Uranium Mine Cleanup Analysis and Proposal for Alternative Methods of Disposal (Feasibility Study) Schmitt Decline Abandoned Uranium Mine McKinley County, New Mexico

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Prepared for

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LIST OF ABBREVIATIONS AND ACRONYMS

APE	area of potential effect
AOD	area of disturbance
AUM	Abandoned Uranium Mine
bgs	below ground surface
cm	centimeter(s)
CY	cubic yard(s)
EA	EA Engineering, Science, and Technology Inc., PBC
EMNRD	Energy Minerals & Natural Resources Department
EPA	U.S. Environmental Protection Agency
LiDAR	light detection and ranging
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSLO	New Mexico State Land Office
PAL	project action level
pCi/g	picocurie(s) per gram
pCi/L	picocurie(s) per liter
Pinyon	Pinyon Environmental, Inc.
Ra-226	Radium-226
Site	Schmitt Decline Abandoned Uranium Mine
SU	Survey Unit

1. INTRODUCTION

EA Engineering, Science, and Technology, Inc., PBC (EA) has prepared this report to provide a cleanup analysis and propose alternative methods of disposal for surface reclamation of the Schmitt Decline Abandoned Uranium Mine (AUM) (NM0261, Site) located in McKinley County, New Mexico (Figure 1-1). The Site is located on a mesa, approximately 1.3 miles west of the intersection of New Mexico State Highways 605 and 509. Access to the mine site is from New Mexico State 509 along a 4.67-mile-long unimproved dirt road (Figure 1-2). Site features are shown in Figure 1-3.

The purpose of this report is to provide alternative methods of disposal of radioactive contaminated materials from legacy uranium mining, their advantages and disadvantages, and any environmental and health impacts potentially resulting from these alternatives. Preliminary cost estimates for each of the alternatives are provided under separate cover. Selection of the method of disposal will be made by the New Mexico State Land Office (NMSLO). Following selection, a closure plan and cost estimate for the preferred method will be provided.

1.1 OVERSIGHT RESPONSIBILITY

The Schmitt Decline AUM is an abandoned uranium mine site located on State Trust Land managed by NMSLO. The New Mexico Environment Department Office of Strategic Initiatives is the regulatory body overseeing cleanup activities at the Schmitt Decline AUM.

1.2 CLEANUP TARGETS

1.2.1 Cleanup Goals

The cleanup option chosen for the Schmitt Deline AUM should:

- Remove the physical hazard created by the open portal and decline, and on-Site mining equipment
- Remediation of radiologically impacted soils and waste rock to meet the regulatory criteria for Radium-226 (Ra-226), Radon-220, and Radon-222 described in Section 1.2.3
- Reclamation of the site to minimize impacts to surface and groundwater and support ecosystem reconstruction
- Minimize disturbance to cultural and biological resources

1.2.2 Future Land Use

The Site is located on State Trust Land behind locked gates to be managed by NMSLO. The land will be held in state trust and unlikely to ever be used for residential purposes.

1.2.3 Regulatory Criteria

The following concentration limits were established in the approved Work Plan and are used as cleanup standards for remediation of the Schmitt Decline AUM:

- Ra-226:
  - 5 picocuries per gram (pCi/g) above background, averaged over the first 15 centimeters (cm) of soil below the surface
  - 15 pCi/g above background, averaged over 15 cm-thick layers of soil more than 15 cm below the surface
- Radon-220 and Radon-222:
  - 20 picocuries per square meter per second

The Work Plan prepared by EA (EA 2025a) provides a full discussion of the applicable cleanup regulations including the basis for the concentration limits provided above. The limits were obtained from the *Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico*. (Energy Minerals & Natural Resources Department and New Mexico Environment Department [EMNRD and NMED] 2016).

2. SITE CONDITIONS

2.1 MINE HISTORY

The Grants area experienced a uranium rush in 1950 when a uranium deposit was discovered at Haystack Mountain, located northwest of Grants (Pinyon Environmental, Inc. [Pinyon] 2025a). Additional uranium mines followed along with the construction of several uranium mills. However, many of the mines in the area only operated until the 1960s, with a brief boom in the 1970s during the Arab oil embargo, before shutting down permanently by 1983 (McClure 1988; McLemore and Chenoweth 1991; Robinson 1994).

Historic mining activity, likely associated with Schmitt Decline, appears in historical aerials dating from 1971 (NETROnline 2025). Based on the title search findings provided in Appendix A of the Work Plan (EA 2025a), the operational history is unknown. No potentially responsible party was identified, and the Site is not under any dedicated site-specific program. EA could not identify any encumbrances, liens, rights-of-way, or property restrictions. The Site is part of an NMSLO Agricultural Lease, Identification R21760000.

2.2 SITE FEATURES

The former mine consists of an open unfenced decline portal (mine entrance), remnant mining equipment, miscellaneous debris, and an access road (Figure 2-1). An orthophoto with superimposed contour lines from *Stage 2 Uranium Mine Site Investigation Report for the Schmitt Decline Mine, McKinley County, New Mexico* (Stage 2 Report, EA 2025b) shows the mounding of the waste rock piles and the depression at the mine entrance (Figure 2-2).

The decline dips steeply at approximately 21 degrees to the west. Waste rock from mine development extends a maximum of approximately 150 feet to the north of the mine portal. There are two mine waste rock piles, one to the northeast and the other to the northwest of the decline entrance (Figure 1-3). A third waste rock pile, which indicated elevated radiological concentrations, is located approximately 130 feet east of the mine portal. A dry wash is located to the north of the portal. Drainage appears to be to the northeast. A detailed description of previous investigations and site conditions was provided in the *Work Plan for the Schmitt Decline Mine Site Assessment* (Work Plan) (EA 2025a).

An underground light detection and ranging (LiDAR) survey was performed during the Phase II investigation to determine the geometry of the mine, and the results were provided in the Stage 2 Report (EA 2025b). The decline slopes at an angle of approximately 21 degrees for a distance of 176 feet, approximately 62 feet below ground surface (bgs). At that point, the drift narrows dramatically where it appears to have caved or was backfilled. Approximately 98 feet from the portal at a depth of approximately 37 feet bgs, two crosscuts branch out to the left and right (north and south) from the decline. Both crosscuts are backfilled close to their openings. Based on the LiDAR data obtained, the underground volume of the decline and remaining crosscut opening is 439.48 cubic yards (CY) (Figure 2-3).

2.3 ECOLOGIC SETTING

A biological assessment/biological evaluation was conducted as part of the Stage 2 investigation (Pinyon 2025b). Three vegetation communities were mapped in the area of potential effect (APE) selected by the NMSLO: desert grassland, piñon-juniper woodland and grasslands, and piñon-juniper woodland and rocky outcrops (Figure 2-4). No wetlands were identified. The APE provides potential habitat for a wide variety of wildlife common in arid grassland and piñon-juniper habitats throughout McKinley County. There is low potential for occurrence for two endangered species, the Mexican wolf and the monarch butterfly, and twelve special status species have the potential to occur in or be impacted by a project in the APE.

Based on the biological assessment/biological evaluation, cleanup activities at the Schmitt Decline AUM are not anticipated to result in direct impacts to federally listed or proposed species, special status species, or unprotected wildlife species. Impacts to wildlife and plants can be avoided or minimized by following recommended minimization measures provided in Section 5.2 of the *Biological Assessment/Biological Evaluation, Schmitt Decline Abandoned Uranium Mine Project, McKinley County, New Mexico* (Pinyon 2025a).

During the evaluation, no birds or bats were observed using the mine entrance. To deter birds or bats potentially using the mine entrance and interfering with cleanup activities, EA installed chicken wire over the mine entrance and an owl decoy above the entrance on 13 November 2025 (Figure 2-5).

2.4 HISTORICAL AND ARCHAEOLOGICAL SETTING

An archaeological survey was conducted as part of the Phase II investigation (Pinyon 2025b). The cultural resource inventory resulted in the identification of 31 cultural resources within the APE, including 6 newly recorded sites, and 25 newly recorded isolated occurrences (Figure 2-6). Prescribed avoidance measures are in place to minimize impacts to the prehistoric locus. With the avoidance measures in place, cleanup activities at the Schmitt decline mine will result in no adverse effects on historic properties.

Based on the results of the archaeological survey, Pinyon has concluded that cleanup activities at the Schmitt Decline AUM will result in no adverse effects on historic properties, and no further archaeological work is required for the project. Sites or isolated occurrences located near the access route will be marked with orange fencing to prevent vehicles from disturbing archaeological or cultural features (Figure 2-7).

2.5 GEOLOGIC SETTING

2.5.1 Surface Geology

Within the area of disturbance (AOD) for the Schmitt Decline AUM, the surface topography is relatively flat, sloping slightly downwards to the northeast. The surface geology consists of Dakota Sandstone with some areas overlain by thin layers of unconsolidated sediment.

There are two joint sets observed in the Dakota Sandstone at the Site. The most dominant and continuous jointing is in the north-northwest to south-southeast direction, with fractures approximately 10 to 20 feet apart. The second joint set is approximately perpendicular to the dominant joints, is discontinuous, and fractures are frequently more than 50 feet apart (Figure 2-8).

2.5.2 Subsurface Geology

Using the geologic cross-sections provided in the *Phase 2 Ground-Water Investigation Report for the San Mateo Creek Basin Legacy Uranium Mines Site, Cibola and McKinley Counties, New Mexico* (U.S. Environmental Protection Agency [EPA] 2018), the Dakota Sandstone at the Schmitt Decline AUM site is most likely between 25 and 50 feet thick (Figure 2-9) and dips to the northeast. In nearby locations where the full thickness is noted (i.e., where it is not exposed and weathered at the surface), the Dakota Sandstone is approximately 100 feet thick (EPA 2018). During the Stage 2 Investigation, drone video footage was obtained underground in the mine. An apparent contact between the Dakota Sandstone and the underlying Brushy Basin Member of the Morrison Formation was observed at a depth of approximately 37 feet bgs (Figure 2-10).

In this region, the Brushy Basin Member of the Morrison Formation directly underlies the Dakota Sandstone. The Brushy Basin Member is locally a mudstone, described as being dominantly a slightly swelling, locally sandy claystone (Freeman and Hilpert 1956). A stratigraphic column for the region was provided in the *Phase 2 Ground-Water Investigation Report for the San Mateo Creen Basin Legacy Uranium Mine Site, Cibola and McKinely Counties, New Mexico* (EPA 2018) and is included as Figure 2-11 in this report. Based on the cross-section in Figure 2-9, the Brushy Basin Member is expected to be approximately 100 feet thick but could vary between 35 and 130 feet thick. The Brushy Basin Member and the underlying uranium-bearing Westwater Canyon Member interfinger with each other in the region (Freeman and Hilpert 1956).

It is likely that the waste rock on the surface came from the Westwater Canyon Member of the Morrison Formation that underlies the Brushy Basin Member. The Westwater Canyon Member is noted as an ore-bearing zone on the stratigraphic column presented in Figure 2-11 . The Westwater Canyon member ranges from about 50 to 190 feet in thickness in the Gallup-Albuquerque area, except near Laguna, where it is locally absent. The Westwater Canyon is a yellowish gray to light-grayish-red, locally conglomeratic, fine- to coarse-grained sandstone that is characterized by scour-and-fill crossbedding and by angular grains of unweathered feldspar. Discontinuous lenses of grayish-green sandy claystone are present. The waste rock on the site appears to be of the same color and grain size as the description of the Westwater Canyon sandstone. The Westwater Canyon interfingers with the underlying Recapture and the overlying Brushy Basin members (Freeman and Hilpert 1956).

2.6 HYDROLOGIC SETTING

2.6.1 Surface Water

The Site is located within the San Mateo Creek Watershed. It is located approximately 2700 feet west of the Arroyo del Puerco and 800 feet north of the tributary of the Arroyo del Puerco

(Figure 2-12). A dry wash located to the northwest of the waste rock piles runs from the southwest to the northeast during heavy rains (Figure 2-1). Ephemeral pools form at joint intersections (Figure 2-1). No wetlands were identified during the biological assessment/biological evaluation (Pinyon 2025b).

2.6.2 Groundwater

During the Stage 2 Investigation, drone video footage was obtained underground in the mine. Groundwater was not observed within the mine, and it appeared dry. However, a cave in or backfilling of the decline was observed at approximately 166 feet from the portal.

One groundwater well is located near the Schmitt Decline AUM, livestock well SMC-18 located approximately 0.1 mile to the south-southeast of the Site (Figure 2-1). No well log was found for SMC-18. During the Stage 2 Investigation, depth of water was measured at 82.53 feet bgs with a total depth of 103 feet bgs. Based on the depth, the well may be completed within Westwater Canyon Member of the Morrison Formation. According to the *Phase 2 Ground-Water Investigation Report for the San Mateo Creek Basin Legacy Uranium Mines Site, Cibola and McKinley Counties, New Mexico* (EPA 2018), groundwater flow is generally in the direction of the regional tilt of the bedrock in the region, to the north and northeast.

As indicated in the Stage 2 Report, the elevation of the groundwater found in well SMC-18 and the lowest accessible portion of the decline is approximately 6838 feet above mean sea level. However, groundwater was not observed at the bottom of the decline, and the mine appeared to be dry. It is possible that the groundwater was obscured by the mine cave in, that the water observed in SMC-18 is perched and localized to the well location, or that the groundwater surface slopes down from the well towards the mine. Further investigation of the groundwater is warranted and any mine reclamation option that is selected should be protective of surface and groundwater.

2.7 EXTENT OF CONTAMINATION

2.7.1 Background Levels

A combination of reference background area surface soil samples and surface soil samples from areas not likely to be impacted by mining activities (i.e., areas within Survey Unit [SU]-3) were collected to provide sufficient data for estimating the background concentration of Ra-226 in surface soil. A total of 15 surface soil samples with Ra-226 concentrations less than 2 pCi/g were selected to provide the Ra-226 background concentration estimate. The reference background area was located at the parking spot, approximately 200 feet southwest of the AOD (Figure 2-1).

Exploratory data analysis combining graphical and statistical tools was used to evaluate the background data set. These data can be found in the Stage 2 Report (EA 2025b). The evaluation showed the data included in the background data set were normally distributed with no statistical outliers (i.e., concentrations were consistent with expected background concentrations for Ra-226).

The median Ra-226 background concentration of 1.25 pCi/g was selected as a reasonable estimate of Ra-226 background concentrations at the Schmitt Decline AUM Site and was used as the basis for the project action level (PAL) of 6.25 pCi/g (5 pCi/g above background, Section 1.2) for all surface sample locations on the Site. An action level of 16.25 pCi/g (15 pCi/g above background, Section 1.2.3) for all subsurface soils was used for the purpose of site characterization.

2.7.2 Areas of Elevated Radioactivity

The Gamma Walkover Survey and soil sampling performed during the Stage 2 Investigation delineated areas of radiological concern where Ra-226 exceeded the cleanup standards presented in Section 1.2.3 of this report (Figure 2-13). Elevated radioactivity was observed within SU-1A, large portions of SU-2, and select areas within SU-3, located in close proximity to SU-1A. In contrast, SU-1B, located around the mine portal and consisting primarily of exposed bedrock, exhibited concentrations consistent with background radiological readings. Areas evaluated outside the original area of concern (SU-3) were primarily confirmed to be below background, indicating limited lateral migration of contamination. Analytical results were provided in Appendix E of the Stage 2 Report (EA 2025b).

Evaluation of the soil results indicate remedial actions are warranted when compared to established PALs. Using the PAL of 6.25 pCi/g above background (surface, 0 to 0.5 feet bgs) and 16.25 pCi/g above background (subsurface, greater than 0.5 feet bgs) provides a range of 1,750 to 2,725 CY of impacted waste rock requiring excavation. The impacted waste rock volumes were estimated by creating 0.5-foot-thick contours of the waste rock pile. Waste rock with radiological concentrations above the PALs based on analytical data was contoured and the volume of each contour was calculated using ArcGIS. The excavation depth contours are shown in Figure 2-14. The minimum amount (1,750 CY) captures all soil within the green excavation contour limits of Figure 2-14. The yellow contour in Figure 2-14 captures all soil above PALs from the surface to the deepest depth with the maximum amount (2,750 CY).

2.7.3 Groundwater and Surface Water Analytical Results

One groundwater sample and one surface water sample were collected during the Stage 2 Investigation (Figure 2-1). The surface water sample was collected from an ephemeral pool located within the dry wash and downstream from the Site. Analytical results were provided in Appendix E of the Stage 2 Report (EA 2025b). Ra-226 was detected in groundwater at a concentration of 7.81 picocuries per liter (pCi/L) and in surface water at 9.88 pCi/l. The standard for combined Ra-226 and Ra-228 under 20.6.2.3103 of the New Mexico Administrative Code (NMAC) is 5 pCi/l. As recommended in the Stage 2 Report (EA 2025b), "*Given the elevated radiological concentration observed in the nearby surface water and groundwater in well SMC-18, it is recommended that additional assessment of water features in the area be performed.*" This assessment was recommended as a separate scope of work to be performed outside of the reclamation of the Site.

2.8 POTENTIAL RECEPTORS

2.8.1 Sources

The primary sources of radioactive materials are the waste rock piles located within the AOD (Figure 2-13).

2.8.2 Pathways

Potential pathways for radioactive materials away from the Site are wind and precipitation events (run-off and infiltration). The average annual wind speed in the region ranged between 8.3 and 8.7 miles per hour, with the prevailing wind direction from the west-northwest, as measured at the Grants-Milan, New Mexico airport (EA 2025a).

Run-off from precipitation primarily follows ephemeral stream channels. Erosional features associated with the ephemeral stream channels were observed containing water from precipitation. Overall, the topography slopes downwards to the northeast. Flow direction of infiltration from precipitation events may be impacted by the jointing patterns noted in the Dakota sandstone, with the dominant direction running from the north-northwest to the south-southeast.

2.8.3 Receptors

2.8.3.1 Human Receptors

The Site is situated approximately 1.22 air-miles west-northwest of the intersection of State Highway 509 and State Highway 605 in McKinley County, New Mexico. Approximately 50 people are located within a 5-mile radius. The economic base in this area is primarily from farming and ranching (EA 2025c). The closest occupied residence is approximately one mile to the east, located hydrologically cross-gradient of the Site.

2.8.3.2 Groundwater Receptors

Groundwater could be impacted by infiltration following precipitation events. Although the Brushy Basin Member mudstone would impede infiltration from the overlying Dakota Sandstone, jointing, fractures, or locally sandy sections could provide a conduit to groundwater. One groundwater well, livestock well SMC-18, is located near the Site (Figure 2-7). A groundwater sample collected from this well indicated the presence of elevated Radium concentrations (EA 2025b).

Well SMC-18 is not currently being used and does not contain a pump. Access to the well should be restricted by welding a lockable cover to the well casing. This would prevent unwarranted access to the well while still allowing water samples to be collected.

2.8.3.3 Ecological Receptors

Rainwater that collected in the erosional features associated with the ephemeral stream (Section 2.7.2) could impact cattle and wildlife if using these features as a water source. Reclamation of the radiologically impacted waste rock at the Site may reduce the radiological concentration observed in the water associated with these features.

3. CLOSURE AND MITIGATION OPTIONS

The Stage 2 Investigation assessed between 1750 and 2750 CY of radiologically elevated waste rock would need to be managed to prevent radiological and radon exposure (see Section 2.7.2 for description of volume estimate). Using an average density of sandstone of 1.8 tons per CY equates to between 3150 and 4950 tons of waste rock with elevated radiological concentrations that will require management.

The funding for this project expires in June 2026. Therefore, all reclamation activities need to be completed by that date.

3.1 NO ACTION APPROACH

This option consists of the site remaining as it is with no actions taken. The Site is remotely located behind a locked gate and located on NMSLO land. The closest residence is located approximately 1 mile east of the Site. The grazing of cattle occurs in the area. The Site currently consists of an open decline surrounded by radiologically elevated waste rock. The open decline is a public safety risk, and the radiologically elevated waste rock presents an ongoing impact to the environment as evidenced by the radiologically elevated concentrations observed in the nearby surface water. Performing no action would allow these risks to continue. This approach could be completed within the anticipated funding schedule.

Option advantages:

- Lowest cost option
- Can be completed within the current funding schedule
- Least amount of ground disturbance to the access road and Site of all of the options

Option disadvantages:

- The Site continues to be a safety risk by allowing unwarranted access to the mine.
- Injuries that occur on the property would be a liability
- Radiologically elevated waste rock would continue to impact surface water
- Radiologically elevated waste rock would continue to allow radiologically elevated recharge to affect the groundwater (if present at the site)

3.2 SAFEGUARDING THE DECLINE

Safeguarding of the decline will be performed concurrently with the management of the waste rock and included as part of the schedule for the Site reclamation. Signs in accordance with Section 19.7.2.8.(B) NMAC shall be installed at the Site. Cost for mine safeguarding will be provided with each waste rock management alternative under a separate cover.

There are two methods to safeguard the decline, as follows:

- Construct a physical barricade to block the entrance to the mine
- Backfill the decline with waste rock located on the Site

3.2.1 Physical Barricade

A physical barricade can consist of installation of a steel gate or other barrier such as a concrete masonry unit wall constructed at the portal. Installation of a physical barricade will require ongoing maintenance and can be broken into by vandals. Installation of a physical barricade does not take advantage of using the on-Site waste rock that would assist with the reclamation of the Site.

Option advantage:

- It prevents unwarranted entry into the decline while allowing entry if necessary

Option disadvantages:

- Doesn’t take advantage of disposal of on-Site waste rock
- Requires on-going maintenance and monitoring
- Vandals could break through the barricade to obtain unwarranted entry
- Higher cost of the two options

The design life for the installation of a physical barricade would range between 15 to 30 years depending on the type of barricade and would cause little ground disturbance to the access road and Site.

3.2.2 Backfill with Waste Rock

Backfilling the decline with waste rock not only assists with reclamation of the radiologically elevated waste rock, but it also prevents entry into the mine by vandals and does not require ongoing maintenance when placed to minimize potential subsidence of the material. The method of backfilling the mine would be performed using a front-end loader to place the radiologically elevated waste rock in the portal. A small skid steer, track loader, or bulldozer would be used to push the radiologically elevated waste rock as far as safely possible into the mine decline without having personnel working underground. An extension may be used on the front of the skid steer or bulldozer to push the material as far into the mine as is safe and practical. Innovative methods of material placement including remotely operated mini-loaders or all-terrain material slingers (a conveyor that would shoot the material into the decline), would be evaluated in addition to conventional means of material placement.

Option advantages:

- Cannot be vandalized or broken into (such as with a barricade), preventing any entry into the decline
- Takes advantage of using on-Site waste rock and minimizes the amount of radiologically elevated waste rock on the surface
- Minimizes long-term maintenance and monitoring
- Lowest cost safeguarding option

Option disadvantage:

- None

The design life for the plug, based on EMNRD experience, is at least 40 years. With some maintenance (such as maintaining vegetation and keeping water off of the plug), the plug could last in perpetuity. Movement of the waste rock into the decline to create the plug would create some disturbance at the Site. However, the disturbance would be limited to the already disturbed area associated with the historical abandoned uranium mine activities.

3.3 MANAGEMENT OF WASTE ROCK

The following three methods of managing the waste rock were assessed: high-pressure slurry ablation, off-Site disposal, and on-Site containment.

3.3.1 High-Pressure Slurry Ablation

High-pressure slurry ablation, a new technology that uses high pressure water to remove mineralization from waste rock, was evaluated. However, the significant amount of water needed to perform the process and the disposition of that water afterwards as potentially radiologically impacted was determined to be impractical for consideration at this Site. In addition, the waste rock would need to be ground requiring transportation of the material to an off-Site crushing plant. Licensing for the process would be required by the Nuclear Regulatory Commission, and it is unlikely that the license would be obtained in a reasonable timeframe to complete reclamation within the current funding schedule.

Option advantages:

- Radiologically elevated waste rock would be removed from the site
- Long term maintenance is reduced, but short-term maintenance and monitoring will be required

Option disadvantages:

- Would require off-Site transportation to a crushing and processing plant since there is not enough space at the site for this equipment
- Requires significant amounts of water that would later require disposal as a radiological waste
- Requires licensing by the Nuclear Regulatory Commission
- New, relatively unproven technology
- Will require disposal of the sediments after removal of radiologic material. In addition, not all of the radiologic material would be removed so this material would still have some radiologic material left.

The design life and site disturbance for this option would be similar to the off-Site disposal option (Section 3.3.2, below). However, this option is not recommended since it will create an additional waste stream (radiologically impacted water) to dispose of.

3.3.2 Off-Site Disposal of Elevated Waste Rock

Off-site disposal of the elevated radiological waste rock was assessed as a potential option. The following three locations were identified as sites to which radiologically elevated waste rock could be brought:

- Energy Solutions Clive Treatment and Disposal Facility in Clive, Utah—The distance from Milan to the Clive, Utah, repository is approximately 612 miles. This would require a 10- to 12-hour one-way trip.
- The Clean Harbors Deer Trail Landfill Facility in Deer Trail, Colorado—The distance from Milan to this facility is approximately 540 miles. This would require an 8- to 10-hour one-way trip.
- The White Mesa Mill in Blanding, Utah—This facility would process the material as ore and extract the uranium in the rock, leaving the tailings at their mill site. The distance from Milan, New Mexico, to the White Mesa Mill is approximately 250 miles. This would require a 4- to 4.5-hour one-way trip.

For the White Mesa Mill to accept the material for processing, the uranium grade to be considered ore is at least 0.005 percent. The calculated grade and tonnage for the radiologically elevated waste rock was estimated at 4450 tons at a grade of 0.0003792 percent and 500 tons at a grade of 0.01686 percent for an overall grade of 0.0019 percent. At these grades, there is not sufficient uranium to cover the cost of processing. White Mesa Mill could still accept the material, but would need to charge a processing fee.

The closest disposal location for off-Site disposal of the radiologically elevated waste rock is the White Mesa Mill since this is the closest of the three locations. This location provides the best option for meeting the project deadline. The radiologically elevated waste rock would be trucked in 18-wheel end dump trucks. The waste rock would be wetted to minimize dust and tarped. It would be radiologically scanned to make sure that the concentrations did not exceed their acceptance criteria. Each load of waste rock would be transported under a manifest. Transportation of each load of radiologically elevated waste rock would require a two- to three-day turnaround time.

A significant challenge posed by off-Site disposal for this particular site is the condition of the access road. The condition of the access road to the mine is too poor to allow for the use of 18-wheel end dump trucks. In addition, the cultural resources located along the access road from the parking area to the mine and the limited space to turn an 18-wheel end dump truck at the Site prohibit their use. This would require the use of 10-wheel dump trucks to move the radiologically elevated waste rock to a transfer location where it could be dumped and then reloaded into 18-wheel end dump trucks that are permitted to travel on the highway. The use of dump trucks to travel long distances on the highway would be inefficient due to their smaller transportation capacity (typically no more than 12 tons) and slow speed on the highways. Requirements for the transfer location would include the following:

- Close to either Highway 509 or Highway 605
- Large enough to stockpile hundreds of yards of radiologically elevated waste rock and allow for dumping of materials by dump trucks and loading of materials into 18-wheel end dump trucks
- Secured from the public
- Ideally on NMSLO-owned land or land owned by someone willing to allow for the stockpiling of low-level radiological material

Options to safeguarding the portal under this alternative are as follows:

- Installation of a physical barrier as discussed in Section 3.2, above
- Plugging the portal with waste rock that was deemed to be below PALs, eliminating the need for a radiological barrier
- Plugging the portal with radiologically elevated waste rock to reduce the quantity of material to be shipped to the landfill; EA does not recommend this option because the presence of radiologically elevated waste rock in the portal would require long-term monitoring

All options would result in vegetation maintenance and monitoring that will consist of the following:

- Annual reseeding and erosion control repairs for the first few years until vegetation takes hold (considered to be a minimum of 70% ground coverage over the site as required by a stormwater pollution prevention plan)

In addition, closure of the transfer location would require the following:

- A post-reclamation survey in compliance with the Multi-Agency Radiation Survey and Site Investigation Manual (Department of Defense, et al. 2000)
- Removal and disposal of gravel placed at the Site to allow for truck traffic
- Annual reseeding and erosion control repairs for the first few years until vegetation takes hold (considered to be a minimum of 70% ground coverage over the Site as required by a stormwater pollution prevention plan)

Note that there may be some long-term liability with this option, particularly the White Mesa Mill. In the event that the owner of the waste repository went into bankruptcy, it is possible that the owners of the waste could be called as a responsible party to the remediation.

3.3.2.1 Off-Site Disposal Timeline

The estimated duration for waste rock management activities includes the following:

- One to two months for road and site preparation followed by identification and preparation of a temporary transfer location—This assumes significant permitting of the Site will not be required.
- One month for trucking radiologically elevated waste rock to the transfer location—This assumes moving 360 tons per day (ten trucks containing 12 tons each) for the maximum amount of radiologically waste rock (4,950 tons) working five days per week. Adding additional trucks would increase road deterioration, increase the need for dust control, increase truck idle time (decreasing truck efficiency), and increase traffic issues (trucks unable to pass each other without staying on the road).
- One month for trucking of the radiologically elevated waste rock to the White Mesa Mill location—This assumes twenty 18-wheel dump trucks hauling 22 tons each. The round-trip time is estimated at 2 days for each load.
- Closure of the transfer location would require approximately one month to complete.
- Grading of the remaining waste rock, reseeding, and installation of erosion control is estimated to take approximately one month.

Off-Site disposal of the radiologically elevated waste rock is estimated to take approximately four to six months to complete while performing activities concurrently. Additional equipment could be added to the project to reduce the schedule but would increase the project cost and complexity.

A cost estimate to complete the off-Site disposition of the radiologically elevated waste rock and perform revegetation of the decline plug and remaining waste rock for a period of five years has been included under separate cover. This is the most expensive option

3.3.2.2 Option Advantages and Disadvantages

Option advantages:

- Radiologically elevated waste rock would be removed from the site
- Long term maintenance is reduced, but short-term maintenance and monitoring will be required
- Protective of surface and groundwater. However, if the backfilling safeguarding option is chosen, a cap as discussed in the following section will need to be constructed to mitigate meteoric water from infiltrating the radiologically elevated waste rock

Option disadvantages:

- Will require a transfer location that will need to be:
  - Surveyed for cultural and biological resources
  - Permitted
  - Fenced and graveled to allow for heavy truck traffic
  - Remediated and reclaimed upon completion of reclamation
- May require special permitting in order to travel through Native American lands.
- Increased risk to the environment and the public if a truck accident occurs
- Acceptance of the waste may delay disposal past the current funding schedule
- It would require a significant number of trucks in order (a minimum of 20 and more likely 30) to meet the current funding schedule, increasing on-road risk of truck accidents
- Cost is higher than on-Site waste rock repository
- Nearly no economic benefit to local businesses since the majority of the expense (trucking and disposal) would be provided by out-of-state businesses

The design life for the plug, based on EMNRD experience, is at least 40 years. With some maintenance (such as maintaining vegetation and keeping water off the plug), the plug could last in perpetuity. Movement of the waste rock into the decline to create the plug would create some disturbance at the Site. Site disturbance from loading of waste rock into trucks for disposal would be confined primarily to the existing disturbed areas of the Site. The number of trucks needed to move the radiologically elevated waste rock would require improvements to the access road, but the access road could be maintained using water trucks and placement of gravel. The creation of a transfer location would require disturbing one to two acres of land near a paved roadway that would need to be reclaimed once the project was completed.

White Mesa Mill disposal-specific issues:

- The Ute Mountain Tribe has been advocating for the closure of the mill, making disposal at the White Mesa Mill politically contentious
- The U.S. Environmental Protection Agency issued an Unacceptability Notice in late 2021 that banned the mine from accepting Superfund waste due to uncovered tailings cells that violated the Clean Air Act.
- Disposal at the White Mesa Mill could present long-term liability in the event that the owner declared bankruptcy and reclamation of the site was performed under Superfund

3.3.3 On-Site Waste Rock Repository

Leaving the waste in an on-Site repository would generally consist of consolidating the radiologically elevated waste rock around the mine portal. A cover material would be placed as a cap over the radiologically elevated waste rock.

The cap would be designed and constructed to:

- Meet the State of New Mexico Site post-reclamation radiation level for gamma radiation (EMNRD and NMED 2016)
- Minimize erosion and facilitate drainage of meteoric water away from the cap and the on-Site drainage channel, preventing impacts to surface water and reducing maintenance needs
- Minimize infiltration of meteoric water, preventing impacts to groundwater
- Promote vegetative growth to facilitate cap stability, minimizing impacts to groundwater

A radiological technician will be present during Site reclamation to screen and assist with segregating radiologically elevated waste rock from waste rock that screens below the PAL. Waste rock that screens below the PAL would be segregated for later use with vegetation regrowth.

Due to the limited amount of soil (the majority of the Site is exposed bedrock) and to minimize the potential for erosion at the Site, it is proposed that the cover material be brought in from an off-Site pit. The cover material would be trucked to the Site in dump trucks. A loader would be needed at the borrow location, and a road grader and water truck would be needed to maintain the road and minimize dust. A loader and skid steer would be located at the Site to move waste rock and spread cover material. A second water truck would be needed at the Site to minimize dust. The thickness of the cap would be determined using the RADON Model (the Windows-compatible version of the Radiation Attenuation Effectiveness and Cover Optimization with Moisture Effects Model). For the purposes of the rough order of magnitude cost estimate, a thickness of two feet and an area slightly larger than half an acre was used. This would equate to approximately 4,800 tons, assuming a material similar to shale with a density of approximately 2.4 tons/cubic yard. But the properties of the actual material used will be included in the Closure Plan (Section 4.2). The final repository will likely be slightly larger than a half-acre in size.

The cap would be contoured to reduce erosion of the cap. The repository area would be fenced to keep the public out. Erosion controls and revegetation of the cap would be required to minimize maintenance of the cap. The following will be placed to minimize erosion of the cap:

- Installation of geogrid: Geogrid is a geosynthetic material that contains cells and is used to reinforce soils. The cells hold the soil mass together to minimize erosion of unconsolidated soils. The geogrid would be placed over the cover material and used to contain the topsoil. Using geogrid would provide a more natural look at the Site while still allowing for erosion minimization.

- Topsoil will be added to facilitate growth of vegetation and evapotranspiration cover (EMNRD and NMED 2016). The topsoil will be placed within the geogrid to contain the material, increase the chances for vegetative growth, and minimize erosion. The evapotranspiration cover will retain moisture for vegetation and reduce the chances of precipitation permeation into the repository.

- Placing rock obtained from the mine portal, also known as “rock armoring”—Rock armoring consists of using an excavator with a hydraulic breaker to break up sandstone located adjacent to the mine portal. The Phase 2 Investigation determined that the rock around the portal is below PALs and would be suitable for this purpose. The sandstone removed from the portal would be stockpiled until the cap is completed. The sandstone would then be placed over the cap. This procedure has three benefits: (1) it creates a larger area to place radiologically impacted waste rock beneath the surface, (2) it slows the flow of rainwater as it moves over the cap, thereby minimizing erosion, and (3) it provides areas for the seed to be captured and allowed to grow. Rock armoring would provide the greatest erosion protection and provide the best chance for revegetation but would not blend into the surrounding landscape as well as the use of geogrid. The removal of rock from the mine portal may also require a mining permit from NMSLO and could not be obtained if a cultural resource was located within 100 feet of the rock removal area.

Installation of these erosion prevention methods would provide the greatest reduction of maintenance of the repository. Maintenance of the repository would consist of the following:

- Annual reseeding and erosion control repairs for the first few years until vegetation takes hold (considered to be a minimum of 70% ground coverage over the site as required by a stormwater pollution prevention plan)

- Annual monitoring to confirm maintenance is not needed at the Site

3.3.3.1 On-Site Waste Repository Timeline

The estimated duration for the construction of an on-Site waste rock repository includes the following:

- Approximately one month for road and site preparation
- Approximately one month for trucking 4,800 tons of cover material to the Site; this assumes ten dump trucks at three round trips per day from a borrow source located within a 20-mile radius of the Site
- Plugging the mine portal, placement and grading of the cap, and reseeding and installation of erosion control is estimated to take approximately two months

Completion of the on-Site repository is estimated to take approximately three to four months to complete while performing activities concurrently. Additional equipment could be added to the project to reduce the schedule but would increase the project cost and complexity.

A cost estimate to complete the on-Site repository and perform maintenance and monitoring of the repository for a period of 12 years has been included under separate cover. This is the least expensive option aside from the No Action option.

3.3.3.2 Option Advantages and Disadvantages

Option advantages:

- Lowest risk option:
    - Eliminates the risk of radiological material spills on public roadways
    - Minimizes safety risks to the public with less truck trips on public roadways
    - No long-term disposal risk
- Provides long-term environmental protection from radiologically elevated waste rock
- Provides long-term protection of ground and surface water
- Eliminates the need for an off-Site transfer location to safely transfer radiologically elevated waste rock from dump trucks to 18-wheel end dump trucks
- Reduces the project cost and schedule duration associated with transporting waste rock material to an off-Site disposal facility
- Estimated completion meets the schedule requirements

- It is the lowest cost option aside from the No Action alternative
- It is the lowest liability option
- Highest economic benefit to local companies

Option disadvantage:

- Long-term maintenance and monitoring required. However, the per-year cost projected over a 12-year period would be less than $9,000.

The design life for the plug, based on EMNRD experience, is at least 40 years. Placement of a cap over the plug that includes a relatively water impermeable material and an evapotranspiration layer could allow the plug to last in perpetuity. With the use of geotextiles and revegetation of the evapotranspiration layer, the cap could last at least 40 years.

Movement of the waste rock into the decline to create the plug would create some ground disturbance that would be contained to the existing disturbed areas of the Site. The number of trucks needed to move cap and topsoil material to the Site would require improvements to the access road. However, the access road could be maintained using water trucks and placement of gravel. Construction and grading of the cap would be contained to the existing disturbed areas of the Site.

3.4 GRADING AND RECLAMATION

All listed alternatives will require final site grading, installation of erosion control measures, and reseeding. Site grading, erosion control, and reseeding measures will be included in the Closure Plan (Section 4.2).

4. CLOSURE RECOMMENDATIONS

Based on a balanced assessment of risk, cost, schedule, and funding constraints, EA recommends the following:

- The mine be plugged with existing radiologically elevated waste rock (Section 3.2.2) and,
- The radiologically elevated waste rock would be capped with an acceptable imported cover material to act as a radiological barrier (Section 3.3.3).

Topsoil will be placed over the cover to facilitate establishment of vegetation. The radiological barrier will be further stabilized with geogrid, rock mulch, or both if requested by NMSLO.

4.1 RECOMMENDED APPROACH

The general process for the recommended closure alternative is as follows:

- Improve the access road from Highway 509 to the Site. Road improvements will consist of filling low areas as minimally as needed and will not include excavation. Any road improvements will stay within the existing road width. A water truck will be present to control dust.
- Site preparation would consist of the following:
  - Tree removal in the required cap and staging areas
  - Fencing off the avoidance areas adjacent to the access road as shown in Figure 4-1
  - Placement of sand on the bedrock road to smooth it sufficiently to facilitate truck ingress and egress
  - Removal of the historic mining equipment for NMSLO disposition
- Rock mulch for erosion control will require an excavator with a hydraulic rock breaker. Rock around the portal will be excavated using the rock breaker and stockpiled at a location away from the prehistoric component boundary (Figure 4-1) for future use.
- The waste rock with the most elevated concentrations that were identified as area SU-1A (Figure 2-13) in the Phase 2 Investigation would be moved to the mine portal. As much radiologically elevated waste rock would be placed within the decline as possible without having personnel work underground. The remainder of the SU-1A radiologically elevated waste rock will be spread out over the top of the mine portal. A water truck will be available on Site to assist with minimizing dust while movement of radiologically elevated waste rock is performed.

- The SU-2 radiologically elevated waste rock (Figure 2-13), primarily located in the center of the northern waste rock pile, would be moved and placed over the backfilled portal location.

- Waste rock that is below the PALs would be stockpiled nearby (Figure 4-1) to be used later to place over the radiologically elevated waste rock. This material will be used as part of the cover to minimize the amount of off-Site borrow material needed.

- Transport approximately 4,800 tons of borrow source cover material to the Site. Cover material will be placed over the waste rock. The thickness and location of the cover material will be discussed in the Closure Plan (Section 4.2). The cover material will be contoured to minimize erosion and facilitate drainage away from the repository. The need for additional erosion controls will be discussed in the Closure Plan.

- Geotextile will be placed at this point, and the repository will be covered with topsoil to facilitate growth of vegetation.

- Rock mulch will be placed over the topsoil to minimize erosion.

- Seeding of the repository will be performed using NMSLO-approved seed mix.

- A 6-foot chain link fence or 3-wire barbwire fence (at the preference of NMSLO) will be installed surrounding the Site with a 12-foot access gate. Signs in accordance with Section 19.7.2.8.(B) NMAC will be installed at the Site.

- Site maintenance and monitoring would begin the following year and would consist of evaluating if reseeding of the Site is required, repairing any erosion that may have occurred, and providing a report of observations and activities performed.

- Annual monitoring reports will be prepared during the Site maintenance and monitoring period.

5. CLOSURE PLAN

A Closure Plan consistent with New Mexico Environment Department and NMSLO recommendations will be prepared in accordance with the *Joint Guidance for the Cleanup and Reclamation of Existing Uranium Mining Operations in New Mexico* and consider the *Guidance for Meeting Radiation Criteria Levels and Reclamation at New Uranium Mining Operations*. The Closure Plan will include the following:

- Preparation of a time-oriented reclamation plan and cost estimate for each phase of the reclamation to include the following:
  - Approximate volumes and location of placement of radiologically elevated waste rock
  - Geotechnical analysis and suitability of cover material
  - Estimated thickness of cover material
  - Grading and revegetation plan
  - Required seed mix and erosion control methods
  - Plan to show the approximate final cover, fence, and erosion control equipment locations
- A Gantt chart outlining relevant project milestones
- Assessment for the need for engineered designs on neglected sites to account for climate change
- Stormwater Pollution Prevention Plan, if required
- Design of temporary or permanent run-on and run-off stormwater management structures
- A task-specific health and safety plan to include zones of decontamination or other safety measures, if required
- A long-term Site monitoring and maintenance plan

The Closure Plan will be prepared following selection of the reclamation alternative.

6. REFERENCES

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Figures

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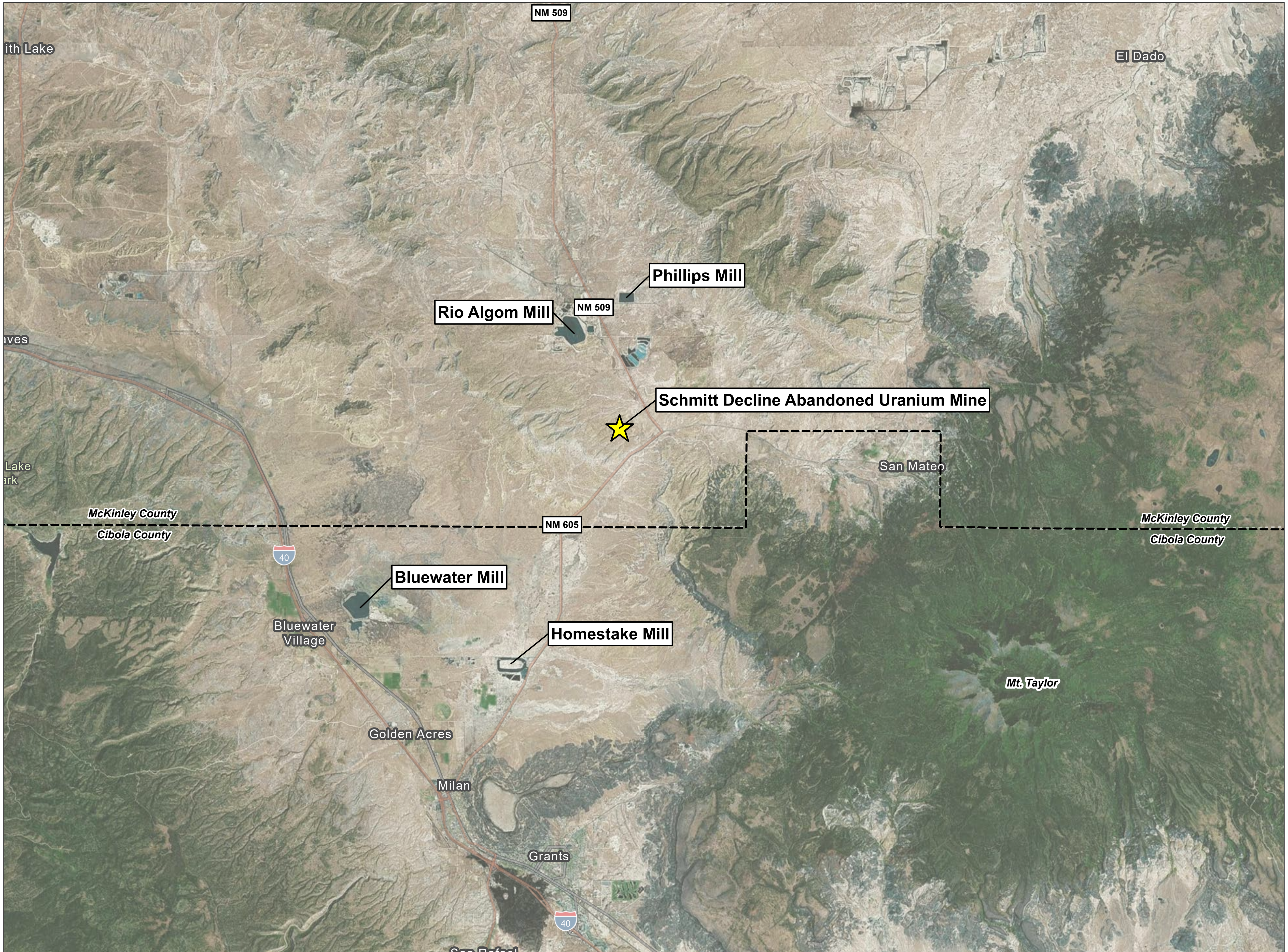

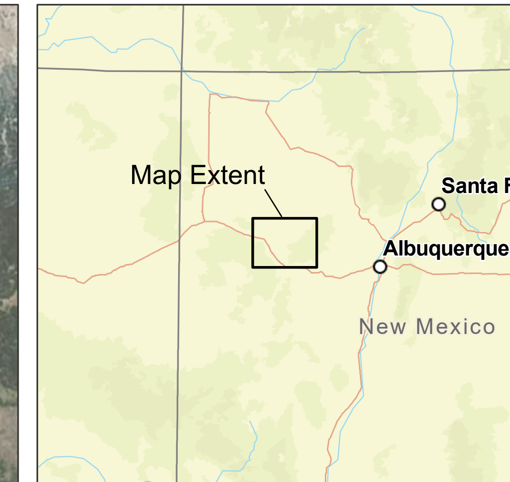

Legend

- Schmitt Decline Abandoned Uranium Mine
- County Boundary

Date Saved: 12/19/2025
Projection: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:192,000

0 3 6
Miles

Data Sources: ESRI

Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Site Location Map

Figure 1-1

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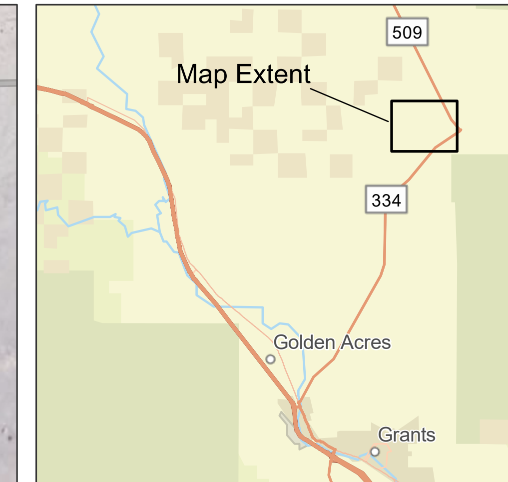

Legend

- ☆ Schmitt Decline Abandoned Uranium Mine
- ➤ Existing Road to Site
- — Access to Site (through areas of avoidance)

Date Saved: 12/19/2025
Projection: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:12,000

N

0 1,000 2,000
Feet

Data Sources: ESRI

Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Site Access

Figure 1-2

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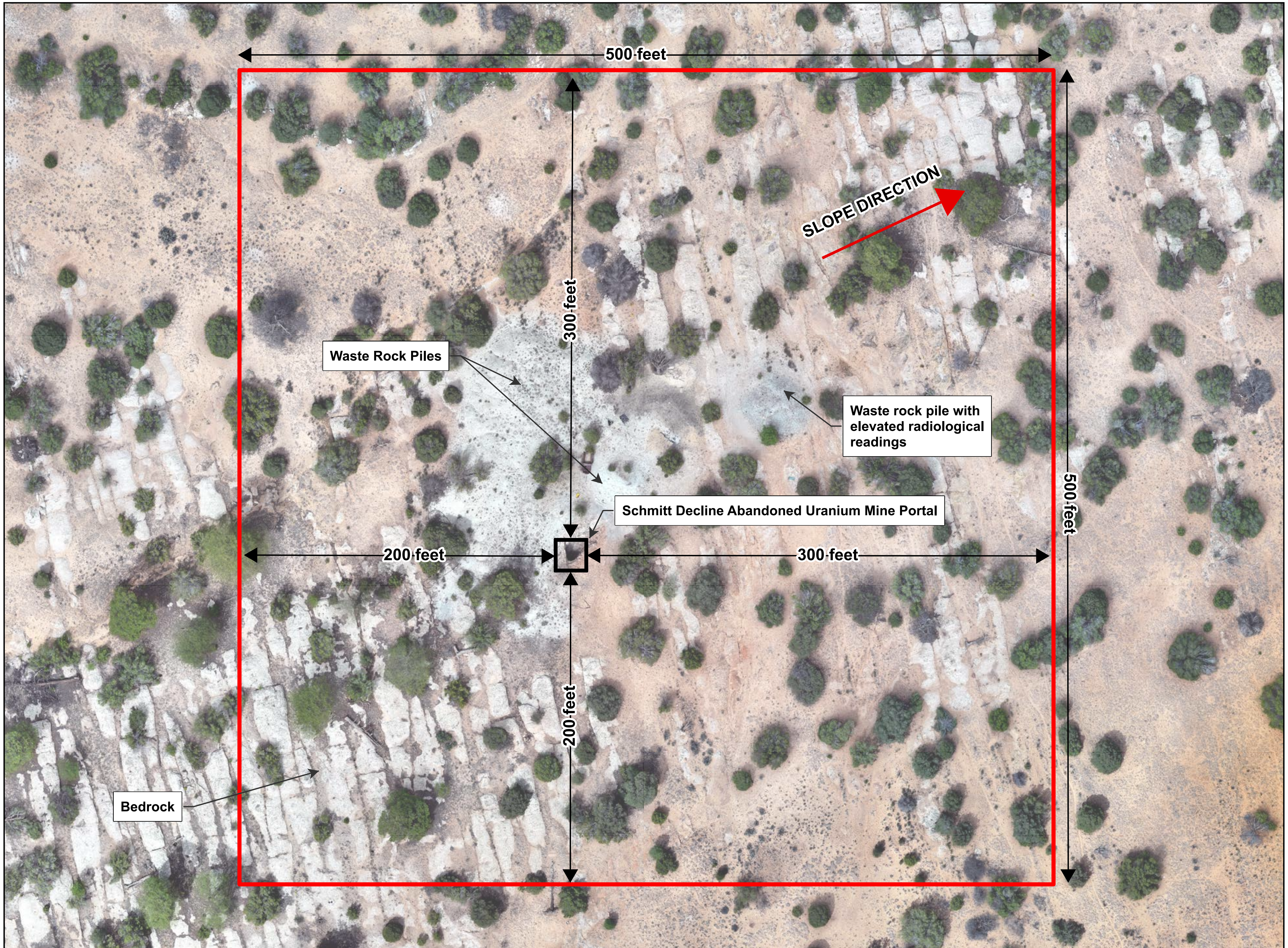
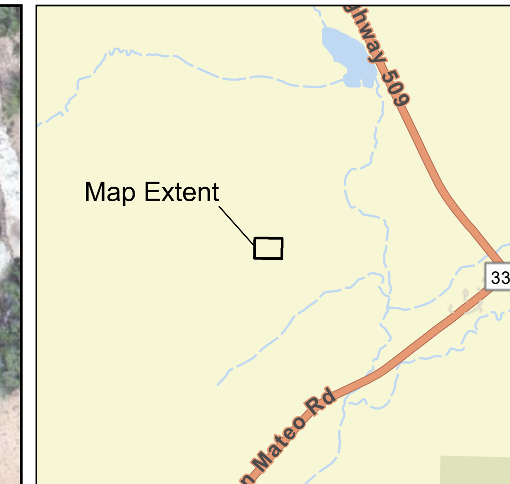




Legend

- Schmitt Decline Abandoned Uranium Mine Portal
- Area of Disturbance

Date Saved: 12/19/2025
Projection: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:720

0 60 120
Feet

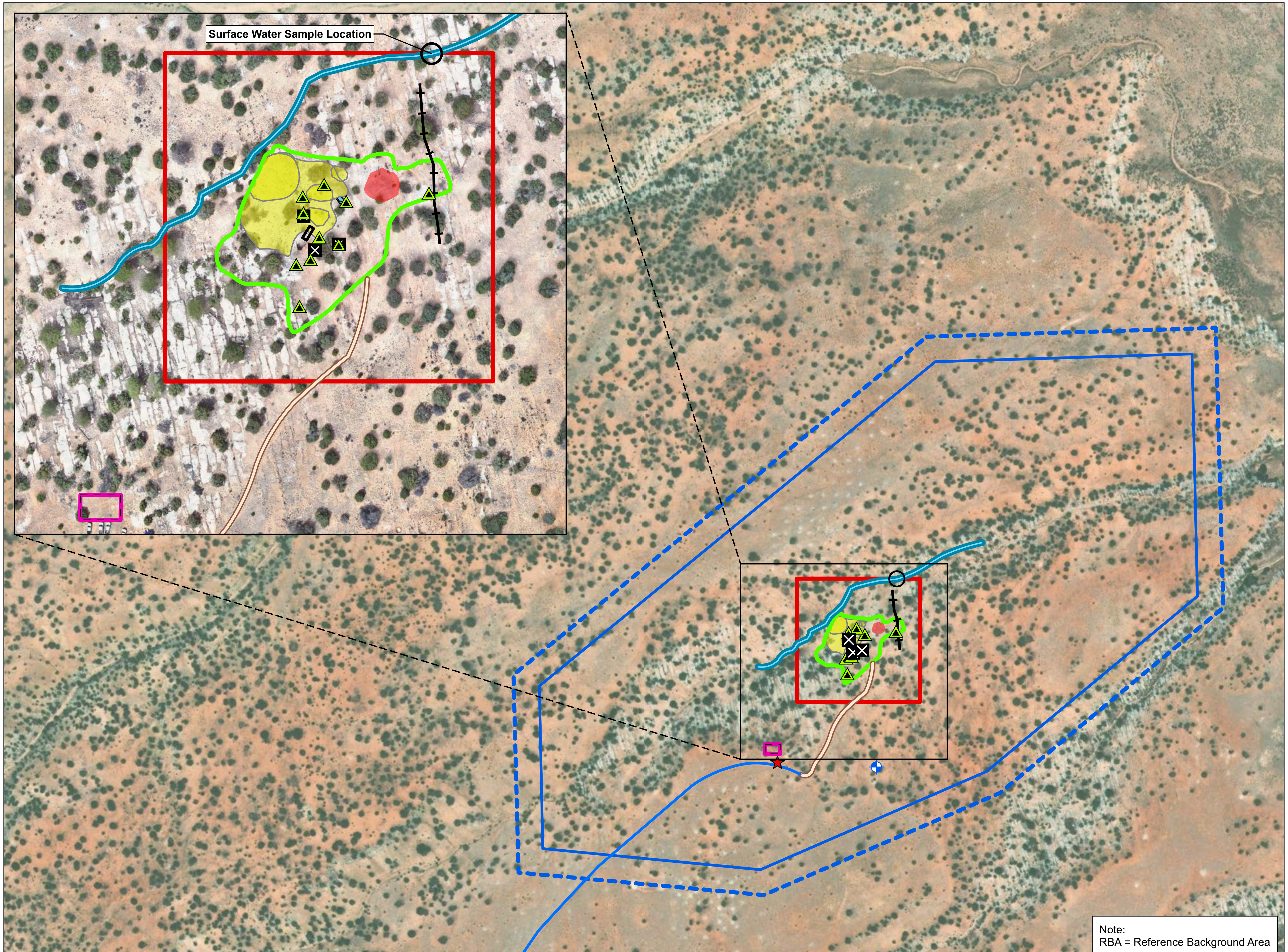
Data Sources: ESRI

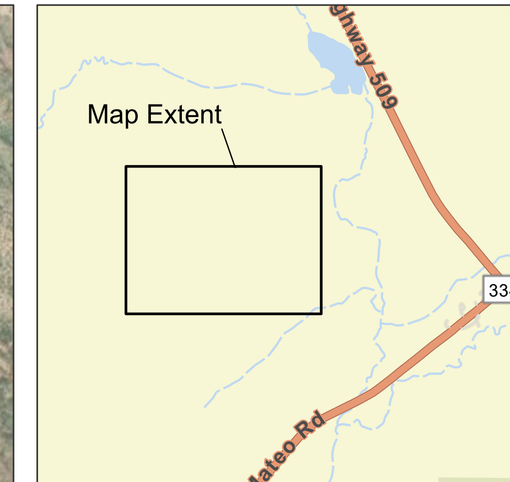
Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Site Features

Figure 1-3

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx





Legend

- Livestock Well SMC-18 (approximate location)
- Parking Spot
- Remnant Mining Equipment
- Debris
- Surface Water Sample Location
- Dry Wash
- Fence Line
- Access to Site (needs to be cleared by Archaeologist and flagged)
- Existing Road to Site (assume no Archaeological Survey required)
- Area of Potential Effect
- Cultural Resources Buffer 13 August 2025
- Area of Disturbance
- High Reading Waste Rock Pile
- Settling Cells
- Overburden
- Schmitt Decline
- Outside Boundary of Impacted Area (Includes Piles, Surface Cover, and Overburden)
- RBA Boundary

Date Saved: 12/24/2025
Projection: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:4,800

0 400 800
US Feet

Data Sources: ESRI

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Site Layout

Figure 2-1

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx | 12/24/2025 | ecarpio

Legend

Schmitt Decline Abandoned Uranium Mine Portal

Elevation Contours (0.5-foot intervals)

Date Saved: 12/19/2025

Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet

Scale: 1:240

0 20 40
Feet

Data Sources: UAS

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Site Layout with Contour Elevations (0.5-foot intervals)

Figure 2-2

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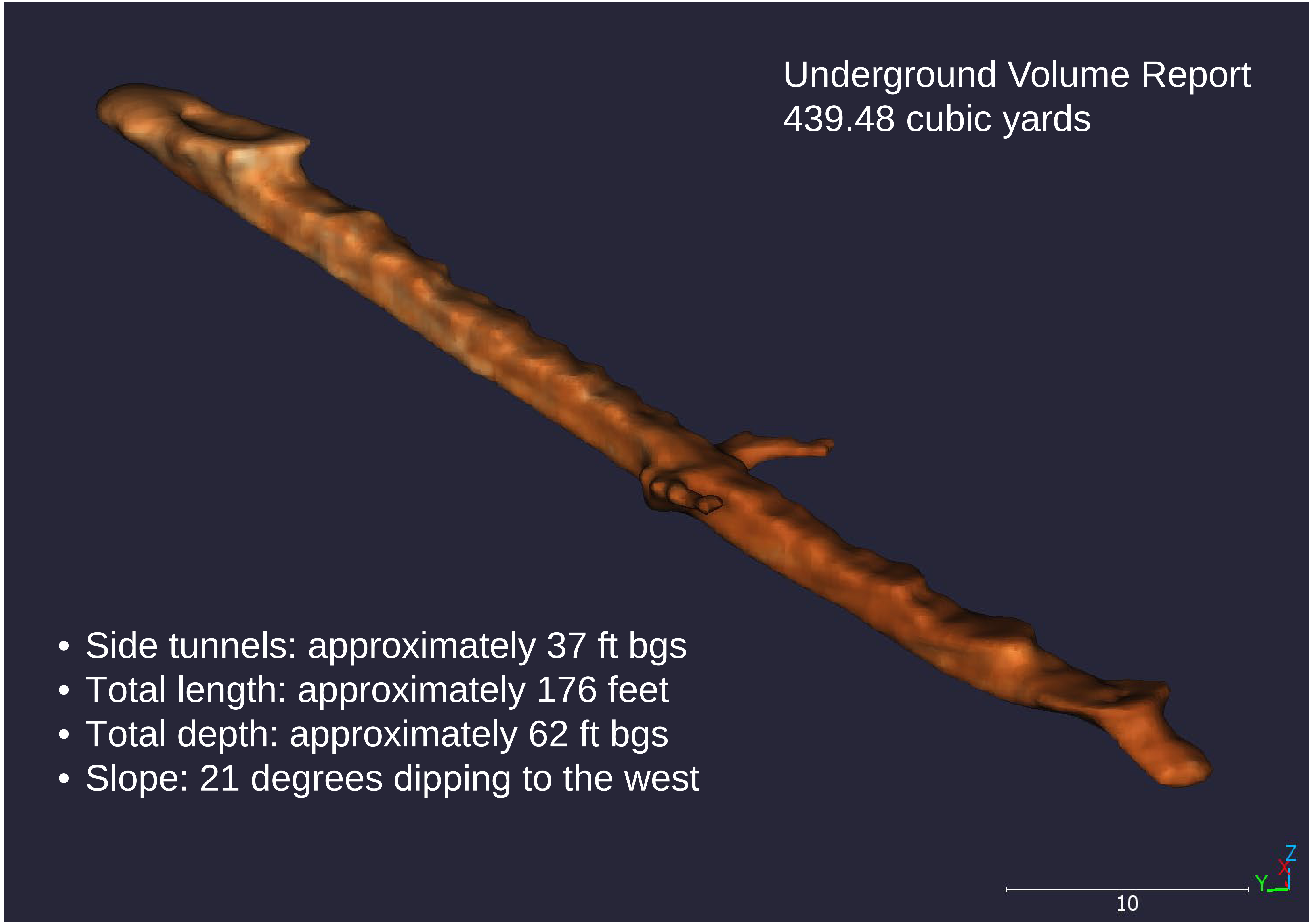
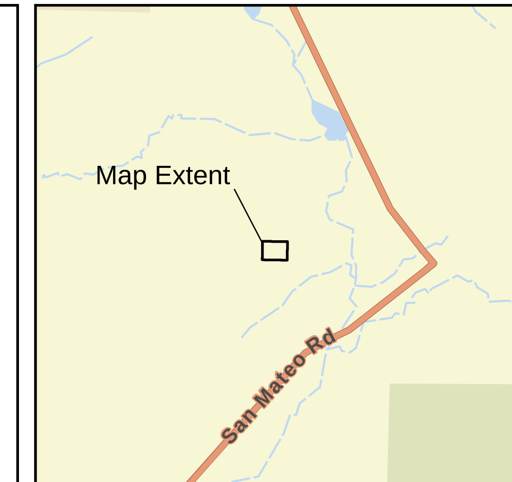




ft bgs = feet below ground surface

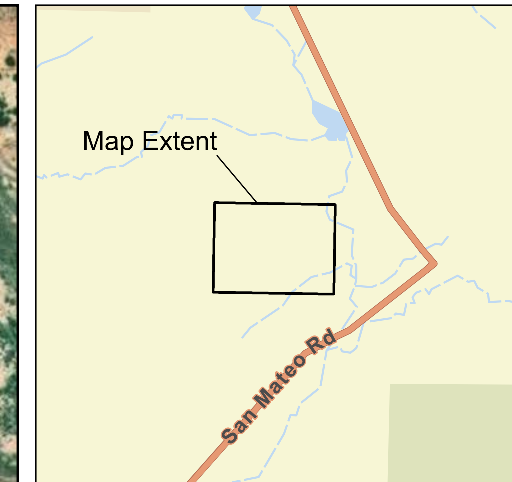
Data Sources: Unmanned Aerial Services, Inc.

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Underground Mine Volume Estimate

Figure 2-3

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_CHARACTERIZATION_.aprx



Legend

Habitat Type

- Desert Grassland
- Piñon-Juniper Woodland & Grasslands
- Piñon-Juniper Woodland & Rocky Outcrops
- Schmidt Decline Abandoned Uranium Mine Portal
- Sampling Point
- Avian Point Count Station
- Area of Disturbance
- Area of Potential Effect
- Ephemeral Stream

Date Saved: 12/19/2025

Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet

Scale: 1:4,800

0 400 800
Feet

Data Sources: Pinyon Environmental, Inc.

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Biological Resources

Figure 2-4

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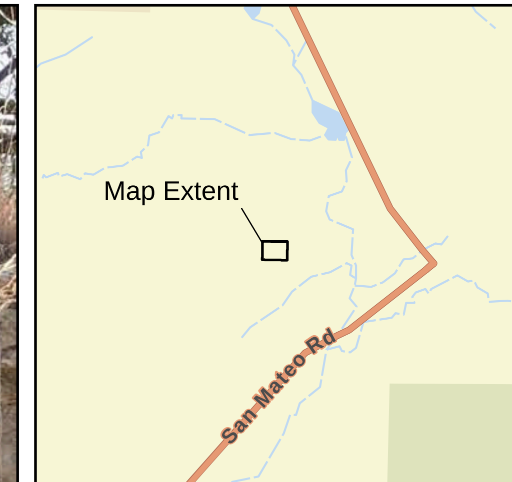

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Bird Deterrent Measures

Figure 2-5

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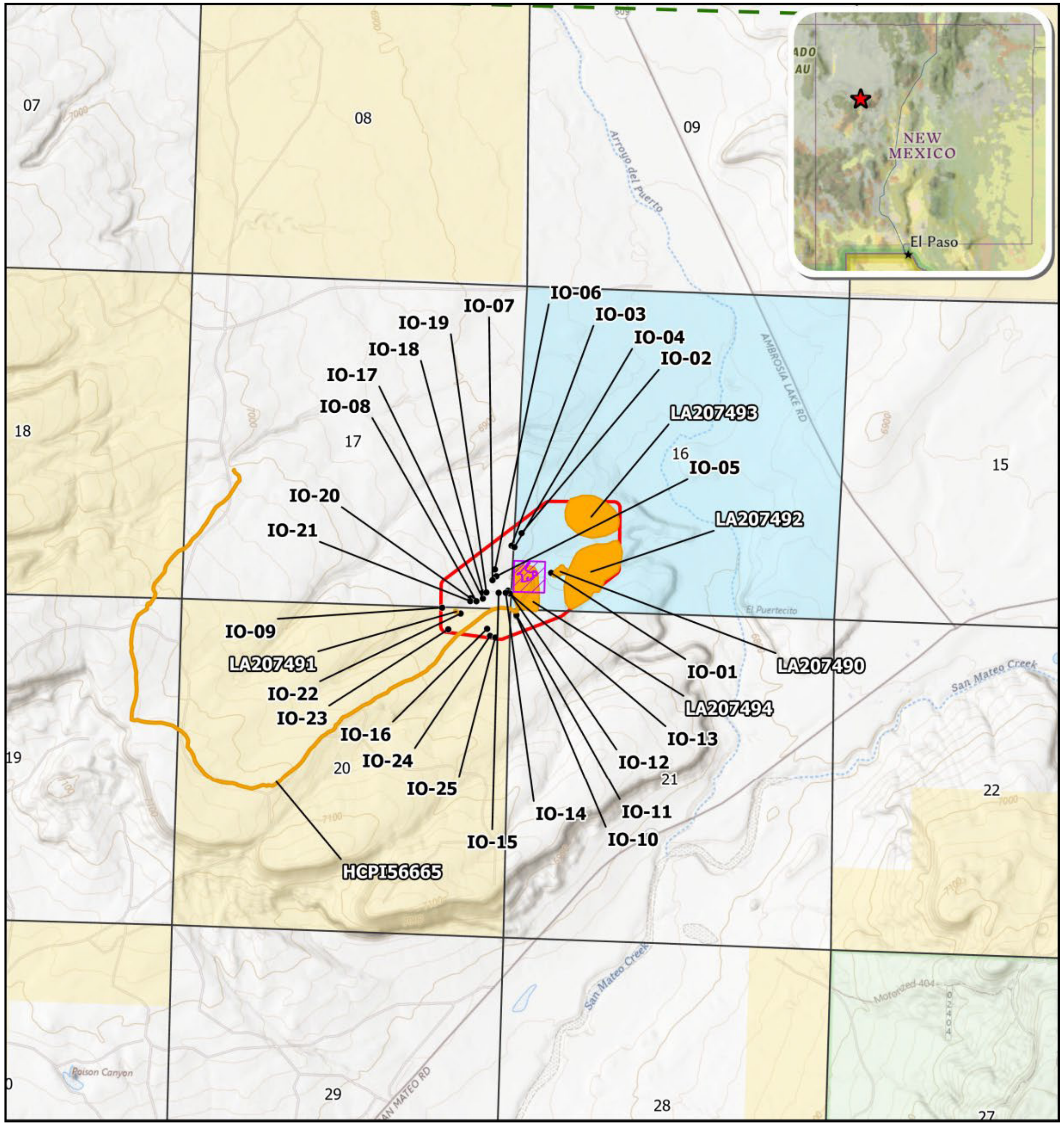

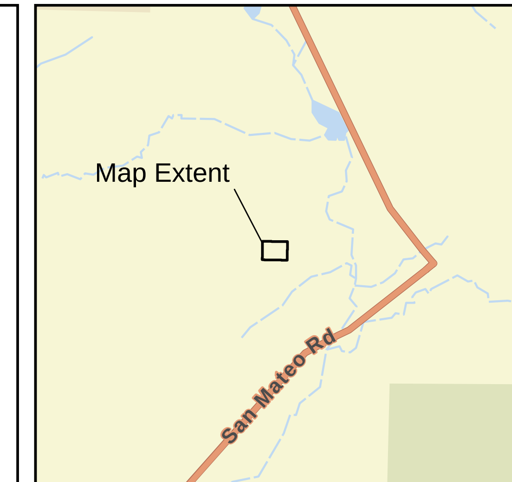

Legend

- Isolate
- Archeological Site
- Area of Potential Effects (APE)
- Area of Disturbance
- USGS 24K Topo Map Boundary
- Public Land Survey System Section
- Public Land Survey System Township
- Bureau of Land Management
- Forest Service
- State Trust Land

Date Saved: 11/12/2025

Scale: 1:24,000

Site Location: Sections 16, 17, 20,21, Township 13N, Range 9W, New Mexico Meridian

USGS 7.5' Minute Quadrangle
AMBROSIA LAKE, DOS LOMAS, New Mexico

0 2000 4000
Feet

Data Sources: Pinyon Environmental,

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Historic and Archaeological
Survey Results

Figure 2-6

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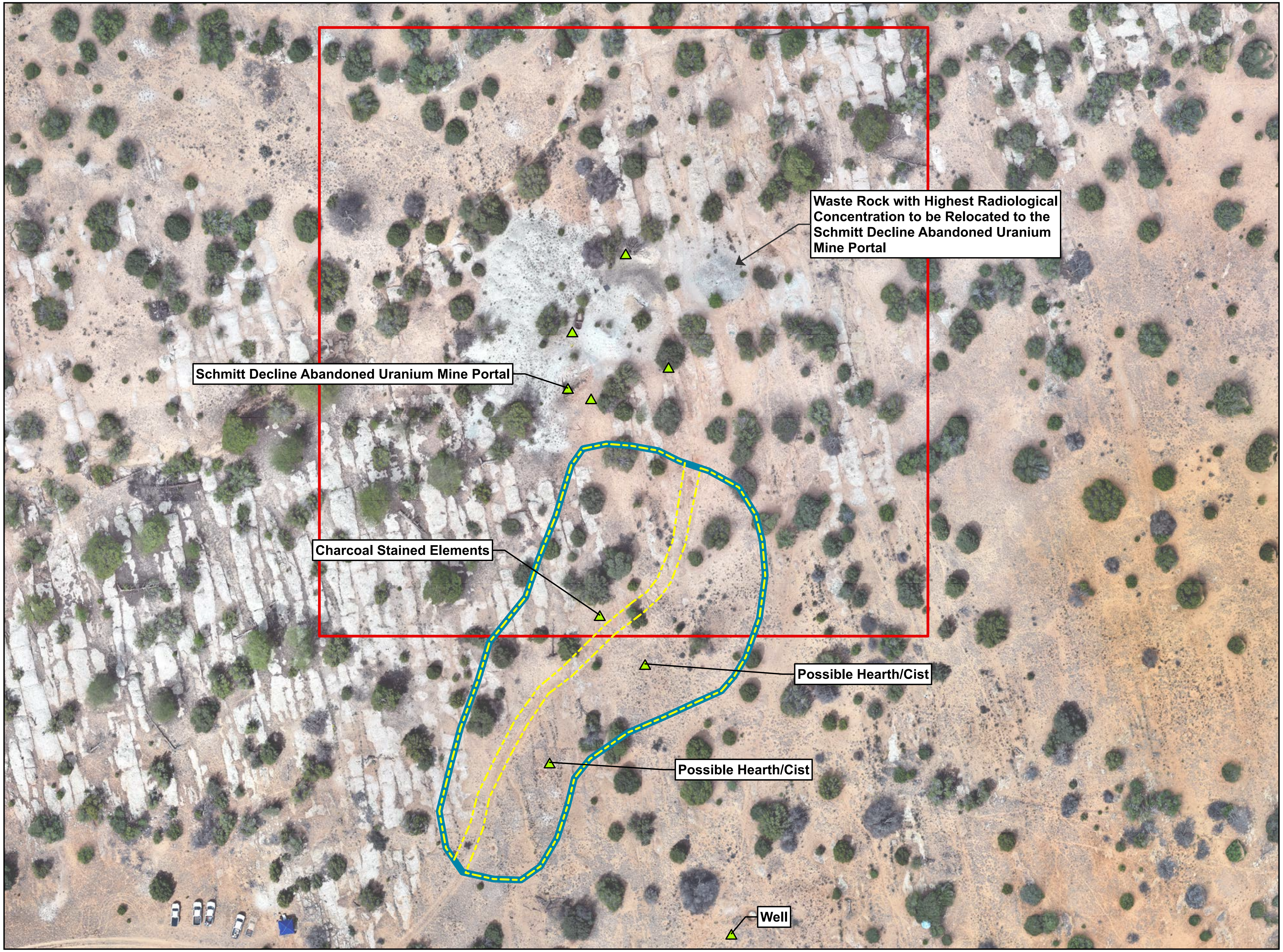

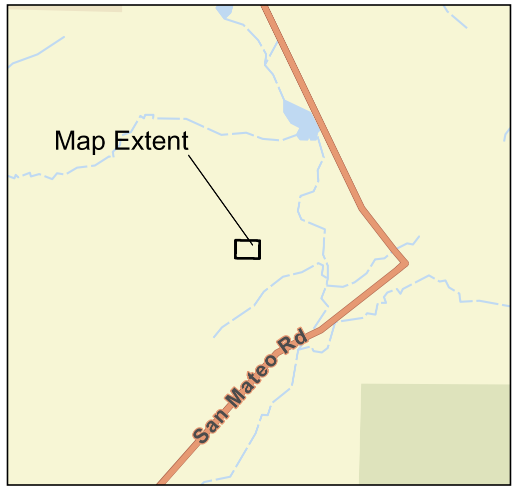

Legend

- Features
- Area of Disturbance
- Avoidance Areas
- Prehistoric Component Boundary

Date Saved: 12/19/2025
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Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:960

0 80 160
Feet

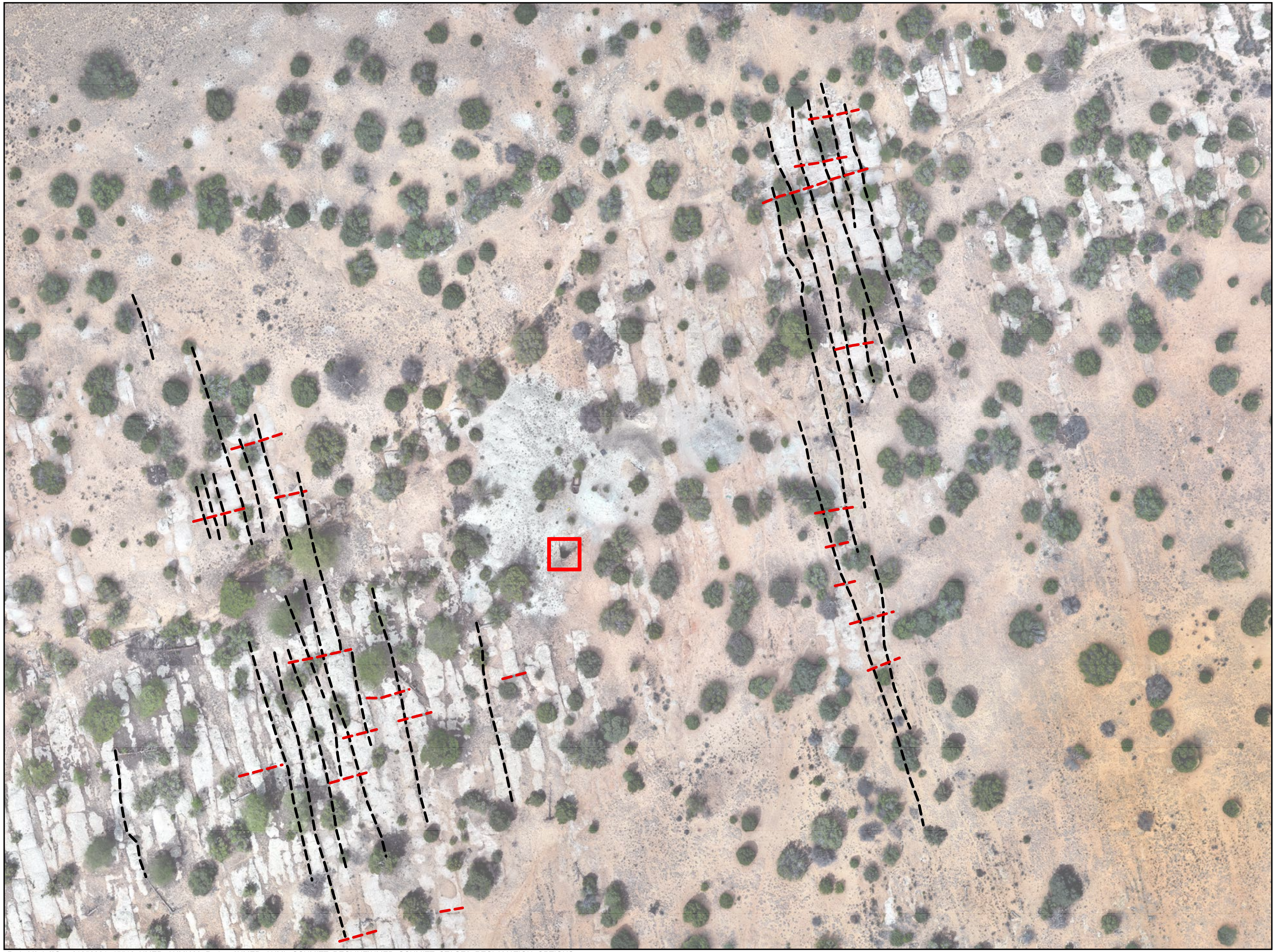
Data Sources: ESRI

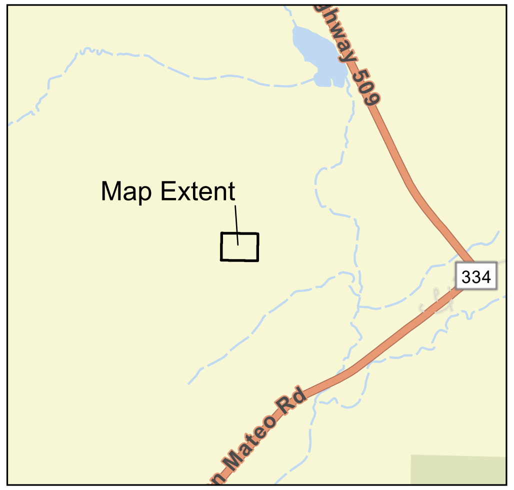
Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Features and Avoidance Areas

Figure 2-7

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx





Legend

Schmitt Decline Abandoned Uranium Mine Portal

Dominant Jointing

Secondary Jointing

Note:
Representative joints are delineated on this figure to orient the viewer. Not all joints are delineated.
Reference:
Phase 2 Ground-Water Investigation Report for the San Mateo Creek Basin Legacy Uranium Mines Site, Cibola and McKinley Counties, New Mexico (EPA, 2018)

Date Saved: 12/19/2025

Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet

Scale: 1:960

0 80 160

Feet

Data Sources: UAS

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Jointing in Dakota Sandstone

Figure 2-8

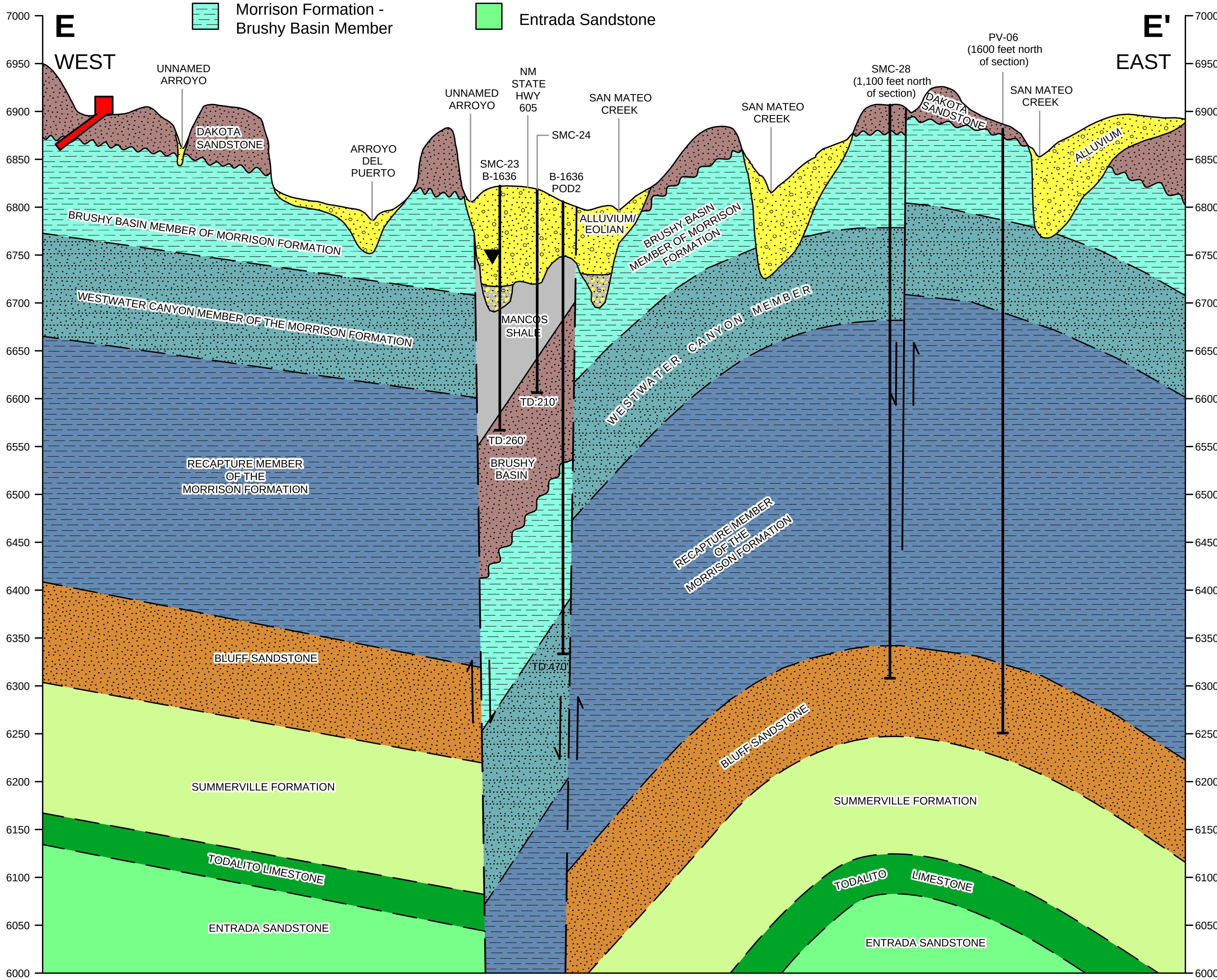
Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx

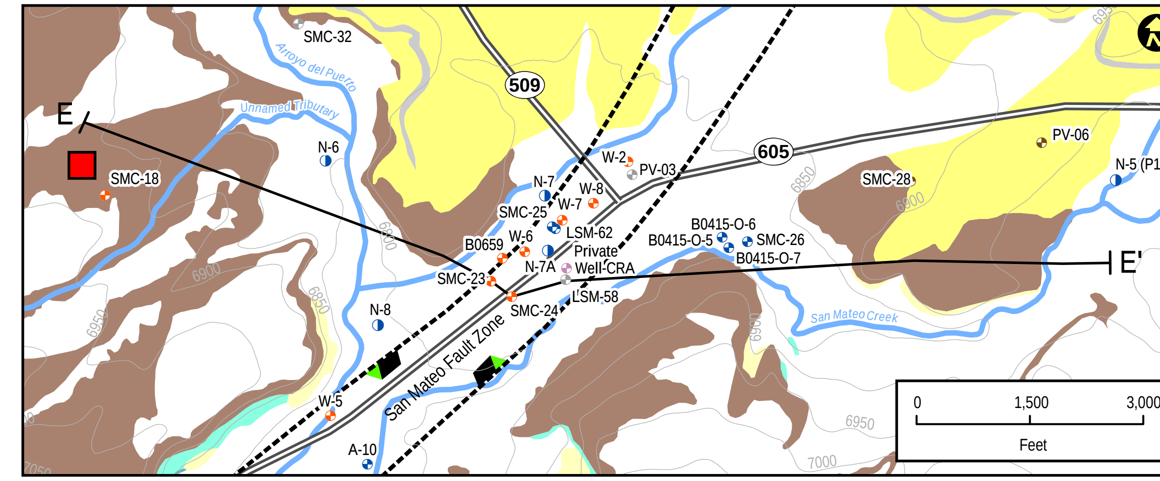
CROSS-SECTION LEGEND

- Well Location
- Direction of Fault Displacement
- Approximate Regional Water Level
- Approximate Location of Schmitt Decline
- Alluvium/Eolian
- Alluvium Gravel
- Mancos Shale
- Dakota Sandstone Formation
- Morrison Formation - Brushy Basin Member
- Morrison Formation - Westwater Canyon Member
- Morrison Formation - Recapture Member
- Bluff Sandstone
- Summerville Formation
- Todilito Limestone
- Entrada Sandstone

NOTES:

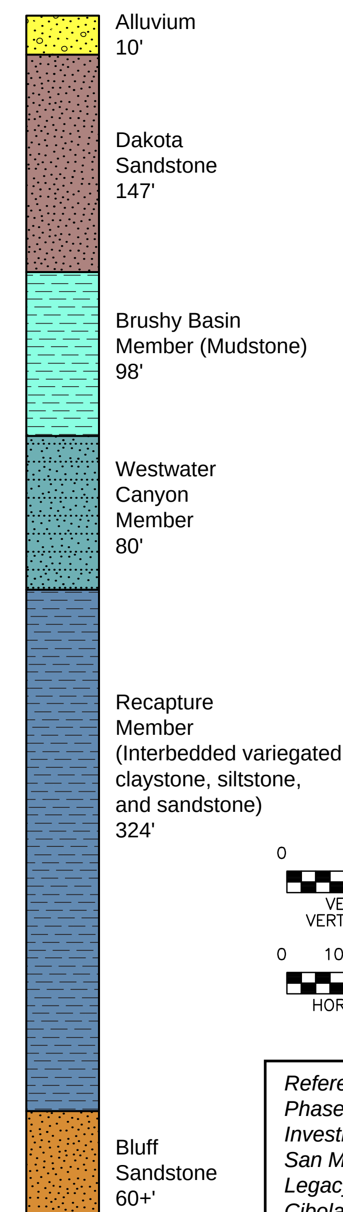
1. VERTICAL EXAGGERATION = 20X
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL.
3. DASHED WHERE INFERRED.
4. ALL FAULTS INFERRED.
5. SURFACE GEOLOGY IS BASED ON U.S. GEOLOGICAL SURVEY AND NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES 1967 AND 2011 GEOLOGIC MAPS OF THE DOS LOMAS QUADRANGLE, CIBOLA AND MCKINLEY COUNTIES, NEW MEXICO.
6. THIS CROSS SECTION REPRESENTS AN INTERPRETATION OF GEOLOGIC DATA AND IS SUBJECT TO CHANGE AS NEW DATA BECOME AVAILABLE.
7. THIS CROSS SECTION IS FOR ILLUSTRATION PURPOSES ONLY. IT IS DESIGNED TO AID IN THE UNDERSTANDING OF THE GENERAL GEOLOGIC FRAMEWORK OF THE STUDY AREA.





Geologic Boring Log

Well PV-06



TD - 704 ft.

0 50 100 200
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION: 20X

0 1000 2000 4000
HORIZONTAL SCALE IN FEET

Reference:
Phase 2 Ground-Water Investigation Report for the San Mateo Creek Basin Legacy Uranium Mines Site, Cibola and McKinley Counties, New Mexico (EPA, 2018)

PLAN VIEW LEGEND

Wells/Borings by Geologic Formation

- Approximate Location of Schmitt Decline
- Alluvium
- Bluff Sandstone
- Dakota Sandstone
- Mancos Shale
- Morrison Fm - Westwater Canyon Member

Geologic Formation

- Alluvium Deposits
- Talus and Landslide Blocks
- Colluvium Deposits
- Mancos Shale Outcrop
- Dakota Sandstone Outcrop
- Brushy Basin Member Outcrop
- Elevation Contour (Feet)
- Fault, [concealed]: Covered by another unit
- Geologic Cross Section Line
- Downthrown Displacement Indicator

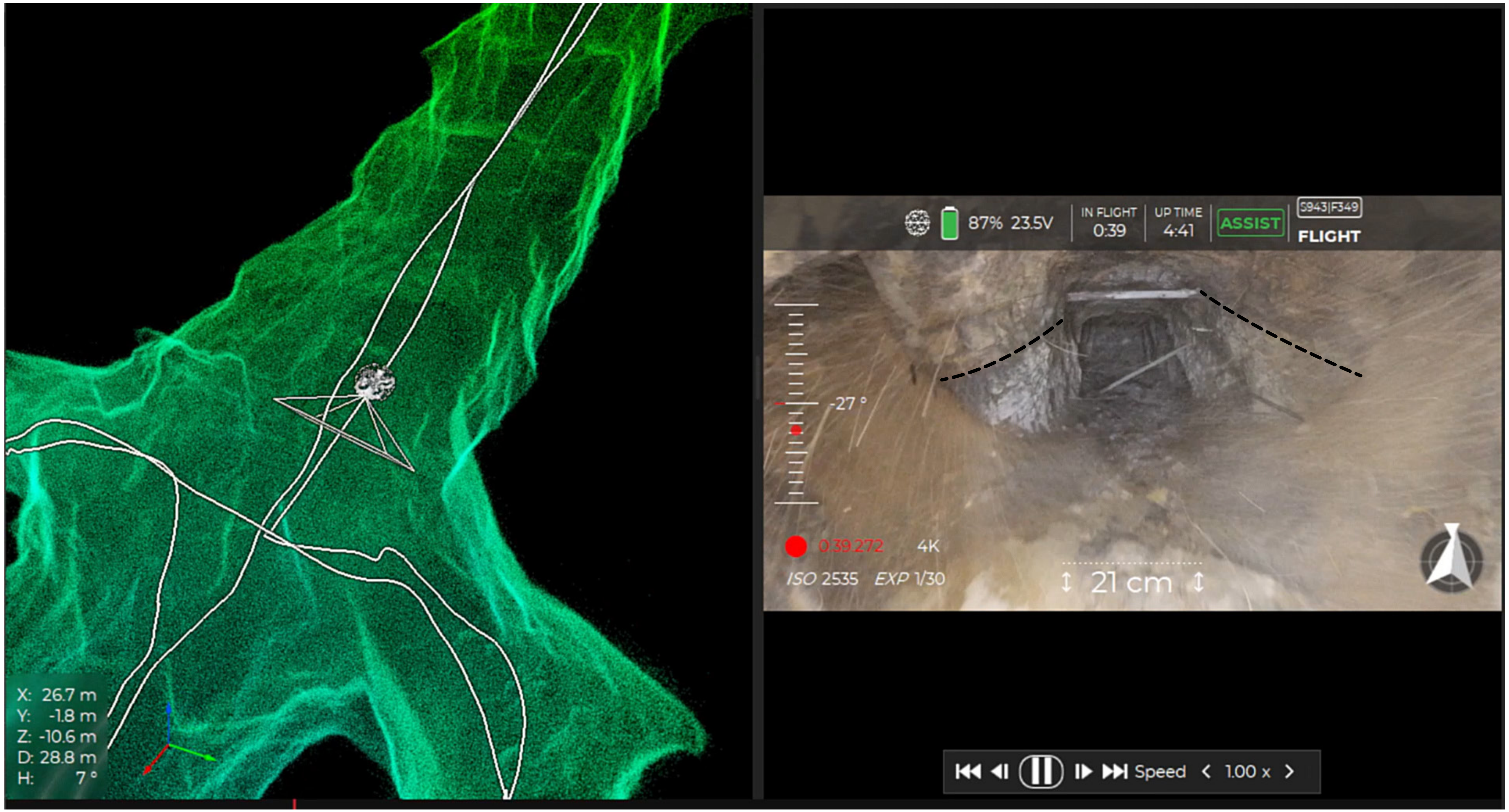
NOTES:
1. Surface geology based on USGS Geologic Map Dos Lomas Quadrangle (Thaden et al., 1967 and Cather, 2011).
2. All faults inferred.
3. P1 - Phase 1 Investigation Boring.
4. CRA - Crossroads Area.

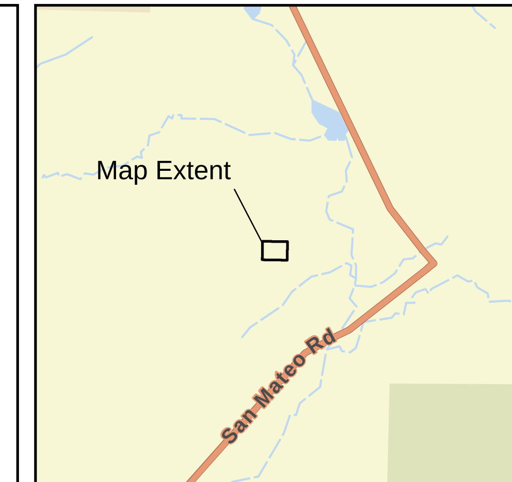
SEMS ID: NMN000606847
TDD NO: 0001/17-039
SOURCES: U.S. Geological Survey, National Hydrography Dataset; NAVTEQ Street Dataset.

Schmitt Decline Mine
McKinley County, New Mexico

Geologic Cross-Section E-E'

Figure 2-9





LEGEND

Base of Dakota Sandstone (approximately 37 feet below ground surface)

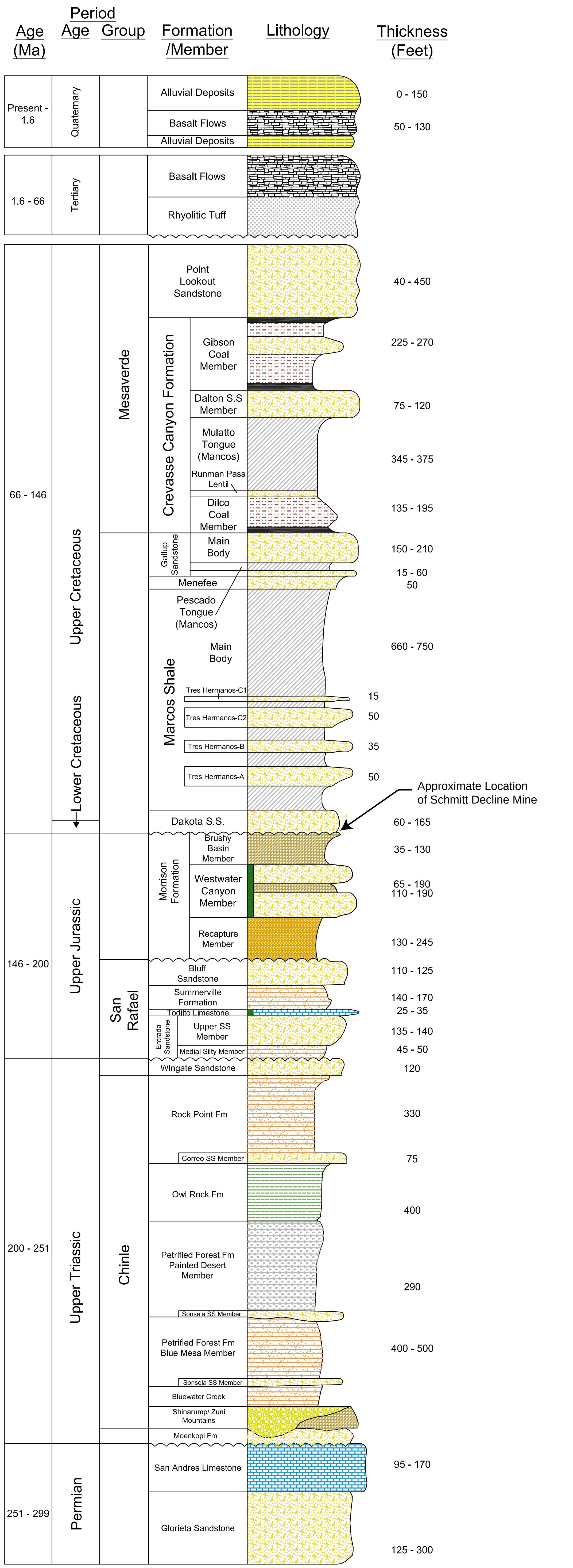
Data Sources: Unmanned Aerial Services, Inc.

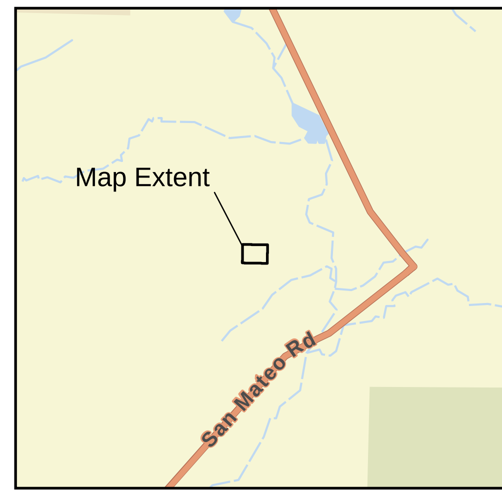
Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Base of Dakota Sandstone

Figure 2-10

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_CHARACTERIZATION_.aprx





LEGEND

- Ore-Bearing Zone
- Alluvial Deposits
- Basaltic Flows
- Claystone
- Coal
- Conglomerate
- Interbedded Variegated Mudstone, Claystone, Siltstone and Sandstone
- Limestone
- Mudstone
- Rhyolitic Tuff
- Sandstone with Shale Interbeds
- Sandstone
- Shale
- Siltstone
- Siltstone with Limestone Interbeds

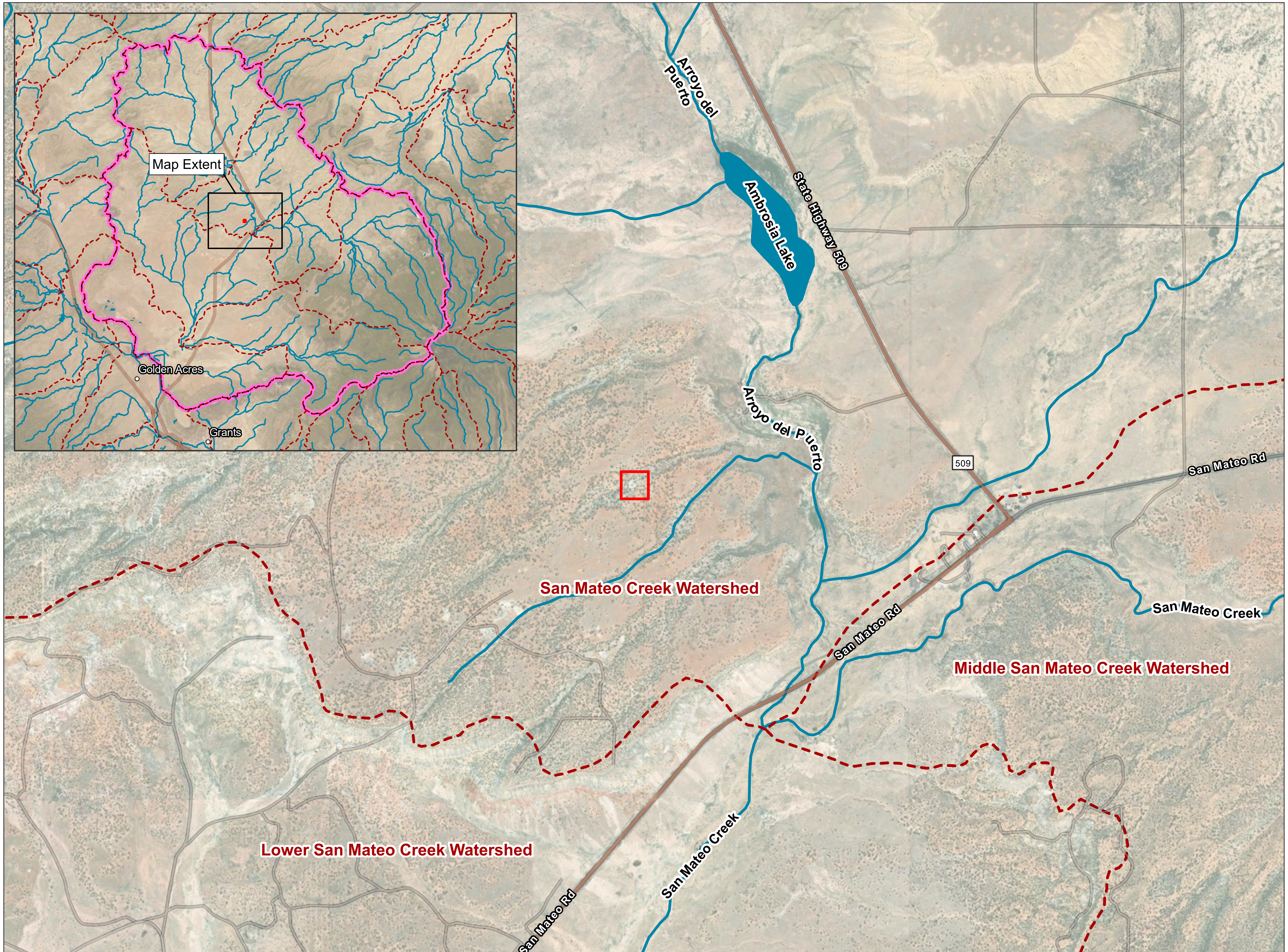
Reference:
Phase 2 Ground-Water Investigation Report for the San Mateo Creek Basin Legacy Uranium Mines Site, Cibola and McKinley Counties, New Mexico (EPA 2018)

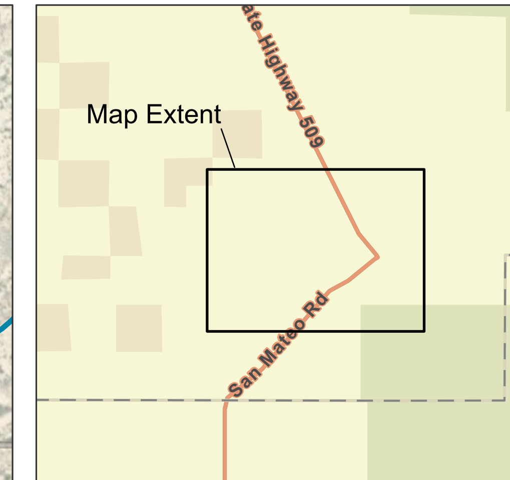
Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Stratigraphic Column

Figure 2-11

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_CHARACTERIZATION_.aprx





Legend

- San Mateo Basin Boundary (inset map)
- Area of Disturbance
- Surface Water
- Streams
- Watershed Boundaries

Date Saved: 12/18/2025
Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:21,600

0 900 1,800 3,600
US Feet

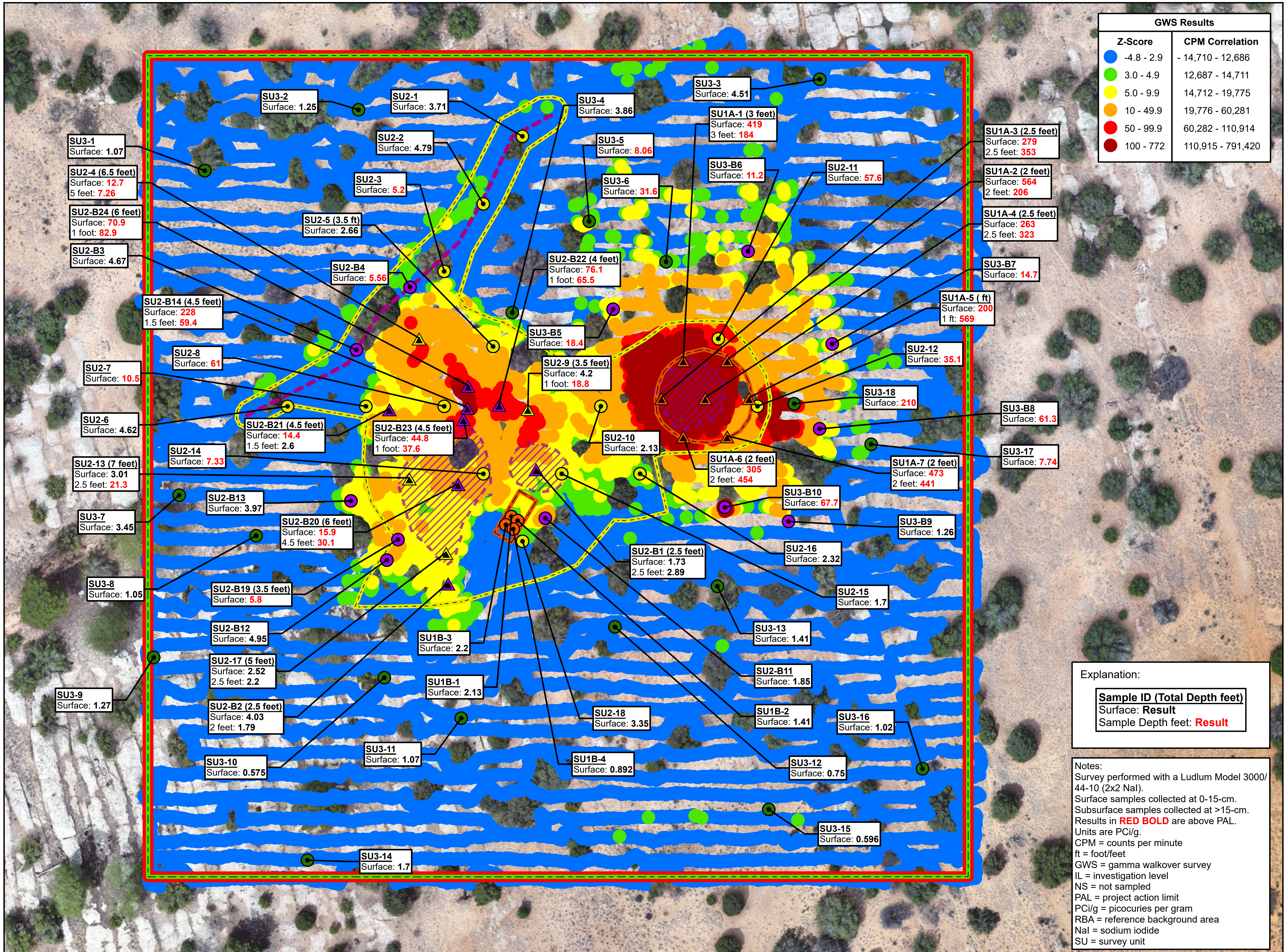
Data Sources: ESRI

Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Regional Surface Hydrology

Figure 2-12

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx | 12/18/2025 | ecarpio



Notes:
Survey performed with a Ludlum Model 3000/ 44-10 (2x2 NaI).
Surface samples collected at 0-15-cm.
Subsurface samples collected at >15-cm.
Results in RED BOLD are above PAL.
Units are PCi/g.
CPM = counts per minute
ft = foot/feet
GWS = gamma walkover survey
IL = investigation level
NS = not sampled
PAL = project action limit
PCi/g = picocuries per gram
RBA = reference background area
NaI = sodium iodide
SU = survey unit

Legend

SU Boundaries MARSSIM Class (SU)
- Class 1 (SU 1A/1B)
- Class 2 (SU 2)
- Class 3 (SU 3)
- Area of Disturbance

SU1A Systematic Samples
- Surface/ Subsurface

SU1B Systematic Samples
- Surface

SU2 Systematic Samples
- Surface
- Surface/ Subsurface

SU3 Random Samples
- Surface

Bias Samples
- Surface
- Surface/ Subsurface
- Dry Wash (Approximately)
- Waste Piles

Date Saved: 12/20/2025
Projection:
Name: NAD 1983 StatePlane New Mexico Central FIPS 3002 Feet
Scale: 1:720

0 60 120
Feet

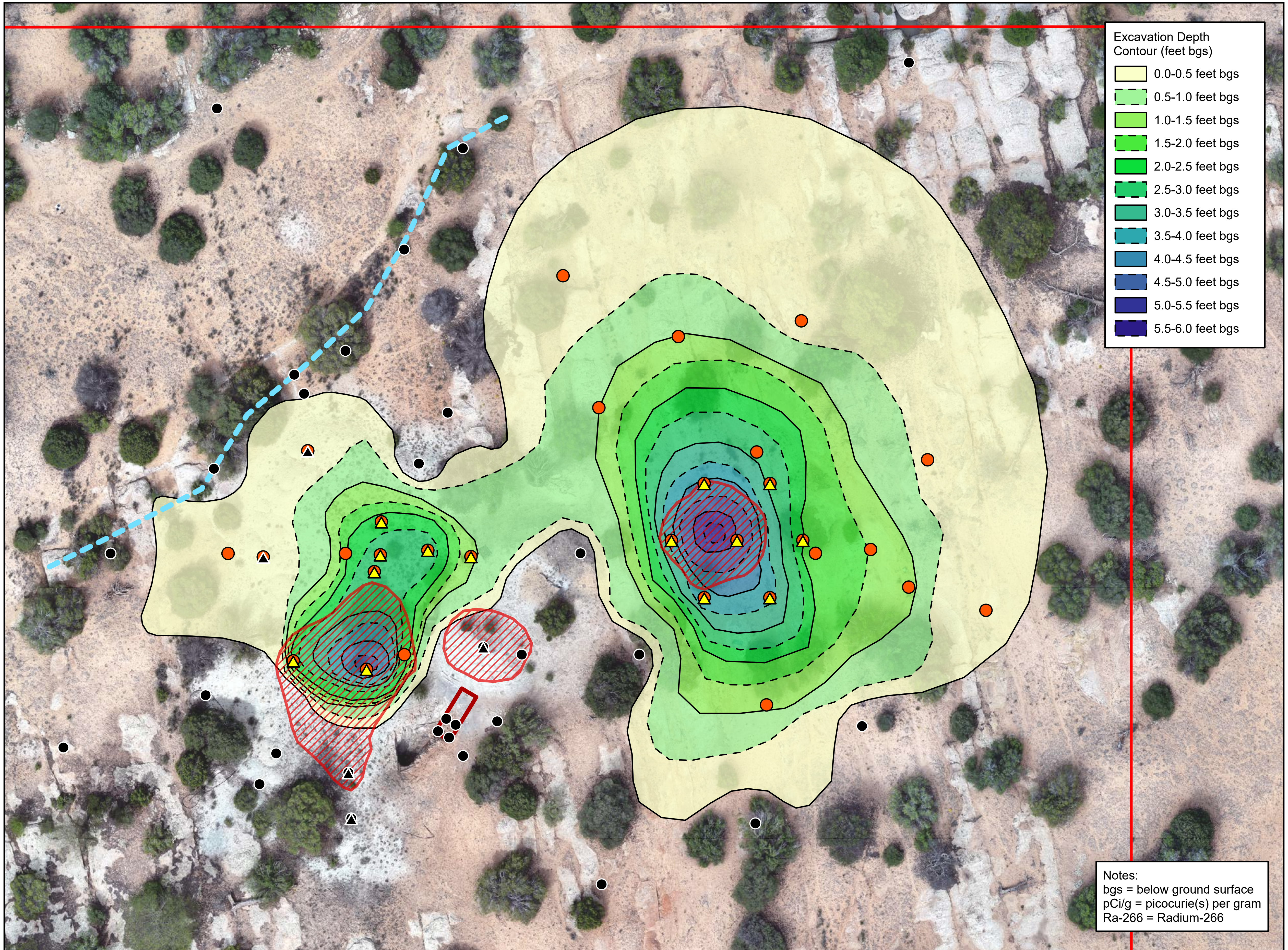
Data Sources: ESRI

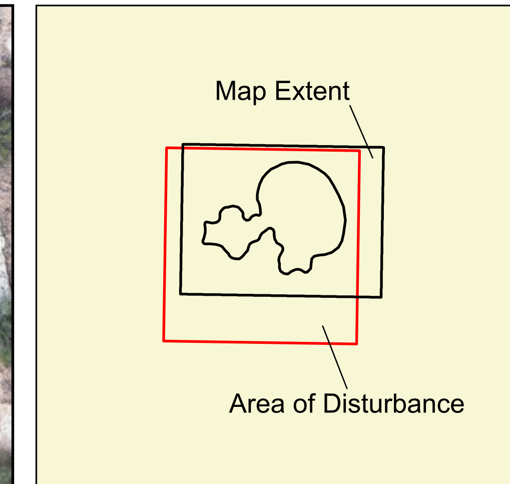
Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Gamma Walkover Survey and Radium-226 Analytical Results

Figure 2-13

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx





Legend

Surface Soil Sample

Ra-226 Soil Concentration (pCi/g)

- > 5 pCi/g
- < 5 pCi/g

Subsurface Soil Sample

Ra-266 Soil Concentration (pCi/g)

- > 15 pCi/g
- < 15 pCi/g

Portal Entrance

Waste Piles

Area of Disturbance

Dry Wash (Approximately)

Date Saved: 12/24/2025

Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet

Scale: 1:480

0 20 40
Feet

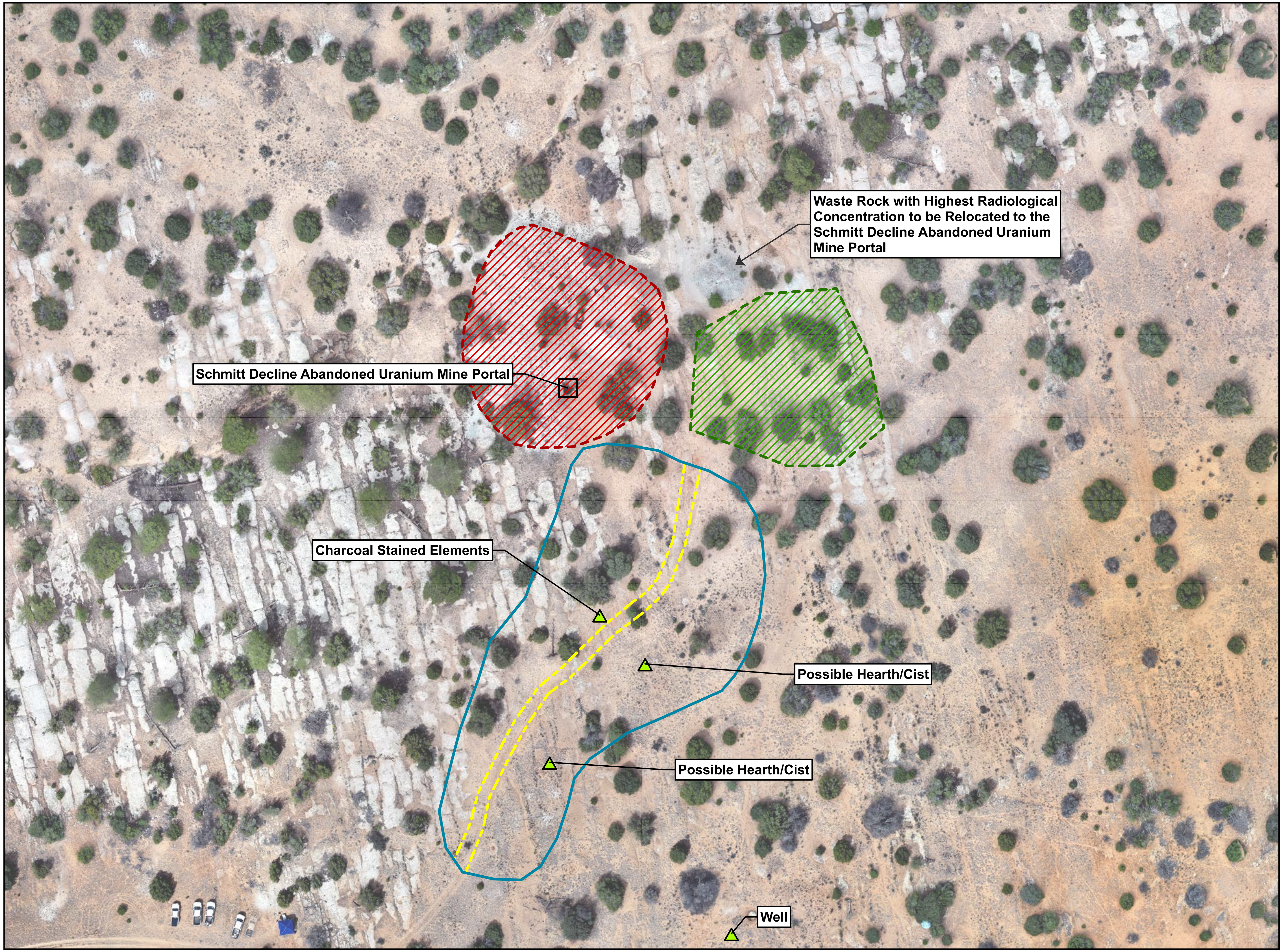
Data Sources: UAS, Energy Solutions

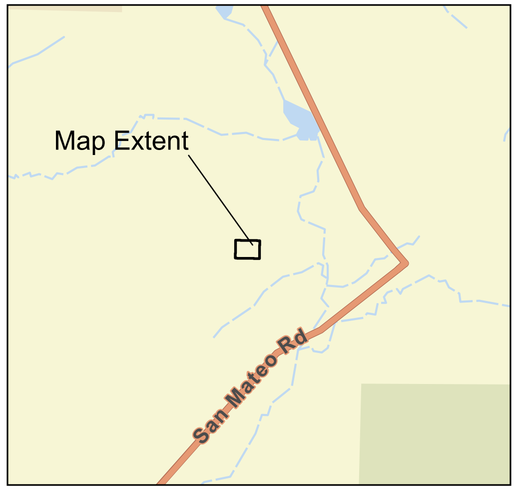
Schmitt Decline
Abandoned Uranium Mine
McKinley County, New Mexico

Excavation Depth Contours

Figure 2-14

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx





Legend

- Schmitt Decline Abandoned Uranium Mine Portal
- Archeological Features
- Site Access Road
- Prehistoric Component Boundary
- Approximate Location of Waste Rock Repository
- Stockpile Area

Date Saved: 12/19/2025
Projection:
Name: NAD 1983 StatePlane New Mexico West FIPS 3003 Feet
Scale: 1:960

0 80 160
Feet

Data Sources: ESRI

Schmitt Decline Abandoned Uranium Mine
McKinley County, New Mexico

Waste Rock Repository Disposition Map

Figure 4-1

Path: Y:\gis2\State\1656901_45516_NMED_AUML\03_Projects\NMED_AUML_SCHMITT_DECLINE\NMED_SCHMITT_STAGE2_RECLAMATION_OPTIONS.aprx