 ft bgs to 280 ft bgs
  - Installation and development of up to 28 MWs ranging from approximately 70 ft bgs to 400 ft bgs

[1] Intera Inc. (Intera). 2022. Corrective Action Assessment Work Plan (CAAWP). November 16, 2022.
[2] Fieldwork on tailing impoundments will be completed in Phase 1 of CAAWP.

2.0 INVESTIGATION DERIVED WASTE

For the purpose of this plan, IDW means any waste derived from drilling and support activities related to the CAAWP field investigation. IDW is a general term; all waste will be further classified and handled according to the regulatory requirements prescribed by the Nuclear Regulatory Commission (NRC), Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), and the Utah Department of Environmental Quality (UDEQ) Division of Waste Management and Radiation Control (DWMRC), as further described in sections below.

2.1 IDW CLASSIFICATION

IDW generated during field activities will be classified in one of two ways: Byproduct material or RCRA solid waste. Figures 2 and 3 present the IDW classification applied to each proposed drilling location in Phase 1 and 2, respectively.

Specifically, IDW will be classified as:

- **Byproduct Material**: Uranium milling tailings and wastes are a separate category of regulated material, which are referred to as 11.e(2) byproduct material. The Nuclear Regulatory Commission (NRC) has further defined 11e.(2) byproduct material in 10 CFR 40 as "the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes."
- **RCRA Solid Waste**: Based on BHP's generator knowledge and the Site conceptual model, there is no potential for RCRA F-, K-, U- or P-listed wastes to be present; IDW to exhibit the RCRA characteristics of Reactivity, Ignitability, or Corrosivity; or wastes to exhibit the RCRA characteristic of Toxicity for organic constituents. However, there is the potential for solid and aqueous IDW (not including byproduct material) to exhibit the RCRA hazardous characteristic of toxicity for metals or Naturally occurring Radioactive Materials (NORM). Therefore, IDW that is not byproduct material (except for municipal garbage) will be handled in accordance with RAML Standard Operating Procedure for RCRA Waste (potentially Hazardous) Management included as Appendix A, pending further analytical classification.

2.2 ESTIMATED VOLUMES OF IDW

Estimated volumes of IDW were calculated for the Phase 1 and Phase 2 drilling activities to support operational planning for implementation of the CAAWP. This section describes the assumptions made and factors used to estimate volumes of IDW. The volumes provided are estimations for planning purposes only and do not represent actual quantities generated. Trihydro will tabulate actual volumes of IDW generated during the field activities and submit to RAML in a brief memorandum at the completion of each Phase of fieldwork.

IDW generated during this field investigation will include:

- Comingled solid/liquid waste that will consist of:
  - Solid material: drill cuttings, sediments, core samples.
  - Aqueous material: groundwater, drilling fluid, decontamination water.
- Municipal Garbage: packaging, food, PPE, and other items commonly known as trash.

In addition to the IDW generating activities listed above, BHP will excavate 23 test pits and complete 14 hollow stem auger borings in four potential clean borrow areas (Figure 4) The clean borrow areas are located outside of the radius of mill-affected environmental media[3] and off of RAML-owned property. Soil removed will be backfilled into the excavation area, in accordance with the location-specific soil reuse criteria.

Many of the drilling locations in the CAAWP (byproduct material and RCRA material locations) are located where artesian conditions[4] naturally occur in subsurface geology, and large volumes of water may be produced during drilling activities. Where artesian conditions occur, the drill pad will be equipped with a transfer pump, plumbed to the Lisbon Mill Frac Tank Farm (Figure 5) to manage the large volumes of liquid IDW generated.

For purposes of IDW planning, the following assumptions are made:

- Where artesian conditions are ***likely*** at a single drilling location: Estimate 20,000 gallons of aqueous IDW
- Where artesian conditions are ***unlikely*** at a single drilling location: Estimate 500 gallons of aqueous IDW

Approximate drill cutting volumes were calculated using the proposed depth and diameter of each borehole, including a 30% expansion factor. Additionally, and due to the nature of the single comingled IDW stream at each location, the estimated volume of IDW to be generated is assumed to be generally consistent at both the core hole and monitoring well locations. Tables 1 and 2 below provide estimated total volume of IDW during each Phase of the CAAWP Field activities, Tables 3 and 4 (attached) provide the location details and estimated quantities of IDW to be generated at each drilling location during Phase 1 and Phase 2 CAAWP field activities.

[3] Environmental media (e.g., soil, sediments, groundwater, soil/rock cores) are not inherently a solid or hazardous waste and are not subject to regulation under RCRA unless they are contaminated (typically through accidental spills of hazardous waste or spills of product chemicals that, when spilled, become hazardous wastes) and "contain" a hazardous waste; which is known as EPA's contained in policy (61 FR 18780, 18783: April 29, 1996)

[4] Water is confined under pressure below layers of relatively impermeable rock.

TABLE 1. PHASE 1 ESTIMATED TOTAL VOLUME OF IDW

IDW Classification	Tailing Impoundment	Estimated Volume of Solid IDW (cubic yards)	Estimated Volume of Aqueous IDW (gallons)
By Product IDW	On -Tailing	25.13	8,000
By Product IDW	Off - Tailing	42.34	4,000
Total Phase 1 Byproduct Material		67.48	12,000
RCRA IDW	Off - Tailing	49.62	81,000
Estimated Total Phase 1 IDW		**117.10**	**93,000**

TABLE 2. PHASE 2 ESTIMATED TOTAL VOLUME OF IDW

IDW Classification	Tailing Impoundment	Estimated Volume of Solid IDW (cubic yards)	Estimated Volume of Aqueous IDW (gallons)
By Product IDW	On -Tailing	0	0
By Product IDW	Off - Tailing	130.81	53,000
Total Phase 2 Byproduct Material		130.81	53,000
RCRA IDW	Off - Tailing	75.57	122,500
Estimated Total Phase 2 IDW		**206.39**	**175,500**

2.3 IDW GENERATING DRILLING METHODOLOGIES

The drilling activities proposed in the CAAWP include sonic and diamond core drilling, and Air Rotary Casing Hammer (ARCH) drilling methods. Potable water will be utilized as drilling fluid during rock coring activities. If additivies (e.g., mud) are necessary to maintain borehole stability, the viscosity of the drilling fluid will be minimized to the extent possible. Where a mud system is used during drilling, the drilling fluid will be circulated through a system to separate fines and cuttings from the drilling fluid. Solids will be transferred via the mud system into a lined super-sack (with zipped top). Upon completion of the boring, drilling fluids will be pumped via a designated transfer pump and placed into a roll-off bin, frac-tank, or poly tank.

The different drilling methodologies require slight variances in operational set up at the drill pad (e.g., tank, containment, and transfer pump placement) to adequately contain IDW once generated. Further, the IDW classification (e.g., byproduct material or RCRA IDW) and the potential for artesian conditions impact the operational framework requirements at each drill pad. Due to the complex nature of these factors, the following diagrams are provided, which illustrate a typical drill pad set up respective to the drilling technology, IDW classification of the drill location, and potential for artesian conditions. The diagrams also provide step-by-step handling instructions specific to each set up.

- Figure 6: On-Tailings Sonic & HW Drilling
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - One roll-off bin
  - One 8,000-gallon tank
- Figure 7: ARCH Set Up – Byproduct Material Non-Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll-off bins
- Figure 8: ARCH Set Up – Byproduct Material Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll-off bins
  - Byproduct material designated transfer pump
  - One 8,000-gallon tank & transfer line to Frac Tank Farm
- Figure 9: Sonic & HQ Set Up – Byproduct Material Non-Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - One roll-off bin
- Figure 10: Sonic & HQ Set Up – Byproduct Material Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll- off bins
  - Byproduct material designated transfer pump
  - One 8,000-gallon tank & transfer line to Frac Tank Farm

- Figure 11: ARCH Set Up – RCRA Material Non-Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll- off bins
- Figure 12: ARCH Set Up – RCRA Material Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll- off bins
  - RCRA material designated transfer pump
  - One 8,000-gallon tank & transfer line to Frac Tank Farm
- Figure 13: Sonic & HQ Set Up – RCRA Material Non-Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - One roll-off bin
- Figure 14: Sonic & HQ Set Up – RCRA Material Artesian Conditions
  - One super sack for PPE and municipal solid waste
  - One super sack positioned under the drill rig throughout the duration of active drilling
  - Two roll- off bins
  - RCRA material designated transfer pump
  - One 8,000-gallon tank & transfer line to Frac Tank Farm

2.4 IDW HANDLING

A one-cubic yard (cy) self-standing woven polypropylene super sack will be used to containerize drill cuttings at each drill pad. The super sack will either be transferred to the Lisbon Mill storage yard for long-term storage, or contents emptied into a roll-off bin. The super sacks will be lined with plastic and equipped with a zipped top. Roll-off bins will be lined with plastic and have a closed top. Liquid IDW will be decanted from any solids and pumped into a poly or frac tank.

If a rain event occurs during the drilling program, waste containers will be closed to prevent rainwater from entering the container. Using a damaged container for IDW storage is not permitted. All IDW containers must be closed at the end of the day.

2.5 IDW RECORD KEEPING REQUIREMENTS

Record keeping is an integral part of this IDWMP and the CAAWP field program. Each IDW stream should be recorded on the Waste Tracking Form included as **Appendix B** at the point of first generation.

IDW volumes should be recorded at the following frequency:

- At each drilling location:
  - Upon first generation;
  - At the end of each day shift
  - Upon completion of drilling activities
- At the Lisbon M ill Frac Tank Farm:
  - Upon receipt of each waste stream influent to the Tank Farm
  - At the end of each day shift
  - Upon completion of drilling activities
- At the Lisbon Mill Storage Yard
  - Upon receipt of each waste stream transferred into the Storage Yard
  - At the end of each day shift
  - Upon completion of drilling activities

The BHP Field Supervisor will collect waste tracking forms for Site personnel at the end of each day shift and send to Trihydro for waste tracking throughout the duration of field activities. When waste generating activities at individual drill pads is complete, the Trihydro Project Manager, Ashley Tillinghast, will provide the release for IDW prior to transfer to the IDW storage yard. **IDW should be moved from the drill pad to the storage yard without release.**

3.0 BYPRODUCT MATERIAL IDW

Material within the subsurface boundary where historic milling operations are known to have impacted groundwater is considered byproduct material and will be managed as Byproduct material IDW (see Figures 2 and 3). There are no prospective confirmatory or retrospective confirmatory sampling required for these IDW.

3.1 CONTAINERS

Containers holding byproduct material IDW may be moved between designated-byproduct material locations; a single container may receive waste from multiple designated-byproduct material locations. **Containers holding byproduct material IDW shall not be moved to areas designated as RCRA material IDW.** All containers holding designated-byproduct material IDW must be labeled "Caution: Radioactive Materials" in black or white ink/paint consistent with 10 CFR 20.1904 and be placed into pop-up style secondary containment. Contaminated PPE may be consolidated in a single super-sack and stored in the Byproduct Area of the Lisbon mill storage yard (Figures 2 and 3).

3.2 LABELING

Containers holding byproduct material IDW must be labeled in accordance with the following:

- A durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL".
- Radionuclides present.
- Estimate of quantity of radioactivity.
- Radiation levels.
- Date for which activity is estimated.
- Type of material contained.

Before removal of empty uncontaminated containers to unrestricted areas, remove or deface any label or otherwise clearly indicate that the container no longer contains byproduct material (e.g., place an 'EMPTY" label on the container).

3.3 STORAGE

Designated byproduct material IDW will be stored in the Lisbon Mill Storage Yard shown on Site figures. The byproduct area of the storage yard will be gated and posted consistent with the requirements of 10 CFR 20.1902 and

10 CFR 20.1801. Solid IDW will be stored in a strong-tight container (e.g., Conex box, or equivalent) and liquid IDW will be stored in open-top frac tank.

3.3.1 DECONTAMINATION PAD

A temporary pop-up HDPE wash pad and potable water tank will be staged in a designated area within the restricted area of the Site. The wash pad will be of adequate size to collect and capture wash water generated during decontamination of drilling equipment and tooling. Water generated on the decontamination pad will be pumped via a byproduct material designated transfer pump to the byproduct material frac tank farm. Any disposable items that do not meet the release criteria will remain on-Site and be treated as byproduct material IDW.

4.0 RCRA IDW AND MUNICIPAL SOLID WASTE

Where drilling occurs outside of the byproduct boundary at the Site, IDW should be managed as RCRA waste in accordance with RAML's *SOP for Unclassified RCRA Solid Waste (Potentially Hazardous) Management*, as described further in the sections below. The Federal regulations that govern hazardous waste identification, classification, generation, management, and disposal are found in the 40 CFR Parts 260 through 273.

4.1 CONTAINERS

Containers holding RCRA IDW may be moved between designated-RCRA IDW locations; a single container may receive waste from multiple designated-RCRA IDW locations. **Containers holding RCRA IDW shall not be moved to areas designated as byproduct material IDW.** All containers holding RCRA IDW must be labeled in accordance with the *SOP for Unclassified RCRA Solid Waste (potentially hazardous) management* and be placed into pop-up style secondary containment. Contaminated PPE may be consolidated in a single super-sack and stored in the RCRA Area of the Lisbon mill storage yard (Figures 2 and 3). As waste is generated, take special care to not overspill the container. Once full, containers should be properly closed and tightened. Then, transferred to the designated hazardous waste storage area at the Site. Containers should be closed following and in between immediate fill to the extent practicable

4.2 LABELING

Containers holding RCRA IDW must be labeled **with both a "Pending Analysis" Label and a "Hazardous Waste" Label.** The "Pending Analysis" label can be left blank, and the "Hazardous Waste" label must include the following generator information:

- Name: BHP – Rio Algom Mining Company.
- Address: P.O. Box 218.
- Phone: BHP-RAML, TBD.
- City: Grants.
- State: New Mexico.
- Zip: 87020.
- Accumulation start date: the date the waste was first placed into the container.
- The EPA ID number and Manifest Document number can be left blank.

Before removal of empty uncontaminated containers to unrestricted areas, remove or deface any label or otherwise clearly indicate that the container no longer contains byproduct material (e.g., place an 'EMPTY" label on the container).

4.3 STORAGE

RCRA IDW will be temporarily stored in the Lisbon Mill Storage Yard shown on Site figures. The RCRA area of the storage yard will be gated and locked, and clearly labeled 'RCRA Waste Storage Area', consistent with 40 CFR 262. RCRA IDW will be characterized for pertinent site-specific analytes and disposed of off-site, as described in the *RCRA Waste Characterization* section below.

4.4 MUNICIPAL SOLID WASTE

Municipal solid waste, more commonly known as trash or garbage, consists of everyday items we use, then throw away, such as product packaging (i.e., food products, paper towels, etc.), bottles, food scraps, and newspapers. Municipal garbage does not include borehole cuttings or liquids used to drill boreholes but does include PPE workers use while drilling. This waste will be collected in a roll-off container with a closing top located at the laydown area for the project (Figure 2) and disposed of monthly by MP Environmental (MPe) during the course of field activities.

4.5 UNINTENTIONALLY GENERATED WASTE

This IDWMP is not intended to address unintentionally generated wastes (i.e., paint, batteries, hydraulic oils, etc.). **If other wastes are generated unintentionally throughout the course of this field program, a stop-work should be employed, and the BHP project manager called.** BHP will consult with Trihydro staff for the appropriate management and characterization for such wastes.

5.0 RCRA WASTE CHARACTERIZATION

Constituents and parameters pertinent to RCRA waste characterization are chosen based upon generator knowledge of the site and activities, as well as the underlying hydrogeology (e.g., potential for naturally occurring metals present at concentrations greater than RCRA thresholds). The constituents/parameters of interest are subject to change as processes, environmental conditions, and generator knowledge change. The characterization suite is also subject to change with the requirements of the waste facility that will accept the waste (i.e., to meet facility waste acceptance criteria).

For RCRA waste generated during this CAAWP field program, the following constituents/parameters will be quantified to characterize the waste streams:

- Toxicity by: RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)
- Radionuclides of Concern (ROC) [radium-226, thorium-230, and isotopic uranium]

TABLE 5. ANALYTES OF INTEREST AND ASSOCIATED ANALYTICAL METHODS

Analyte	Name	Method Number
RCRA 8 Metals	TCLP Metals	EPA 6010/7470
Uranium	Metals	EPA 6020 (total) / EPA 1311 (leachable)
Lead (Pb) 210*	Metals	Gamma spectroscopy
Thorium isotopics[a]	Alpha spectroscopy	ASTM D3972
Radium-226	Gamma spectroscopy via in-growth of radon decay products	EPA 901.1[b]

[a] Digestion method is hydrofluoric acid digestion (EPA 3052).
[b] Modified method
*Pb 210 is a required analyte from the receiving landfill, not an analyte of interest
ASTM - ASTM International
DOE - U.S. Department of Energy
EML - Environmental Measurements Laboratory
EPA - U.S. Environmental Protection Agency
HASL - Health and Safety Laboratory

This characterization suite is based on the understanding that (1) there is no potential for RCRA F-, K-, U- or P-listed wastes to be present; (2) to exhibit the RCRA characteristics of Reactivity, Ignitability, or Corrosivity; or (3) wastes to exhibit the RCRA characteristic of Toxicity for organic constituents. Additional analyses should be performed if listed wastes or additional characteristics are potentially present.

Characterization sampling will occur when RCRA IDW containers are full and before they are transferred to the Lisbon Mill Storage Yard. A bailer will be used to collect characterization samples from liquid IDW containers. A composite sample will be collected from containers holding solid IDW, in the following manner to ensure the sample is representative of the waste container as a whole:

- Collect a subsample from four discrete points along the vertical profile of the container holding IDW
- Name the samples: 'Container ID'-COMP-1, -2, -3, -4
- Place samples in cooler for shipment to ACZ Laboratories
- Indicate sample homogenization required on the Chain of Custody

Representative sampling will be performed by MPe and sent to ACZ Laboratories in accordance with the Site Waste Management Plan and RAML's *SOP for Unclassified RCRA Solid Waste (Potentially Hazardous) Management*, as directed by Trihydro.

5.1 CRITERIA FOR WASTE CLASSIFICATION

Analytical results will be compared to the RCRA Toxicity Characteristic Leachate Procedure (TCLP) criteria for waste classification 40 CFR 261 and the Utah Administrative Code R313-19-13(d)(b) for Naturally Occurring Radioactive Material (NORM waste), shown in table and further discussed below.

TABLE 6. RCRA 8 METALS HAZARDOUS WASTE THRESHOLDS TABLE

RCRA Waste Code	RCRA Characteristic	Hazardous Waste Thresholds	
	Toxicity: RCRA 8 Metals*	TLCP (leachable)	TCLPx20 (screening for solid matrix)**
D004	Arsenic	5 mg/L	100 mg/L
D005	Barium	100 mg/L	2000 mg/L
D006	Cadmium	1 mg/L	20 mg/L
D007	Chromium	5 mg/L	100 mg/L
D008	Lead	5 mg/L	100 mg/L
D009	Mercury	0.2 mg/L	4 mg/L
D010	Selenium	1 mg/L	20 mg/L
D011	Silver	5 mg/L	100 mg/L

* Toxicity characteristic thresholds for metals only, does not include organics based on generator knowledge.

** 20xTCLP threshold is used for non-aqueous waste streams to confirm if the TCLP is necessary; total results less than 20xTCLP thresholds indicate that the sample cannot exceed the TCLP based on the 20x method dilution factor. Results greater than 20xTCLP can be used for the generator to apply the RCRA toxicity characteristic for that constituent or to make the decision to release a sample on hold for TCLP with quantification of metals in the leachate.

If any of the RCRA metals exceed their respective TCLP threshold, then the decision can be made to classify the material as RCRA hazardous waste. The "Pending Analysis" label will be removed from the respective container, and the Waste Tracking form updated accordingly. If elevated radionuclide concentrations are evident (above 15 picocuries per gram) and RAML is confident the waste is not byproduct material, then the material will be handled as NORM waste. **Place a "Caution Naturally Occurring Radioactive Material Present" Label on the container.**

Alternatively, if none of the RCRA metals exceed their respective TCLP threshold, the decision can be made to classify the material as non-hazardous waste. The "Pending Analysis" label and the "Hazardous Waste" label will be removed from the respective container, and a "Non-Hazardous" label applied. The waste tracking form will be updated accordingly. The "Non-Hazardous" label must include the same Container ID and Generation date listed on the 'old' labels that are removed from the container. If elevated radionuclide concentrations are evident (above 15 picocuries per gram) and RAML is confident the waste is not byproduct material, then the material will be handled as NORM waste. **Place a "Caution Naturally Occurring Radioactive Material Present" Label on the container.**

5.2 RCRA IDW DISPOSAL

Following characterization of the RCRA IDW, the waste profile and appropriate waste manifest(s) for the waste stream(s) will be prepared. Upon approval of the waste manifest (approval from Trihydro & BHP), Trihydro will schedule the disposal of the waste with MPe, waste will be removed approximately once per each month throughout the duration of field activities[5].

Prior to disposal, the waste manifest will be signed by a BHP representative and provided to the Trihydro Site Supervisor. Prior to removal from Site, Trihydro Site Supervisor will release the container for loading onto the vehicle. Trihydro will confirm the waste manifest accurately describes the waste in accordance with the container ID, that container labels are accurate and securely placed, and that the waste container is loaded onto the disposal vehicle safely. **IDW will not be removed from the Site without release.**

[5] Dependent upon receipt of analytical laboratory data to prepare profile and manifest.

TABLES

TABLE 4. PHASE 2 DRILLING LOCATION DETAILS IDW SUMMARY

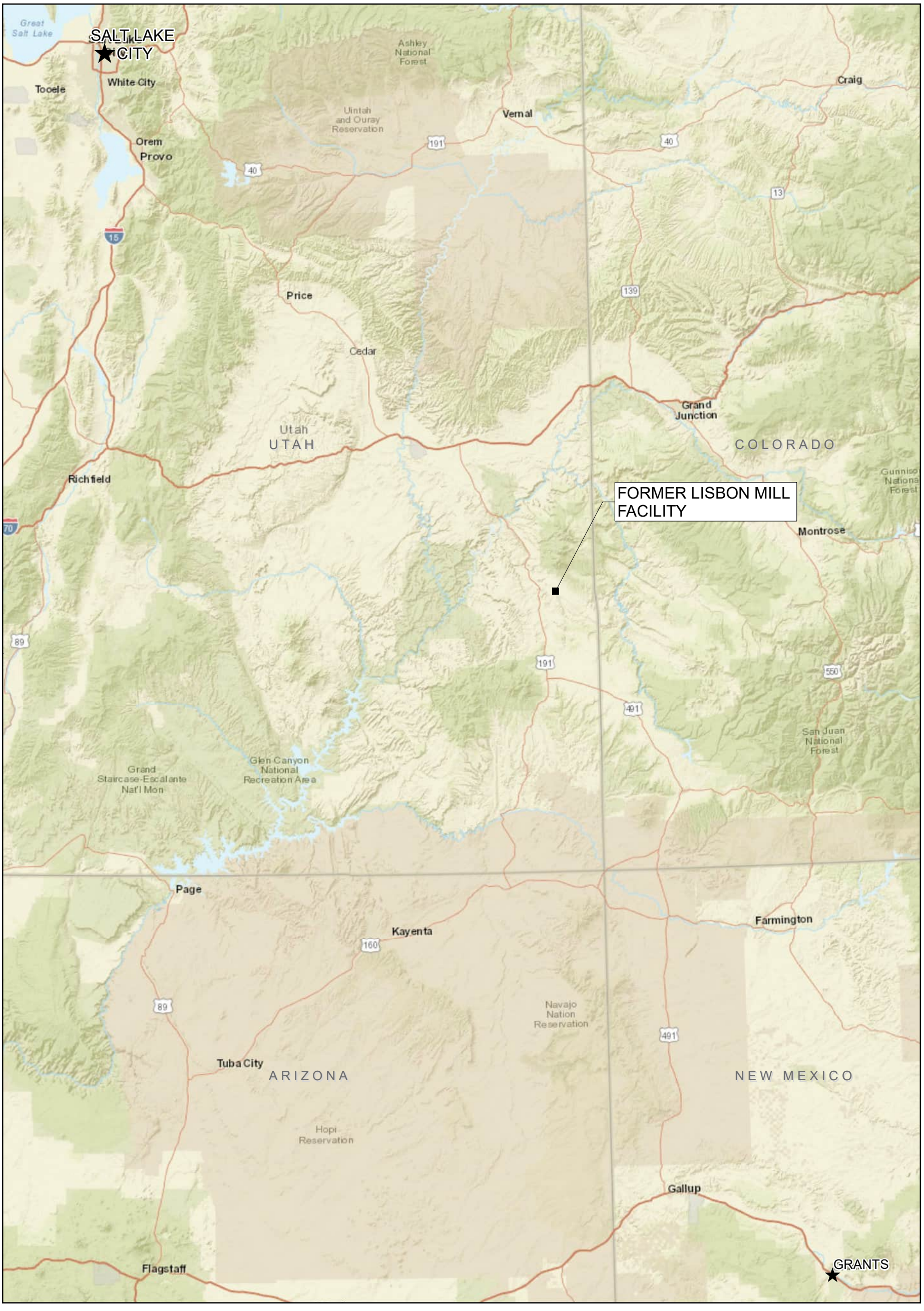
Location ID	Corehole or MW	Tailings Impoundment ID	IDW Classification	Drilling Method	Artesian Conditions (Y/N)	Total Depth (ft bgs)	Estimated Volume of Solid IDW (cubic yards)	Estimated Volume of Aqueous IDW (gallons)	IDW Containerization Method	IDW Management Strategy Figure
PHASE 2 DRILLING PROGRAM										
Phase 2 ByProduct Material IDW										
PC-144	Corehole	N/A	Byproduct IDW	Sonic	N	247	2.34	500	Supersacks, IBC totes	**Figure 9 Sonic & HQ Drilling By-Product Material NON Artesian Conditions**
PC-101	Corehole	N/A	Byproduct IDW	Sonic	N	168	1.59	500	Supersacks, IBC totes	
PC-RL3	Corehole	N/A	Byproduct IDW	Sonic	N	198	1.87	500	Supersacks, IBC totes	
PC-151	Corehole	N/A	Byproduct IDW	Sonic	N	102	0.96	500	Supersacks, IBC totes	
PC-119	Corehole	N/A	Byproduct IDW	Sonic	N	92	0.87	500	Supersacks, IBC totes	
PC-154	Corehole	N/A	Byproduct IDW	Sonic	N	153	1.45	500	Supersacks, IBC totes	
PC-155	Corehole	N/A	Byproduct IDW	Sonic	N	152	1.44	500	Supersacks, IBC totes	
PC-157	Corehole	N/A	Byproduct IDW	Sonic	N	136	1.29	500	Supersacks, IBC totes	
PC-158	Corehole	N/A	Byproduct IDW	Sonic	N	169	1.60	500	Supersacks, IBC totes	
PW-143	MW	N/A	Byproduct IDW	ARCH	N	165	6.24	500	Roll-off bins	**Figure 7 ARCH Drilling By-Product Material NON Artesian Conditions**
PW-144	MW	N/A	Byproduct IDW	ARCH	N	246	9.30	500	Roll-off bins	
PW-145	MW	N/A	Byproduct IDW	ARCH	N	267	10.10	500	Roll-off bins	
PW-146	MW	N/A	Byproduct IDW	ARCH	N	164	6.20	500	Roll-off bins	
PW-149	MW	N/A	Byproduct IDW	ARCH	N	195	7.37	500	Roll-off bins	
PW-150	MW	N/A	Byproduct IDW	ARCH	N	117	4.42	500	Roll-off bins	
PW-151	MW	N/A	Byproduct IDW	ARCH	N	102	3.86	500	Roll-off bins	
PW-152	MW	N/A	Byproduct IDW	ARCH	N	124	4.69	500	Roll-off bins	
PW-153	MW	N/A	Byproduct IDW	ARCH	N	157	5.94	500	Roll-off bins	
PW-154D	MW	N/A	Byproduct IDW	ARCH	N	153	5.79	500	Roll-off bins	
PW-155D	MW	N/A	Byproduct IDW	ARCH	N	147	5.56	500	Roll-off bins	
PW-156D	MW	N/A	Byproduct IDW	ARCH	N	166	6.28	500	Roll-off bins	
PW-157D	MW	N/A	Byproduct IDW	ARCH	N	134	5.07	500	Roll-off bins	
PW-136M	MW	N/A	Byproduct IDW	ARCH	N	116	4.39	500	Roll-off bins	
PW-158D	MW	N/A	Byproduct IDW	ARCH	N	161	6.09	500	Roll-off bins	
PW-159D	MW	N/A	Byproduct IDW	ARCH	N	176	6.66	500	Roll-off bins	
PW-124D	MW	N/A	Byproduct IDW	ARCH	N	201	7.60	500	Roll-off bins	

TABLE 4. PHASE 2 DRILLING LOCATION DETAILS IDW SUMMARY

Location ID	Corehole or MW	Tailings Impoundment ID	IDW Classification	Drilling Method	Artesian Conditions (Y/N)	Total Depth (ft bgs)	Estimated Volume of Solid IDW (cubic yards)	Estimated Volume of Aqueous IDW (gallons)	IDW Containerization Method	IDW Management Strategy Figure
PW-160M	MW	N/A	Byproduct IDW	ARCH	Y	131	4.95	20,000	Roll-off bins, Mini-frac	**Figure 8** **ARCH Drilling** **By-Product Material** **Artesian Conditions**
PW-160D	MW	N/A	Byproduct IDW	ARCH	Y	183	6.92	20,000	Roll-off bins, Mini-frac	
						Phase 1: Total ByProduct IDW OFF Tailings	**130.81**	**53,000**		
Phase 1 RCRA Material IDW										
PC-167	MW	N/A	RCRA IDW	Sonic	Y	279	2.64	20,000	Roll-offs, mini-frac	**Figure 14** **Sonic & HQ Drilling** **RCRA** **Artesian Conditions**
PC-168	MW	N/A	RCRA IDW	Sonic	Y	279	2.64	20,000	Roll-offs, mini-frac	
PW-161	MW	N/A	RCRA IDW	ARCH	N	220	8.32	500	Roll-off bins	**Figure 11** **ARCH Drilling** **RCRA** **NON- Artesian Conditions**
PW-162	MW	N/A	RCRA IDW	ARCH	N	154	5.82	500	Roll-off bins	
PW-163	MW	N/A	RCRA IDW	ARCH	N	162	6.13	500	Roll-off bins	
PW-169	MW	N/A	RCRA IDW	ARCH	N	243	9.19	500	Roll-off bins	
PW-170	MW	N/A	RCRA IDW	ARCH	N	380	14.37	500	Roll-off bins	
PW-167S	MW	N/A	RCRA IDW	ARCH	Y	71	2.68	20,000	Roll-off bins, Mini-frac	**Figure 12** **ARCH Drilling** **RCRA** **Artesian Conditions**
PW-167D	MW	N/A	RCRA IDW	ARCH	Y	279	10.55	20,000	Roll-off bins, Mini-frac	
PW-168S	MW	N/A	RCRA IDW	ARCH	Y	71	2.68	20,000	Roll-off bins, Mini-frac	
PW-168D	MW	N/A	RCRA IDW	ARCH	Y	279	10.55	20,000	Roll-off bins, Mini-frac	
						Phase 1: Total RCRA Material IDW	**75.57**	**122,500**		
						Phase 1 Total Byproduct IDW	**130.81**	**53,000**		
						Estimated Total IDW Phase 1 Drilling:	**206.39**	**175,500**		
							cubic yards	**gallons**		

Note:
IDW volume estimates are calculated using an expansion factor of 1.3 times the borehole volume.

FIGURES



EXPLANATION

- ■ FORMER LISBON MILL FACILITY
- ★ ADJACENT CITIES FOR GEOGRAPHIC CONTEXT

N

0 30 Miles

Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

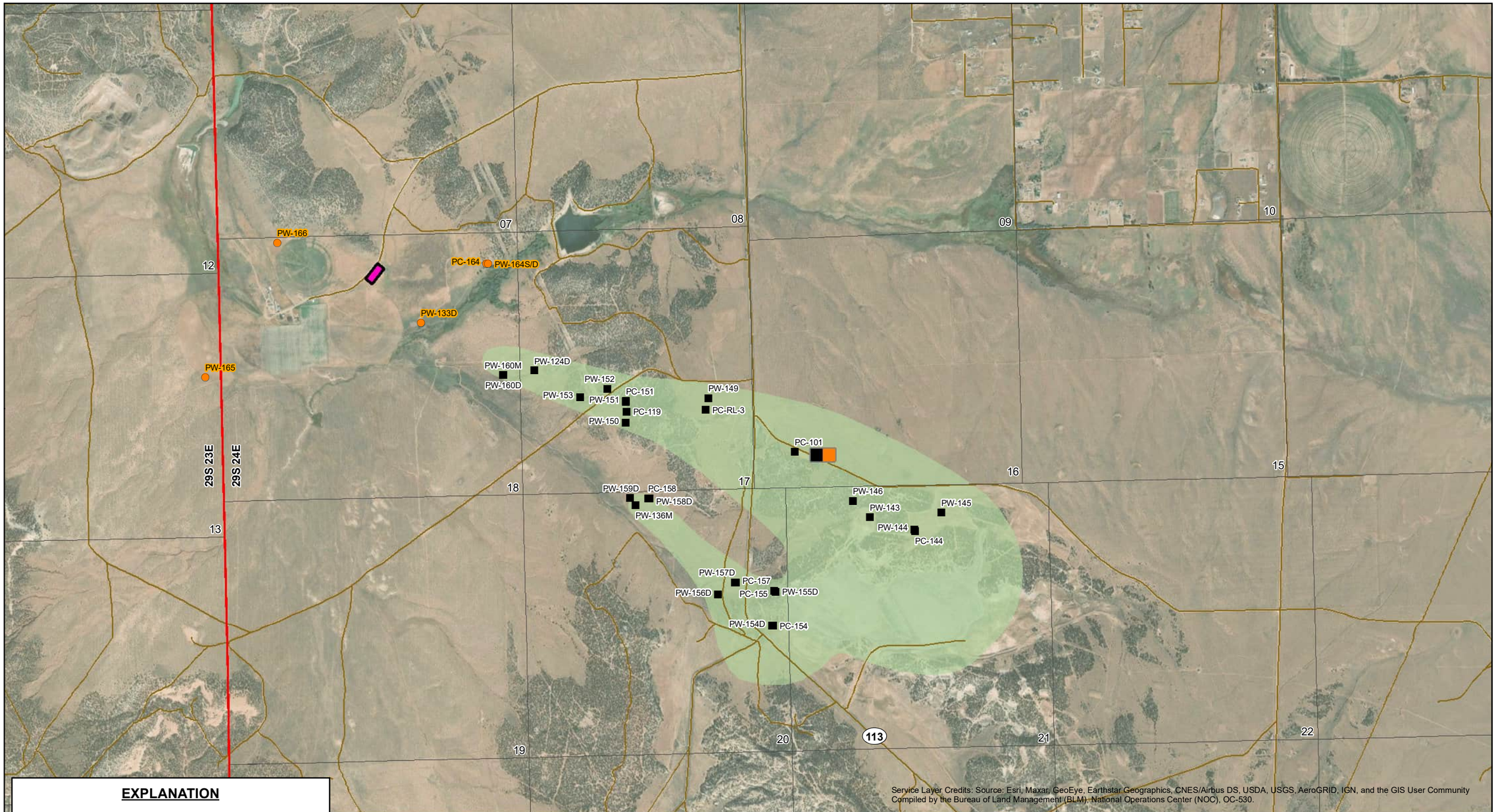
FIGURE 1

FORMER LISBON MILL FACILITY LOCATION MAP

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

Drawn By: PH	Checked By: AC	Scale: 1 " = 30 miles	Date: 8/23/23	File: 1_BHPLisbonV_SiteLocMap.mxd

L:\BHP - DOCUMENTS\LISBON VALLEY - UTAH\GIS\MAPPING\DWMP_CORRECTIVEACTION_WP\1_BHPLISBONV_SITELOCMAP.MXD



EXPLANATION

- IDW GENERATED IS RCRA WASTE
- IDW GENERATED IS BYPRODUCT MATERIAL
- ROAD
- IDW STORAGE YARD
- TEMPORARY RCRA LIQUID IDW STORAGE
- OCTOBER 2022 URANIUM PLUME

NOTES:

1. THIS FIGURE PROVIDES THE CLASSIFICATION FOR IDW GENERATED AT EACH DRILLING LOCATION PROPOSED IN THE CAAWP.
2. URANIUM PLUME DATA PROVIDED BY INTERA IN THE JANUARY 27, 2023 *LISBON URANIUM CONTOURS FIGURES (2018-2022) AND TIMESERIES PLOTS* TECHNICAL MEMORANDUM.
3. CAAWP = CORRECTIVE ACTION ASSESSMENT WORK PLAN.
4. IDW = INVESTIGATION DERIVED WASTE.
5. RCRA = RESOURCE CONSERVATION AND RECOVERY ACT.

N

0 2,000 '

Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 3

PHASE 2: DRILLING LOCATIONS AND WASTE CLASSIFICATION

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

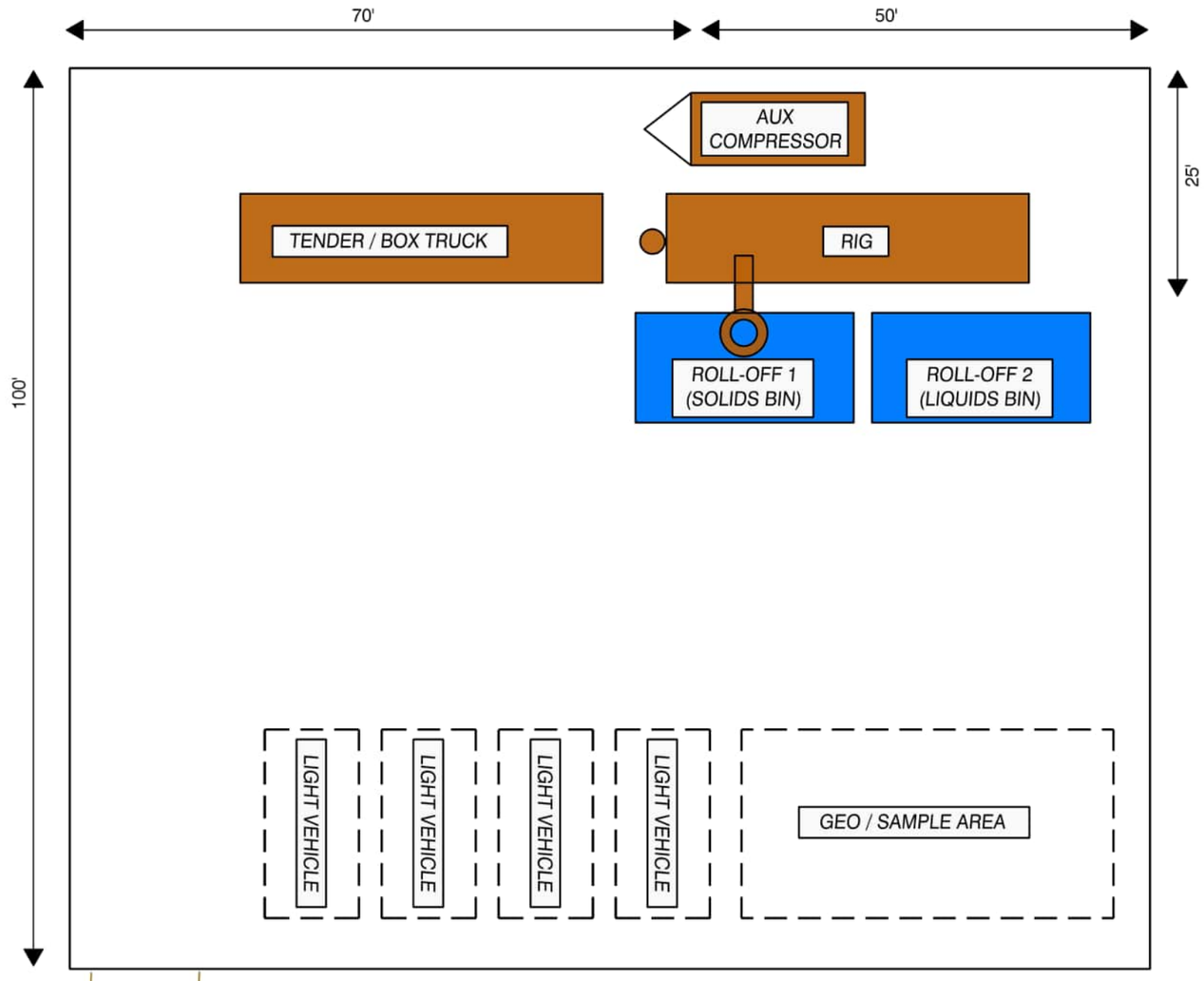
Drawn By: DH	Checked By: AC	Scale: 1 " = 2,000 '	Date: 8/23/23	File: 3_BHPLisbonV_Ph2WasteClass.mxd

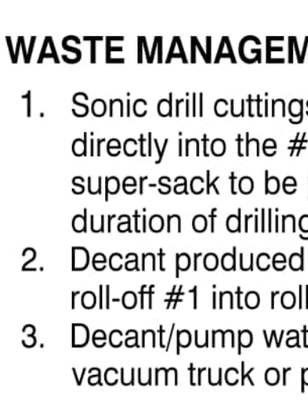
L:\BHP - DOCUMENTS\LISBON VALLEY - UTAH\GIS\MAPPING\UDVMP -CORRECTIVEACTION_WP3_BHPLISBONV_PH2WASTECLASS.MXD

ARCH SET UP - BYPRODUCT MATERIAL NON-ARTESIAN CONDITIONS

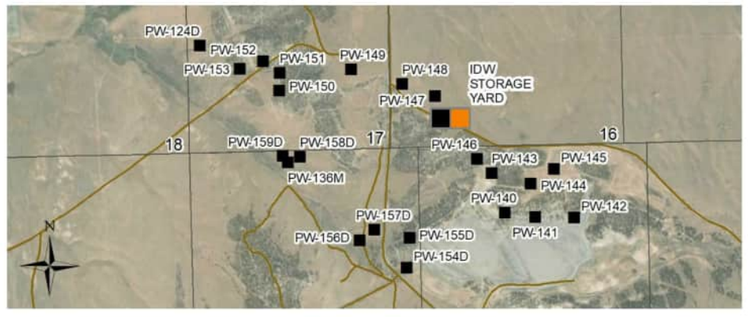
WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings and fluid (water) is discharged directly into the #1 roll-off bin as shown. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Decant produced water with a transfer pump from roll-off #1 into roll-off #2;
3. Decant/pump water from roll-offs as needed via vacuum truck or poly tanks and haul to IDW storage area;
4. Discharge water into the Byproduct liquid storage tanks located in the IDW Storage Yard;
5. When roll-off is half full of solids, remove free liquid and transport to the Byproduct area of the IDW Storage Yard;





DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 7

ARCH SET UP - BYPRODUCT MATERIAL NON-ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

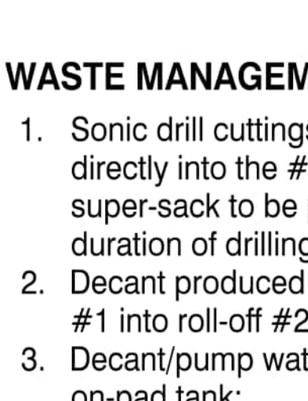
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

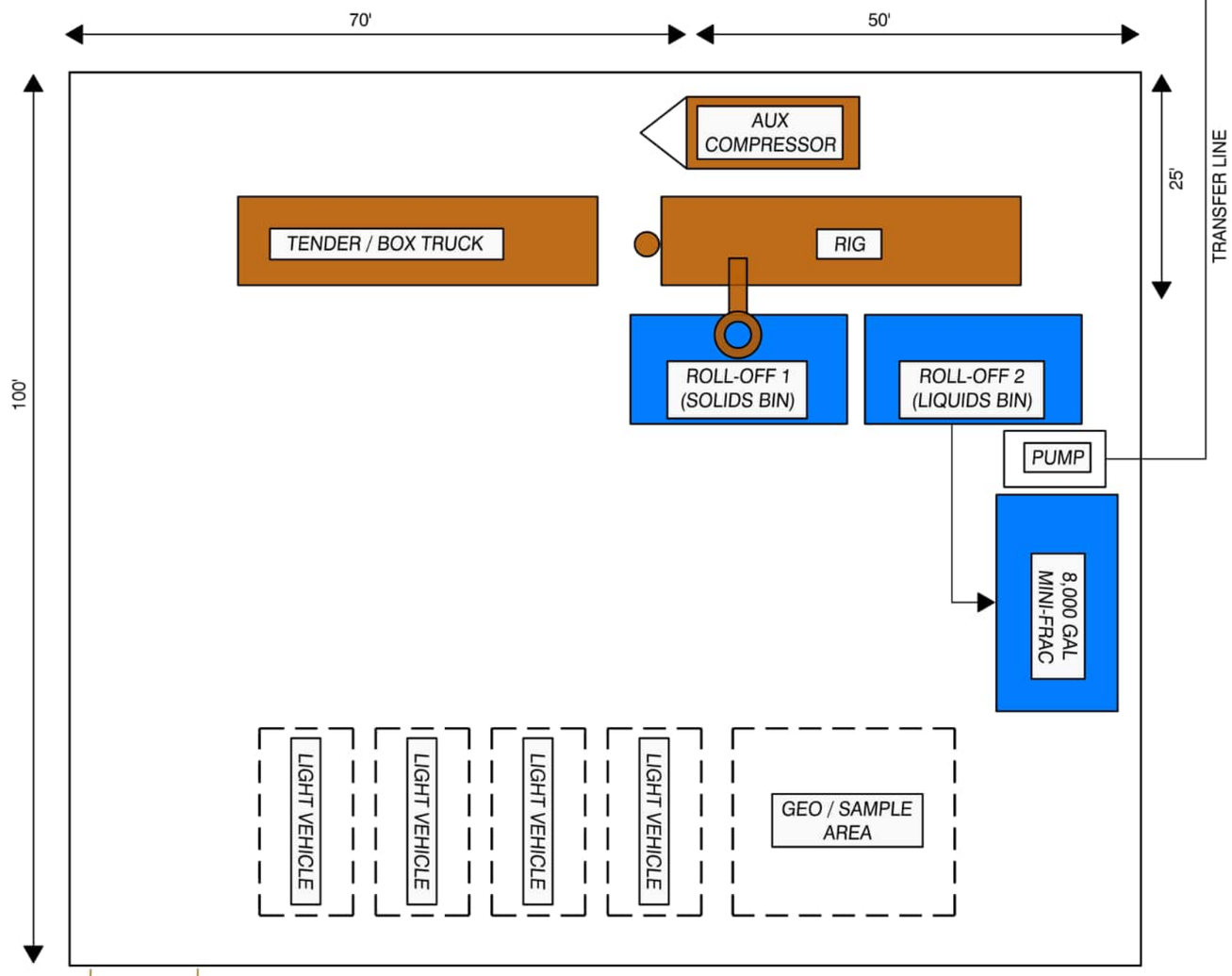
J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

ARCH SET UP - BYPRODUCT MATERIAL ARTESIAN CONDITIONS

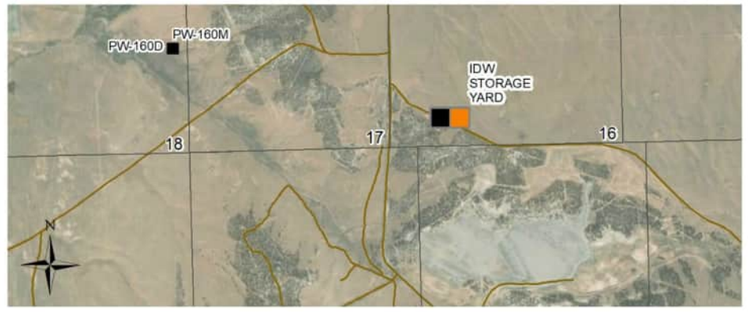
WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings and fluid (water) is discharged directly into the #1 roll-off bin as shown. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Decant produced water with a transfer pump from roll-off #1 into roll-off #2;
3. Decant/pump water from roll-off #2 into the 8,000 gallon on-pad tank;
4. Pump water via the HDPE transfer line into the Byproduct liquid storage tanks located in thefrac-tank farm;
5. Do Not co-mingle Byproduct liquids with RCRA liquids;
6. When roll-off is half full of solids, remove free liquid and transport to the Byproduct area of the IDW Storage Yard;
7. Using truck-mounted poly tank designated for Byproduct liquids, transfer liquids from the frac-tank farm to the Byproduct liquid storage tanks located in the IDW Storage Yard;





DRILLING LOCATION AREA MAP



J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 8

ARCH SET UP - BYPRODUCT MATERIAL ARTESIAN CONDITIONS

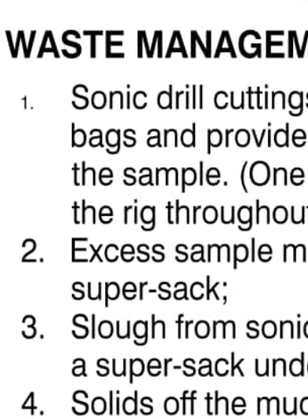
RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

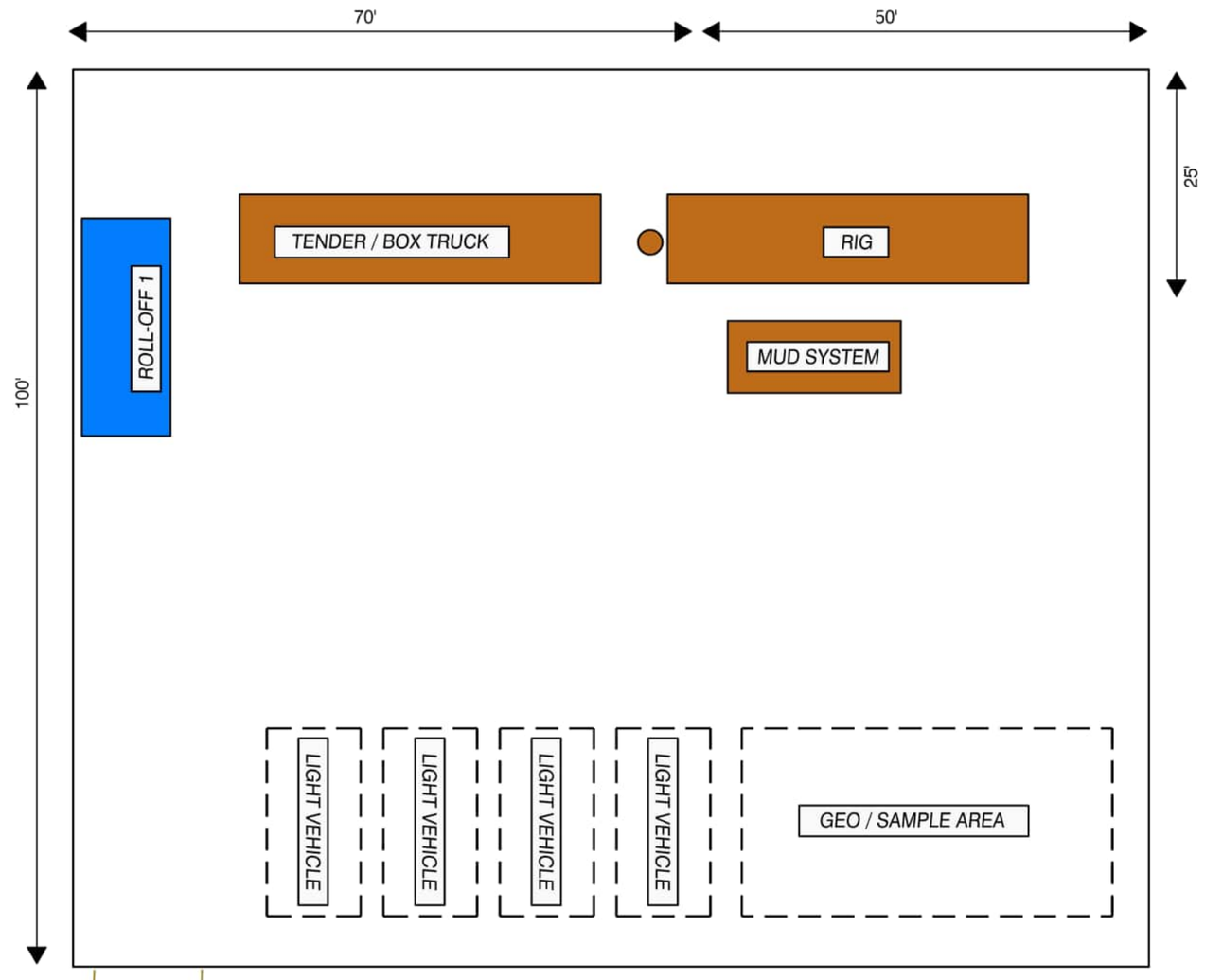
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

SONIC & HQ SET UP - BYPRODUCT MATERIAL NON-ARTESIAN CONDITIONS

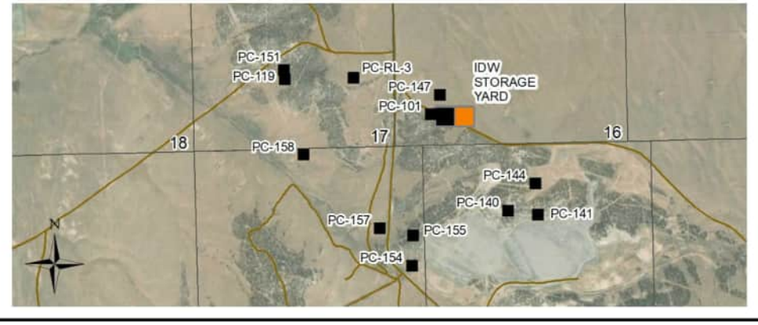
WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings/core are vibrated out into sample bags and provided to the onsite geologist who logs the sample. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Excess sample material is placed in the roll-off bin or super-sack;
3. Slough from sonic core barrel is dropped directly into a super-sack under the drill deck;
4. Solids off the mud system screens are dropped in the super-sack;
5. Drill mud/fluids for HQ coring are pumped into Byproduct designated poly tanks;
6. Transport poly tanks and transfer fluids into the Byproduct liquid storage tanks located in the IDW Storage Yard;
7. Transport super-sacks to the Byproduct area of the IDW Storage Yard and place on pallet inside secondary containment;





DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 9

SONIC & HQ SET UP - BYPRODUCT MATERIAL NON-ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

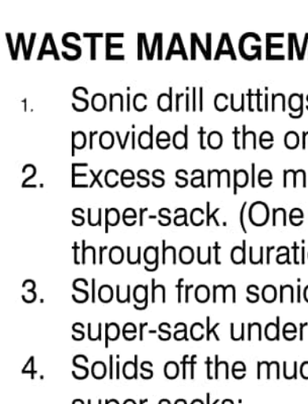
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

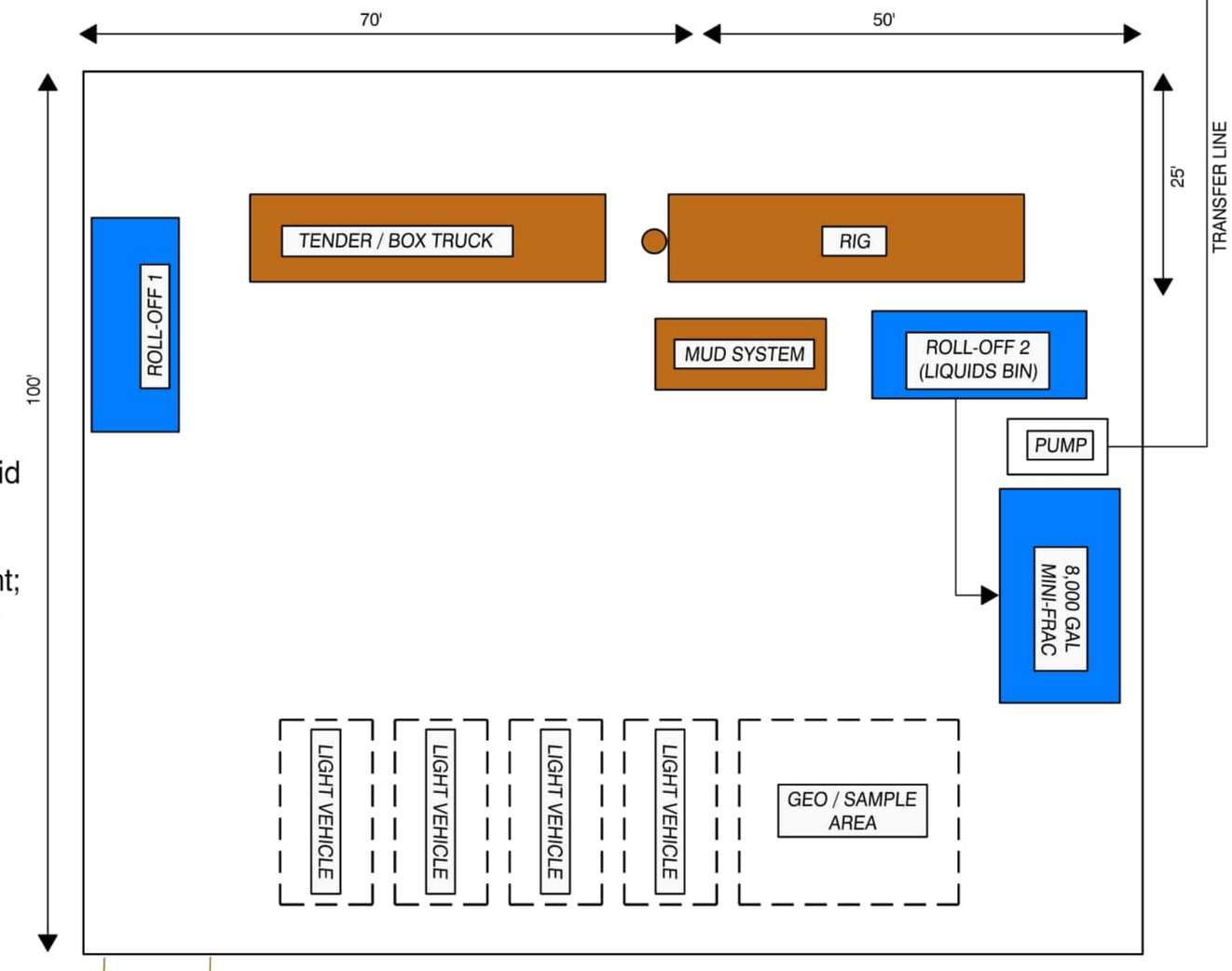
J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

SONIC & HQ SET UP - BYPRODUCT MATERIAL ARTESIAN CONDITIONS

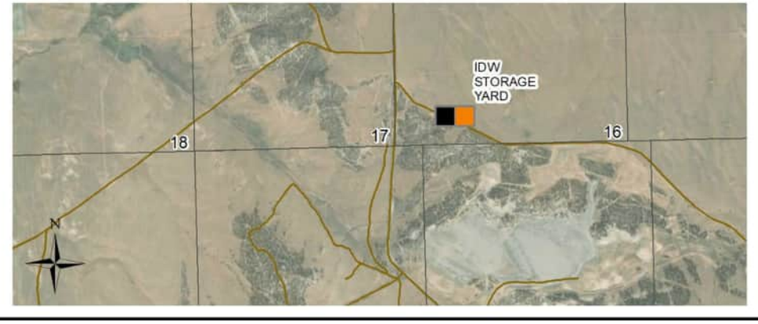
WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings/core are vibrated out into sample bags and provided to the onsite geologist who logs the sample;
2. Excess sample material is placed in the roll-off bin or super-sack. (One super-sack to be positioned under the rig throughout duration of drilling);
3. Slough from sonic core barrel is dropped directly into a super-sack under the drill deck;
4. Solids off the mud system screens are dropped into the super-sacks;
5. Drill mud/fluids for HQ coring are pumped into Byproduct designated poly tanks;
6. Transport poly tanks and transfer fluids into the Byproduct liquid storage tanks located in the IDW Storage Yard;
7. Transport super-sacks to the Byproduct area of the IDW Storage Yard and place on pallet inside secondary containment;
8. If excess water is produced, pump water via the HDPE transfer line into the Byproduct liquid storage tanks located in the frac-tank farm. Pump water only - no drill mud.





DRILLING LOCATION AREA MAP



J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 10

SONIC & HQ SET UP - BYPRODUCT MATERIAL ARTESIAN CONDITIONS

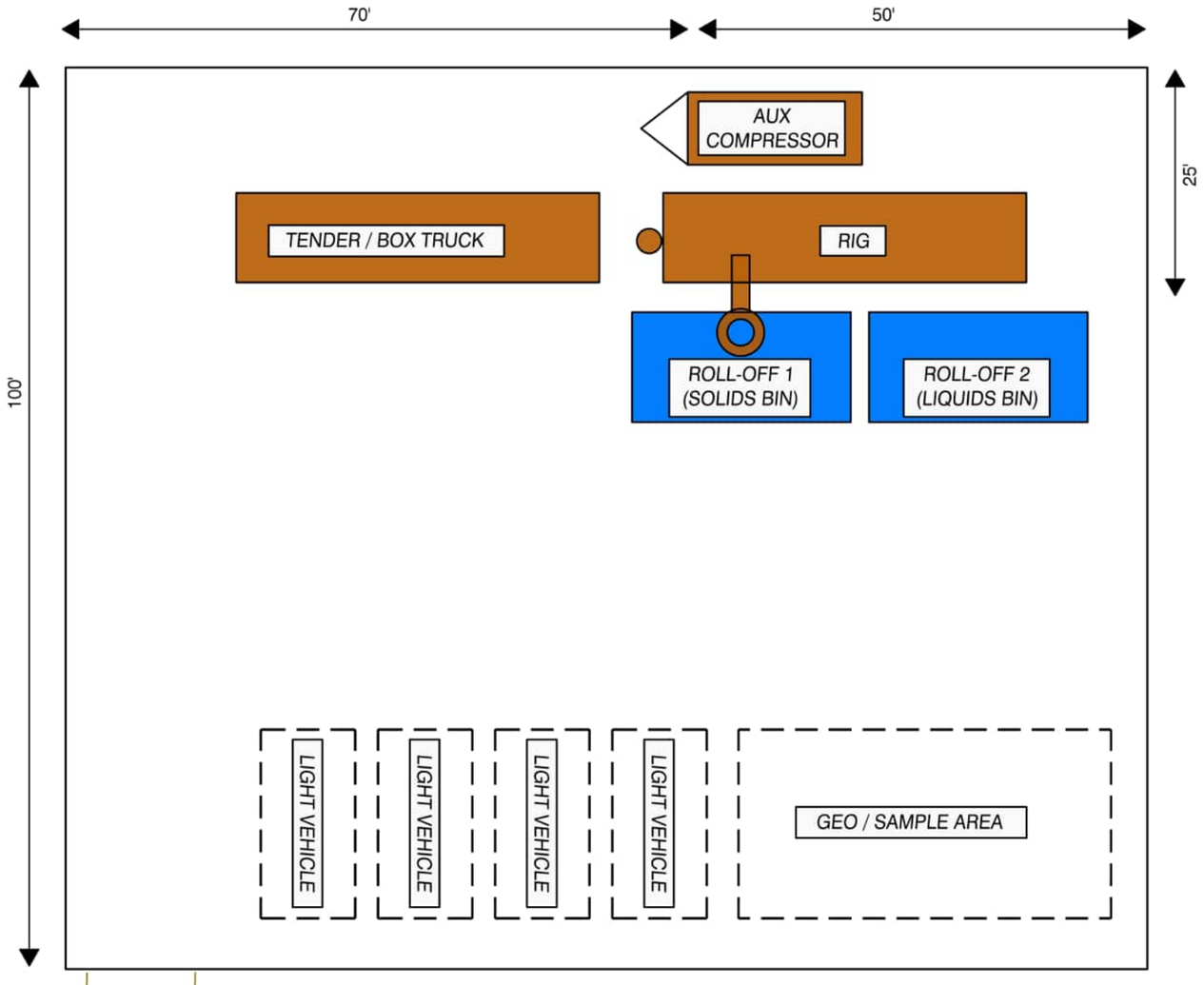
RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

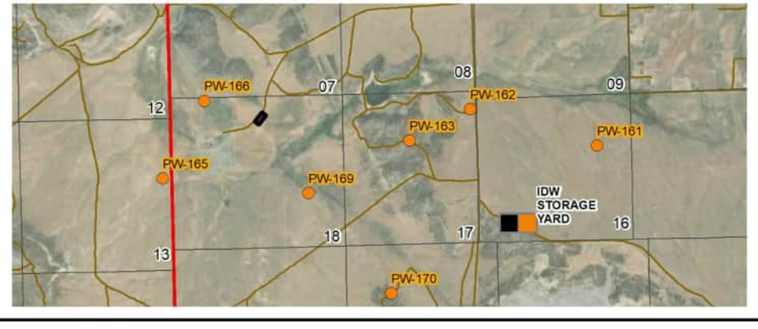
ARCH SET UP - RCRA MATERIAL NON-ARTESIAN CONDITIONS

WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings and fluid (water) is discharged directly into the #1 roll-off bin as shown. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Decant produced water with a transfer pump from roll-off #1 into roll-off #2;
3. Decant/pump water from roll-offs as needed via vacuum truck or poly tanks and haul to IDW storage area;
4. Discharge water into the RCRA liquid storage tanks located in the IDW Storage Yard;
5. When roll-off is half full of solids, remove free liquid and transport to the RCRA area of the IDW Storage Yard;



DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 11

ARCH SET UP - RCRA MATERIAL NON-ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

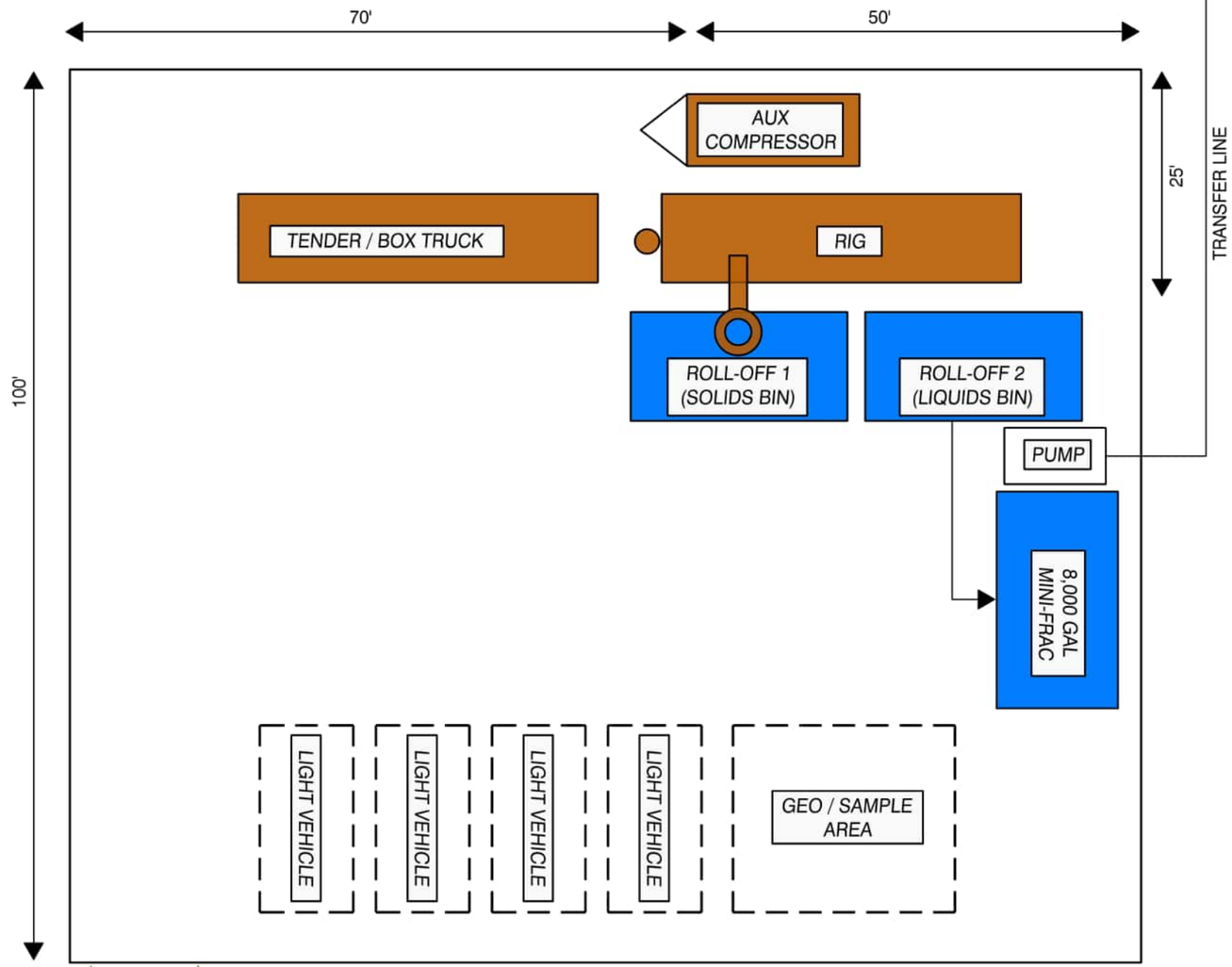
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

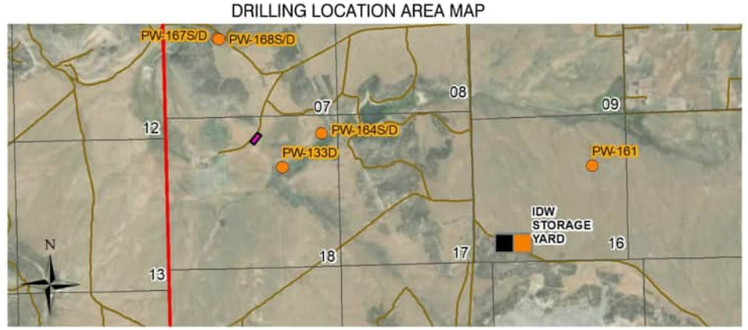
ARCH SET UP – RCRA MATERIAL ARTESIAN CONDITIONS

WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings and fluid (water) is discharged directly into the #1 roll-off bin as shown. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Decant produced water with a transfer pump from roll-off #1 into roll-off #2;
3. Decant/pump water from roll-off #2 into the 8,000 gallon on-pad tank;
4. Pump water via the HDPE transfer line into the RCRA liquid storage tanks located in thefrac-tank farm;
5. Do Not co-mingle RCRA liquids with Byproduct liquids;
6. When roll-off is half full of solids, remove free liquid and transport to the RCRA area of the IDW Storage Yard;
7. Using truck-mounted poly tank designated for RCRA liquids, transfer liquids from the frac-tank farm to the RCRA liquid storage tanks located in the IDW Storage Yard;



DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 12

ARCH SET UP – RCRA MATERIAL ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

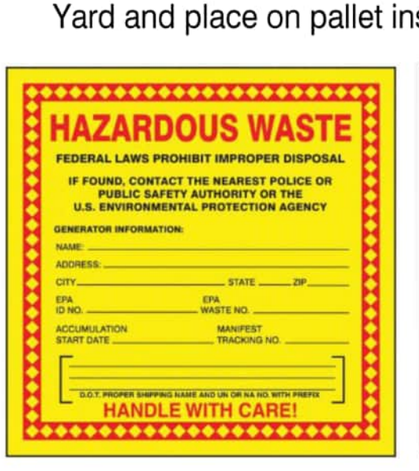
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

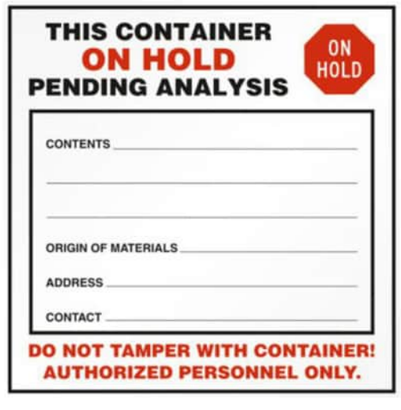
J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

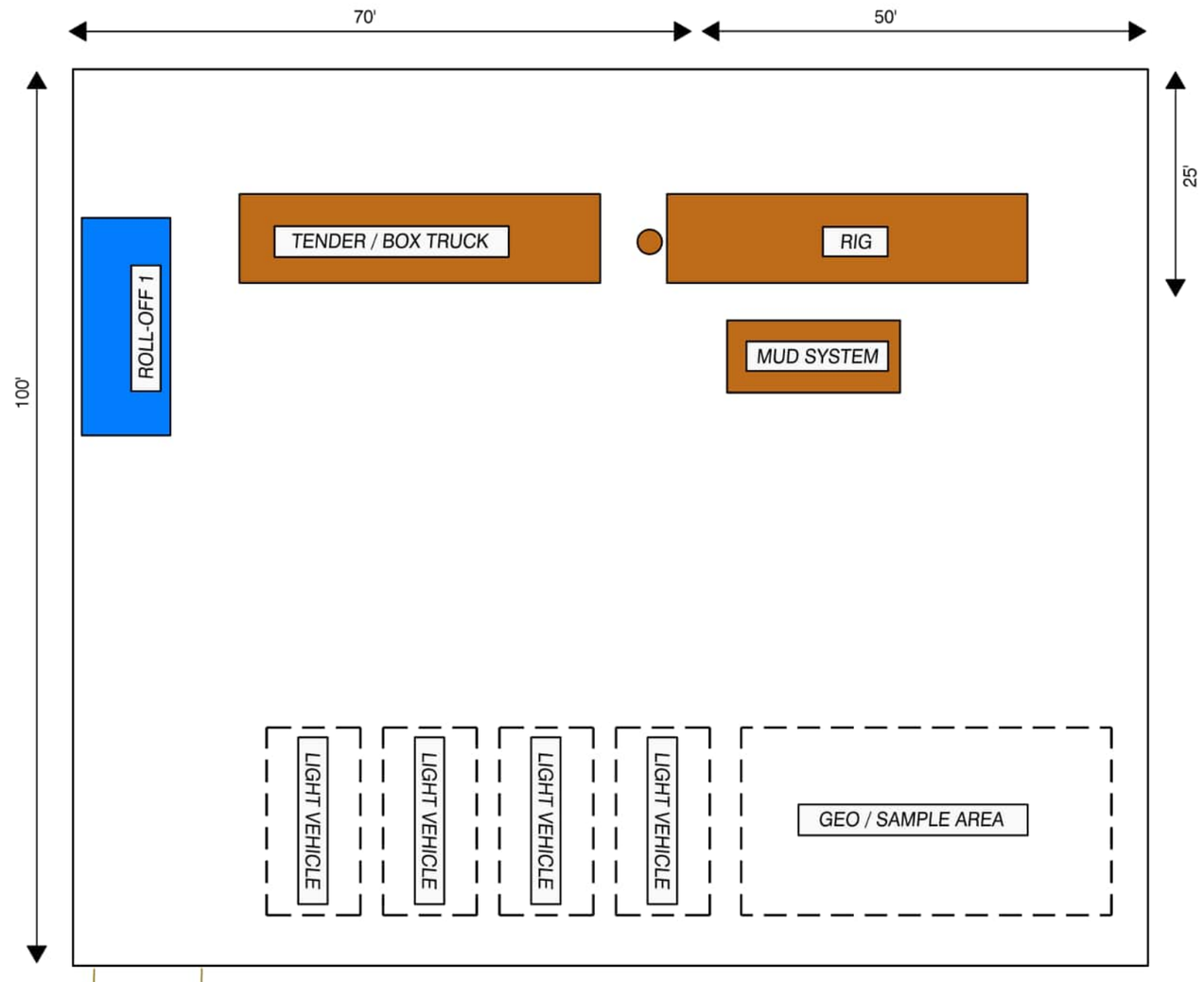
SONIC & HQ SET UP - RCRA MATERIAL NON-ARTESIAN CONDITIONS

WASTE MANAGEMENT PROCEDURE

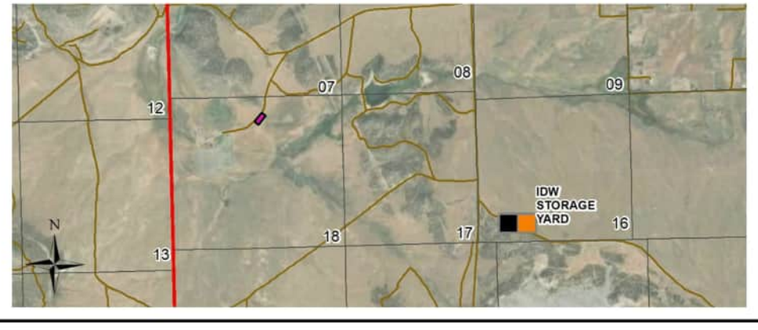
1. Sonic drill cuttings/core are vibrated out into sample bags and provided to the onsite geologist who logs the sample. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Excess sample material is placed in the roll-off bin or super-sack;
3. Slough from sonic core barrel is dropped directly into a super-sack under the drill deck;
4. Solids off the mud system screens are dropped in the super-sack;
5. Drill mud/fluids for HQ coring are pumped into RCRA designated poly tanks;
6. Transport poly tanks and transfer fluids into the RCRA liquid storage tanks located in the IDW Storage Yard;
7. Transport super-sacks to the RCRA area of the IDW Storage Yard and place on pallet inside secondary containment;







DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 13

SONIC & HQ SET UP - RCRA MATERIAL NON-ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

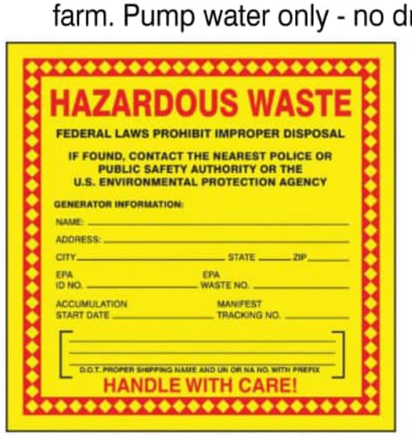
Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

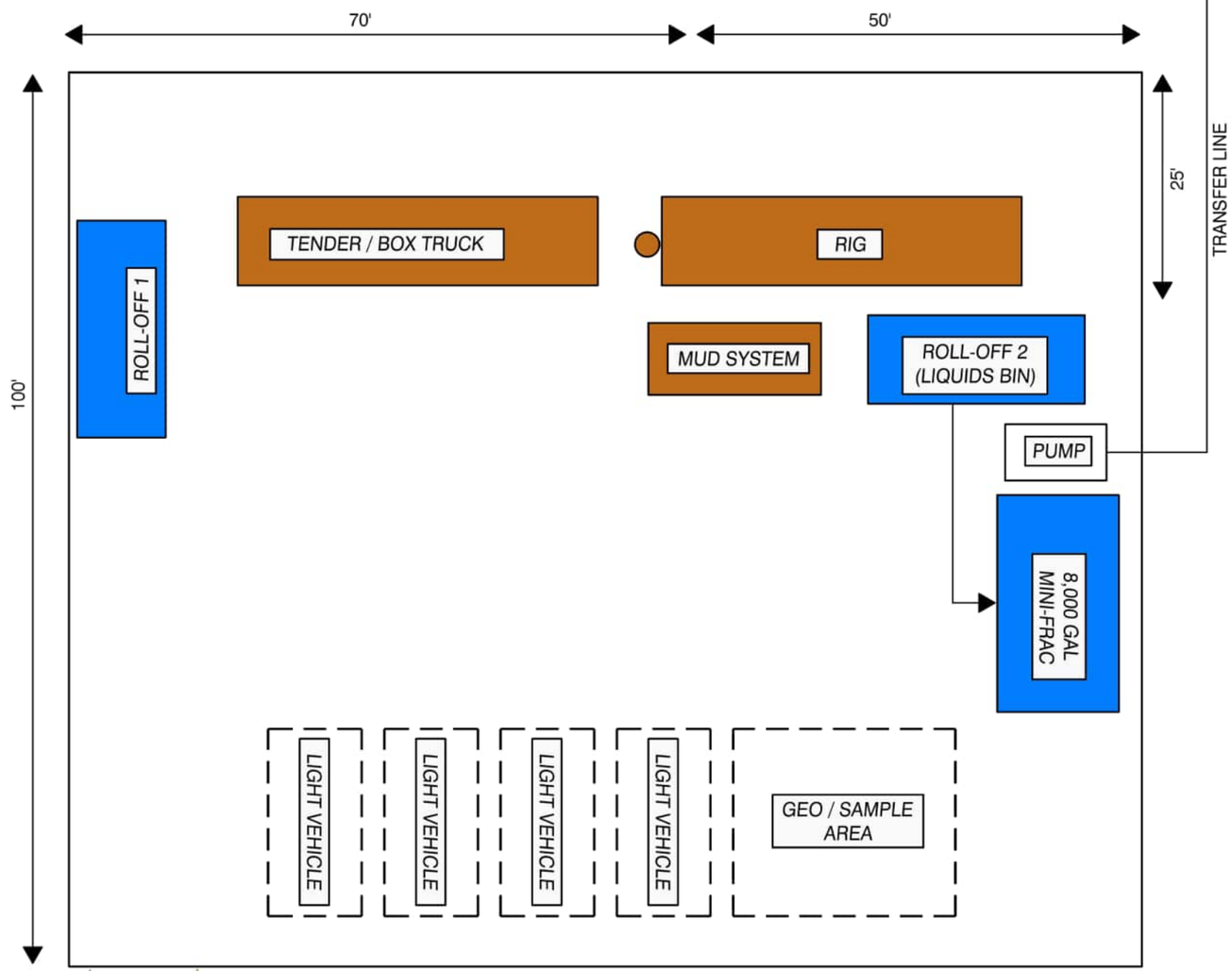
J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

SONIC & HQ SET UP - RCRA MATERIAL ARTESIAN CONDITIONS

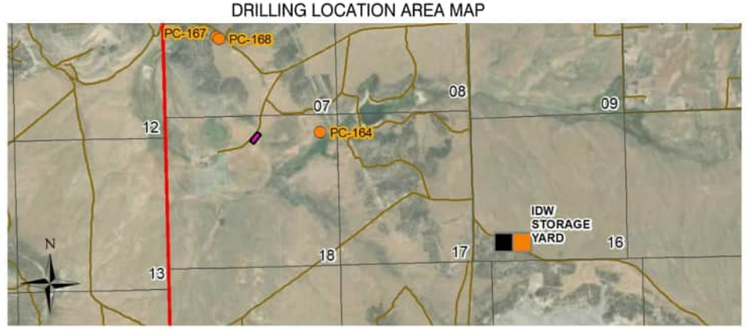
WASTE MANAGEMENT PROCEDURE

1. Sonic drill cuttings/core are vibrated out into sample bags and provided to the onsite geologist who logs the sample. (One super-sack to be positioned under the rig throughout duration of drilling);
2. Excess sample material is placed in the roll-off bin or super-sack;
3. Slough from sonic core barrel is dropped directly into a super-sack under the drill deck;
4. Solids off the mud system screens are dropped into the super-sacks;
5. Drill mud/fluids for HQ coring are pumped into RCRA designated poly tanks;
6. Transport poly tanks and transfer fluids into the RCRA liquid storage tanks located in the IDW Storage Yard;
7. Transport super-sacks to the RCRA area of the IDW Storage Yard and place on pallet inside secondary containment;
8. If excess water is produced, pump water via the HDPE transfer line into the RCRA liquid storage tanks located in the frac-tank farm. Pump water only - no drill mud.





DRILLING LOCATION AREA MAP



Trihydro CORPORATION
1252 Commerce Drive
Laramie, Wyoming 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 14

SONIC & HQ SET UP - RCRA MATERIAL ARTESIAN CONDITIONS

RIO ALGOM MINING, LLC
LISBON VALLEY SITE
SAN JUAN COUNTY, UTAH

Drawn By: DPG	Checked By: AT	Scale: NTS	Date: 8/22/23	FieldOps.dwg

J:\GIS\BHPLisbon\CAAWP_FieldOps\FieldOps.dwg

APPENDIX A

SOP RCRA SOLID WASTE (POTENTIALLY HAZARDOUS) MANAGEMENT

STANDARD OPERATING PROCEDURE FOR
RCRA WASTE (POTENTIALLY HAZARDOUS) MANAGEMENT

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide standard instruction for the 'cradle to grave' handling of unclassified solid waste generated from the Former Lisbon Mill. For this document, unclassified solid waste means any solid waste that could potentially be contaminated with or contain a hazardous waste.

For any Site work that will involve land disturbance, this SOP should be used to assist with completing the waste management information on the RAML US Legacy Assets Disturbance Approval Form (LAX-HS-FRM-00027, e.g., Land Disturbance Form).

2.0 BACKGROUND

The Resource Conservation and Recovery Act (RCRA) is the public law that provides the framework for the proper management of hazardous and non-hazardous solid waste. The United States Environmental Protection Agency (US EPA) has the authority to develop the standards for the management of solid waste from the "cradle to grave". This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The Federal regulations that govern hazardous and non-hazardous waste identification, classification, generation, management, and disposal are found in the United States Code of Federal Regulations (CFR) parts 260 through 273.

Environmental media (e.g., soil, sediments, groundwater, and soil/rock cores) are not inherently a solid or hazardous waste and are not subject to RCRA regulations unless they are contaminated and "contain" hazardous waste, which is known as US EPA's contained in policy (61 CFR 18780, 18783: April 29, 1996).

If an unclassified waste is generated, it should be handled and managed as though it may contain a hazardous waste and the planning and procedural steps of this SOP should be followed.[1]

3.0 PLANNING

The following items should be completed during the planning phase (e.g., prior to mobilization) of land disturbance activities at the Site where the unclassified waste will be, or was, generated.

1. A scope of work and/or a work plan should be prepared for the work to be completed.
2. The RCRA contractor (Trihydro Corporation) will complete a pre-characterization study of the planned waste-generating activities.
3. The RCRA contractor will provide a determination of which waste streams are to be managed as unclassified waste and the estimated quantity (in pounds) of unclassified waste to be generated from the work activities.

   Note: The RCRA contractor should be consulted with any questions or for clarifications needed for the procedures outlined herein.
4. Weekly inspections of waste containers are required when stored on-site, prior to disposal. In the planning phase, consult the RCRA contractor to schedule the weekly inspections of the unclassified waste.

[1] The management and off-Site disposal of RCRA hazardous waste shall be conducted under the direction of the Site Superintendent and in accordance with RAML WMP (Trihydro, 2023).

5. Unclassified waste should be stored in the designated Hazardous Waste Storage Area. In the planning phase, consult with the Site superintendent to confirm the location of the hazardous waste storage area at the Site.
6. If the waste is liquid (e.g., groundwater), a small spill kit should be acquired from the RAML Site Superintendent (e.g., absorbent material) and kept nearby.
7. For all waste-generating activities, obtain adequate containers, labels, equipment, and documentation for the generation and storage of hazardous waste.

4.0 EQUIPMENT

The following are general types of equipment anticipated to be used for this work. Equipment will vary dependent of the size and scope of the work to be completed. Consult the RCRA Contractor and BHP project manager for appropriate waste containers.

1. Containers – types of containers include but are not limited to the following: 55-gallon closed top drums, 1-cubic yard self-standing woven polypropylene super sack, 300-gallon intermediate bulk containers, pop-up style secondary containment.
2. Tools – a 5/16 socket wrench and 5/16 wrench or crescent wrench.
3. Labels – "HAZARDOUS Waste" label & "PENDING ANALYSIS" label.
4. PPE – Nitrile Gloves, high visibility garment, safety glasses, and hard-toe shoes – Level D PPE.
5. Spill Control Equipment – absorbent material.
6. Miscellaneous – Plastic drop sheeting.

5.0 PROCEDURE

The following provides the procedure for unclassified waste generation and handling. All waste generated should be recorded on the waste tracking form included as Attachment 1.

1. Prepare to generate the waste: Minimize the potential for surface impact by laying down plastic sheeting adjacent to and underneath the waste container. Additionally, lay down plastic sheeting around the area where waste-generating activities will occur (e.g., surrounding a drilling location).
2. Ensure containers are in good condition: Visually inspect all containers to ensure no dents, rust, or holes. If the container is damaged in any way – STOP. Replace the container.
3. Complete both a "Pending Analysis" and "Hazardous Waste" label and place them on all containers which will hold the hazardous waste. Consult the RCRA contractor for Hazardous Waste Labeling guidance as needed.

   The "Pending Analysis" label can be left blank, and the hazardous waste label must include generator information including:

   - Name: BHP – Rio Algom Mining Company
   - Address: P.O. Box 218
   - Phone: BHP-RAML, TBD
   - City: Grants

- State: New Mexico
- Zip: 87020
- Accumulation start date: the date the waste was first placed into the container
- The EPA ID number and Manifest Document number can be left blank

4. As waste is generated, take special care to not overspill the container. Containers should be closed following and in between immediate fill to the extent practicable.
5. Once full, containers should be properly closed and tightened. Then, transferred to the designated hazardous waste storage area at the Site.
6. Record the waste on the Waste Tracking Form and submit a scan of the completed form to the RCRA Contractor for record keeping.

The procedure for generating unclassified waste should include careful attention to segregating the waste from all other waste streams at the Site. Never mix different types of waste, waste from different designated areas, or waste from designated areas with waste from undesignated areas and vice versa.

6.0 CHARACTERIZATION

Constituents and parameters pertinent to RCRA waste characterization are chosen based upon generator knowledge of the site and activities, as well as the underlying hydrogeology (e.g., potential for naturally occurring metals present at concentrations greater than RCRA thresholds). The constituents/parameters of interest are subject to change as processes, environmental conditions, and generator knowledge change. The characterization suite is also subject to change with the requirements of the waste facility that will accept the waste (i.e., to meet facility waste acceptance criteria).

For RCRA waste generated during this CAAWP field program, the following constituents/parameters will be quantified to characterize the waste streams:

- Toxicity by: RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)
- Radionuclides of Concern (ROC) [radium-226, thorium-230, and isotopic uranium]

TABLE 1. ANALYTES OF INTEREST AND ASSOCIATED ANALYTICAL METHODS

Analyte	Name	Method Number
RCRA 8 Metals	TCLP Metals	EPA 6010/7470
Uranium	Metals	EPA 6020 (total) / EPA 1311 (leachable)
Lead (Pb) 210*	Metals	Gamma spectroscopy
Thorium isotopics[a]	Alpha spectroscopy	ASTM D3972
Radium-226	Gamma spectroscopy via in-growth of radon decay products	EPA 901.1[b]

[a] Digestion method is hydrofluoric acid digestion (EPA 3052).
[b] Modified method
*Pb 210 is a required analyte from the receiving landfill, not an analyte of interest
ASTM - ASTM International
DOE - U.S. Department of Energy
EML - Environmental Measurements Laboratory
EPA - U.S. Environmental Protection Agency
HASL - Health and Safety Laboratory

This characterization suite is based on the understanding that (1) there is no potential for RCRA F-, K-, U- or P-listed wastes to be present; (2) to exhibit the RCRA characteristics of Reactivity, Ignitability, or Corrosivity; or (3) wastes to exhibit the RCRA characteristic of Toxicity for organic constituents. Additional analyses should be performed if listed wastes or additional characteristics are potentially present.

Characterization sampling will occur when RCRA IDW containers are full and before they are transferred to the laydown yard.

A bailer will be used to collect characterization samples from liquid IDW containers. A composite sample will be collected from containers holding solid IDW, in the following manner to ensure the sample is representative of the waste container as a whole:

- Collect a subsample from four discrete points along the vertical profile of the container holding IDW
- Name the samples: 'Container ID'-COMP-1, -2, -3, -4
- Place samples in cooler for shipment to ACZ Laboratories
- Indicate sample homogenization required on the Chain of Custody

Representative sampling will be performed by dedicated personnel, at the direction of BHP and sent to ACZ Laboratories.

7.0 Criteria for Waste Classification

Analytical results will be compared to the RCRA Toxicity Characteristic Leachate Procedure (TCLP) criteria for waste classification 40 CFR 261 and the Utah Administrative Code R313-19-13(d)(b) for Naturally Occurring Radioactive Material (NORM waste), shown in table and further discussed below.

TABLE 2. RCRA 8 METALS HAZARDOUS WASTE THRESHOLDS TABLE

RCRA Waste Code	RCRA Characteristic	Hazardous Waste Thresholds	
	Toxicity: RCRA 8 Metals*	TLCP (leachable)	TCLPx20 (screening for solid matrix)**
D004	Arsenic	5 mg/L	100 mg/L
D005	Barium	100 mg/L	2000 mg/L
D006	Cadmium	1 mg/L	20 mg/L
D007	Chromium	5 mg/L	100 mg/L
D008	Lead	5 mg/L	100 mg/L
D009	Mercury	0.2 mg/L	4 mg/L
D010	Selenium	1 mg/L	20 mg/L
D011	Silver	5 mg/L	100 mg/L

* Toxicity characteristic thresholds for metals only, does not include organics based on generator knowledge.
** 20xTCLP threshold is used for non-aqueous waste streams to confirm if the TCLP is necessary; total results less than 20xTCLP thresholds indicate that the sample cannot exceed the TCLP based on the 20x method dilution factor. Results greater than 20xTCLP can be used for the generator to apply the RCRA toxicity characteristic for that constituent or to make the decision to release a sample on hold for TCLP with quantification of metals in the leachate.

If any of the RCRA metals exceed their respective TCLP threshold, then the decision can be made to classify the material as RCRA hazardous waste. The "Pending Analysis" label will be removed from the respective container, and the Waste Tracking form updated accordingly. If elevated radionuclide concentrations are evident (above 15 picocuries per gram) and RAML is confident the waste is not byproduct material, then the material will be handled as NORM waste. **Place a "Caution Naturally Occurring Radioactive Material Present" Label on the container.**

Alternatively, if none of the RCRA metals exceed their respective TCLP threshold, the decision can be made to classify the material as non-hazardous waste. The "Pending Analysis" label and the "Hazardous Waste" label will be removed from the respective container, and a "Non-Hazardous" label applied. The waste tracking form will be updated accordingly. The "Non-Hazardous" label must include the same Container ID and Generation date listed on the 'old' labels that are removed from the container. If elevated radionuclide concentrations are evident (above 15 picocuries per gram) and RAML is confident the waste is not byproduct material, then the material will be handled as NORM waste. **Place a "Caution Naturally Occurring Radioactive Material Present" Label on the container.**

8.0 RCRA IDW Disposal

Following characterization of the RCRA waste, the waste profile and appropriate waste manifest(s) for the waste stream(s) will be prepared. Upon approval of the waste manifest (approval from Trihydro & BHP) Trihydro will schedule the disposal of the waste.

Prior to disposal, the waste manifest will be signed by a BHP representative and provided to the Trihydro Site Supervisor. Prior to removal from the Site, Trihydro Site Supervisor will release the container for loading onto the vehicle. Trihydro will confirm the waste manifest accurately describes the waste in accordance with the container ID, that container labels are accurate and securely placed, and that the waste container is loaded onto the disposal vehicle safely. **IDW will not be removed from the Site without release.**

ATTACHMENT 1

WASTE TRACKING FORM

ATTACHMENT 1. WASTE TRACKING FORM

Site: _____

Date	Known Waste Classification			Container	Description of Waste	Type of Waste	Location Waste Generated	Quantity
	11.e(2)	RCRA Haz.	Non-Haz.	ID	(e.g., oil based paint, drill cuttings, laboratory waste, etc.)	(e.g., IDW Soil, Aerosol Can, Oil Filter, etc.)		(e.g., Units, kg, gallons, etc.)

Notes:

- Place an "X" in the known waste classification column if the waste has been previously characterized; if the waste is uncharacterized, leave blank
- For the description be as detailed as possible, make special note of chemicals associated with the waste
- Location of waste includes boring or monitoring well ID numbers and predesignated areas (e.g., borrow area 3)
- Quantity should include enough detail so that a weight in kilograms (kg) can be determined, if the weight in kg is known, use this for quantity

ATTACHMENT 2

EXAMPLE LABEL

THIS CONTAINER
ON HOLD
PENDING ANALYSIS

ON HOLD

CONTENTS _____

_____

_____

ORIGIN OF MATERIALS _____

ADDRESS _____

CONTACT _____

DO NOT TAMPER WITH CONTAINER
AUTHORIZED PERSONNEL ONLY

HAZARDOUS WASTE

FEDERAL AND/OR STATE LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY, THE U.S. ENVIRONMENTAL PROTECTION AGENCY OR THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERATOR INFORMATION:

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

EPA I.D. NO. _____ STATE MANIFEST TRACKING NO. _____

ACCUMULATION START DATE _____ EPA WASTE NO. _____

_____

_____

_____

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

APPENDIX B

WASTE TRACKING FORM

APPENDIX B. WASTE TRACKING FORM

Site Location: **Former Lisbon Mill, San Juan County, Utah**

Field Event: **Corrective Action Assessment Work Plan**

Drill Pad Location: _____

Date	Known Waste Classification				Container ID	Quantity (e.g., Units, kg, gallons, etc.)	Description of Waste (e.g., oil based paint, drill cuttings, laboratory waste, etc.)	Date Transferred to Laydown Yard
	11.e(2)	RCRA Haz.	Non-Haz.	Trash				

Notes:

- Place an "X" in the known waste classification column if the waste has been previously characterized; if the waste is uncharacterized, leave blank
- For the description be as detailed as possible, make special note of chemicals associated with the waste
- Location of waste includes boring or monitoring well ID numbers and predesignated areas (e.g., borrow area 3)
- Quantity should include enough detail so that a weight in kilograms (kg) can be determined, if the weight in kg is known, use this for quantity

Rio Algom Mining LLC

P.O. Box 218, Grants, NM USA 87020 - Tel: 520.719.4167

Attachment D – Sampling and Analysis Plan

Rio Algom Mining LLC

2022 Groundwater Sampling and Analysis Plan

Lisbon Facility
San Juan County, Utah

August 2022

Contents

Acronyms and Abbreviations iv
1 Introduction 1
2 Groundwater Monitoring Program 1
2.1 Monitoring Well Network 1
2.2 Long-Term Groundwater Monitoring Plan Compliance Monitoring Program 2
2.2.1 Monitoring Schedule 2
2.2.2 Groundwater Monitoring Parameters 2
2.2.3 Reporting 3
3 Groundwater Monitoring Procedures 4
3.1 Standard Operating Plan 4
3.2 Groundwater Level Measurement 4
3.3 Groundwater Sample Collection 4
3.3.1 Field Instrument Calibration 4
3.3.2 Groundwater Sampling Methods 5
3.3.2.1 Low-Flow (Minimal Purge), Standard Purge, and Low-Permeability Well Sampling Methods 5
3.3.3 Sample Filtration 5
3.3.4 OW-UT-9 5
3.3.5 Quality Assurance / Quality Control Sampling 6
3.3.5.1 Duplicate Samples 6
3.3.5.2 Laboratory Split Samples 6
3.3.5.3 Equipment Blank Samples 6
3.3.5.4 Rinsate Blank Samples 6
3.3.6 Sample Designation and Labeling 7
3.3.7 Equipment Decontamination Procedures 7
3.4 Sample Control 7
3.4.1 Sample Containers/Sample Handling 7
3.4.2 Sample Custody 7
3.4.3 Packaging and Shipping 8
3.4.4 UN2910 Sample Handling 8
3.5 Laboratory Analysis 8
3.6 Investigation-Derived Waste 9

4 References 10

Tables

Table 1 Monitoring Well List

Table 2 Regulatory Concentration Limits for Compliance Monitoring License Wells

Table 3 Groundwater Monitoring Analytical Methods

Table 4 Groundwater Monitoring Program Schedule

Figure

Figure 1 Site Map

Appendices

Appendix A. ESP-007-LIS Groundwater Sampling Standard Operating Procedure, Lisbon

Appendix B. Groundwater Sampling Field Forms

Appendix C. UN2910 Radionuclide Shipping Standard Operating Procedure

Appendix D. HP-016 DOT Shipping for UN2910 and LSA-1 and CT-009 QC Counts, Function Check and Total Efficiency of a Survey Meter

Acronyms and Abbreviations

ASTM	ASTM International (Formerly American Society for Testing and Materials)
COC	constituent of concern
DO	dissolved oxygen
DRC	Utah Division of Radiation Control
DWMRC	Utah Division of Waste Management and Radiation Control
ft	foot *or* feet
GMP	Groundwater Monitoring Plan (RAML, 2015)
H3	H3 Environmental, LLC
IDW	investigation-derived waste
License	Radioactive Materials License No. UT 1900481
LTGMP	Long-Term Groundwater Monitoring Plan
NTU	nephelometric turbidity units
OOC	Out-of-Compliance
ORP	oxidation reduction potential
POC	Point of Compliance
POE	Point of Exposure
POOC	Probable-Out-of-Compliance
Q4	fourth quarter
QA/QC	quality assurance and quality control
RAML	Rio Algom Mining LLC
RSO	Radiation Safety Officer
SAP	sampling and analysis plan
SOP	standard operating procedure
Site	Lisbon Facility
TDS	total dissolved solids
UN2910	UN2910, Radioactive Materials, Excepted Package – Limited Quantity of Material
US EPA	United States Environmental Protection Agency

1 Introduction

Arcadis has prepared this groundwater sampling and analysis plan (SAP) for groundwater monitoring at the Lisbon Facility (Site) located near La Sal, Utah (Figure 1). This document is for Rio Algom Mining LLC (RAML) and Arcadis internal use and is based on the Groundwater Monitoring Plan (GMP) Version 2.0 submitted to the Utah Division of Waste Management and Radiation Control (DWMRC) dated July 31, 2015. This document is nearly identical to the GMP Version 2.0; the difference between this document and the GMP Version 2.0 is that this SAP includes guidance for sampling 48 "non-License" hydrogeology wells in addition to the 14 License wells addressed in the GMP Version 2.0 that are listed in the Site's Radioactive Materials License (License No. UT1900481 [License]). This SAP for all Lisbon Site wells serves as the statement of work for the sampling events of 2020 and subsequent years and will be modified as warranted to apply to new wells installed on or in the Site vicinity for the purposes of groundwater monitoring. This SAP will be reviewed annually at the end of the calendar year and updated as needed.

Groundwater monitoring is currently conducted at the Site to meet the requirements of DWMRC Radioactive Materials License #UT1900481, Amendment 7 Condition 29 (License) (DWMRC, 2021). The License and the GMP require quarterly water level measurements and, at a minimum, annual groundwater sampling from the License wells. Any License wells that exceed the compliance limits set in the License may require quarterly or monthly groundwater sampling as approved by the DWMRC. This SAP provides guidance for the biannual groundwater sampling of the 14 License wells and the 48 "non-License" hydrogeology wells. The hydrogeology wells are monitored as part of an ongoing characterization of the lateral and vertical extent of impacted groundwater in the area.

Depth to water measurements and groundwater samples, if sufficient water is present (i.e., >2 feet), are obtained from the 62 monitoring wells in accordance with the License requirements and Site characterization project. The primary constituent of concern (COC) identified at the Site is uranium. Other COCs include molybdenum, selenium, and arsenic. Additional analytes monitored at the Site are described below in Section 3.5.

This SAP has been prepared to provide details on the Site sampling programs and quality assurance and quality control (QA/QC) procedures for all of the Lisbon Site wells.

2 Groundwater Monitoring Program

The following sections describe the monitoring well network and summarize the groundwater monitoring program for all Lisbon Site wells.

2.1 Monitoring Well Network

There are 14 License wells and 48 "non-License" hydrogeology wells on and near the Site. Figure 1 shows the locations of these monitoring wells. Construction details for the monitoring wells are summarized in Table 1.

2.2 Long-Term Groundwater Monitoring Plan Compliance Monitoring Program

Fourteen monitoring wells are currently sampled in accordance with the Long-Term Groundwater Monitoring Plan (LTGMP, Appendix A of the GMP). These wells are designated as compliance monitoring wells in accordance with the License ("License wells"):

- Point of Compliance (POC) wells: EF-3A and OW-UT-9
- Point of Exposure (POE) wells: RL-4, RL-5, and RL 6
- Trend wells: EF-6, EF 8, ML-1, RL-1, RL-3, H-63, and LW-1
- Background wells: MW-5 and MW 13

The License stipulates compliance limits as the enforceable groundwater protection standards (concentration limits) for these 14 License wells. The compliance designation for each well and respective compliance limits are provided in Table 2. Table 3 presents the analytical methods for the groundwater samples collected within the License compliance and hydrogeology study programs.

2.2.1 Monitoring Schedule

The combined License compliance monitoring and hydrogeology study monitoring event will be conducted during the fourth calendar quarter (Q4) of each year. The monitoring event is expected to take approximately two weeks to complete and will be conducted by Arcadis personnel. Biannually, during Q2 and Q4 of the year, all Site wells are sampled. During the Q1 and Q3 quarterly groundwater sampling events, any out-of-compliance wells (OOC), probable out-of-compliance wells (POOC), and new wells are sampled. New wells are sampled quarterly for 8 sample events and then sampling is reduced to semi-annual. Table 4 presents the monitoring schedule for the License wells and the hydrogeology wells. Note, that this monitoring schedule may change if detections of COCs are greater than the compliance limits set for the corresponding wells, see Table 2. OOC conditions were detected in RL-3 in 2020. Monthly sampling started in September 2020 and continue as approved in a letter from DWMRC dated July 23, 2020.

2.2.2 Groundwater Monitoring Parameters

As specified in the LTGMP, compliance groundwater monitoring includes depth to water level measurement and groundwater sampling. In accordance with the License, groundwater samples will be analyzed for the COCs uranium, molybdenum, selenium, and arsenic, and indicator parameters including total dissolved solids (TDS), chloride, sulfate, bicarbonate, and pH. Additional parameters have been added to the groundwater sampling analyte list to aid in geochemical analysis of the Site groundwater (Table 3). Table 3 lists the sampling analytes, methods, holding times, and sample container requirements. Groundwater quality indicator parameters monitored in the field include temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity. Indicator parameter stabilization criteria are provided in the groundwater sampling standard operating procedure (SOP) provided in Appendix A. Drawdown of the water column in the well will also be monitored during the pre-sampling purge, as described in Appendix A.

2.2.3 Reporting

A report summarizing the sampling event results for the License wells will be prepared for delivery to DWMRC in accordance with the GMP. Results from sampling all Lisbon Site wells are included in the hydrological site assessment analyses and reports.

3 Groundwater Monitoring Procedures

Groundwater monitoring will be performed by qualified and trained personnel. Procedures for data acquisition QA/QC, groundwater level measurement, groundwater sampling and analysis, and sample control are described in the following sections.

3.1 Standard Operating Plan

Groundwater sampling and analysis will be conducted in accordance with the Groundwater Sampling SOP prepared for this SAP (Appendix A). The SOP describes the personnel responsible for data collection and establishes the sampling and analytical protocols and documentation requirements to ensure the groundwater monitoring data are collected and reviewed in a consistent manner. The SOP includes data quality objectives for data measurement, sampling procedures, sample and document custody procedures, internal quality control checks, data review and reporting procedures, and corrective action procedures.

QA/QC procedures will be conducted in the field and laboratory. Field procedures will include field documentation, unique number sample labeling, and collection of quality control samples including sample duplicates, split samples, sampling equipment blanks, and rinsate blanks. Field QA/QC procedures will be conducted in accordance with the SOP.

3.2 Groundwater Level Measurement

During each monitoring event, manual depth-to-water measurements will be obtained from wells designated in the program using a decontaminated electronic water level indicator. Water levels will be measured to the nearest 0.01-foot (ft) from the designated measuring point marked on the top of the well casing. Measurements will be recorded immediately on a water level field data sheet (Appendix B). Water level measurements will be obtained in as short a period of time as practical. Standard operating procedures for water level measurement are provided in Appendix A.

3.3 Groundwater Sample Collection

The following sections provide the procedures to be utilized during the collection of groundwater samples from monitoring wells.

3.3.1 Field Instrument Calibration

At the beginning of each day of sampling, field instruments will be calibrated following manufacturer's recommended procedures using known, standard solutions and as defined in Appendix A. Calibration procedures, date, and time will be recorded on field instrument calibration data sheets (Appendix B). Back-up instruments will be available in case of malfunction. Instrument maintenance will be performed as deemed appropriate by the manufacturer.

3.3.2 Groundwater Sampling Methods

The low-flow minimal purge method is the recommended method of sampling for License wells and the Site characterization “non-License” hydrogeology wells. The low-flow method has been approved by the DWMRC (DWMRC, 2015) as long as the appropriate pumping rates, drawdown stabilization, and field parameter stabilization criteria are followed (ASTM, 2002). However, RAML will implement the standard purge method or the low-permeability well method if the low-flow sampling criteria cannot be met (Appendix A). For artesian well MW-134D, a minimum of 1.2 casing volumes will be purged prior to sample collection. Details of the artesian sampling procedure are presented in Appendix A, Section 7.4. Sampling information will be recorded on field sampling data sheets (Appendix B). General procedures for recommended sample methods are described in the following sections. Standard operating procedures for sampling methods are provided in Appendix A.

3.3.2.1 Low-Flow (Minimal Purge), Standard Purge, and Low-Permeability Well Sampling Methods

When the low-flow method is used, groundwater samples will be collected in general accordance with the United States Environmental Protection Agency (US EPA) *Low-Flow (Minimal Drawdown) Ground-Water Monitoring Procedures (Puls and Barcelona, 1996)* and *Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations, Designation D 6771-02* (ASTM, 2002). A submersible pump will be placed at the midpoint of the well screen interval. Wells will be purged through disposable tubing at rates less than 500 milliliters per minute to minimize water level drawdown. During purging, field parameters (pH, specific conductance, temperature, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity) will be monitored through a flow-through cell and recorded on field sampling data sheets at 3 minute intervals. With stable water levels in the well, groundwater samples will be collected after field parameters have stabilized within ±0.1 standard units for pH, ±3 percent for specific conductance and temperature, ±10 millivolts for ORP, ±10 percent for DO, and ±10 percent or ± 1 nephelometric turbidity units (NTU) when <10 NTU for turbidity. These stabilization criteria are also presented in Appendix A.

The standard-purge method may be employed if the low-flow criteria cannot be met. Likewise, some wells may contain such small amounts of water or low recharge rates that the low-permeability purging and sampling method may be used. Please see Appendix A for a description of each of these methods.

3.3.3 Sample Filtration

Samples collected for dissolved parameters will be field-filtered using a disposable, in-line, 0.45-micron filter. Water samples will be pumped through the filter attached directly to the discharge tubing of the groundwater pumping system. A new filter and tubing will be used for each sample.

3.3.4 OW-UT-9

Point of compliance well OW-UT-9 is highly alkaline and reacts with the preservatives in the sample bottles, therefore a modified approach consistent with EPA and ASTM guidelines may be followed. Water from OW-UT-9 will be field filtered and may be collected into an unpreserved bottle or ample room will be left in the bottle to accommodate reaction between the sample and preservative. If preservative is added to the sample bottles collected from OW-UT-9, the lids and bottles must be checked prior to packing for shipping. Samples from OW-

UT-9 will be shipped priority overnight the same day they are collected, and the laboratory will be instructed to check the sample pH upon receipt and add preservative, if necessary, under a fume hood prior to analysis.

3.3.5 Quality Assurance / Quality Control Sampling

Quality assurance and quality control (QA/QC) sampling will be conducted in accordance with the SOP for the Site (Appendix A). QA/QC samples will consist of duplicate samples, split samples, equipment blanks and rinsate blanks. QA/QC samples will be clearly identified on the field sampling forms.

3.3.5.1 Duplicate Samples

Duplicate groundwater samples will be collected at a frequency of 10 percent of the total number of groundwater samples collected during quarterly or semiannual events. Specific locations will be designated for collection of duplicate samples prior to the beginning of sample collection. The duplicate samples will be collected at the same locations as the corresponding primary samples and will be collected simultaneously using identical sampling techniques. Duplicate samples will be treated in an identical manner as the primary samples during storage, transportation, and analysis. The duplicate sample containers will be assigned an identification number in the field so that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis.

3.3.5.2 Laboratory Split Samples

Laboratory split groundwater samples will be collected at a frequency of 5 percent of the total number of primary groundwater samples collected during semiannual events. At each location, a second set of sample containers will be filled and submitted to a different laboratory. The split samples will be submitted for equivalent analysis as the primary sample.

3.3.5.3 Equipment Blank Samples

To assess the effectiveness of equipment decontamination procedures, equipment blanks will be collected at a frequency of 5 percent of the total number of primary groundwater samples collected during semiannual events. Equipment blanks will be prepared by pouring or pumping reagent-grade de-ionized water over or through sampling devices after decontamination procedures have been conducted. The water will be collected and transported to the laboratory for the equivalent analysis as the primary samples.

3.3.5.4 Rinsate Blank Samples

A rinsate blank is collected if distilled water is being used for decontamination. A rinsate sample is collected in the sample container of the water used for the equipment blank. The rinsate blank shall be analyzed for the same analysis as the primary sample and the equipment blank sample. If an analyte is detected in the equipment blank and in the rinsate blank, the rinsate used for the equipment blank was the source, not contaminated equipment.

3.3.6 Sample Designation and Labeling

All groundwater samples collected from monitoring wells, including duplicate samples, will be given a unique blind sample identifier number. Sample identifiers will be recorded on field sampling data sheets. Sample containers and chain of custody will be labeled with the sample identifier, data and time of sampling, and sampler's initials.

3.3.7 Equipment Decontamination Procedures

Before use at each location, the submersible pumps and depth-to-water sensors that are used in multiple wells will be washed using a solution of water and Liqui Nox™, rinsed with potable water, and rinsed a second time with distilled/deionized water. Disposable polyethylene tubing will be discarded after each well is sampled and replaced with new tubing. Samplers will use new, disposable gloves at each well location. Decontamination is not required for pumps and tubing dedicated to a single well.

3.4 Sample Control

3.4.1 Sample Containers/Sample Handling

The sample containers will be prepared and provided by the analytical laboratory. Samples will be preserved consistent with conditions presented in Table 3. The type and size of container used for each parameter and the type of preservative added, if any, will be recorded on the field sampling data form. Sample containers will be placed in an ice-filled cooler immediately after sample collection. The sample containers will be kept closed and kept cold until analysis. Maximum holding times from the time of sample collection until sample analysis are provided in Table 3.

3.4.2 Sample Custody

At the end of each sampling day and before samples are transferred offsite, sample information will be documented on the chain-of-custody/laboratory analysis request form. Once samples are collected, any samples needing to go through the proper UN2910 procedure before being transported from the sampling location will do so (see Section 3.4.4 below). All samples will be stored in a secure room and / or will remain in the custody of the sampler or other authorized personnel until shipped to the laboratory. Upon transfer of sample possession to subsequent custodians, the persons transferring custody will sign the chain-of-custody form. During interstate transport, the chain-of-custody form will be placed in a resealable plastic bag and accompany each sample cooler to the laboratory. Signed and dated chain-of-custody seals will be placed on coolers prior to shipping. When the samples are received at the laboratory, the custody seal on the shipping container will be broken, and the condition of the samples will be recorded by the laboratory custodian. Chain-of-custody records will be included in the analytical report prepared by each laboratory.

The laboratory will also maintain a sample-tracking record that will follow each sample through the laboratory process. The sample-tracking record must show the dates of sample extraction or preparation and sample analysis.

3.4.3 Packaging and Shipping

Samples will be shipped to the analytical laboratory by overnight or two-day delivery. Samples will be packaged and shipped using the following procedures:

- Sample containers will be placed in resealable plastic bags in sealed, insulated coolers. A sufficient amount of ice will be placed around the samples.
- If used, glass bottles will be separated in the shipping container by shock-absorbent packaging material to prevent breakage.
- Sample shipments will be accompanied by chain-of-custody/laboratory analysis request forms, which will be sealed in plastic bags and taped to the inside lid of each cooler.

3.4.4 UN2910 Sample Handling

The samples from certain wells and lysimeters installed on the tailings impoundments may have radionuclide concentrations or activities that require the samples to be classified and transported as UN2910, Radioactive Materials, Excepted Package – Limited Quantity of Material (UN2910). The Lisbon Site Radiation Safety Officer (RSO), Mike Schierman of H3 Environmental, LLC (H3), will determine which samples must be transported as UN2910 material. As of March 2020, five wells; OW-UT-9, MW-102, MW-101, RL-1, and RL-3; and any tailings water sample are classified as UN2910 material.

UN2910 classified samples cannot be transported across the public county road, Lisbon Valley Road, until they have been packaged and scanned following the standard operating procedure for shipping UN2910 material provided in Appendix C and the procedure outlined in HP-016 provided in Appendix D.

3.5 Laboratory Analysis

Groundwater samples will be submitted for hydrochemical analysis to analytical laboratories certified by the State of Utah. Laboratory analyses will be performed using US EPA-approved methods. Samples collected during each sampling event will be analyzed for the following parameters:

- Metals by US EPA Methods 200.7 or 200.8, as necessary to achieve appropriate sensitivity
- License-required analytes include uranium, molybdenum, selenium, arsenic (DWMRC, 2017)

Additional analytes included in the hydrogeologic study are:

- Aluminum, beryllium, boron, copper, cadmium, cobalt, iron, lead, zinc, calcium, magnesium, manganese, nickel, phosphorus, potassium, silicon, sodium, strontium, thallium, and vanadium by US EPA Methods 200.7 or 200.8
- TDS by Standard Method A2540 C
- Chloride, Bromide, and sulfate by US EPA Method 300.0
- Combined analysis of total Nitrite-N and Nitrate-N by method 353.2
- Total alkalinity, bicarbonate alkalinity, carbonate alkalinity, and hydroxide alkalinity by Standard Method A2320 B
- pH by Standard Method A4500-HB
- Specific conductance by Standard Method A2510 B

- Dissolved Organic Carbon by method A5310 C
-
- Fluoride analysis by method A4500-F C
- Lead 210, Radium 226, Radium 228, and Isotopic Thorium by E909.0, E903.0, RA-05 and A7500-U C methods, respectively.

Methods for all analyses are summarized in Table 3. Other analyses may be conducted for characterization purposes. The methods listed above are current as of the publication of this SAP; however, alternate methods may be used for any other analyses under the conditions that they are US EPA-approved, are adequately sensitive to meet detection limit and regulatory requirements and are appropriate for use in this setting.

Laboratory QA/QC procedures will be conducted in accordance with the SOP (Appendix A). Laboratory QA/QC procedures will include completion of laboratory performance criteria including sample holding times, matrix spike/matrix spike duplicate recoveries, and laboratory method blank analysis.

3.6 Investigation-Derived Waste

Purge water and equipment decontamination water generated during groundwater sampling activities will be considered liquid investigation-derived waste (IDW). Purge and decontamination water will be transported to a secured container on the RAML property and temporarily stored on-site. Three (3) temporary liquid IDW storage containers are located on the lower tailing impoundment next to the weather station and a separate storage tank for MW-134D purge water is in the storage area. The three temporary liquid IDW storage containers are staged to accept a specific category of liquid IDW; “11e2 liquid IDW,” “RCRA hazardous liquid IDW,” and “RCRA nonhazardous liquid IDW.” Table 1 provides guidance for how the purge water should be categorized and which temporary liquid IDW storage container it should be disposed into. Liquid IDW is allowed to evaporate. All purge water collected from MW-134D is stored in a frac tank in the storage area. Any liquid IDW that does not evaporate will be transported and properly disposed at an appropriate facility following receipt of laboratory analytical results and disposal characterization. A RAML representative will sign and retain copies of all transport and disposal manifests.

All solid IDW that must be thrown away (including used filters, tubing, gloves, and any other material that comes into contact with the purge and decontamination water that is labeled as “11e2”) are contained in separate trash bags marked with “potential 11e2 waste” labels or in prelabeled waste drums. All potential 11e2 waste trash bags and drum waste will be temporarily stored on-site near the “11e2 liquid IDW” waste tank until the Site RSO can scan the refuse and dispose of it appropriately. All non-11e2 solid IDW must be bagged, removed from the site, and disposed of at any nearby landfill.

4 References

ASTM International. 2002. Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations, Designation D 6771-02.

Puls, R. W. and Barcelona, M. J. 1996. Low-Flow (Minimal Drawdown) Ground-Water Monitoring Procedures, EPA/540/S-95/504, April 1996.

Utah Department of Environmental Quality, Division of Radiation Control (DRC). 2011. Letter from Rusty Lundberg of the Utah Radiation Control Board to Chuck Wentz of the State of Utah Department of Environmental Quality, Division of Radiation Control, RE: Rio Algom Mining L.L.C. August 17, 2010, Lisbon Operation, 1st Half 2010, Groundwater Stability Monitoring Report, Received by DRC August 25, 2010, Radioactive Materials License No. 1900481, Amendment 3: DRC Notice of Enforcement Discretion and Confirmatory Action Letter, dated February 7, 2011.

Utah Division of Waste Management and Radiation Control (DWMRC). 2015. Letter from Mr. Scott T. Anderson, Director, DWMRC, to Mr. Anthony Baus, Site Manager, Rio Algom Mining, LLC, RE: Rio Algom Mining – Lisbon Facility, Groundwater Monitoring Plan Version 2.0, Radioactive Material License Number UT 1900481, dated August 19, 2015.

_____. 2021. Utah Department of Environmental Quality, Division of Radiation Control Radioactive Material License UT 1900481, Amendment 7, Rio Algom Mining LLC, August 18, 2021.

Tables

Table 1
Monitoring Well List
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Type	Well Name	Notes	Well Dia. (in)	TD (ft btoc)	Oct 2021 DTW (ft btoc)	Jan 2022 DTW (ft btoc)	Ded. Pump	Pump Intake (ft btoc)	Top Screen (ft btoc)	Base Screen (ft btoc)	Screen Length (ft)	Liquid IDW Category		
												11e2	RCRA Hazardous	RCRA Non-hazardous
License	EF-3A	POC	6	215	79	--	Yes	182.5	150	215	65	X	--	--
License	OW-UT-9	POC, Quarterly	6	141.72	123.7	124.1	Yes	130.9	118	138	20	X	--	--
License	RL-4	POE	5	178	156.19	--	Yes	166.6	137	177	40	X	--	--
License	RL-5	POE	5	186	152.08	--	Yes	169.5	150	187	37	X	--	--
License	RL-6	POE	5	20	12.8	--	No	15.9	9	19	10	X	--	--
License	EF-6	Trend	4	137	68.21	--	Yes	120	105	135	30	X	--	--
License	EF-8	Trend, Quarterly	5	244.2	70.84	71.8	Yes	227	212	242	30	X	--	--
License	ML-1	Trend	4	157	41.96	--	Yes	147	137	157	20	X	--	--
License	RL-1	Trend, Quarterly	6	123.6	116.1	116.51	Yes	120.1	104	124	20	X	--	--
License	RL-3	Trend, Quarterly	5	184.7	170.5	170.89	Yes	176.8	163	183	20	X	--	--
License	H-63	Trend	5	172	135.72	--	Yes	155	140	170	30	X	--	--
License	LW-1	Trend	5	233	149.29	--	Yes	218	203	233	30	X	--	--
License	MW-13	Background	4	208.45	93.89	--	Yes	160.0	125	195	70	X	--	--
License	MW-5	Background	6	197	155.73	--	Yes	182.0	167	197	30	X	--	--
Monitoring	UW-1	--	4	140	105.31	--	No	122.7	103	140	37	--	--	X
Monitoring	MW-100	--	4	203	149.94	--	Yes	176.5	138	203	65	--	--	X
Monitoring	MW-101	--	4	159	151.76	--	Yes	155.4	139	159	20	X	--	--
Monitoring	MW-102	--	4	136	125.68	--	Yes	130.8	116	136	20	X	--	--
Monitoring	MW-102DB	--	4	175	119.91	--	Yes	160	145	175	30	--	--	X
Monitoring	MW-103	--	4	111.5	83.08	--	Yes	97.3	81.5	111.5	30	X	--	--
Monitoring	MW-104	Dewater, sample after recovery	4	108	94.58	--	No	96.3	68	98	30	X	--	--
Monitoring	MW-105	--	4	135	73.41	--	Yes	103.5	65	135	70	--	--	X
Monitoring	MW-106	Dewater, sample after recovery	4	267	226.17	--	No	250	235	265	30	--	--	X
Monitoring	MW-107S	--	4	61.18	49.92	--	Yes	55.4	31	61	30	--	--	X
Monitoring	MW-107D	--	4	81.7	50.08	--	Yes	71	61	81	20	--	--	X

Table 1
Monitoring Well List
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Type	Well Name	Notes	Well Dia. (in)	TD (ft btoc)	Oct 2021 DTW (ft btoc)	Jan 2022 DTW (ft btoc)	Ded. Pump	Pump Intake (ft btoc)	Top Screen (ft btoc)	Base Screen (ft btoc)	Screen Length (ft)	Liquid IDW Category		
												11e2	RCRA Hazardous	RCRA Non-hazardous
Monitoring	MW-108	--	4	169.6	23.17	--	Yes	128	88	168	80	--	--	X
Monitoring	MW-109	Dewater, sample after recovery	4	155.7	136.44	--	No	145.72	125	155	30	X	--	--
Monitoring	MW-110	Dewater, sample after recovery	4	142	131.56	--	No	135.8	100	140	40	--	--	X
Monitoring	MW-111	Dewater, sample after recovery	4	125.85	80.1	--	No	102.6	75	125	50	--	--	X
Monitoring	MW-112	--	4	141.8	43.67	--	Yes	91.1	35	140	105	--	--	X
Monitoring	MW-113	--	4	104.45	65.13	--	Yes	83.9	58	103	45	X	--	--
Monitoring	MW-114	--	4	199	55.14	--	Yes	126.8	49	199	150	--	--	X
Monitoring	MW-115S	--	4	126.9	72.63	--	Yes	98.8	61	126	65	X	--	--
Monitoring	MW-115M	--	4	217	72.54	--	Yes	170	125	215	90	X	--	--
Monitoring	MW-116	--	4	124	81.2	--	Yes	114	104	124	20	--	X	--
Monitoring	MW-117S	--	4	126.7	80.02	--	Yes	102.2	71	126	55	X	--	--
Monitoring	MW-117M	--	4	151.4	80.44	--	Yes	137.5	125	150	25	X	--	--
Monitoring	MW-118	--	4	66.4	12.2	--	Yes	38.6	10	65	55	--	--	X
Monitoring	MW-119	Dewater, sample after recovery	4	90	70.3	--	No	72.2	54	74	20	X	--	--
Monitoring	MW-120	--	4	246.9	126.05	--	Yes	185.5	116	246	130	--	--	X
Monitoring	MW-121	Previously Dry, Sample if sufficient water	4	201.85	197.96	--	No	NA	171.5	201.5	30	--	--	X
Monitoring	MW-122	Dry, No Sample	4	197.81	197.21	--	No	NA	156	195	39	--	--	X
Monitoring	MW-123	--	4	270	87.79	--	Yes	260	250	270	20	--	--	X
Monitoring	MW-124	Quarterly sample	4	132	42.45	42.92	Yes	122	112	132	20	X	--	--
Monitoring	MW-125	--	4	120.5	98.05	--	Yes	109.3	90.5	120.5	30	--	--	X
Monitoring	MW-126	--	4	119	83.4	--	Yes	93.2	63.0	103.0	40	--	X	--
Monitoring	MW-128	--	4	204	83.26	--	Yes	170	160.0	180.0	20	--	--	X
Monitoring	MW-129	--	4	111	76.61	--	Yes	101	91.0	111.0	20	--	--	X
Monitoring	MW-130	Previously Dry, Sample if sufficient water	4	30	28.79	29.5	No	--	19.7	29.7	10	--	--	X

Table 1
Monitoring Well List
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Type	Well Name	Notes	Well Dia. (in)	TD (ft btoc)	Oct 2021 DTW (ft btoc)	Jan 2022 DTW (ft btoc)	Ded. Pump	Pump Intake (ft btoc)	Top Screen (ft btoc)	Base Screen (ft btoc)	Screen Length (ft)	Liquid IDW Category		
												11e2	RCRA Hazardous	RCRA Non-hazardous
Monitoring	MW-131ALL	Alluvial well	4	32.88	13.12	12.85	Yes	22	12.6	32.6	20	--	--	X
Monitoring	MW-131S	--	4	74.58	13.29	12.07	No	64.2	54.2	74.2	20	--	--	X
Monitoring	MW-132ALL	Alluvial well	4	31.17	18.01	15.85	Yes	27	21.9	31.6	9.7	--	--	X
Monitoring	MW-132S	--	4	66.5	18.96	16.6	Yes	56.6	46.6	66.6	20	--	--	X
Monitoring	MW-133ALL	Alluvial well	4	22.39	11.88	10.6	Yes	18	12.8	22.8	10	--	--	X
Monitoring	MW-133S	--	4	63.69	13.7	10.14	No	--	43.3	63.3	20	--	--	X
Monitoring	MW-134S	--	4	123.3	20.02	19.58	No	--	103.0	123.0	20	--	--	X
Monitoring	MW-134D	Artesian well	4	231.362	--	--	No	--	211.0	231.0	20	--	--	X
Monitoring	MW-135	--	4	142.98	24.31	24.47	Yes	132.6	122.5	142.5	20	--	--	X
Monitoring	MW-136	--	4	153.3	36.7	38.5	Yes	143	133.3	152.6	19.3	--	--	X
Monitoring	MW-138S	--	3	78	8.37	8.79	No	--	69.5	79.0	9.5	X	--	--
Monitoring	MW-138D	--	4	165.9	9.88	10.25	No	--	145.9	165.9	20	--	--	X
Monitoring	MW-139	--	4	50.62	35.87	38.6	No	--	35.0	50.0	15	--	--	X

Notes:

NA= not applicable
Dia. = Diameter
Ded. = Dedicated
TD = Total Depth
in = inches
ft = feet
btoc = below top of casing
IDW = Investigation Derived Waste
-- = Not available / not known / not applicable
POC = point of Compliance
POE = Point of Exposure

Wells identified by DWMRC as not suitable for low flow sampling due to low recharge:

MW-104 Burrow Canyon Aquifer dry zone
MW-106 Brushy Basin Member
MW-110 Brushy Basin Member
MW-111 Brushy Basin Member
MW-121 Chinle
MW-122 Burro Canyon Aquifer

Wells completed in the alluvial aquifer:

MW-131S MW-132S MW-133S

Wells under artesian conditions:

MW-134D MW-138S (at times)

Table 2
Regulatory Concentration Limits for Compliance Monitoring License Wells
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Name	Well Designation	Compliance Limit Type	Regulatory Concentration Limit (mg/L)			
			Uranium	Arsenic	Selenium	Molybdenum
OW-UT-9	Point of Compliance	Alternate Concentration Limit	101.58	2.63	0.1	58.43
EF-3A	Point of Compliance	Alternate Concentration Limit	96.87	3.06	0.93	23.34
RL-4	Point of Exposure	Compliance	0.32	---	---	---
RL-5	Point of Exposure	Compliance	0.32	---	---	---
RL-6	Point of Exposure	Compliance	0.32	---	---	---
RL-1	Trend	Target Action Level	42.1	---	---	---
RL-3	Trend	Target Action Level	37.3	---	---	---
EF-6	Trend	Target Action Level	3.9	---	---	---
EF-8	Trend	Target Action Level	0.3	---	---	---
ML-1	Trend	Target Action Level	0.26	---	---	---
H-63	Trend	Target Action Level	0.06	---	---	---
LW-1	Trend	Target Action Level	0.028	---	---	---
MW-5	Background	Background	0.01	0.05	0.01	0.07
MW-13	Background	Background	0.02	0.066	0.01	0.05

Notes:
mg/L = milligrams per liter
--- = not applicable

Table 3
Groundwater Monitoring Analytical Methods
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Parameter	Analytical Method	Laboratory Reporting Limit (mg/L)	Holding Time	Container and Size	Preservation Method[a]
Aluminum (dissolved)	EPA Method 200.7	0.100	6 months	Plastic-250 mL	Field filter (0.45 micron) add nitric acid (HNO3) to pH<2, cool, <6°C
Arsenic (dissolved)	EPA Method 200.8	0.001	6 months		
Beryllium (dissolved)	EPA Method 200.8	0.001	6 months		
Boron (dissolved)	EPA Method 200.7	0.050	6 months		
Cadmium (dissolved)	EPA Method 200.8	0.010	6 months		
Calcium (dissolved)	EPA Method 200.7	1	6 months		
Cobalt (dissolved)	EPA Method 200.8	0.005	6 months		
Copper (dissolved)	EPA Method 200.8	0.010	6 months		
Iron (dissolved)	EPA Method 200.7	0.03	6 months		
Lead (dissolved)	EPA Method 200.8	0.001	6 months		
Magnesium (dissolved)	EPA Method 200.7	1	6 months		
Manganese (dissolved)	EPA Method 200.8	0.001	6 months		
Molybdenum (dissolved)	EPA Method 200.8	0.001	6 months		
Nickel (dissolved)	EPA Method 200.8	0.005	6 months		
Phosphorus (dissolved)	EPA Method 200.7	0.1	6 months		
Potassium (dissolved)	EPA Method 200.7	1	6 months		
Selenium (dissolved)	EPA Method 200.8	0.001	6 months		
Silicon (dissolved)	EPA Method 200.7	0.1	6 months		
Sodium (dissolved)	EPA Method 200.7	1	6 months		
Strontium (dissolved)	EPA Method 200.7	0.01	6 months		
Thallium (dissolved)	EPA Method 200.8	0.0005	6 months		
Uranium (dissolved)	EPA Method 200.8	0.0003	6 months		
Vanadium (dissolved)	EPA Method 200.7	0.01	6 months		
Zinc (dissolved)	EPA Method 200.7	0.010	6 months		
Nitrogen + Nitrate as N	E353.2	0.1	28 days	Plastic - 250 mL	Sulurfic Acid (H2SO4) to pH < 2, cool to <6°C
Bromide	EPA 300.0	0.1	28 days	Plastic - 1L	Cool, <6°C
Chloride	EPA 300.0	1	28 days		
Sulfate	EPA 300.0	1	28 days		
Bicarbonate, as HCO3	SM A2320 B	5	14 days		
Carbonate, as CO3	SM A2320 B	5	14 days		
Hydroxide as OH	SM A2320 B	5	14 days		
Alkalinity, Total as CaCO3	SM A2320B	5	14 days		
Total Dissolved Solids	SM A2540 C	20	7 days		
pH	SM A4500-H B	0.01	15 minutes[b]		
Specific Conductance	SM A2510 B	5	28 days		
Flouride	A4500-F C	0.10	28 days		
Lead 210	E909.0	(-)1000 - 0 pCi/L	6 months	Plastic - 2L	Field filter (0.45 micron) add nitric acid (HNO3)
Radium 226	E903.0	(-)1000 - 0 pCi/L	6 months		
Radium 228	RA-05	(-)1000 - 0 pCi/L	6 months		
Thorium, Isotopic	A7500-U C	(-)1000 - 0 pCi/L	6 months		
Carbon, Dissolved Organic	A5310 C	0.5	28 days	Amber Glass - 250 mL	Field filter (0.45 micron)

Notes:

mg/L = milligrams per liter

mL = milliliter

[a] Note: water at OW-UT-9 reacts with preservative and extra room in the bottle may be required to accommodate reaction or the sample may be collected without field preservation.

Table 3
Groundwater Monitoring Analytical Methods
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Parameter	Analytical Method	Laboratory Reporting Limit (mg/L)	Holding Time	Container and Size	Preservation Method[a]

[b] pH is measured in the field at the time of sample collection and checked in the laboratory

Table 4
Groundwater Monitoring Program Schedule
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Name	Well Designation	Schedule and Recommended Sample Method											
		2022											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
OW-UT-9	License - Point of Compliance	LF			LF			LF			LF		
EF-3A	License - Point of Compliance				LF						LF		
RL-4	License - Point of Exposure				LF						LF		
RL-5	License - Point of Exposure				LF						LF		
RL-6	License - Point of Exposure				LF						LF		
RL-1	License - Trend	LF			LF			LF			LF		
RL-3	License - Trend	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
EF-6	License - Trend				LF						LF		
EF-8	License - Trend	LF			LF			LF			LF		
ML-1	License - Trend				LF						LF		
H-63	License - Trend				LF						LF		
LW-1	License - Trend				LF						LF		
MW-5	License - Background				LF						LF		
MW-13	License - Background				LF						LF		
UW-1	Hydrogeology				LF						LF		
MW-100	Hydrogeology				LF						LF		
MW-101	Hydrogeology				LF						LF		
MW-102	Hydrogeology				LF						LF		
MW-102DB	Hydrogeology				LF						LF		
MW-103	Hydrogeology				LF						LF		
MW-104	Hydrogeology				G						G		
MW-105	Hydrogeology				LF						LF		
MW-106	Hydrogeology				G						G		
MW-107S	Hydrogeology				LF						LF		
MW-107D	Hydrogeology				LF						LF		
MW-108	Hydrogeology				LF						LF		

Table 4
Groundwater Monitoring Program Schedule
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Name	Well Designation	Schedule and Recommended Sample Method											
		2022											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MW-109	Hydrogeology				LF						LF		
MW-110	Hydrogeology				G						G		
MW-111	Hydrogeology				G						G		
MW-112	Hydrogeology				LF						LF		
MW-113	Hydrogeology				LF						LF		
MW-114	Hydrogeology				LF						LF		
MW-115S	Hydrogeology				LF						LF		
MW-115M	Hydrogeology				LF						LF		
MW-116	Hydrogeology				LF						LF		
MW-117S	Hydrogeology				LF						LF		
MW-117M	Hydrogeology				LF						LF		
MW-118	Hydrogeology				LF						LF		
MW-119	Hydrogeology				G						G		
MW-120	Hydrogeology				LF						LF		
MW-121	Hydrogeology				G						G		
MW-122	Hydrogeology				D						D		
MW-123	Hydrogeology				LF						LF		
MW-124	Hydrogeology	LF			LF			LF			LF		
MW-125	Hydrogeology				LF						LF		
MW-126	Hydrogeology				LF						LF		
MW-128	Hydrogeology				LF						LF		
MW-129	Hydrogeology				LF						LF		
MW-130	Hydrogeology	LF			LF			LF			LF		
MW-131ALL	Hydrogeology	LF			LF			LF			LF		
MW-131S	Hydrogeology	LF			LF			LF			LF		
MW-132ALL	Hydrogeology	LF			LF			LF			LF		

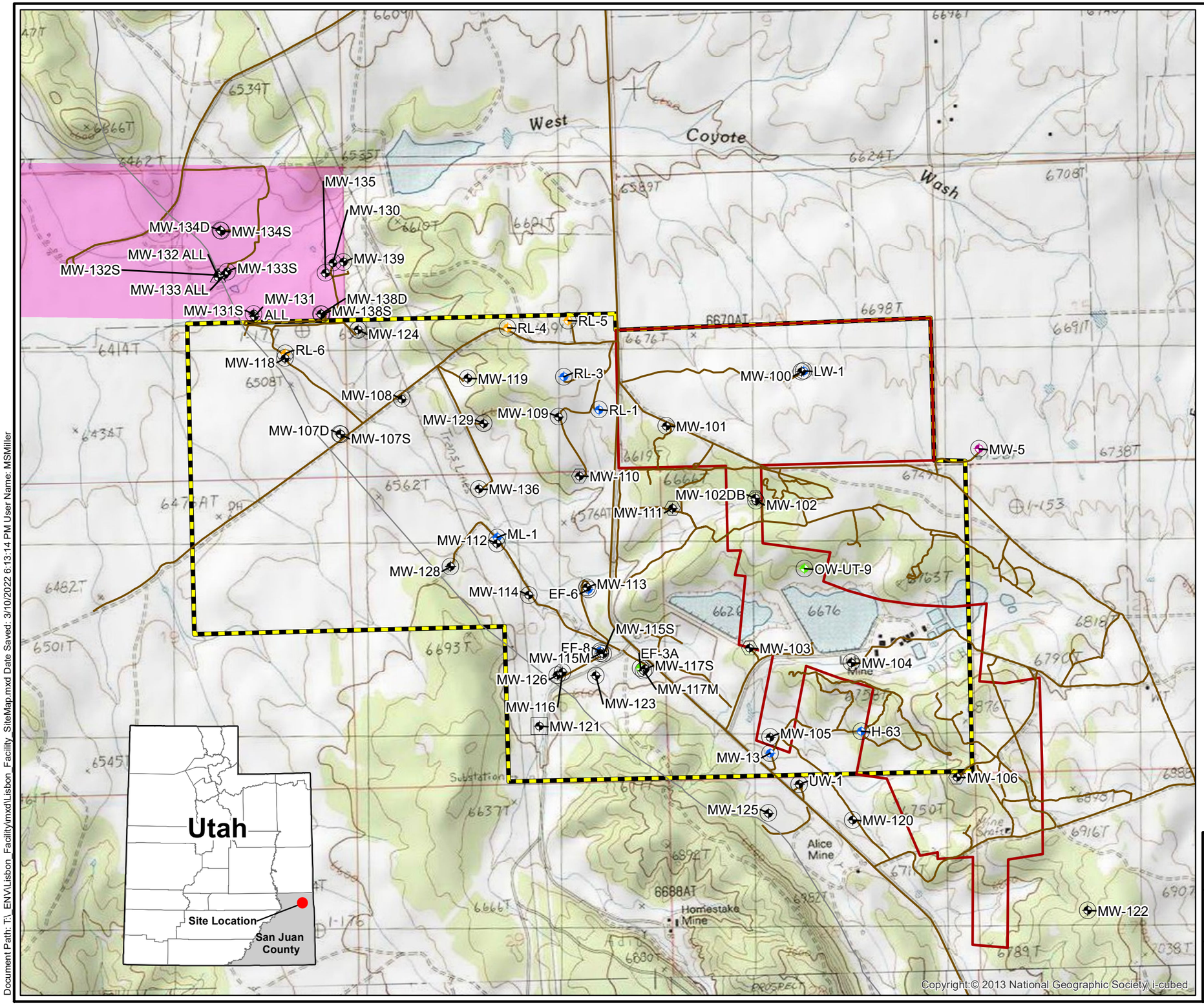
Table 4
Groundwater Monitoring Program Schedule
2022 Groundwater Sampling and Analysis Plan
Rio Algom Mining LLC
Lisbon Facility

Well Name	Well Designation	Schedule and Recommended Sample Method											
		2022											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MW-132S	Hydrogeology	LF			LF			LF			LF		
MW-133ALL	Hydrogeology	LF			LF			LF			LF		
MW-133S	Hydrogeology	LF			LF			LF			LF		
MW-134S	Hydrogeology	LF			LF			LF			LF		
MW-134D	Hydrogeology	G			G			G			G		
MW-135	Hydrogeology	LF			LF			LF			LF		
MW-136	Hydrogeology	LF			LF			LF			LF		
MW-138S	Hydrogeology	LF			LF			LF			LF		
MW-138D	Hydrogeology	LF			LF			LF			LF		
MW-139	Hydrogeology	LF			LF			LF			LF		

Notes:

Quarterly and annual event schedules are approximate and may be conducted anytime within the quarterly period.
Actual frequency beyond the annual event is subject to change based on License conditions and installation of new wells.
Shaded in grey = Compliance groundwater monitoring program.
Sample Methods: LF = Low-flow, G = Grab, D = Dry Well
MW-134D is flowing artesian. Sampling is purging 1.2 casing volumes prior to sample collection.

Figures



Legend

- Background Well
- Hydrogeology Well
- Point of Compliance; Burro Well Canyon
- Point of Exposure Well; Burro Canyon
- Trend Well; Burro Canyon
- Well Screened in Brushy Basin
- Well Screened In Burro Canyon Aquifer
- Well Screened In Chinle
- Well Screened in Navajo
- Lisbon Valley Fault
- Site Roads
- Rio Algom Mining LLC Property Boundary
- Preliminary Long Term Surveillance and Maintenance Boundary
- Rattle Snake Ranch

0 2,000 4,000 Feet

GRAPHIC SCALE

LISBON FACILITY

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

Document Path: T:_ENV\Lisbon_Facility\mxd\Lisbon_Facility_SiteMap.mxd Date Saved: 3/10/2022 6:13:14 PM User Name: MSMiller

Attachment E – BLM Reclamation Bond Calculator

	A	B	C	D	E	F	G	H
1	**RECLAMATION BOND CALCULATION SPREADSHEET - USER INPUT SHEET**							
2	Revised 2018							
3	**NOTE: USE THIS SPREADSHEET ONLY IF YOUR TOTAL DISTURBANCE IS LESS THAN 20 ACRES AND AN AQUIFER**							
4	**PROTECTION PERMIT IS NOT REQUIRED.**							
5								
6	**USER INPUT AND RECLAMATION COST TOTAL**							
7	Please fill in the yellow cells relating to the areas to be disturbed during the operation.							
8	Use the units indicated - feet (ft), square feet (sf), inches (in), cubic yards (cu yd), etc.							
9	Identify structure construction type by placing an X in the appropriate cell (line 120-129).							
10	Leave cells that do not apply to your operation blank.							
11	Hover on cells with red in upper right corner to see note to user.							
12								
13	**Roads**	#1	Length (ft)	3950	Width (ft)	10		
14	(average lengths and widths)	#2	Length (ft)		Width (ft)			
15		#3	Length (ft)		Width (ft)			
16								
17	**Road cuts**	#1	Length (ft)		Width (ft)		Depth of cut (ft)	
18	(ave. length, width and depth	#2	Length (ft)		Width (ft)		Depth of cut (ft)	
19	of cut at highwall)	#3	Length (ft)		Width (ft)		Depth of cut (ft)	
20	(Enter add'l cuts on Continuation page)							
21								
22	**Cleared areas**	#1	Length (ft)		Width (ft)			
23	(average lengths & widths)	#2	Length (ft)		Width (ft)			
24		#3	Length (ft)		Width (ft)			
25	(Enter add'l areas on Continuation page)							
26								
27	**Drill pads**	#1	Length (ft)	100	Width (ft)	30	Depth of cut (ft)	0
28	(average lengths, widths and	#2	Length (ft)	150	Width (ft)	100	Depth of cut (ft)	0
29	depth of cut)	#3	Length (ft)	100	Width (ft)	30	Depth of cut (ft)	0
30	(Enter add'l pads on Continuation page)							
31								
32	**Culverts**	#1	Length (ft)	15	Diameter (ft)	3	Ave. depth (ft)	3
33	(average lengths, diameter	#2	Length (ft)	15	Diameter (ft)	3	Ave. depth (ft)	3
34	and depth of burial)	#3	Length (ft)	15	Diameter (ft)	4	Ave. depth (ft)	4
35								
36	**Waste dumps/spoil piles**	#1	Length (ft)		Width (ft)		Face height (ft)	
37	(average length, width and	#2	Length (ft)		Width (ft)		Face height (ft)	
38	height of top surface of dump)	#3	Length (ft)		Width (ft)		Face height (ft)	
39		#4	Length (ft)		Width (ft)		Face height (ft)	
40		#5	Length (ft)		Width (ft)		Face height (ft)	
41		#6	Length (ft)		Width (ft)		Face height (ft)	
42		#7	Length (ft)		Width (ft)		Face height (ft)	
43		#8	Length (ft)		Width (ft)		Face height (ft)	
44		#9	Length (ft)		Width (ft)		Face height (ft)	
45		#10	Length (ft)		Width (ft)		Face height (ft)	
46								
47	**Shafts**	#1	Length (ft)		Width (ft)		Depth (ft)	
48	(lengths and widths of shafts		Depth of water(ft)					
49	at collar, water depth from bottom)	#2	Length (ft)		Width (ft)		Depth (ft)	
50			Depth of water(ft)					
51		#3	Length (ft)		Width (ft)		Depth (ft)	
52			Depth of water(ft)					
53		#4	Length (ft)		Width (ft)		Depth (ft)	
54			Depth of water(ft)					
55		#5	Length (ft)		Width (ft)		Depth (ft)	
56			Depth of water(ft)					
57								
58	**Distance to source of HC fill**		Miles		Entry required for shafts with water			
59								
60	**Large Pits (Volume > 1000 cu. yd.)**	#1	Length (ft)		Width (ft)		Depth (ft)	
61	(Average lengths and widths	#2	Length (ft)		Width (ft)		Depth (ft)	
62	at surface) Generally deep, with	#3	Length (ft)		Width (ft)		Depth (ft)	
63	much excavated material removed	#4	Length (ft)		Width (ft)		Depth (ft)	
64	for processing or sale.	#5	Length (ft)		Width (ft)		Depth (ft)	
65								
66	**Small Pits (Volume <1000 cu. yd.)**	#1	Length (ft)		Width (ft)		Depth (ft)	

	A	B	C	D	E	F	G	H
67	Typically shallow, most excavated	#2	Length (ft)		Width (ft)		Depth (ft)	
68	material available to refill pit.	#3	Length (ft)		Width (ft)		Depth (ft)	
69		#4	Length (ft)		Width (ft)		Depth (ft)	
70		#5	Length (ft)		Width (ft)		Depth (ft)	
71	(Enter add'l small pits on Continuation page)							
72								
73	**Highwalls**	#1	Length (ft)		Height (ft)		Blasting required?	
74	(average length and height)	#2	Length (ft)		Height (ft)		(Yes or No)	
75		#3	Length (ft)		Height (ft)			
76		#4	Length (ft)		Height (ft)			
77								
78	**Trenches**	#1	Length (ft)		Width (ft)		Depth (ft)	
79	(average lengths and widths	#2	Length (ft)		Width (ft)		Depth (ft)	
80	at surface)	#3	Length (ft)		Width (ft)		Depth (ft)	
81	Generally shallow excavations	#4	Length (ft)		Width (ft)		Depth (ft)	
82	with length much larger than	#5	Length (ft)		Width (ft)		Depth (ft)	
83	width. Excavated material is	#6	Length (ft)		Width (ft)		Depth (ft)	
84	generally available nearby for	#7	Length (ft)		Width (ft)		Depth (ft)	
85	refilling.	#8	Length (ft)		Width (ft)		Depth (ft)	
86		#9	Length (ft)		Width (ft)		Depth (ft)	
87		#10	Length (ft)		Width (ft)		Depth (ft)	
88	(Enter add'l trenches on Continuation page)							
89								
90	**Adits**		How many?					
91								
92	**Water or silt ponds**	#1	Length (ft)		Width (ft)		Depth (ft)	
93	(average lengths and widths	#2	Length (ft)		Width (ft)		Depth (ft)	
94	at surface)							
95								
96	**Tailings impoundment**		Length (ft)		Width (ft)		Face height (ft)	
97	(average length, width, face ht.)							
98								
99	**Water wells**		Total depth of					
100			all water wells (ft)	4744				
101	**Drill holes ***		Total length of					
102			all drill holes (ft)	2128				
103	**Concrete slabs**							
104	Unreinforced	#1	Length (ft)		Width (ft)		Thickness (in)	
105		#2	Length (ft)		Width (ft)		Thickness (in)	
106		#3	Length (ft)		Width (ft)		Thickness (in)	
107		#4	Length (ft)		Width (ft)		Thickness (in)	
108		#5	Length (ft)		Width (ft)		Thickness (in)	
109								
110	Reinforced	#1	Length (ft)		Width (ft)		Thickness (in)	
111		#2	Length (ft)		Width (ft)		Thickness (in)	
112		#3	Length (ft)		Width (ft)		Thickness (in)	
113		#4	Length (ft)		Width (ft)		Thickness (in)	
114		#5	Length (ft)		Width (ft)		Thickness (in)	
115								
116	**Concrete foundations**		Total (cu. yd.)					
117								
118	**Asphalt**		Total area (sf)		Thickness (in)			
119								
120	**Structures**	#1	Length (ft)		Width (ft)		Eave height (ft)	
121	Construction:		Steel?		Block?		Wood?	
122		#2	Length (ft)		Width (ft)		Eave height (ft)	
123	Construction:		Steel?		Block?		Wood?	
124		#3	Length (ft)		Width (ft)		Eave height (ft)	
125	Construction:		Steel?		Block?		Wood?	
126		#4	Length (ft)		Width (ft)		Eave height (ft)	
127	Construction:		Steel?		Block?		Wood?	
128		#5	Length (ft)		Width (ft)		Eave height (ft)	
129	Construction:		Steel?		Block?		Wood?	
130								
131	**Fences** (add length of all together)		Length (ft)		Wire strands		Post spacing (ft)	
132	**Metal gates** (don't count wire gates)		How many?					

	A	B	C	D	E	F	G	H
133								
134	**Septic tanks**		How many?					
135								
136	**Trailers**		How many?					
137								
138	**Tanks, empty**	#1	Length/height (ft)		Diameter (ft)			
139	(Steel tanks, not drums)	#2	Length/height (ft)		Diameter (ft)			
140		#3	Length/height (ft)		Diameter (ft)			
141		#4	Length/height (ft)		Diameter (ft)			
142		#5	Length/height (ft)		Diameter (ft)			
143		#6	Length/height (ft)		Diameter (ft)			
144								
145	**Tanks, with liquid**		Contents:					
146	(list number of each type)		Water or fuel		(Greater than 55 gal.)			
147			Chemicals		(Greater than 55 gal.)			
148								
149	**Tires**							
150	Off road		How many?					
151	Highway		How many?					
152								
153	**Chemical drums**		How many?					
154								
155	**Fuel/oil/lube drums**		How many?					
156								
157	**Explosives**		Lbs.					
158								
159	**Non-metal trash and scrap**		Cubic yards					
160								
161	**Recylable metal scrap**		Cubic yards		(Crushers, conveyors,screens, steel scrap, etc.)			
162								
163	**Mobile equipment & vehicles**		How many?	4	(Includes cars, trucks, dozers, etc.)			
164								
165	**Distance to landfill/recycler**		Miles	31	(Entry required)			
166								
167	**Distance to equipment rental**		Miles	26	(Entry required)			
168								
169	**HAZMAT site assessment, testing**				(Place an "x" in this box if testing is required)			
170								
171	**Your reclamation bond is:**		**$255,334**					
172	**Disturbed Acreage**		**8.6**					
173								
174	* All drill holes are treated the same (wet or dry). Costs are calculated for neat cement grout tremied from bottom to top of hole to meet							
175	ADWR worst case closure standards.							
176								

Ecosphere
Environmental Services

Durango, CO
Pagosa Springs, CO
Albuquerque, NM
Farmington, NM

ADDENDUM

DATE: December 28, 2023
TO: Bureau of Land Management, Moab Field Office
FROM: Ecosphere Environmental Services, Inc.
SUBJECT: Addendum to Modified Plan of Operations

This addendum to Rio Algom Mining LLC's (RAML) Modification of the Plan of Operations, submitted on August 24, 2023, is being made to address several cultural resources issues identified during the Bureau of Land Management (BLM), Moab Field Office (MFO) review of the application package. Specifically, as communicated to RAML by Ian Crosser, ERO Supervisory Archaeologist/GIS Specialist, the author of the project cultural resources report, the BLM staff had concern that two proposed pads overlap the required 15-meter buffer around eligible sites and a third location and access road were outside the cultural resources survey boundary. In addition, the BLM requested the addition of a resource protection stipulation. The specific concerns (numbered) and the stipulation consist of the following:

1. The first pad, associated with PW-163 slightly overlaps with a site buffer. If the pad can be moved about 15-feet to the west, and outside of the buffer, nothing further will be required. If the pad cannot be shifted, BLM will require a qualified archaeologist to be present to monitor construction.

Addendum 1 – RAML will move the pad associated with PW-163 approximately 15-feet to the northwest to get completely out of the required buffer zone.

2. The second pad, associated with PC-101, not only overlaps the buffer, but extends into the actual site boundary, with the well location right on the edge of the buffer.

Addendum 2 – This location, PC-101, was inadvertently included in the Modification to the Plan of Operations. The location is on RAML owned land and is consequently removed from inclusion in the Modification application. RAML will shift this location, in accordance with their internal corporate cultural resource protection policy, outside of the site boundary.

3. The well pad and access for PW-145 are outside of the Class III survey area. As such they either need to be removed from the Plan of Operations or they need to be surveyed."

Addendum 3 – ERO completed a cultural survey of the PW-145 location and access road on September 18, 2023. The survey expanded the original survey boundary by 1.47-acres which includes a 60-foot buffer around the well pad and access road. There were no new cultural resources found. The results and map revision will be submitted in a minor report revision to BLM.

Addendum 4 – At the request of the BLM archaeologist, RAML will add the following stipulation regarding road maintenance: *Road maintenance within a 15-meter buffer of eligible sites will be limited to the existing disturbance corridor AND have a qualified archaeologist monitoring during road maintenance activities within the buffered site boundary.*

At BLM's request, this addendum to the Modification to the Plan of Operation is being submitted within 10 days of our receipt of BLM's comments.

Biological Survey Report

Corrective Action Assessment Work Plan

Lisbon Facility

Rio Algom Mining LLC

Prepared for:

Bureau of Land Management Moab Field Office

Prepared by:

Ecosphere Environmental Services, Inc.

Ecosphere
Environmental Services
776 E. 2nd Avenue
Durango, CO 81301

August 2023

This page is intentionally left blank.

Table of Contents

1. Introduction **1**

2. Project Description **1**

3. Methods **2**

3.1 Off-Site Methods 2

3.2 On-Site Methods 2

4. Existing Conditions **2**

4.1 Action Area 3

4.2 Physical Description 3

4.3 Biological Description 3

5. Results **4**

5.1 Federally Listed Threatened and Endangered Species 4

5.2 Bureau of Land Management Sensitive and Conservation Agreement Species 6

6. Discussion **12**

6.1 Southwestern Willow Flycatcher 12

6.2 Monarch Butterfly 12

6.3 BLM Sensitive Bats 13

6.4 White-Tailed Prairie Dog 13

6.5 Kit Fox 14

6.6 Raptors and Eagles 14

6.7 Burrowing Owl 14

6.8 Western Bumblebee 15

6.9 Migratory Birds 15

6.10 Noxious Weeds 15

7. References **17**

Attachment A – Maps **A-1**

Attachment B – Sensitive Species Lists **B-1**

Attachment C – Representative Habitat Photographs **C-1**

Attachment D – Species Observed During the Biological Survey **D-1**

List of Tables

Table 5-1. USFWS Listed Endangered and Candidate Species, Status, Habitat, and Potential to Occur in the Action Area 5

Table 5-2. Bureau of Land Management Moab Field Office Sensitive and Conservation Agreement Species 6

List of Maps

Map 1. Vicinity Map A-1

Map 2. Land Status Map A-2

Map 3. Aerial Detail Map A-3

Map 4. Soils Map A-4

Map 5. Hydrology Map A-5

Map 6. Vegetation Communities Map A-6

Map 7. Sensitive Species Map A-7

Map 8. Southwestern Willow Flycatcher Survey Map A-8

List of Photographs

Photograph 1. Project area looking north to the La Sal Mountains. C-2

Photograph 2. Sagebrush flat converted to agricultural lands. C-2

Photograph 3. Partially disturbed transmission line right-of-way. C-3

Photograph 4. Sagebrush flats looking to the northwest C-3

Photograph 5. Prairie dog town on private land. C-4

Photograph 6. Typical dry arroyo drainage bisecting sagebrush and pinyon-juniper habitats C-5

Photograph 7. Suitable willow flycatcher habitat of mixed willow and exotic shrub thickets. C-6

Photograph 8. Russian olive thickets associated with wetlands and open water is suitable habitat for the willow flycatcher. C-7

Photograph 9. Sagebrush flats breaking up pinyon-juniper woodlands C-8

Acronyms

BLM	Bureau of Land Management
BSR	Biological Survey Report
CAAWP	Corrective Action Assessment Work Plan
COC	constituents of concern
Ecosphere	Ecosphere Environmental Services, Inc.
facility	Lisbon Facility
GIS	geographic information system
GUSG	Gunnison's sage grouse
MBTA	Migratory Bird Treaty Act
MFO	Moab Field Office
MPO	Modified Plan of Operations
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
RAML	Rio Algom Mining LLC
SLM	Salt Lake Meridian
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1. Introduction

Rio Algom Mining LLC (RAML) has initiated the field program described in the Corrective Action Assessment Work Plan (CAAWP) (INTERA 2022) for the Lisbon Facility in San Juan County, Utah. The work proposed in the CAAWP presents the data collection and analyses required to evaluate candidate corrective action technologies for groundwater impacts associated with the former Lisbon Mill. The site investigation activities will improve the understanding of the site's hydrogeology and geochemistry, such that a diverse range of candidate technologies can be evaluated to determine the efficacy of each technology. The CAAWP investigation will provide the information needed to narrow down candidate technologies to a few candidate technologies to select the final remedy to be proposed for the site. The CAAWP investigations will be incorporated into a Modified Plan of Operations (MPO) for the site, which will be subject to the Bureau of Land Management (BLM) Moab Field Office (MFO) National Environmental Policy Act (NEPA) review.

This Biological Survey Report (BSR) report describes the potential for U.S. Fish and Wildlife Service (USFWS) threatened, endangered, or candidate species, as well as BLM MFO designated sensitive species management or conservation agreement species consideration to occur in the project and action areas. The action area is defined as any area that the CAAWP site characterization activities may directly or indirectly impact.

There is marginal potential habitat present for the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*) along West Coyote Wash and an unnamed tributary thereof in willow and exotic shrub patches. A single Monarch butterfly (*Danaus plexippus*), a USFWS candidate listed, and a BLM MFO sensitive species was observed in the study area. Additionally, there are 13 BLM MFO-designated sensitive species management or conservation agreement species with the potential to occur in the study area. Section 6. discusses the potential impacts on these sensitive species and makes mitigation recommendations to minimize or eliminate impacts on each species. Also included in Section 6. is a discussion on impact minimization to migratory birds protected under the Migratory Bird Treaty Act (MBTA) and noxious weed baselines and mitigation planning.

2. Project Description

The Lisbon Facility (facility) is located approximately 3 miles southwest of La Sal, Utah, and about 18 miles southeast of Moab, Utah (Appendix A, Map 1). The facility is located on federal lands administered by the BLM MFO, and private lands, and is mapped on the La Sal West, Utah, U.S. Geological Survey (USGS) 7.5-minute quadrangle map (Appendix A, Map 2 and Map 3). The legal description of the project area is Sections 16, 17, 18, 19, 20, and 21 of Township 29 South, Range 24 East, in Salt Lake Meridian (SLM); and Section 13 Township 29 South, Range 23 East, SLM, in San Juan County, Utah.

RAML is proposing to conduct a variety of activities as part of the CAAWP. These activities include geophysical surveys, core hole drilling and sampling, installation of monitoring wells, hydrologic testing, and other sampling and testing activities. This BSR summarizes the findings of biological surveys

completed within the 1,434-acre project area in 2022 and 2023. An additional approximately 138-acres of private lands were added to the project area in 2023.

3. Methods

3.1 Off-Site Methods

Prior to conducting field surveys, biologists from Ecosphere Environmental Services, Inc. (Ecosphere) compiled lists of USFWS threatened, endangered, or candidate species, and BLM MFO sensitive species that occur or have the potential to occur in San Juan County, Utah. USFWS-listed species were obtained from the Information for Planning and Consultation (IPaC) database (USFWS 2022). There was no change to the IPaC listed species in 2023. The BLM sensitive or special management species were compiled from the Utah BLM Sensitive Wildlife Species List (BLM MFO 2018a) and the Utah BLM Sensitive Plant Species List (BLM MFO 2018b). The USFWS and BLM sensitive species lists are included in Appendix B.

In addition, to ensure complete coverage of the project area, geographic information system (GIS) data were uploaded to handheld electronic devices using the ArcGIS Collector application for navigation reference and field notetaking.

3.2 On-Site Methods

Ecosphere biologists conducted field investigations of the project area in September 2022. In 2023, Ecosphere biologists repeated the general and species-specific surveys completed in 2022 but added USFWS protocol surveys (5 surveys) for the endangered southwestern willow flycatcher along West Coyote Wash and associated tributaries. These surveys followed the USFWS southwestern willow flycatcher survey protocol (Sogge et al. 2010) and were completed by Ecosphere biologists permitted by the USFWS. General flora/fauna surveys were conducted in the afternoons following each of the 5 willow flycatcher surveys between mid-May and mid-August. These surveys consisted of habitat assessments, raptor nest surveys, surveys for burrowing owls and documentation of project area vegetative communities and noxious weeds. Invasive species were assessed according to the Utah Department of Agriculture and Food (UDAF) listing of invasive weeds of Utah (UDAF 2022).

During the surveys, dominant plant species and wildlife or signs of wildlife observed were recorded, and digital photographs taken. Binoculars were used to survey the area for raptors and potential nesting habitat. The project area and a 0.3-mile buffer or action area (refer to Section 4.1) were evaluated for habitat suitability and the presence/absence of USFWS-threatened, endangered, and candidate species and BLM MFO sensitive species with the potential to occur in the area.

4. Existing Conditions

The following section describes the action area (project area plus buffer) evaluated and includes physical and biological descriptions. Appendix C provides representative photographs of the project area.

4.1 Action Area

The action area is defined as any area that CAAWP activities could directly or indirectly impact. For this BSR, the action area consists of the 1,434-acre project area and surrounding terrain within a 0.3-mile radius buffer. The buffer area is an area that sensitive species or common wildlife, if present, could be impacted by human/equipment activity or noise generated in the project area.

4.2 Physical Description

The topography in the action area is in a region characterized by broad open alluvium flats to low undulating cuestas terrain and interspersed by broken terraces mesas. Elevation ranges from about 6,400 to 6,660 feet above mean sea level.

The surficial geology includes Burro Canyon Formation of the Lower Cretaceous, Navajo Sandstone from the Glen Canyon Group of the Lower Jurassic, and Dakota Sandstone of the Upper Cretaceous (Doelling 2004). The surface geology is characterized by mixed eolian and alluvial deposits and sandstone fragments of exposed bedrock, and a low eroded terrace. There are no geologic features with prominent surface expressions within the action area.

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (refer to Appendix A, Map 4), eight soil mapping units occur in the study area: (1) Barnum loam, 0 to 3 percent slopes; (2) Cahona fine sandy loam, 2 to 8 percent slopes; (3) Shalako-Thumb Rock-Rock outcrop complex, 3 to 15 percent slopes; (NRCS 2022a); (4) Ackmen loam, 0 to 10 percent slopes, moderately eroded; (5) Monticello very fine sandy loam, low rainfall, 2 to 10 percent slopes; (6) Montvale very rocky very fine sandy loam, 2 to 25 percent slopes; (7) Northdale loam, low rainfall, 0 to 6 percent slopes; (8) Pack silt loam, 2 to 6 percent slopes (NRCS 2022b). Surface soil ranges from loam, fine sandy loam, gravelly fine sandy loam, very fine sandy loam, very stony very fine sandy loam, and silt loam (NRCS 2022a, 2022b).

There are 15 unnamed ephemeral drainages (refer to Appendix A, Map 5) and two named washes within the study area boundary. West Coyote Wash, an ephemeral tributary to the Hatch Wash, flows through the project area's northern portion. Hatch Wash eventually drains into Kane Creek, approximately 13 miles to the northwest. Kane Creek drains into the Colorado River about 23 miles northwest of the project area. Rattlesnake Ranch Number Two Reservoir, an earth dam reservoir, is located immediately north of the study area.

4.3 Biological Description

Four primary vegetation communities occur within the project area (refer to Appendix A, Map 6) — (1) Great Basin Desert shrub—sagebrush series, and (2) piñon-juniper series (Brown 1994), (3) agricultural, and (4) disturbed/developed. A complete list of plant species observed in the study area is provided in Attachment D.

Most of the study area is located within the sagebrush series dominated by big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), and broom snakeweed (*Gutierrezia sarothrae*). In general, a low cover of herbaceous and grass species are present in this series and includes blue grama (*Bouteloua gracilis*), James' galleta (*Pleuraphis jamesii*), crested wheatgrass (*Agropyron cristatum*),

scarlet globemallow (*Sphaeralcea coccinea*), and little hogweed (*portulaca oleracea*). Vegetation cover is estimated to range from 30 to 40 percent.

Mixed piñon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodlands are present in the central and western portions of the study area. Trees sizes include saplings to mature trees up to 20 feet in height, with a canopy cover estimated at 15 to 20 percent. Herbaceous and woody shrubs within the woodland include James' galleta, big sagebrush, antelope bitterbrush (*Purshia tridentata*), rubber rabbitbrush, and Mormon tea (*Ephedra viridis*).

West Coyote Wash supports a narrow riparian vegetation community dominated by moderate to dense patches of Russian olive (*Elaeagnus angustifolia*), tamarisk (*Tamarix* sp.), and narrowleaf willow (*Salix exigua*). Herbaceous and woody species include rubber rabbitbrush, foxtail barley (*Hordeum jubatum*), alkali sacaton (*Sporobolus airoides*), cattail (*Typha* sp.), and Mediterranean amaranth (*Amaranthus graecizans*). Vegetation cover was visually estimated to range from 50 to 90 percent.

Disturbed areas are prevalent along existing roadways, abandoned agriculture fields, borrow pit areas, and other existing infrastructure. Species diversity and vegetation cover in these areas are generally low and sparse. Dominant species include rubber rabbitbrush, big sagebrush, little hogweed, crested wheatgrass, western wheatgrass (*Pascopyrum smithii*), and yellow spiderflower (*Cleome lutea*).

A complete list of wildlife and sign observed during the field surveys is included in Attachment D. Sensitive species and/or habitats documented in the action area are shown on Map 7 in Appendix A. Golden eagle (*Aquila chrysaetos*) and turkey vulture (*Cathartes aura*) were observed soaring over the action area on multiple occasions. Three active prairie dog (*Cynomys gunnisoni*) colonies occur in the area, all on private lands. The closest recorded BLM MFO golden eagle nest is located approximately 1.1 miles southeast of the project area. This site was briefly checked for occupancy, but no activity was observed. Golden eagle observations were made in the spring of 2023, with a single eagle seen soaring over the project area several times.

5. Results

5.1 Federally Listed Threatened and Endangered Species

According to the USFWS, seven federally threatened, endangered, or candidate species have the potential to occur in San Juan County, Utah and in proximity to the action area. Table 5-1 lists these species, their habitat associations, and their potential to occur in the action area. There is no proposed or designated critical habitat within the project or action areas (USFWS 2022).

Of these listed, only the Monarch butterfly, a federally listed candidate species, was observed in the study area in 2022. Follow up surveys completed in 2023 did not detect any Monarch butterflies. Based on Ecosphere's 2022 documentation of suitable habitat present for the southwestern willow flycatcher, USFWS protocol presence-absence surveys were completed in 2023. During the 2023 protocol surveys, willow flycatchers were detected along West Coyote Wash during both the first (May 29) and second survey (June 6) periods. No willow flycatchers were detected after the second survey period indicating that those documented were likely migratory willow flycatchers using the project area as stopover habitat.

Table 5-1. USFWS Listed Endangered and Candidate Species, Status, Habitat, and Potential to Occur in the Action Area

Species	Status	Habitat Association	Potential to Occur in Action Area
Birds			
Southwestern willow flycatcher (*Empidonax trailli extimus*)	**E**	**Occurs in dense riparian habitats along streams, rivers, and other wetlands. Habitat types for this species include native broadleaf riparian, monotypic exotic, and mixed exotic/native broadleaf. Habitat occurs at elevations below 8,500 feet. This species primarily prefers very dense stands of riparian vegetation.**	**Willow flycatchers were detected while conducting USFWS protocol surveys in 2023 along West Coyote Wash and associated tributaries. Detections were limited to the first and second survey periods indicating that detections were likely migratory birds using the action area as temporary stopover habitat.**
Fish			
Bonytail Chub (*Gila elegans*)	E, critical habitat designated	Common near heads of pools or in riffles of large-order rivers. Found in large main channels of the Green, Colorado, Yampa, and Gila rivers and some reservoirs.	None, no large rivers within the action area.
Colorado pikeminnow (=squawfish) (*Ptychocheilus lucius*)	E, critical habitat designated	Found in the Colorado River basin. Occurs in large rivers with strong currents, deep pools, and quiet backwaters.	None, no large rivers within the action area.
Humpback chub (*Gila cypha*)	T, critical habitat designated	Found in swift, deep, turbulent habitats or deep pools within the Colorado River.	None, no large rivers within the action area.
Razorback Sucker (*Xyrauchen texanus*)	E, critical habitat designated	Occurs in medium to large rivers with silty to rocky substrates. Prefers strong currents and deep pools. Currently found in the larger-order rivers in the Colorado and Green River basins.	None, no large rivers within the action area.
Insects			
Monarch Butterfly (*Danaus plexippus*)	**C**	**During the breeding season in the spring through fall, monarchs lay their eggs on their obligate milkweed (*Asclepias* sp.) host plant.**	**A single Monarch was observed on private property along West Coyote Wash in 2022. Showy milkweed (*Asclepias speciosa*), an**

Species	Status	Habitat Association	Potential to Occur in Action Area
			obligate species, occurs in scattered locations along the wash.
Plants			
Navajo Sedge (*Carex specuicola*)	T, critical habitat designated	Found in hanging gardens with moist sandy to silty soils of shady seep-springs or alcoves in rock faces between 4,500 and 7,200 feet.	None, there are no hanging gardens or seep springs within the project area.

Source: U.S. Fish and Wildlife Service 2022.

Key: E=endangered, T=threatened, and C=candidate.

Note: **Bold**-faced text indicates the potential for species to occur in the project area.

5.2 Bureau of Land Management Sensitive and Conservation Agreement Species

The BLM MFO includes 35 species warranted for sensitive species management or conservation agreement species consideration. Of these, 13 have the potential to occur in the action area. Table 5-2 lists those species and their habitat associations and provides a rationale for eliminating the other 22 species from further analysis. Sensitive species with the potential to occur in the action area are depicted in bold in the table.

While included in the GFO RMP as a sensitive species, the Gunnison's sage grouse (GUSG) is not included on the most current sensitive species list for the field office. Based on conversations with BLM Biologist Melissa Wardle from the BLM Monticello Field Office, adjacent to and south of the MFO, there is no suitable habitat for the GUSG within the MFO. The USFWS has mapped potential GUSG in eastern Utah and western Colorado associated with several BLM RMP amendments in the region. The MFO does not include any of these mapped and/or known occupied GUSG habitats. Accordingly, no further assessment was completed to address this species.

Table 5-2. Bureau of Land Management Moab Field Office Sensitive and Conservation Agreement Species

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
Mammals			
Allen's big-eared bat (*Idionycteris phylotis*)	BLM SS	Primarily occurs in mountainous wooded areas, including ponderosa pine, piñon-juniper, and oak brush, but may be found in cottonwood riparian woodland.	None, no mountainous or cottonwood woodlands within the action area.

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
Big-free-tailed bat (*Nyctinomops macrotis*)	BLM SS	Found in coniferous and mixed woodlands. This species depends on rocky cliffs for roosting. This species typically occurs below 6,000 feet but has been known to occur up to 8,000 feet.	None, no rocky cliff habitats in the action area.
Fringed myotis (*Myotis thysanodes*)	**BLM SS**	**Found in montane coniferous woodlands and mixed shrub habitats below 7,500 feet. Also uses desert-scrub, oak-woodland, oak-juniper, piñon-juniper, deciduous riparian, and riparian habitat.**	**Potential habitat for this species occurs in the action area.**
Gunnison prairie dog (*Cynomys gunnisoni*)	**BLM SS**	**Primarily inhabits grass/forb/shrub habitats on abandoned land, valley floors, stream valleys, mountain meadows, high-elevation plateaus and benches, and intermountain valleys.**	**Prairie dog colonies are present in the action area.**
Kit fox (*Vulpes macrotis*)	**BLM SS**	**Primarily inhabits desert scrub and plains and desert grasslands but occasionally may be found in coniferous woodland. Dens excavated in desert scrub or desert grasslands with soft, alluvial or silty-clay soils, and often with sparse saltbush, shadscale, greasewood, or sagebrush, and grasses.**	**Potential habitat for this species occurs in the action area.**
Spotted bat (*Euderma maculatum*)	**BLM SS**	**Preferred habitat is meadows in subalpine coniferous forest. Also known to occur in riparian, Great Basin Desert shrub, piñon-juniper woodlands, and ponderosa pine habitats. Rocky cliffs are important for roosting. Permanent water sources are important for foraging.**	**Potential habitat for this species occurs in the action area. The potential is limited due to the absence of rocky cliffs for roosting.**
Townsend's big-eared bat	**BLM SS**	**Uses many types of habitats, but most often found near forested areas; caves, mines,**	**Potential habitat for this species occurs in the action area.**

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
(*Corynorhinus townsendii*)		**and buildings are used for day roosting and winter hibernation.**	
Western red bat (*Lasiurus blossevillii*)	BLM SS	Found in cottonwood riparian forests, and mixed conifer forests. This species roosts in trees and avoids caves and buildings during the summer.	None, no cottonwood riparian forests within the action area.
White-tailed prairie dog (*Cynomys leucurus*)	**BLM SS**	**Occurs in open shrublands, semidesert grasslands, and open valleys in flat to gently rolling terrain. In Utah, this sub-species is known from northeast to eastern Utah.**	**Prairie dog colonies in the action area are Gunnison's prairie dogs. All populations are on private lands.**
Birds			
American three-toed woodpecker (*Picoides dorsalis*)	BLM SS	Occurs in boreal and montane coniferous forests with an abundance of insect-infested snags or dying trees. Often associated with recently burned habitat.	None, no boreal or montane forests within the action area.
Bald eagle (*Haliaeetus leucocephalus*)	BLM SS	Nests and roots in forested areas along coasts, large lakes, and rivers.	None, no rivers or large lakes within the project or action area. May incidentally been seen in the action area.
Burrowing owl (*Athene cunicularia*)	**BLM SS**	**Typically associated with prairie dog colonies. Found in dry, open, short-grass, and treeless plains; uses areas that include shrubs, such as four-wing saltbush and rabbit-brush.**	**Prairie dog colonies are present in the action area on private lands. No burrowing owls were observed during the 2022 or 2023 surveys.**
Ferruginous hawk (*Buteo ragalis*)	**BLM SS**	**Flat or rolling terrain in grasslands, shrub-steppes, deserts, and badlands. Prefers elevated nest sites (e.g., buttes, utility poles, trees), but also nests on the ground.**	**Potential habitat in action area though likely limited to foraging habitat due to limited elevated nesting substrates.**
Golden eagle (*Aquila chrysaetos*)	**BLM SS**	**Typically, this eagle is found in open country, especially in mountainous regions. Nests primarily on cliffs.**	**The action area contains foraging habitat; however, there is no suitable nesting habitat in the action area. There is a known nest on BLM land 1.1-mile from the action**

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
			area. This nest was inactive in 2022 and 2023.
Lewis's woodpecker (*Melanerpes lewis*)	BLM SS	Breeding habitat consists of open woodlands, mixed conifer, riparian, and oak woodlands; also fringes of pine and juniper stands; and deciduous forests, especially riparian cottonwoods. Dead trees and stumps are required for nesting. Wintering grounds are over a wide range of habitats, but oak woodlands are preferred.	None, no riparian or oak woodlands in the action area. Presence considered unlikely.
Amphibians			
Great plains toad (*Anaxyrus cognatus*)	**BLM SS**	**Found in southeastern Utah, living in temporary shallow pools, quiet streams, marshes, or irrigation ditches. They are most common in grasslands but also can be found in desert brush and woodland areas.**	**May occur in the action area associated with ditches, pools, and washes.**
Fish			
Bluehead sucker (*catostomus discobolus*)	BLM CAS	Found in the Colorado River mainstem and tributaries. May be found in cold, clear streams to warm, turbid rivers. They stay in deep pools and eddies in cold streams and feed in riffles or shorelines. In warm rivers and occupy shallow areas.	None, no large rivers within the action area.
Flannelmouth sucker (*Catostomus latipinnis*)	BLM CAS	Inhabits rocky pools, runs, and riffles of creeks of medium to large rivers, occurs less often in small to medium rivers.	None, no large rivers within the action area.
Roundtail chub (*Gila robusta*)	BLM CAS	Occurs in large rivers and streams in the Upper Colorado River Basin such as the Green, Yampa, and Colorado rivers. Less abundant in the lower Basin drainages such as the San Juan River.	None, no large rivers within the action area.
Insects			
Monarch Butterfly	**BLM SS**	**During the breeding season in the spring through fall,**	**A single Monarch was observed in 2022 along West**

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
(*Danaus plexippus*)		**monarchs lay their eggs on their obligate milkweed (*Asclepias* sp.) host plant.**	**Canyon Wash on private land. Showy milkweed, an obligate species, occurs along this wash in scattered locations.**
Western bumble bee (*Bombus occidentalis*)	**BLM SS**	**Found in open grassy areas where diverse flowering plants offer a wide variety of nectar and pollen resources.**	**Potential habitat occurs in the action area.**
Reptiles			
Cornsnake (*Elaphe cuttata*)	**BLM SS**	**Known in Utah from the eastern part of the state. Found near streams in rocky or forested habitats.**	**May be found in action area. None seen during 2022 or 2023 surveys.**
Smooth green snake (*Opheodrys vernalis*)	BLM SS	Found in meadows, grassy marshes, moist grassy fields at forest edges, mountain shrublands, streams, bogs, abandoned farmland, and open moist woodland.	No grassy marshes or fields near forests or moist woodlands in action area.
Plants			
Desolation Canyon columbine (*Aquilegia desolaticola*)	BLM SS	Found in seeps and adjacent moist sandy soils in the Tertiary Price River Formation between 4,265 and 4,430 feet.	None, no seeps or moist sandy soils occur in the action area. Surficial geology is not Tertiary Price River Formation.
Isely's milkvetch (*Astragalus iselyi*)	BLM SS	Found in pinon-juniper and desert shrub communities on seleniferous and gypseriferous sandy to gravelly clay slopes of Morrison and Mancos formations between 5,000 and 6,600 feet.	None, no Morrison or Mancos Formation derived soils in the action area.
Peabody's milkvetch (*Astragalus peabodianus*)	BLM SS	Found in entrenched channels on the south and west flanks of the Tavaputs Plateau in pinon-juniper and mixed desert shrub communities between 4,300 and 5,800 feet.	None, the action area is not located on the Tavaputs Plateau.
Cisco milkvetch (*Astragalus sabulosus* var. *sabulosus*)	BLM SS	Found in salt desert shrub communities on the Mancos Shale Formation between 4,250 and 5,250 feet.	None, no Mancos Shale Formation derived soils in the action area.

Species (*Scientific Name*)	Conservation Status	Habitat Association	Potential to Occur in Action Area
Stage milkvetch (*Astragalus sabulosus* var. *vehiculus*)	BLM SS	Found on the Morrison Formation in shadscale, woody-aster, and galleta community between 4,480 and 4,800 feet.	None, no Morrison Formation derived soils in the action area.
Canyonlands lomatium (*Lomatium latilobum*)	BLM SS	Found in rock crevices and sandy deposits of Entrada and Navajo Sandstone between 5,000 and 6,000 feet.	None, no rock crevices or sandy deposits of Entrada or Navajo sandstone in the action area.
Entrada rushpink (*Lygodesmia grandiflora* var. *entrada*)	BLM SS	Found in mixed desert shrub and juniper communities in deep sandy soil on Entrada Sandstone between 4,400 and 4,800 feet.	None, no Entrada Sandstone in the action area.
Shutlz's stickleaf (*Mentzelia shultzorium*)	BLM SS	Co-occurs with shadscale, *Erigonum*, and *Ephedra* communities on steep sparsely vegetated slopes of the Triassic, Chinle, Moenkopi and Permian Cutler and Paradox formations at 4,100 to 5,200 feet.	None, no steep slopes of the Triassic, Chinle, Moenkopi, Permian Cutler and Paradox formations in the action area.
Trotter's oreoxis (*Oreoxis trotteri*)	BLM SS	In crevices or sandy pockets on the Moab Tongue and the Slick Rock members of the Entrada Sandstone.	None, no Entrada Sandstone in the action area.
Jane's globemallow (*Sphaeralcea janeae*)	BLM SS	Found in warm and salt desert shrub communities on the White Rim and Organ Rock members of the Cutler Formation between 4,000 and 4,600 feet in elevation	None, no Cutler Formation in the action area.
Alcove rock-daisy (*Perityle specuicola*)	BLM SS	Found in desert shrub and hanging gardens in narrow canyons, alcoves, and cliff bases of the Navajo Sandstone and Cedar Mesa Formation between 3,700 and 4,200 feet.	None, no Navajo Sandstone or Cedar Mesa Formation surficial geology in the action area.
Psorlea globemallow (*Sphaeralcea psoraloides*)	BLM SS	Found on saline or gypsiferous soils in Mancos Shale, Buckhorn Conglomerate, Curtis Sandstone, Entrada siltstone, Carmel, and Kaibab Limestone between 4,000 and 6,300 feet.	None, no saline or gypsiferous soils in the action area.

Source: BLM MFO 2018a, 2018b.

Key: BLM=Bureau of Land Management, SS=Sensitive Species, and CAS=Conservation Agreement Species.

Note: **Bold**-faced text indicates the potential for species to occur in project area.

6. Discussion

Based on the 2022 and 2023 field investigations findings, suitable migratory stopover habitat and marginal nesting habitat are present for the southwestern willow flycatcher. There is no suitable habitat in the action area for any other USFWS federally listed threatened or endangered species. No critical habitat occurs in the action area. As no vegetation clearing or drilling is planned in riparian zones and following the implementation of recommended mitigation measures (refer to Section 6.1), the Project would have **no effect** on any federally listed species (Table 5-1). Below are discussions of potential impacts on the USFWS-listed southwestern willow flycatcher, the candidate monarch butterfly, and BLM-sensitive species.

6.1 Southwestern Willow Flycatcher

Migratory stopover habitat and marginal nesting habitat for the southwestern willow flycatcher occur along portions of West Coyote Wash and an unnamed wash in the north portion of the project area (refer to Map 7 in Appendix A). Exotic Russian olive and tamarisk thickets dominate West Coyote Wash. A spring-fed unnamed wash in the north portion of the project area has a several acres stand of coyote willow intermixed with tamarisk and scattered Russian olive. While there are dense patches of willow 10-15 ft. in height, the overall structure is semi-open and generally narrow, limiting the habitat quality for nesting. There are several representative habitat photos in Appendix C. As a result of Ecosphere completing 2023 USFWS protocol presence-absence surveys, it was documented that willow flycatchers utilize these habitats briefly while in migration (May-June) as migratory stopover habitat for resting and foraging. Appendix A Map 8 shows the two areas (northern and southern) surveyed. Four willow flycatchers were detected during the first survey (May 29) in the southern survey area, and two in the northern area. During the second survey, three willow flycatchers were detected in the southern survey area, and none were detected in the northern area. No willow flycatchers were detected during the remaining five survey periods that extended into July.

Recommended Mitigation Measures – If CAAWP site characterization activities are planned during the breeding season (mid-May through August), presence/absence follow-up surveys are recommended in accordance with the USFWS survey protocol (Sogge et al. 2010). Surveys to detect the presence of willow flycatchers should be conducted for any activities occurring between May 15 and August 24 that are within 50-meters of suitable habitat (refer to Appendix A Map 8). If willow flycatchers are detected during the second survey period after June 24 (when breeding is suspected), the USFWS should be consulted regarding avoidance timing or other protective measures. As a general measure, it is recommended to minimize ground-disturbing activities within 50-meters of willow flycatcher habitat areas between May 15 and June 24. If no willow flycatchers are detected during surveys one (May 15-30) and two (June 1-24), then no protection measures are warranted, and activities can continue or initiate as planned.

6.2 Monarch Butterfly

The action area contains suitable habitat for the monarch butterfly, a USFWS candidate listed, and a BLM MFO-sensitive species. One individual monarch butterfly was observed on September 6, 2022, in the

northeastern portion of the project area, on private property at West Coyote Wash. In addition, showy milkweed (*Asclepias speciosa*), preferred by monarchs, occurs in scattered populations along this wash (refer to Map 7 in Appendix A). No milkweed was found in other areas of the action area. No monarch butterflies were detected in 2023. Impacts on this species may occur if CAAWP activities result in the removal of showy milkweed individuals or populations. Potential impacts on monarch butterflies are expected to be negligible provided that CAAWP planned activities near West Coyote Wash avoid impacts to showy milkweed individuals or populations.

Recommended Mitigation Measures – It is recommended that botanical investigations be conducted for any ground-disturbing activities within 100 feet of the West Coyote Wash.

6.3 BLM Sensitive Bats

Suitable foraging habitat for fringed myotis (*Myotis thysanodes*), spotted bat (*Euderma maculatum*), and townsend's big-eared bat (*Corynorhinus townsendii*) occur in the action area within piñon-juniper woodlands, and open sagebrush shrublands. Potential roosting habitat is limited as there are few rocky outcrop areas. Impacts on these three bats may include the short-term avoidance of the project area due to increased human activity or noise. No roosting substrate habitats are expected to be removed from CAAWP activities.

Recommended Mitigation Measures – No mitigation measures are recommended.

6.4 White-Tailed Prairie Dog

The study area contains approximately 400 active burrows within approximately 45 acres (refer to Map 7 in Appendix A) of abandoned/fallow agriculture fields and open shrub and grassland habitats. There are three discrete towns within these areas, all on private lands. The Gunnison's prairie dog (*Cynonmys gunnisoni*) species occurs throughout the Four-Corners area. The Gunnison's prairie dog in Utah occurs in Grand and San Juan Counties (Lupis et at. 2007). The white-tailed prairie dog (*Cynomys leucurus*) differs in appearance from the Gunnison's prairie dog in that individuals are generally lighter in color, have a white-tipped tail, and have distinct facial markings. The white-tailed prairie dog forms relatively small colonies compared to other prairie dog species. Colonies are generally irregular in pattern and scattered across the landscape. In Utah, white-tailed prairie dogs occur in Rich, Summit, Dagget, Uintah, Duchesne, Carbon, Emery, and Grand Counties; and this species range extends into parts of Wyoming, Colorado, and Montana (Lupis et al. 2007). Gunnison's prairie dogs were observed in the study area. Human activity and traffic during construction may disturb area prairie dogs. Therefore, pre-construction surveys to determine occupancy of these colonies may be prudent or required by the BLM before ground disturbance through these areas.

Recommended Mitigation Measures – Pre-construction surveys to determine occupancy of these colonies and subspecies present (Gunnison's or white-tailed) may be prudent before ground disturbance through these areas. Following the 2022 and 2023 surveys, no prairie dog colonies were present on BLM lands in the project area.

6.5 Kit Fox

No kit fox (*Vulpes Macrotis*) or kit fox dens were observed within the study area; their potential to occur is based on the presence of shrubland habitat within the known range of this species in the action area. Impacts on this species may include avoidance of CAAWP activities from disturbance due to increased human activity and noise. Impacts to kit fox are expected to be negligible as planned CAAWP activities are similar in magnitude and duration to those at the Lisbon Facility for many years.

Recommended Mitigation Measures – No mitigation measures are recommended.

6.6 Raptors and Eagles

Suitable foraging habitat for ferruginous hawk (*Buteo regalis*) and golden eagle (*Aquila chrysaetos*) occurs in the action area. In Utah, ferruginous hawk nest at the edge of juniper woodlands within open desert or grassland habitats, often near available prey bases, such as prairie dog towns. No ferruginous hawks were observed during the field surveys. Impacts on these species may include short-term avoidance of the study area due to human activity and noise associated with CAAWP activities. No direct impacts on nesting substrates are anticipated.

The golden eagle typically relies on areas supporting healthy populations of lagomorphs and small mammals (Kochert et al. 2002). A pair of adult golden eagles were observed during the field surveys. The closest known golden eagle nest is approximately 1.1 miles southeast of the study area on BLM-administered lands. Impacts on these species may include short-term avoidance of the study area due to human activity and noise associated with CAAWP activities. No direct impacts on nesting substrates are anticipated, although golden eagles occasionally use large piñon-juniper trees for perching and nesting.

Recommended Mitigation Measures – Periodic seasonal raptor surveys are recommended.

6.7 Burrowing Owl

A potential burrowing owl (*Athene cunicularia*) habitat is associated with active prairie dog colonies in the study area. No burrowing owls were observed during the 2022 surveys; however, a complete protocol presence/absence survey was not conducted. Impacts on burrowing owls may include the collapse of available burrow/nests, which may trap or kill owls in burrows during the nesting season (March 1 through August 31). Due to increased human activity or noise, burrowing owls may also avoid the project area during CAAWP activities. No protocol surveys were conducted for this species in 2022. Baseline protocol surveys completed during the 2023 field season resulted in no detections of burrowing owl.

Recommended Mitigation Measures – If CAAWP activities are planned during the breeding season, presences/absence surveys are recommended in accordance with the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Mock 1999). Surveys to detect the presence of burrowing owls should be conducted during the peak of the breeding season, between April 15 and July 15. If any burrowing owls are detected, coordinate resource protection measures with the BLM MFO biologist. The protocol recommends a 0.25-mile spatial buffer from active nests/burrows between March 1 and August 31 to avoid impacts on burrowing owls (Romin and Mock 1999).

6.8 Western Bumblebee

Potential habitat for western bumblebee (*Bobbus occidentalis*) occurs in the action area associated with the presence of flowering plants within the project area and rodent holes. Western bumblebee colonies are annual, with queens emerging from hibernation in late winter or early spring to select nest sites, usually in abandoned rodent holes. Impacts on this species may include the collapse of rodent holes that may provide nesting or overwintering habitat. In addition, individuals may be killed if rodent burrows are occupied in construction areas.

Recommended Mitigation Measures – Conducting a pedestrian survey of the disturbance footprint of any planning CAAWP ground-disturbing activities in spring would be prudent. Surveys would evaluate whether there was observable bumblebee use of any rodent holes in the area.

6.9 Migratory Birds

Pinyon jay (*Gymnorhinus cyanocephalus*) is the only USFWS Bird of Conservation Concern (BCC) identified as potentially occurring in the study area (USFWS 2022). No pinyon jays were observed during the 2022 or 2023 biological field surveys. The study area contains foraging and nesting habitat for various resident and migratory bird species. Impacts on migratory birds include the disturbance of potential nesting and foraging habitat, and the destruction of nests, which the MBTA prohibits. Additional impacts may include avoiding the project area from increased human activity or noise. Impacts on migratory birds would be greater if vegetation and ground-disturbing activities occurred during the nesting season between March 1 and July 31.

Recommended Mitigation Measures – MBTA nest search surveys between April 1 and July 31 are recommended and commonly stipulated by BLM for any planned vegetation clearing during the nesting season. Nest search surveys should be completed within 1 week of planned vegetation clearing if during the breeding season.

Based on communications with Jonathon (Yoni) Argov, BLM MFO biologist, Mr. Argov requested that pinyon jay surveys be initiated during the 2024 field season to establish a baseline in the project area. While the pinyon jay is not a BLM-sensitive species, they have been petitioned to be listed under the Endangered Species Act due to steep population declines in the west. Because of the extent of Pinyon-Juniper habitat in the MFO, pinyon jay conservation is becoming a focus of the field office. The survey protocol will follow the interagency Pinyon Jay Working Group's (PJWG) recommended Pinyon Jay data standards and survey protocol (PJWG 2021) https://partnersinflight.org/wp-content/uploads/2019/10/Data-Standards-and-Survey-Protocol-for-Pinyon-Jays.pdf.

6.10 Noxious Weeds

Tamarisk (saltcedar), Russian olive, field bindweed (wild morning-glory) (*Convulvulus arevense*), Canada thistle (*Cirsium arvense*), and hardheads (Russian knapweed) (*Acroptilon repens*) were observed in the study area in previous disturbed areas and along West Coyote Wash. Tamarisk (saltcedar), field bindweed (wild morning-glory) Canada thistle and hardheads (Russian knapweed) are Utah Class 3 (Containment) noxious weed species, and Russian olive is a Utah Class 4 (Prohibited) weed species.

Surface-disturbing activities associated with CAAWP activities may cause the introduction or spread of noxious weeds in the study area.

Recommended Mitigation Measures – It is recommended that RAML develop a *Noxious Weed Management Plan* to address all ground-disturbing activities associated with future CAAWP activities. The plan would address pre-activity weed surveys, weed mapping, implementation of best management practices (BMPs), weed control, and eradication. Future CAAWP activities with a NEPA trigger commonly require developing and implementing a weed management plan.

7. References

Bureau of Land Management Moab Field Office (BLM MFO). 2018a. Utah Bureau of Land Management Sensitive Wildlife Species List December 2018. Available online https://www.blm.gov/sites/blm.gov/files/Utah%20BLM%20Sensitive%20Wildlife%20Species%20List.pdf. Accessed February 8, 2023.

BLM MFO. 2018b. Utah Bureau of Land Management Sensitive Plant Species List December 2018. Available online https://www.blm.gov/sites/blm.gov/files/Utah%20BLM%20Sensitive%20Plant%20Species%20List.pdf. Accessed February 8, 2023.

Brown, D. E. (ed.). 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. 342 pp. Desert Pl, Vol. 4. University of Utah Press. Salt Lake City, UT.

Doelling, H. H., 2004, Geologic map of the La Sal 30' x 60' quadrangle, San Juan, Wayne, and Garfield Counties, Utah, and Montrose and San Miguel Counties, Colorado: Utah Geological Survey, Map 205, scale 1:100,000. Available online at: https://ngmdb.usgs.gov/Prodesc/proddesc_70706.htm. Accessed February 3, 2023.

INTERA. 2022. Corrective Action Assessment Work Plan, Rio Algom Mining LLC Lisbon Facility, San Juan County, Utah Radioactive Materials License Number UT 190048. November 16.

Kochert, M. N., K. Steenhof, C. L. McIntyre, and E. H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.684

Lupis, S. G, K. D. Bunnel, T. A. Black, and T. A. Messmer. 2007. *Utah Gunnison's Prairie Dog and White-Tailed Prairie Dog Conservation Plan*. Final Draft, 94 pp. Utah Division of Wildlife Resources, Salt Lake City, Utah. Available online: https://extension.usu.edu/utahcbcp/white-tailed-prairie-dog. Accessed February 13, 2023.

Natural Resources Conservation Services (NRCS) Web Soil Survey. 2022a. *Soil Survey Area: Canyonlands Area, Utah – Parts of Grand and San Juan Counties*. Survey area data: Version 17, August 31, 2022. Available online at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Access February 6, 2023.

NRCS Web Soil Survey. 2022b. *Soil Survey Area: San Juan Area, Utah*. Survey area data: Version 15, September 1, 2022. Available online at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Access February 6, 2023.

Pinyon Jay Working Group (PJWG). 2021. Data Standards and Survey Protocol for Pinyon Jays Version 1.0 February 26, 2021.

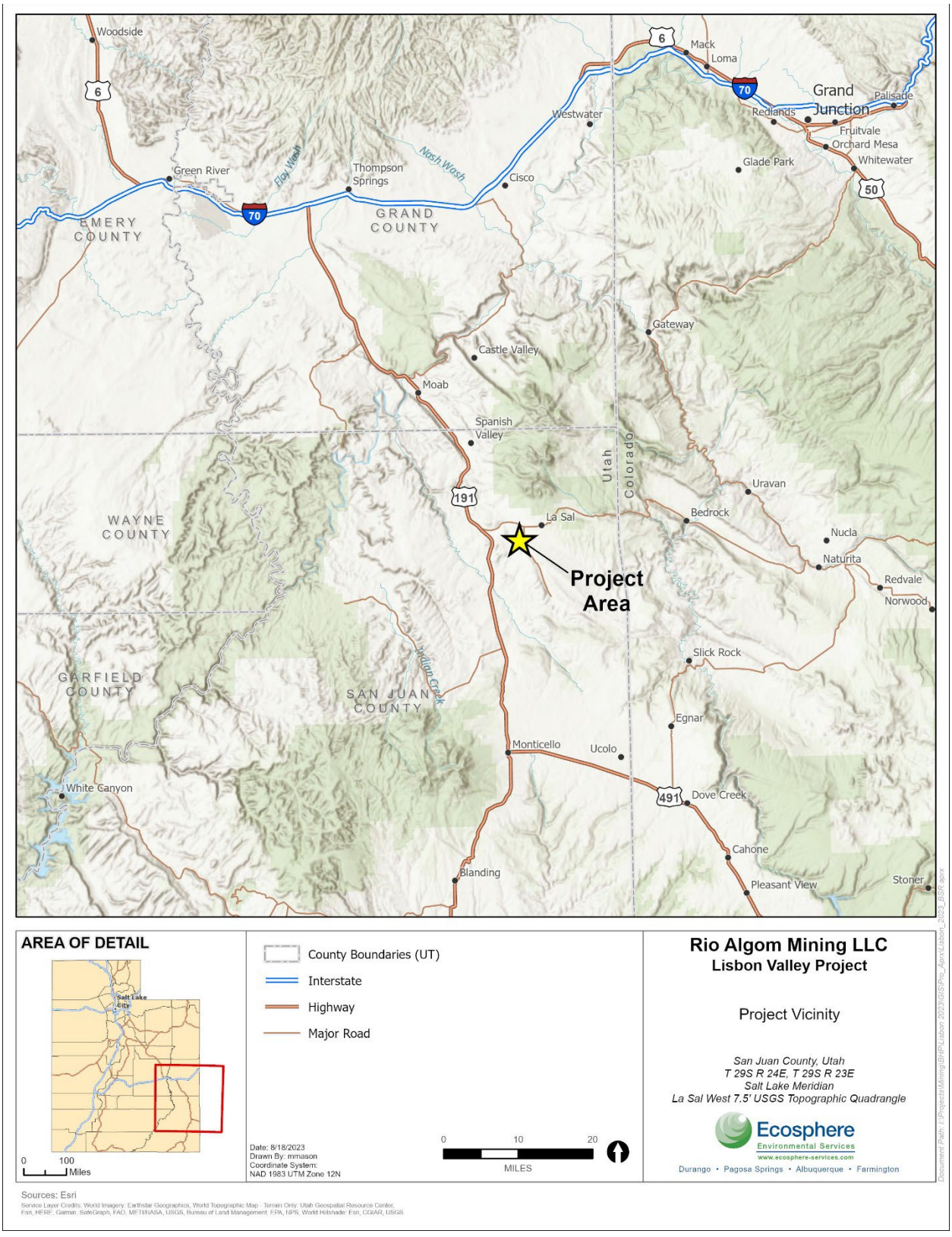
Romin, Laura A., and James A. Muck. 1999. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildlife Service, Utah Field Office, Salt Lake City, Utah. Available online at https://www.fws.gov/media/utah-raptor-guidelines-2002pdf

Sogge et al. 2010. A natural history summary and survey protocol for the southwestern willow flycatcher: U.S. Geological Survey Techniques and Methods 2A-IO, 38 p. The current approved survey protocols can be retrieved at the following address: https://pubs.usgs.gov/tm/tm2a10/

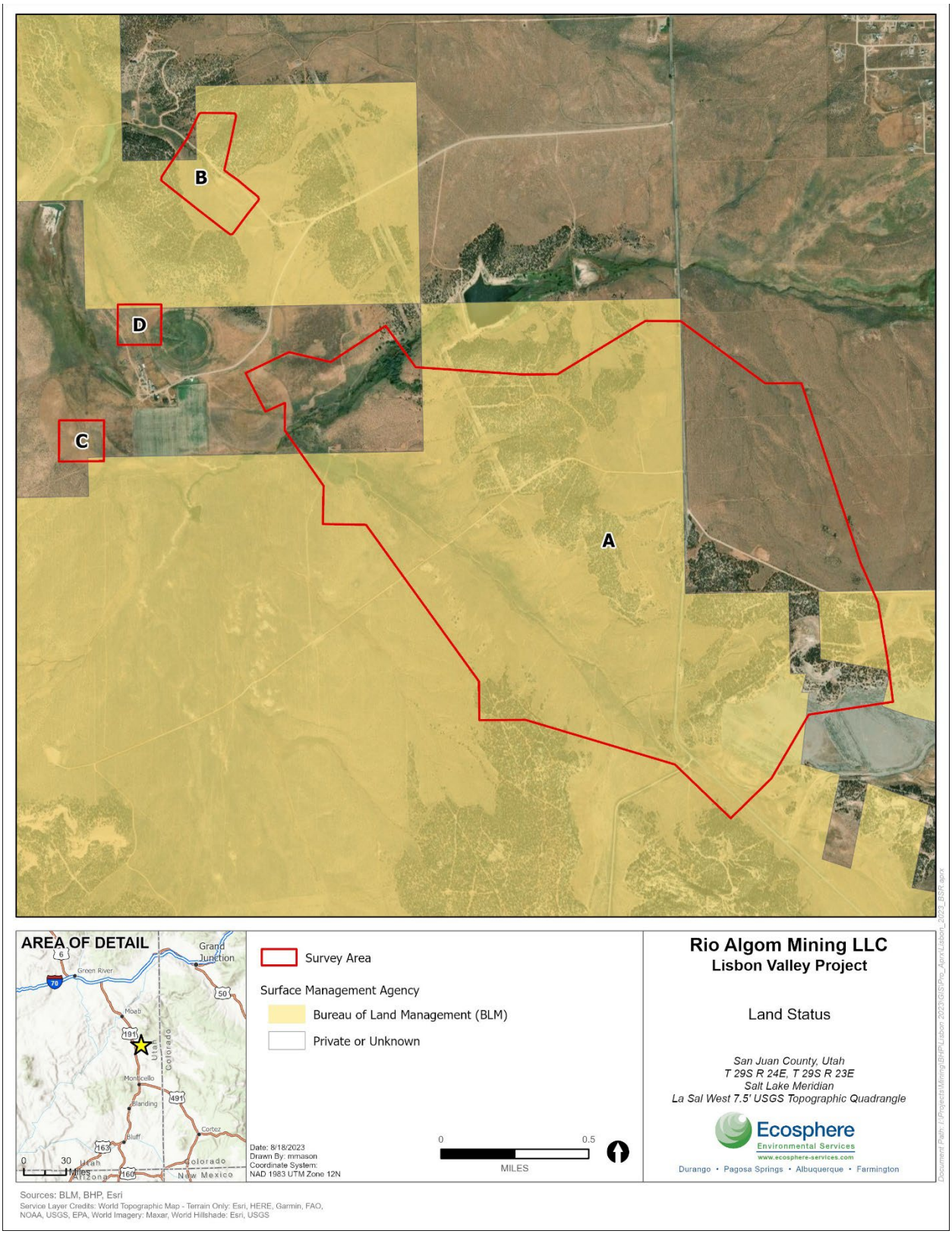
U.S. Fish and Wildlife Service (USFWS). 2022. IpaC-Information for Planning and Consultation. Listed and Sensitive Species in San Juan, Utah. U.S. Fish and Wildlife Service Environmental Conservation Online System. Available online at https://ecos.fws.gov/ipac/. Access August 23, 2022.

Utah Department of Agriculture and Food. 2022. State of Utah Noxious Weed List. Updated June 23, 2022. Available online at: https://ag.utah.gov/farmers/plants-industry/noxious-weed-control-resources/state-of-utah-noxious-weed-list/ Access September 1, 2022.

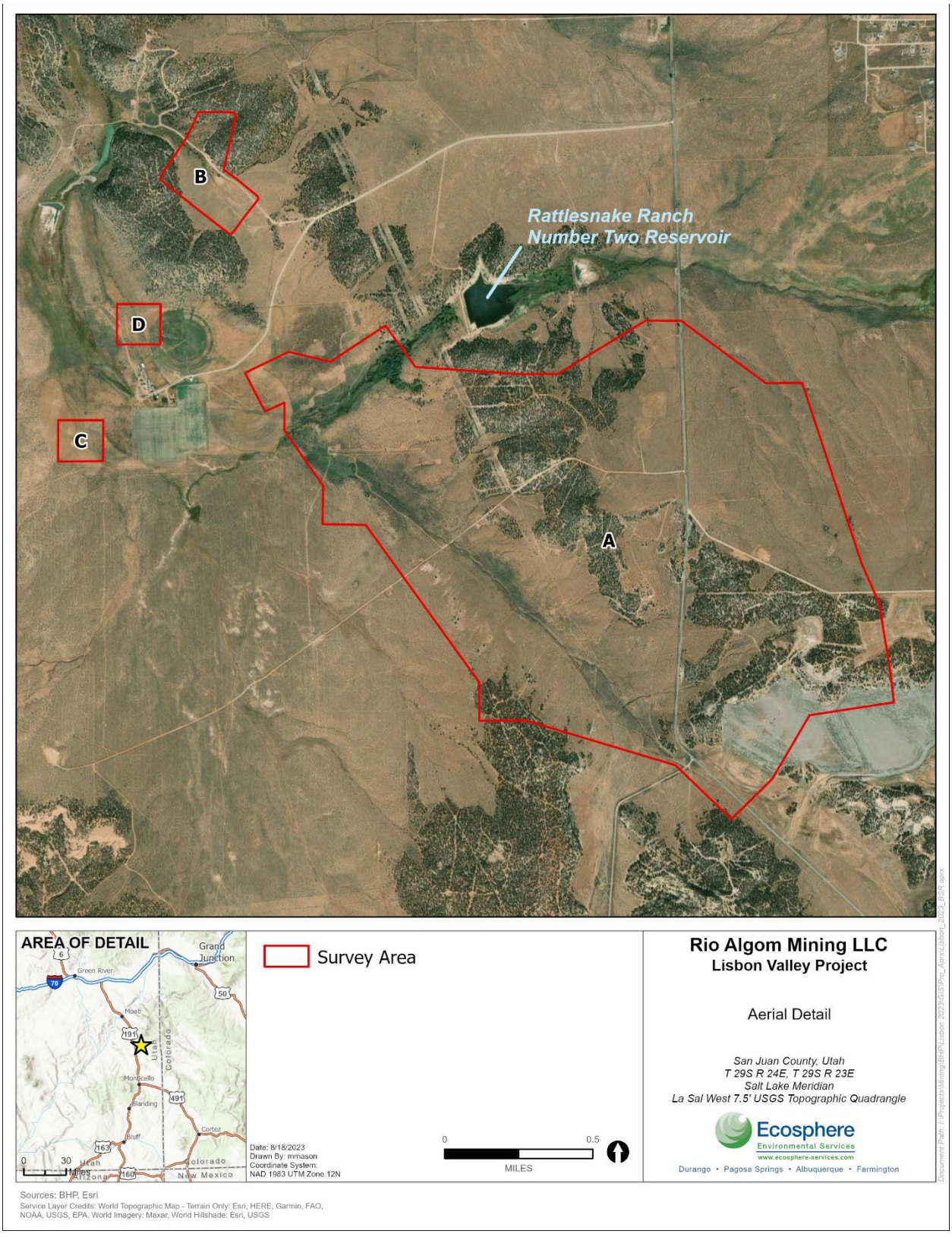
Appendix A – Maps



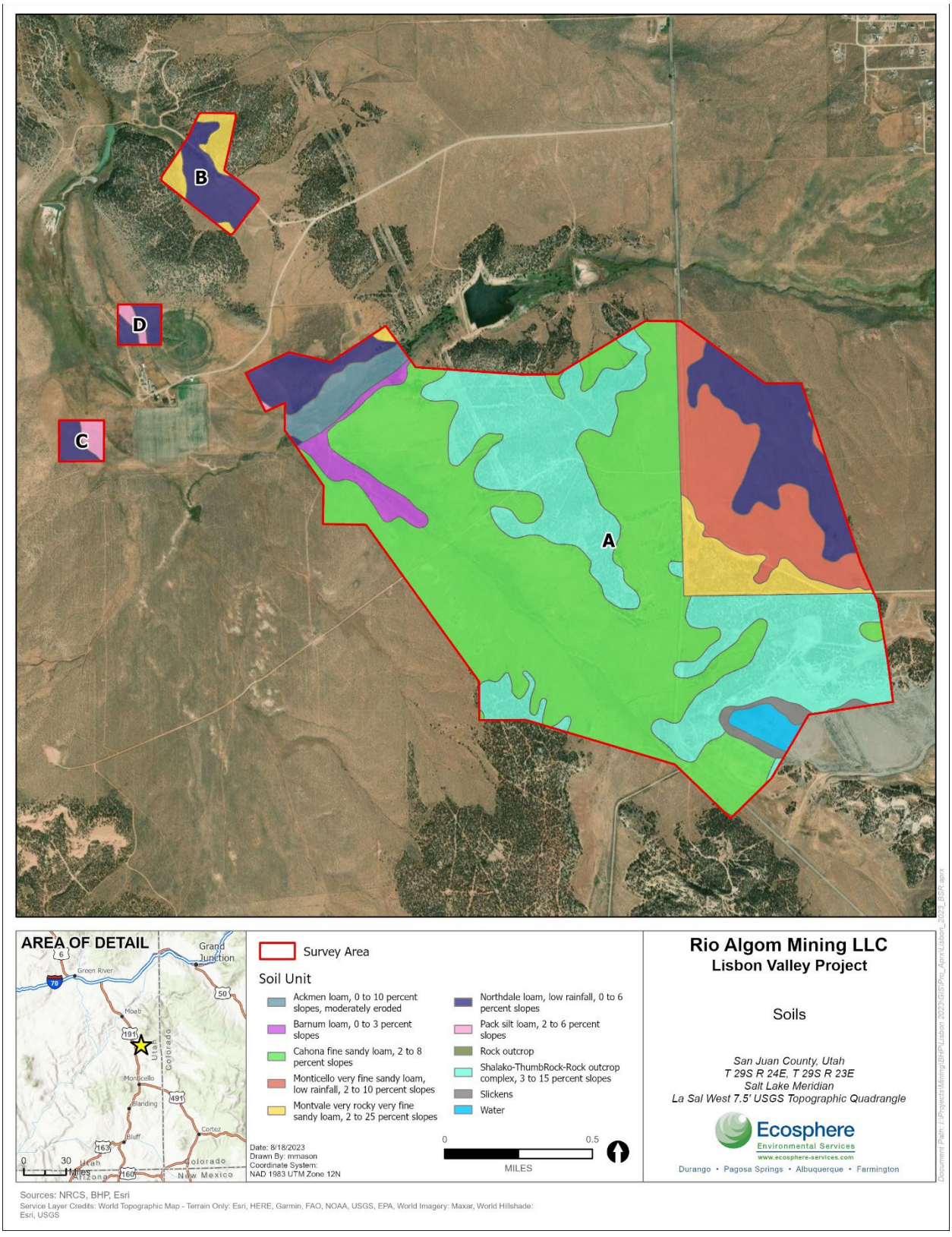
Map 1. Vicinity Map



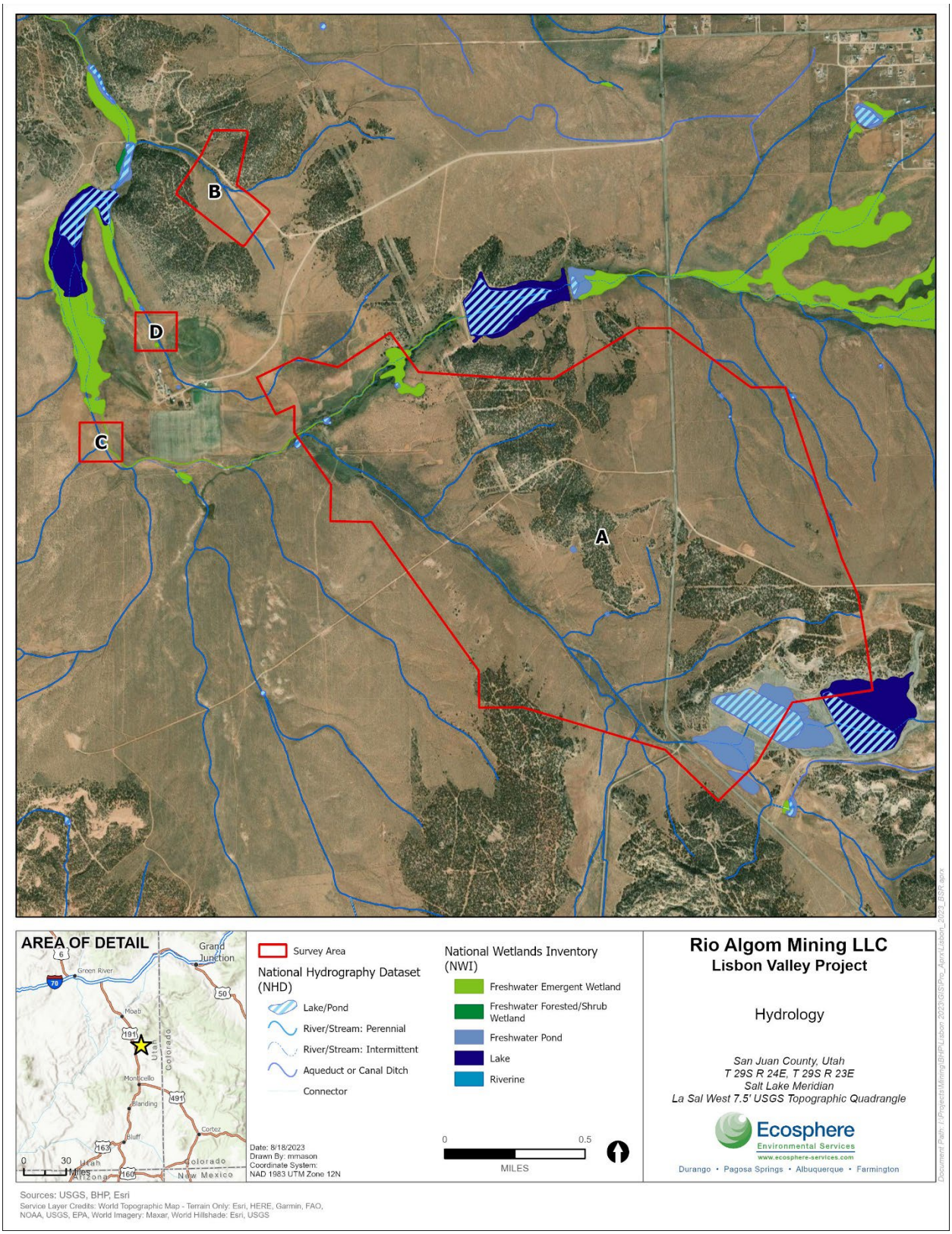
Map 2. Land Status Map



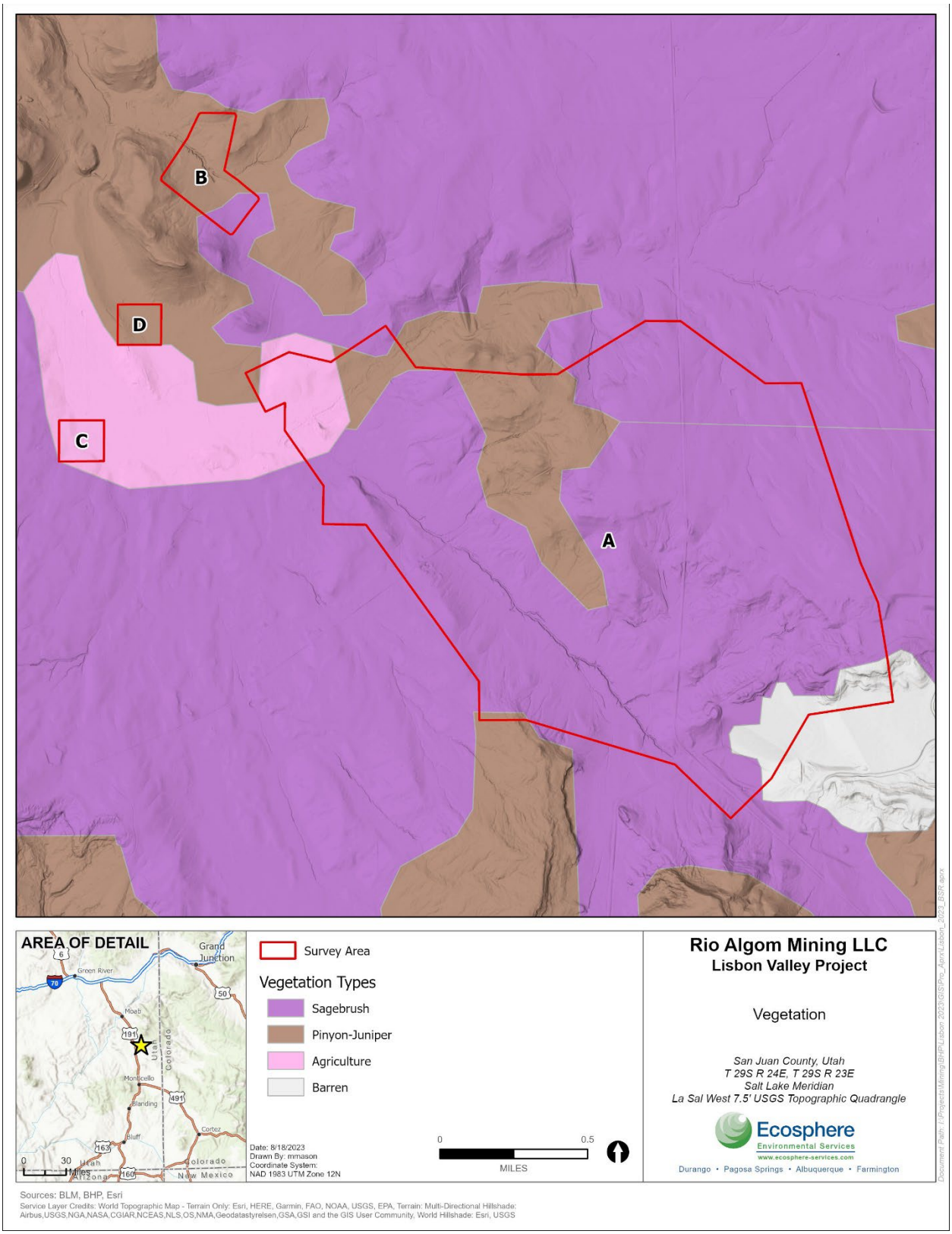
Map 3. Aerial Detail Map



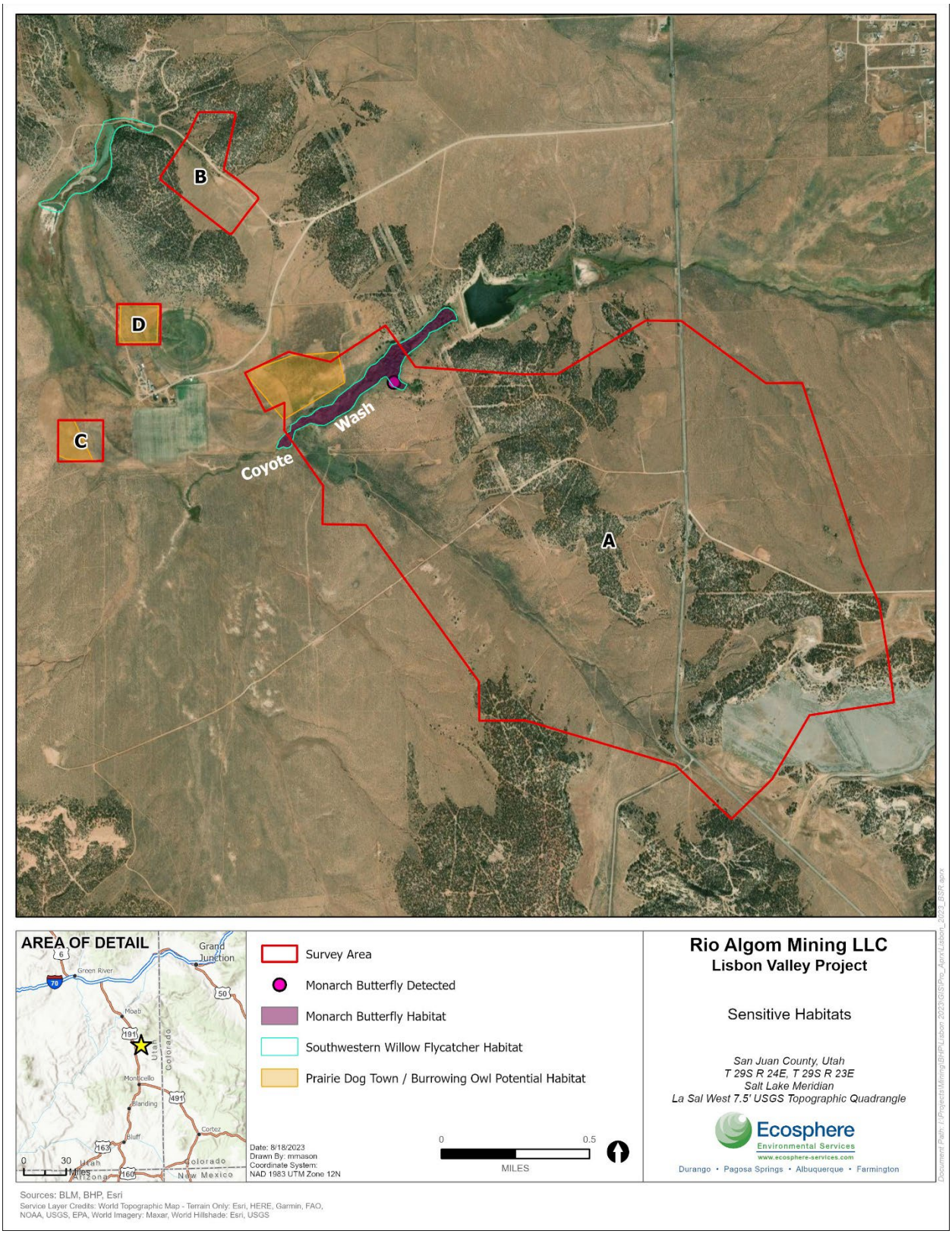
Map 4. Soils Map



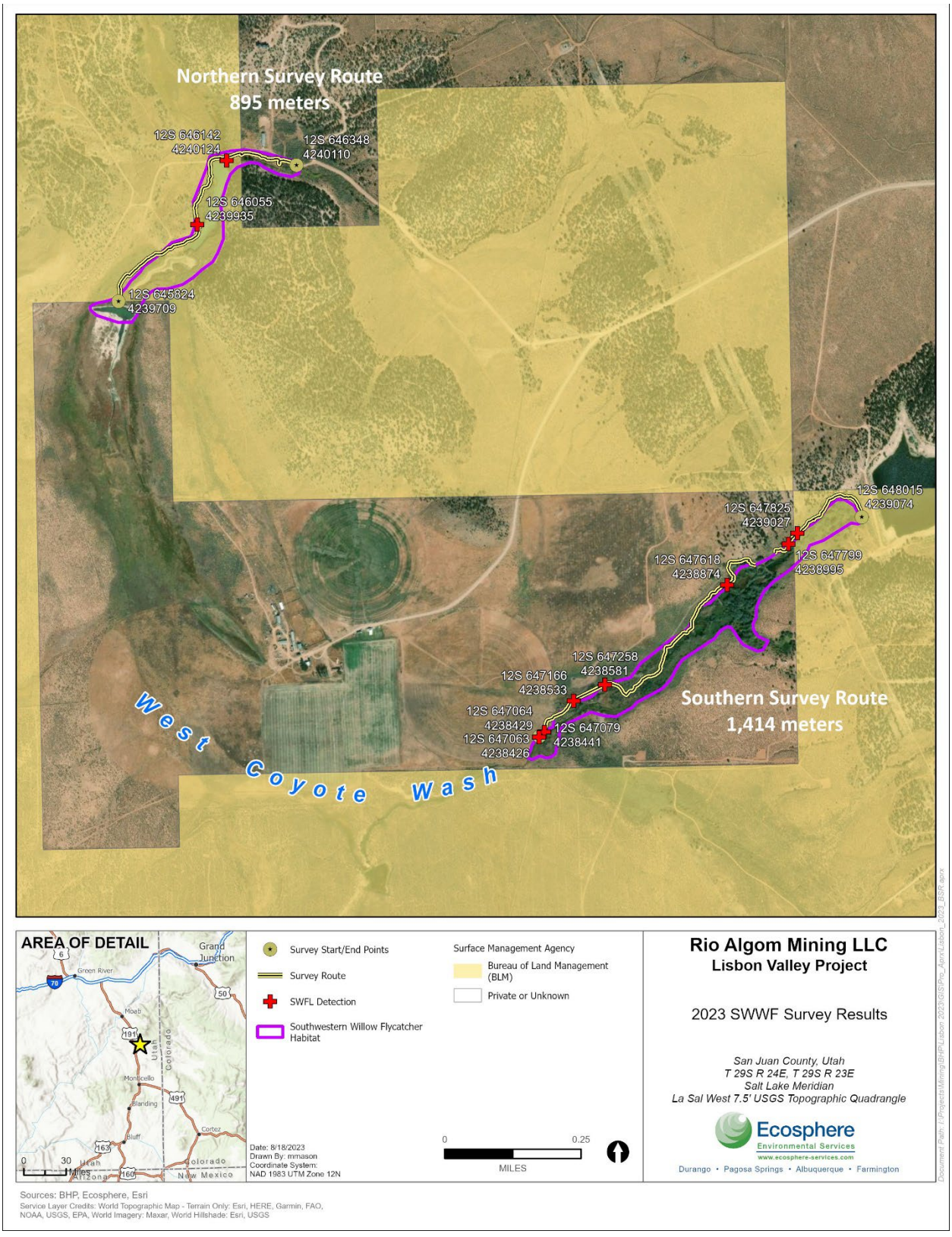
Map 5. Hydrology Map



Map 6. Vegetation Communities Map



Map 7. Sensitive Species Map



Map 8. Southwestern Willow Flycatcher Survey Map

Appendix B – Sensitive Species Lists

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

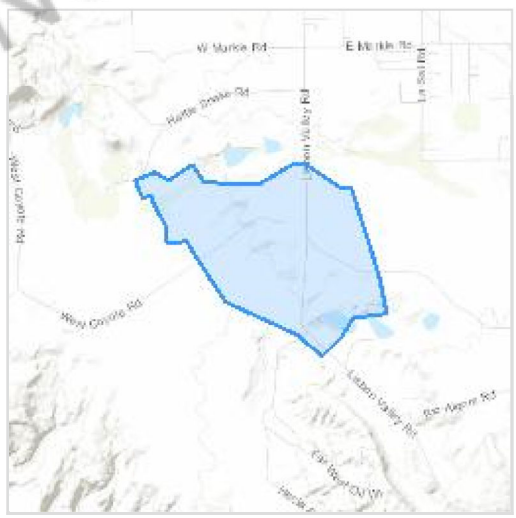
Project information

NAME

Lisbon Project Area

LOCATION

San Juan County, Utah



DESCRIPTION

Some(Biological survey for the proposed Lisbon project area.)

Local office

Utah Ecological Services Field Office

(801) 975-3330
(801) 975-3331

2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603

https://fws.gov/office/utah-ecological-services

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Southwestern Willow Flycatcher Empidonax traillii extimus Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6749	Endangered

Fishes

NAME	STATUS
Bonytail Gila elegans Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1377	Endangered
Colorado Pikeminnow (=squawfish) Ptychocheilus lucius This species only needs to be considered if the following condition applies: • The project depletes water from the Colorado River basin or its tributaries. There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3531	Endangered

Humpback Chub Gila cypha — Threatened
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/3930

Razorback Sucker Xyrauchen texanus — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/530

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Navajo Sedge Carex specuicola Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/8579	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Pinyon Jay Gymnorhinus cyanocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the

bar.

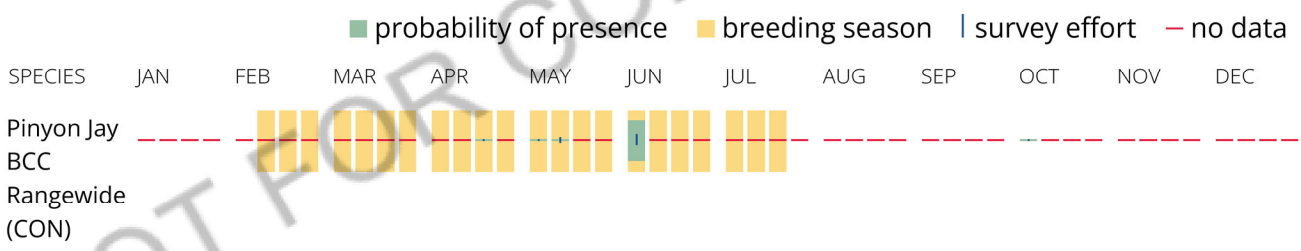
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and

other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

There are no known coastal barriers at this location.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER POND
Palustrine

LAKE
Lacustrine

RIVERINE
Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and

geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Utah Bureau of Land Management Sensitive Plant Species List
December 2018

SCIENTIFIC NAME	COMMON NAME	STATUS	COUNTY	FIELD OFFICE
Aliciella caespitosa	Rabbit Valley gilia	S	Wayne	Richfield
Aliciella tenuis	Mussentuchit gilia	S	Emery, Sevier, Wayne	Price, Richfield
Aquilegia atwoodii	Atwood's columbine	S	Uintah	Vernal
Aquilegia desolaticola	Desolation Canyon columbine	S	Grand	Moab
Aquilegia scopulorum var goodrichii	Goodrich's columbine	S	Duchesne	Vernal
Arabis goodrichii	Goodrich eared rockcress	S	Beaver, Iron	Cedar City, Fillmore
Arabis vivariensis	Park rockcress	S	Uintah	Vernal
Astragalus ampullarius	Gumbo milkvetch	S	Kane, Washington	GSENM, Kanab, St. George
Astragalus anserinus	Goose Creek milkvetch	S	Box Elder	Salt Lake
Astragalus cronquistii	Cronquist's milkvetch	S	San Juan	BENM, Monticello
Astragalus equisolensis	Horseshoe milkvetch	S	Uintah	Vernal
Astragalus hamiltonii	Hamilton's milkvetch	S	Uintah	Vernal
Astragalus iselyi	Isely's milkvetch	S	Grand, San Juan	Moab
Astragalus lentiginosus var pohlii	Pohl's milkvetch	S	Tooele	Salt Lake
Astragalus loanus	Loa milkvetch, Glenwood milkvetch	S	Sevier	Richfield
Astragalus oophorus var lonchocalyx	Pink egg milkvetch	S	Iron, Beaver	Cedar City
Astragalus pubentissimus var peabodianus	Peabody's milkvetch, Green River milkvetch	S	Emery, Grand	Moab, Price
Astragalus sabulosus var sabulosus	Cisco milkvetch	S	Grand	Moab
Astragalus sabulosus var vehiculus	Stage milkvetch	S	Grand	Moab
Astragalus striatiflorus	Escarpment milkvetch	S	Kane, Washington	GSENM, St. George
Astragalus welshii	Welsh's milkvetch, Loa milkvetch	S	Garfield, Iron, Kane, Millard, Piute, Wayne	Cedar City, Fillmore, GSENM, Kanab, Richfield
Atriplex canescens var gigantea	Dunes four-wing saltbush	S	Juab, Tooele	Fillmore, Salt Lake
Camissonia bairdii	Baird's camissonia	S	Washington	St. George
Camissonia bolanderi	Bolander's camissonia	S	Emery, Wayne?	Price, Richfield?
Camissonia gouldii	Gould's camissonia	S	Washington	St. George
Cirsium virginense	Virgin thistle	S	Washington	St. George
Cleomella hillmanii var goodrichii	Goodrich's stickweed	S	Uintah	Vernal

SCIENTIFIC NAME	COMMON NAME	STATUS	COUNTY	FIELD OFFICE
Cryptantha barnebyi	Barneby's cryptanth, Oilshale cryptantha	S	Uintah	Vernal
Cryptantha compacta	Mound cryptanth	S	Beaver, Iron, Millard	Cedar City, Fillmore
Cryptantha creutzfeldtii	Creutzfeldt-flower	S	Carbon, Emery	Price
Cymopterus beckii	Pinnate spring-parsley	S	San Juan, Wayne, Garfield	BENM, GSENM?, Kanab?, Monticello, Richfield
Dalea flavescens var epica	Hole-in-the-rock prairie-clover	S	Garfield, San Juan	BENM, GSENM, Kanab, Monticello
Epilobium nevadense	Nevada willowherb	S	Iron, Millard, Washington	Cedar City, Fillmore, St. George
Ericameria crispa	Pine Valley goldenbush	S	Washington, Millard	Fillmore, St. George
Ericameria lignumviridis	Greenwood's goldenbush	S	Sevier	Richfield
Erigeron kachinensis	Kachina daisy	S	San Juan	BENM, Monticello
Erigeron maguirei	Maguire's daisy	S	Emery, Wayne	Price, Richfield
Erigeron untermannii	Untermann's daisy	S	Duchesne, Uintah	Vernal
Eriogonum ammophilum	Ibex buckwheat	S	Millard	Fillmore
Eriogonum artificis	Kaye H. Thorne's buckwheat	S	Beaver	Cedar City
Eriogonum brevicaule var mitophyllum	Lost Creek wild buckwheat	S	Sevier	Richfield
Eriogonum corymbosum var smithii	Flat Top buckwheat, Smith's wild buckwheat	S	Emery, Wayne	Price, Richfield
Eriogonum cronquistii	Cronquist's buckwheat	S	Garfield	GSENM, Kanab
Eriogonum pharnaceoides var cervinum	Wirestem buckwheat	S	Beaver, Iron, Washington	Cedar City, St. George
Eriogonum phoeniceum	Scarlet buckwheat	S	Millard	Fillmore
Eriogonum racemosum var nobilis	Bluff buckwheat	S	San Juan	BENM, Monticello
Eriogonum soredium	Frisco buckwheat	S, C	Beaver	Cedar City
Euphorbia nephradenia	Utah spurge	S	Emery, Garfield, Kane, Wayne	GSENM, Kanab, Price, Richfield
Frasera ackermaniae	Ackerman's green gentian	S	Uintah	Vernal
Frasera gypsicola	White River swertia	S	Millard	Fillmore
Hymenoxys lapidicola	Rock hymenoxys	S	Uintah	Vernal
Ivesia shockleyi var ostleri	Ostler's ivesia or Wah Wah ivesia	S	Beaver	Cedar City
Jamesia tetrapetala	Four-petal jamesia, Basin jamesia	S	Millard	Fillmore
Lepidium huberi	Huber's pepperplant	S	Uintah	Vernal

SCIENTIFIC NAME	COMMON NAME	STATUS	COUNTY	FIELD OFFICE
Lepidium ostleri	Ostler pepperplant	S, C	Beaver	Cedar City
Lomatium latilobum	Canyonlands lomatium	S	Grand, San Juan	BENM, Moab, Monticello
Lupinus caudatus var cutleri	Cutler's spurred lupine	S	Kane, Garfield	GSENM, Kanab
Lygodesmia grandiflora var entrada	Entrada rushpink	S	Emery, Grand	Moab, Price
Mentzelia argillosa	Arapien stickleaf, Arapien blazingstar	S	Sanpete, Sevier	Richfield
Mentzelia goodrichii	Goodrich's blazingstar	S	Duchesne	Vernal
Mentzelia multicaulis var librina	Horse Canyon stickleaf	S	Carbon, Emery	Price
Mentzelia shultziorum	Shultz' stickleaf	S	Grand	Moab
Oenothera acutissima	Large yellow evening primrose,Flaming Gorge evening primrose	S	Uintah, Daggett, Duchesne, Iron	Cedar City, Vernal
Oenothera murdockii	Murdock's evening primrose	S	Kane	GSENM, Kanab
Oreoxis trotteri	Trotter's oreoxis	S	Emery, Grand	Moab, Price
Pediomelum aromaticum var barnebyi	Barneby's breadroot	S	Washington	St. George
Pediomelum aromaticum var tuhyi	Tuhy's breadroot	S	San Juan	BENM, Monticello
Pediomelum epipsilum	Kane breadroot	S	Kane	GSENM, Kanab
Penstemon acaulis var acaulis	Stemless penstemon	S	Daggett	Vernal
Penstemon angustifolius var dulcis	Neese narrowleaf penstemon	S	Juab, Millard	Fillmore
Penstemon franklinii	Franklin's penstemon	S	Iron	Cedar City
Penstemon gibbensii	Gibben's penstemon	S	Daggett	Vernal
Penstemon goodrichii	Goodrich's penstemon	S	Duchesne, Uintah	Vernal
Penstemon grahamii	Graham's beardtongue	S, P	Duchesne, Uintah, Carbon	Price, Vernal
Penstemon idahoensis	Idaho penstemon	S	Box Elder	Salt Lake
Penstemon pinorum	Pinyon penstemon	S	Iron, Washington	Cedar City, St. George
Penstemon scariosus var albifluvis	White River beardtongue	S, P	Uintah	Vernal
Penstemon wardii	Ward's penstemon	S	Piute, Sanpete, Sevier	Richfield
Perityle specuicola	Alcove rock-daisy	S	Grand, San Juan	BENM, Moab, Monticello
Petalonyx parryii	Parry's petalonyx	S	Washington	St. George
Phacelia argylensis	Argyle Canyon phacelia	S	Duchesne	Vernal
Phacelia cronquistiana	Cronquist's phacelia	S	Kane	GSENM, Kanab

SCIENTIFIC NAME	COMMON NAME	STATUS	COUNTY	FIELD OFFICE
Phacelia indecora	Bluff phacelia	S	San Juan	BENM, Monticello
Phacelia pulchella var atwoodii	Atwood's pretty phacelia	S	Kane	GSEMN, Kanab
Phacelia utahensis	Utah phacelia	S	Carbon, Sevier, Sanpete	Price, Richfield
Phemeranthus thompsonii	Thompson's talinum, Cedar Mountain fameflower	S	Emery	Price
Potentilla cottamii	Cottam's cinquefoil	S	Box Elder, Juab, Tooele	Fillmore, Salt Lake
Primula cusickiana var domensis	House Range primrose	S	Millard	Fillmore
Psorothamnus polydenius var jonesii	Jones indigo bush, Jones' dalea	S	Emery	Price
Sphaeralcea caespitosa var caespitosa	Jones globemallow, Tufted globemallow	S	Beaver, Millard	Cedar City, Fillmore
Salvia columbariae var argillacea	Chinle chia	S	Kane	GSENM, Kanab
Sphaeralcea grossulariifolia var fumariensis	Smoky Mt. globemallow	S	Kane	GSENM, Kanab
Sphaeralcea janeae	Jane's globemallow	S	Grand, San Juan, Wayne (Millard benches)	BENM, Moab, Monticello, Richfield
Sphaeralcea psoraloides	Psorlea globemallow	S	Emery, Grand, Wayne	Moab, Price, Richfield
Stephanomeria occultata	Hidden wirelettuce, Disguised wirelettuce	S	Morgan	Salt Lake
Terraria haydenii	Hayden's mustard	S	Beaver	Cedar City
Thelesperma caespitosum	Low greenthread	S	Duchesne	Vernal
Thelesperma subnudum var alpinum	Alpine greenthread	S	Wayne	Richfield
Thelypodiopsis ambigua var erecta	Kanab thelyplody	S	Kane	GSENM, Kanab
Townsendia beamanii	Beaman's townsendia	S	San Juan	BENM, Monticello
Townsendia jonesii var lutea	Sevier townsendia	S	Juab, Piute, Sevier	Fillmore, Richfield
Townsendia strigosa var prolixa	Strigose townsendia	S	Duchesne, Grand	Moab, Vernal
Trifolium friscanum	Frisco clover	S, C	Beaver, Millard	Cedar City, Fillmore
Trifolium variegatum var parunuweapensis	Sand seep clover or Kane white-tip clover	S	Kane	GSENM, Kanab
Yucca sterilis	Sterile yucca	S	Uintah	Vernal

Status: S – Sensitive, C – Candidate, P - Proposed

Utah Bureau of Land Management Sensitive Wildlife Species List
December 2018

Table 1: Fish

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Bluehead sucker	*Catostomus discobolus*	CA	BOX, CAR, DAV, DUC, EME, GAR, GRA, KAN, MOR, SNJ, SNP, SUM, UIN, WAY, WEB, WSH	BENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Bonneville cutthroat trout	*Oncorhynchus clarkii utah*	CA	BEA, BOX, CAR, DAV, DUC, IRO, JUA, KAN, MIL, MOR, PIU, RIC, SEV, SNP, SUM, TOO, UTA, WEB, WSH, WST	Cedar City, Fillmore, GSENM, Kanab, Price, Richfield, St. George, Salt Lake, Vernal
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	CA	CAR, DAG, EME, GAR, SEV, SNJ, SNP, SUM, UIN, UTA, WAY, WST	BENM, GSENM, Kanab, Monticello, Price, Richfield, Salt Lake, Vernal
Desert sucker	*Catostomus clarkii*	SS	KAN, WSH	GSENM, Kanab, St. George
Flannelmouth sucker	*Catostomus latipinnis*	CA	CAR, DUC, EME, GAR, GRA, KAN, SNJ, UIN, WAY, WSH	BENM, GSENM, Kanab, Moab, Monticello, Price, Richfield, Vernal, St. George
Least chub	*Iotichthys phlegethontis*	CA	BOX, DAV, JUA, MIL, RIC, SAL, TOO	Fillmore, Salt Lake
Northern leatherside chub	*Lepidomeda copei*	CA	RIC, SUM	Salt Lake
Roundtail chub	*Gila robusta*	CA	CAR, DAG, DUC, EME, GAR, GRA, SNJ, UIN, WAY	BENM, GSENM, Kanab, Moab, Monticello, Price, Richfield, Vernal
Southern leatherside chub	*Lepidomeda aliciae*	CA	GAR, IRO, JUA, KAN, MIL, PIU, SEV, SNP, UTA, WAY, WST	Cedar City, Fillmore, Kanab, Richfield, Salt Lake
Virgin spinedace	*Lepidomeda mollispinis mollispinis*	CA	KAN, WSH	Kanab, St. George
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*	CA	BOX	Salt Lake

Table 2: Amphibians

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Arizona toad	*Anaxyrus microscaphus*	SS	GAR, IRO, KAN, WSH	Cedar City, GSENM, Kanab, St. George
Columbia spotted frog	*Rana luteiventris*	CA	JUA, MIL, SAL, SUM, TOO, UTA, WEB, WST	Fillmore, Salt Lake
Great Plains toad	*Anaxyrus cognatus*	SS	DUC, EME, GRA, SNJ, UIN	BENM, Moab, Monticello, Price, Vernal
Western (boreal) toad	*Anaxyrus boreas*	SS	BOX, CAC, DUC, EME, GAR, KAN, MOR, PIU, RIC, SAL, SEV, SUM, UIN, UTA, WAY, WSH, WST	GSENM, Kanab, Price, Richfield, St. George, Salt Lake, Vernal

Table 3: Reptiles

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Common chuckwalla	*Sauromalus ater*	SS	KAN, WSH	GSENM, Kanab, St. George
Cornsnake	*Elaphe guttata*	SS	EME, GRA, SNJ, UIN	BENM, Moab, Monticello, Price, Vernal
Desert iguana	*Dipsosaurus dorsalis*	SS	WSH	St. George
Desert night lizard	*Xantusia vigilis*	SS	KAN, SNJ, WSH	BENM, GSENM, Kanab, Monticello, St. George
Gila monster	*Heloderma suspectum*	SS	WSH	St. George
Mojave rattlesnake	*Crotalus scutulatus*	SS	WSH	St. George
Sidewinder	*Crotalus cerastes*	SS	WSH	St. George
Smooth Green snake	*Opheodrys vernalis*	SS	DUC, DAG, GRA, SAL, SNJ, SUM, UIN, UTA, WEB, WST	BENM, Moab, Monticello, Salt Lake, Vernal
Speckled rattlesnake	*Crotalus mitchellii*	SS	WSH	St. George
Western banded gecko	*Coleonyx variegatus*	SS	WSH	St. George
Western threadsnake	*Leptotyphlops humilis*	SS	WSH	St. George
Zebra-tailed lizard	*Callisaurus draconoides*	SS	WSH	St. George

Table 4: Birds

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
American Three-toed woodpecker	*Picoides dorsalis*	SS	BEA, DAG, DUC, EME, GAR, GRA, IRO, PIU, RIC, SAL, SEV, SNJ, SNP, SUM, UTA, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Price, Richfield, St. George, Salt Lake, Vernal
American white pelican	*Pelecanus erythrorhynchos*	SS		Salt Lake
Bald eagle	*Haliaeetus leucocephalus*	SS	BEA, BOX, CAC, CAR, DAG, DUC, EME, GAR, GRA, IRO, JUA, KAN, MOR, SAL, SNJ, SNP, UIN, WAY, WEB, WSH, WST	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal,
Black swift	*Cypseloides niger*	SS	DUC, GAR, IRO, KAN, PIU, SAL, SEV, SNP, UIN, UTA, WSH	GSENM, Kanab, Richfield, St. George, Salt Lake, Vernal
Bobolink	*Dolichonyx oryzivorous*	SS	BOX, CAC, DAV, DUC, GAG, JUA, MOR, RIC, SAL, SNJ, SUM, TOO, UTA, WAY, WEB, WSH, WST	BENM, Fillmore, Monticello, St. George, Salt Lake, Vernal
Burrowing owl	*Athene cunicularia*	SS	BEA, BOX, CAC, CAR, DAV, DUC, EME, GAR, GRA, IRO, JUA, KAN, MIL, RIC, SAL, SNJ, SNP, SEV, TOO, UIN, UTA, WAY, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Columbian Sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	SS	BOX, CAC, DAG, MOR, UIN, WEB	Salt Lake, Vernal
Ferruginous hawk	*Buteo regalis*	SS	BEA, BOX, CAC, CAR, DUC, GAR, GRA, IRO, JUA, KAN, MIL, PIU, RIC, SAL, SNJ, SNP, TOO, UIN, UTA, WAY, WEB, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Golden eagle	*Aquila chrysaetos*	SS	All	All
Grasshopper sparrow	*Ammodramus savannarum*	SS	SUM, SEV, SNP, UIN, WAY, WSH, WST	Richfield, St. George, Salt Lake, Vernal
Greater sage-grouse	*Centrocercus urophasianus*	SS	BEA, BOX, CAC, CAR, DAG, DUC, EME, GAR, IRO, JUA, KAN, MIL, MOR, PIU, RIC, SEV, SNJ, SNP,	Cedar City, Fillmore, GSENM, Kanab, Price, Richfield, Salt Lake, Vernal

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
			SUM, TOO, UIN, UTA, WAY, WEB, WST	
Lewis's woodpecker	*Melanerpes lewis*	SS	BOX, DAG, DAV, DUC, GRA, IRO, JUA, KAN, RIC, SEV, SNJ, SNP, TOO, UIN, UTA, WAY, WEB, WSH, WST	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Long-billed curlew	*Numenius americanus*	SS	BEA, BOX, CAR, DAV, DUC, EME, GAR, IRO, JUA, KAN, MIL, PIU, SEV, SNJ, SNP, SUM, TOO, UIN, UTA, WAY, WEB, WSH, WST	BENM, Cedar City, Fillmore, GSENM, Kanab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Mountain Plover	*Charadrius montanus*	SS	DUC, GRA, UIN, WEB, WSH	St. George, Salt Lake, Vernal
Northern goshawk	*Accipiter gentilis*	CA	BEA, BOX, CAC, CAR, DAG, DUC, EME, GAR, GRA, IRO, KAN, PIU, SAL, SEV, SNJ, SNP, SUM, UIN, UTA, WAY, WSH, WST	BENM, Cedar City, GSENM, Kanab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Short-eared owl	*Asio flammeus*	SS	BEA, BOX, CAC, DAG, DUC, GAR, IRO, JUA, MIL, SEV, SNJ, SNP, TOO, UIN, WAY, WSH	BENM, Cedar City, Fillmore, St. George, Salt Lake, Richfield
Snowy plover	*Charadrius nivosus*	SS*	BOX, CAC, DAV, GRA, JUA, MIL, SAL, SUM, TOO, UIN, UTA, WEB, WSH	Fillmore, St. George, Salt lake, Vernal

Table 5: Mollusks

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Bifid duct pyrg	*Pyrgulopsis peculiaris*	CA	MIL	Fillmore
California floater	*Anodonta californiensis*	CA	BOX, CAC, JUA, MIL, PIU, RIC, TOO	Fillmore Richfield, Salt Lake
Cloaked physa	*Physa megalochlamys*	CA	MIL	Fillmore
Eureka mountainsnail	*Oreohelix eurekensis*	CA	JUA, UTA	Fillmore, Salt Lake
Fat-whorled pondsnail	*Stagnicola bonnevillensis*	CA	BOX	Salt Lake
Hamlin Valley pyrg	*Pyrgulopsis hamlinensis*	CA	BEA	Cedar City

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Longitudinal gland pyrg	*Pyrgulopsis anguina*	CA	MIL	Fillmore
Lyrate mountainsnail	*Oreohelix haydeni*	CA	MOR	Salt Lake
Northwest Bonneville pyrg	*Pyrgulopsis variegata*	CA	BOX, TOO	Salt Lake
Southern Bonneville pyrg	*Pyrgulopsis transversa*	CA	UTA	Salt Lake
Sub-globose snake pyrg	*Pyrgulopsis saxatilis*	CA	MIL	Fillmore
Utah physa	*Physella utaensis*	CA	BOX, JUA, PIU, TOO, UTA	Fillmore, Richfield, Salt Lake

Table 6: Insects

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Coral Pink Sand Dunes Tiger Beetle	*Cicindela albissima*	CA	KAN	Kanab
Monarch Butterfly	*Danaus plexippus*	SS*	Statewide	All
Western Bumble Bee	*Bombus occidentalis*	SS*	Statewide	All

Table 7: Mammals

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Allen's big-eared bat	*Idionycteris phyllotis*	SS	BEA, GAR, GRA, IRO, KAN, SNJ, TOO, WAY, WSH	BENM, Cedar City, GSENM, Kanab, Moab, Monticello, Richfield, St. George, Salt Lake
Big free-tailed bat	*Nyctinomops macrotis*	SS	BEA, DUC, GAR, GRA, KAN, MIL, SEV, SNJ, SNP, UIN, UTA, WAY, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Richfield, Salt Lake, St. George, Vernal
Dark kangaroo mouse	*Microdipodops megacephalus*	SS	BEA, BOX, IRO, JUA, MIL, SNJ, TOO	Cedar City, Fillmore, Monticello, Salt Lake

COMMON NAME	SCIENTIFIC NAME	BLM STATUS	COUNTY	FIELD OFFICE
Fringed myotis	*Myotis thysanodes*	SS	BEA, CAR, DAG, DUC, EME, GAR, GRA, JUA, KAN, MIL, SNJ, TOO, UIN, WAY, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Gunnison prairie dog	*Cynomys gunnisoni*	SS	GRA, SNJ	BENM, Moab, Monticello
Kit fox	*Vulpes macrotis*	SS	BEA, BOX, DUC, EME, GAR, GRA, IRO, JUA, KAN, MIL, SNJ, TOO, WAY, WSH	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, Richfield, St. George, Salt Lake, Vernal
Preble's shrew	*Sorex preblei*	SS	BOX	Salt Lake
Pygmy rabbit	*Brachylagus idahoensis*	SS	BEA, BOX, IRO, PIU, RIC, SEV, TOO, WAY, WSH	Cedar City, Richfield, St. George, Salt Lake
Silky pocket mouse	*Perognathus flavus*	SS	SNJ	BENM, Monticello
Spotted bat	*Euderma maculatum*	SS	BEA, DAG, DUC, GAR, GRA, IRO, SNJ, UIN, WAY, WSH	Cedar City, GSENM, Kanab, Moab, Monticello, Richfield, Salt Lake, St. George, Vernal
Townsend's big-eared bat	*Corynorhinus townsendii*	SS	BEA, BOX, CAC, CAR, DAG, DAV, DUC, EME, GAR, GRA, IRO, JUA, KAN, MIL, PIU, SEV, SNJ, TOO, UIN, UTA, WAY, WEB, WSH, WST	BENM, Cedar City, Fillmore, GSENM, Kanab, Moab, Monticello, Price, St. George, Salt Lake, Vernal
Western red bat	*Lasiurus blossevillii*	SS	BEA, CAC, CAR, GAR, GRA, KAN, IRO, SEV, SNJ, WAY, WSH	Cedar City, GSENM, Kanab, Moab, Monticello, Price, Richfield, Salt Lake, St. George
White-tailed prairie dog	*Cynomys leucurus*	SS	CAR, DAG, DUC, EME, GRA, RIC, SNJ, UIN	Moab, Price, Salt Lake, Vernal

SS-Sensitive species; SS*-Sensitive species not on UDWR list, CA-Conservation Agreement species; CN-Candidate species

Counties: BEA=Beaver, BOX=Box Elder, CAC=Cache, CAR=Carbon, DAG=Daggett, DAV=Davis, DUC=Duchesne, EME=Emery, GAR=Garfield, GRA=Grand, IRO=Iron, JUA=Juab, KAN=Kane, MIL=Millard, MOR=Morgan, PIU=Piute, RIC=Rich, SAL=Salt Lake, SEV=Sevier, SNJ=San Juan, SNP=Sanpete, SUM=Summit, TOO=Tooele, UIN=Uintah, UTA=Utah, WST=Wasatch, WSH=Washington, WAY=Wayne, WEB=Weber

TABLE 1 Class 1A (EDRR Watch List)	
Weed Name	Binomial Name
Common crupina	Crupina vulgaris
Small bugloss	Anchusa arvensis
Mediterranean sage	Salvia aethiopis
Spring millet	Milium vernale
Syrian beancaper	Zygophyllum fabago
Plumeless thistle	Carduus acanthoides

TABLE 2 Class 1B (EDRR)	
Weed Name	Binomial Name
African rue	Peganum harmala
Camelthorn	Alhagi maurorum
Garlic mustard	Alliaria petiolate
Purple starthistle	Centaurea calcitrapa
Goat's rue	Galega officinalis
African mustard	Brassica tournefortii
Giant reed	Arundo donax
Japanese knotweed	Polygonum cuspidatum
Blueweed (Vipers bugloss)	Echium vulgare
Elongated mustard	Brassica elongate
Common St. Johnswort	Hypericum perforatum
Oxeye daisy	Leucanthemum vulgare
Cutleaf vipergrass	Scorzonera laciniate
Ventenata (North African grass)	Ventenata dubia
Malta starthistle	Centaurea melitensis

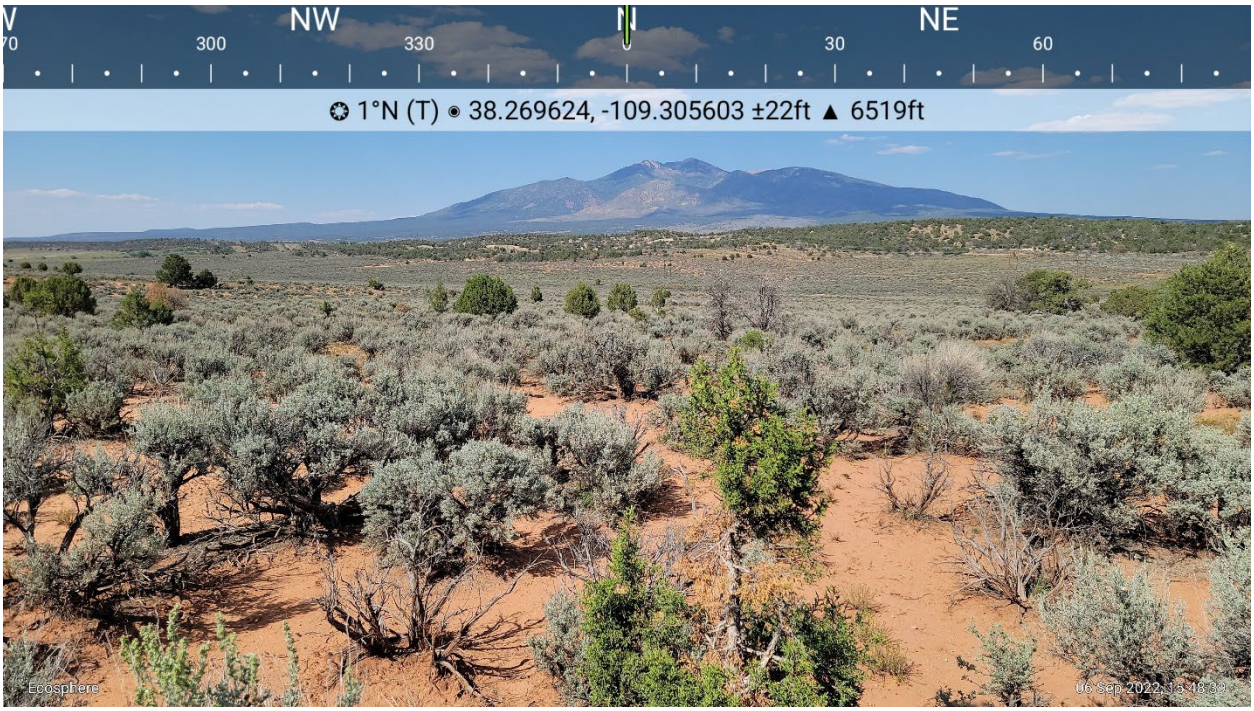
TABLE 3 Class 2 (Control)	
Weed Name	Binomial Name
Leafy spurge	Euphorbia esula
Medusahead	Taeniatherum caput-medusae
Rush skeletonweed	Chondrilla juncea
Spotted knapweed	Centaurea stoebe
Purple loosestrife	Lythrum salicaria
Squarrose knapweed	Centaurea virgata
Dyers woad	Isatis tinctoria
Yellow starthistle	Centaurea solstitialis
Yellow toadflax	Linaria vulgaris
Diffuse knapweed	Centaurea diffusa
Black henbane	Hyoscyamus niger
Dalmation toadflax	Linaria dalmatica

TABLE 4 Class 3 (Containment)	
Weed Name	Binomial Name
Russian knapweed	Acroptilon repens
Houndstounge	Cynoglossum officianale
Perennial pepperweed (Tall whitetop)	Lepidium latifolium

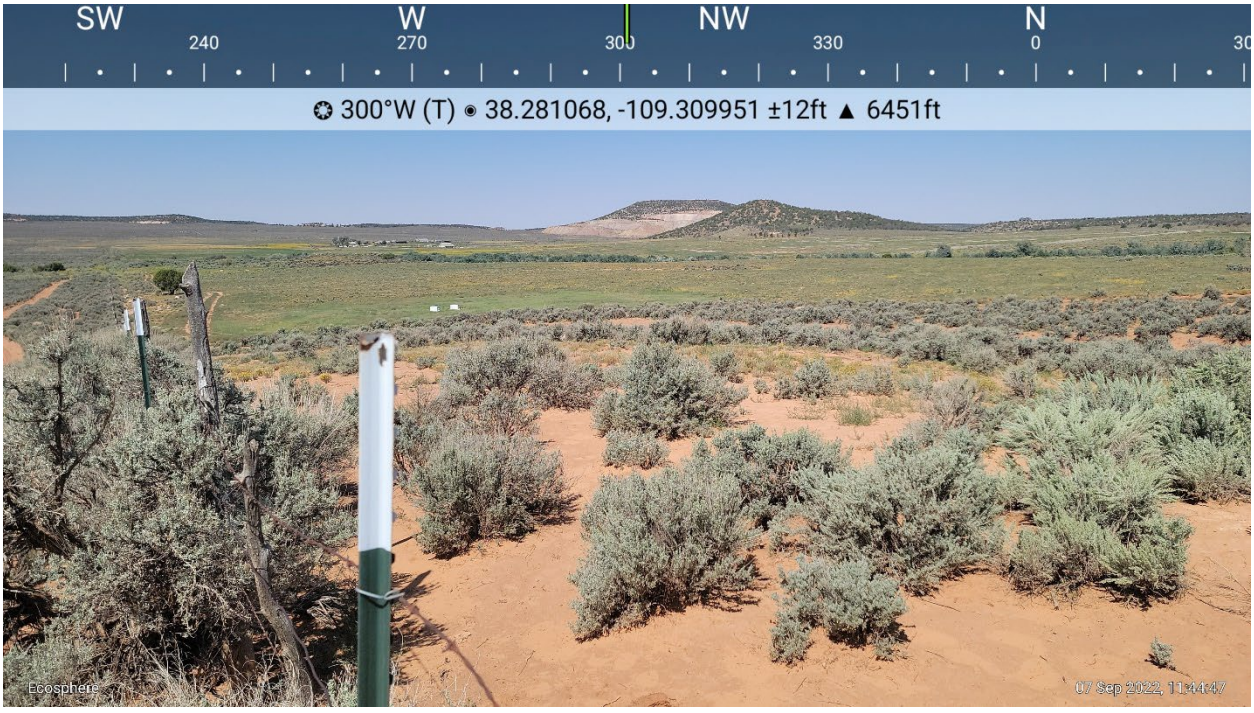
Phragmites (Common reed)	Phragmites australis ssp.
Tamarisk (Saltcedar)	Tamarix ramosissima
Hoary cress (globe-podded)	Lepidium draba (Cardaria draba)
Hoary cress (heart-podded)	Lepidium chalepense (Cardaria chalepensis)
Hoary cress (lens-podded)	Lepidium appelianum (Cardaria pubescens)
Canada thistle	Cirsium arvense
Poison hemlock	Conium maculatum
Musk thistle	Carduus nutans
Quackgrass	Elymus repens
Jointed goatgrass	Aegilops cylindrica
Bermudagrass*	Cynodon dactylon
Perennial Sorghum spp. Including:	
Johnson grass	Sorghum halepense
Columbus grass	Sorghum almum
Scotch thistle (Cotton thistle)	Onopordum acanthium
Field bindweed (Wild Morning-glory)	Convolvulus spp.
Puncturevine (Goathead)	Tribulus terrestris
* Bermudagrass (Cynodon dactylon) shall not be a noxious weed in Washington County and shall not be subject to Title 4, Chapter 17, the Utah Noxious Weed Act within the boundaries of that county. It shall be a noxious weed throughout any other areas of the state and shall be subject to the laws of the state.	

TABLE 5 Class 4 (Prohibited)	
Weed Name	Binomial Name
Cogongrass (Japanese blood grass)	Imperata cylindrica
Myrtle spurge	Euphorbia myrsinites
Dames Rocket	Hesperis matronalis
Scotch broom	Cytisus scoparius
Russian olive	Elaeagnus angustifolia

Appendix C – Representative Habitat Photographs



Photograph 1. Project area looking north to the La Sal Mountains.



Photograph 2. Sagebrush flat converted to agricultural lands.

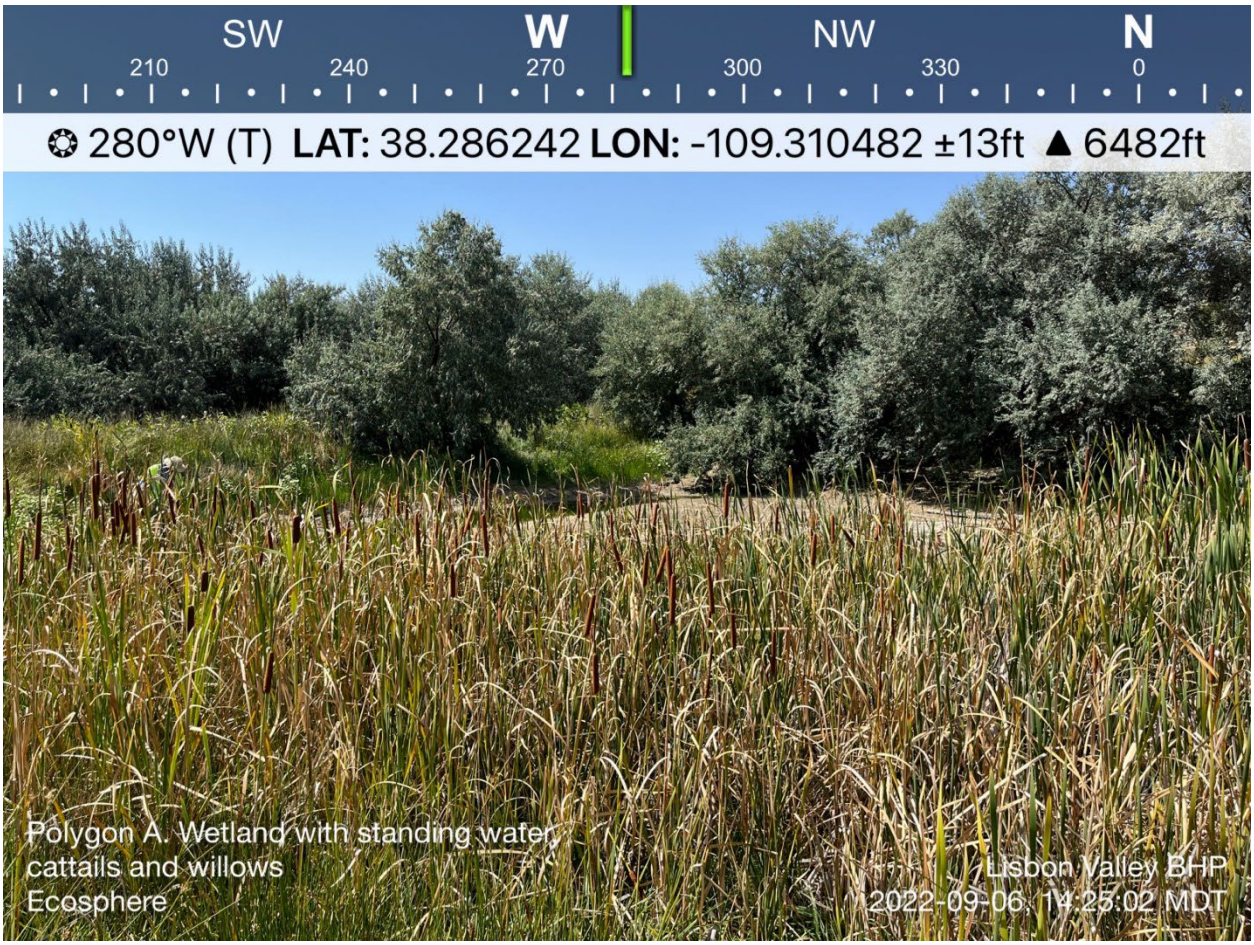
Photograph 3. Partially disturbed transmission line right-of-way.

Photograph 4. Sagebrush flats looking to the northwest.

Photograph 5. Prairie dog town on private land.

Photograph 6. Typical dry arroyo drainage bisecting sagebrush and pinyon-juniper habitats.

Photograph 7. Suitable willow flycatcher habitat of mixed willow and exotic shrub thickets.



Photograph 8. Russian olive thickets associated with wetlands and open water is suitable habitat for the willow flycatcher.

Photograph 9. Sagebrush flats breaking up pinyon-juniper woodlands.

Appendix D – Species Observed During the Biological Survey

Attachment Table D-1. Species observed during the September 6 and 7, 2022 Lisbon Valley project field surveys

Scientific Name	Common Name
Forbs	
Acroptilon repens	hardheads
Ambrosia acanthicarpa	flatspine bur ragweed
Amaranthus graecizans	Mediterranean amaranth
Calochortus nuttallii	sego lily
Carduus nutans	nodding plumeless thistle
Castilleja chromosa	paintbrush
Chenopodium album	lambsquarters
Cirsium arvense	Canada thistle
Cleome lutea	yellow spiderflower
Convolvulus arvensis	field bindweed
Descurainia pinnata	pinnate tansy mustard
Erigeron divergens	spreading fleabane
Eriogonum ovalifolium	cushion buckwheat
Erodium cicutarium	redstem stork's bill
Helianthus annuus	common sunflower
Phacelia crenulata	cleftleaf wildheliotrope
Plantago lanceolata	narrowleaf plantain
Portulaca oleracea	little hogweed
Salsola tragus	prickly Russian thistle
Sphaeralcea coccinea	scarlet globemallow
Sisymbrium altissimum	tall tumblemustard
Stanleya pinnata	desert prince's plume
Typha sp.	cattail
Verbena bracteata	bigbract verbena
Grasses	
Achnatherum hymenoides	Indian ricegrass
Agropyron cristatum	crested wheatgrass
Agropyron triticeum	annual false wheatgrass
Bouteloua gracilis	blue grama
Eremopyrum triticeum	annual wheatgrass
Hordeum jubatum	foxtail barley
Pascopyrum smithii	western wheatgrass

Scientific Name	Common Name
Pleuraphis jamesii	James' galleta
Sporobolus airoides	alkali sacaton
Sporobolus cryptandrus	sand dropseed
Shrubs	
Artemisia tridentata	big sagebrush
Atriplex canescens	fourwing saltbush
Cercocarpus montanus	alderleaf mountain mahogany
Chrysothamnus greenei	green rabbitbrush
Chrysothamnus viscidiflorus	yellow rabbitbrush
Ephedra viridis	Mormon tea
Ericameria nauseosa	rubber rabbitbrush
Gutierrezia sarothrae	broom snakeweed
Krascheninnikovia lanata	winterfat
Purshia tridentata	antelope bitterbrush
Salix exigua	narrowleaf willow
Sarcobatus vermiculatus	greasewood
Tamarix sp.	tamarisk
Trees	
Elaeagnus angustifolia	Russian olive
Juniperus osteosperma	Utah juniper
Pinus edulis	piñon pine
Populus fremontii	fremont cottonwood
Cacti/Yucca	
Opuntia polyacantha	plains pricklypear
Yucca angustissima	narrowleaf yucca
Yucca baccata	banana yucca
Birds	
Aquila chrysaetos	golden eagle
Buteo jamaicensis	red-tailed hawk
Cathartes aura	turkey vulture
Chondestes grammacus	lark sparrow
Corvus corax	common raven
Eremophila alpestris	horned lark
Pandion haliaetus	osprey
Spizella passerina	chipping sparrow

Scientific Name	Common Name
Sturnella neglecta	western meadowlark
Zenaida macroura	mourning dove
Mammals	
Canis latrans	coyote
Cynomys sp.	prairie dog
Lepus californicus	black-tailed jackrabbit
Neotoma sp.	woodrat
Odocoileus hemionus	mule deer