



UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY
**ENVIRONMENTAL RESPONSE
& REMEDIATION**

SITE REASSESSMENT WORK PLAN

**Bauer Tailings
Stockton, Utah
UTD 980635528**

April, 2021

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Utah Department of Environmental Quality
Division of Environmental Response and Remediation

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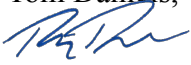
Approved:	 Hannah Marty (Apr 22, 2021 10:35 MDT)	Date:	<u>04/22/2021</u>
	Hannah Marty, UDEQ Project Manager		
Approved:	 Tom Daniels, UDEQ Site Assessment Section Manager	Date:	<u>04/22/2021</u>
Approved:	 Ryan Dunham, Site Assessment Manager, EPA Region 8	Date:	<u>04/22/2021</u>

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1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the Superfund Amendments and Reauthorization Act (SARA) of 1986, and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the Utah Department of Environmental Quality (UDEQ), Division of Environmental Response and Remediation (DERR) has prepared this work plan as part of a Site Reassessment (SRA) of the Bauer Tailings (SEMS EPA ID number UTD980635528) (herein referred to as the “Site”) in Rush Valley, Tooele County, Utah. This SRA will be conducted under a cooperative agreement between the DERR, the United States Environmental Protection Agency, Region 8 (EPA) and CDM Smith. This work plan describes sampling procedures that will be used to identify Site contaminants and potential impacts to the surrounding community.

2.0 OBJECTIVES

The objectives of this work plan are as follows:

- Characterize the location and spread of contamination originating from the site using surface soil samples located across the site and an unmanned aerial vehicle equipped with remote sensing equipment.
- Determine concentrations of contamination at the site using both of the above methods.
- Evaluate potential targets associated with the soil exposure pathway. In particular workers at a down-wind gravel mine where windborn dusts from the site may be migrating.

3.0 BACKGROUND INFORMATION

3.1 SITE LOCATION

The site is located at the south side of Tooele Valley on the west flank of the Oquirrh mountains directly northeast of South Mountain, approximately three miles south of Tooele City. The site is bounded on the north by the Tooele Army Depot, on the south by the town of Stockton, on the west by South Mountain, and on the east by the Oquirrh Mountains (Figure 1). The site consists of a large tailings pond area, large abandoned concrete and metal building structures from former mill, smelter, and mine operations, and foundations from the abandoned town of Bauer. The legal description of the site is the northwest quarter of Section 13, Township 4S, Range 5W.

Geographic coordinates are Latitude 40 20’02” N, Longitude 112 21’40” W. There are three CERCLIS sites in close proximity at this location that have been evaluated together in previous inspections. This work plan deals specifically with the Bauer Tailings site.

3.2 SITE HISTORY

The area surrounding Stockton, Tooele, and the former town of Bauer began to be mined in the early 1860's. Most mined ores consisted of lead-silver carbonates. Mining activity in the mountains across from Bauer ramped up around 1900 when the Honerine Tunnel was constructed to directly transport ore from the mines to the concentrating mill on the Site which was built in 1920. The Bauer site was an active dumping site for silver and lead ore smelting waste from the 1920's until 1979 when mining of the Honerine tunnel ceased (Daniels 1996). The town of Bauer was abandoned shortly after mining ceased. The former Bauer town was demolished in the mid 2000's. Several foundations and partial buildings remain at the Site. At some point in the early to mid 2000's the Honerine Tunnel was collapsed by the property owner, and the stream running through it was re-routed or culverted.

3.3 PREVIOUS INVESTIGATIONS

A Preliminary Assessment (PA) was conducted at the Bauer Tailings site in March 1984 by the Utah Department of Health (UDOH), Division of Environmental Health, Bureau of Solid and Hazardous Waste. The Bauer Tailings PA outlines the presence of tailings and mentions potential problems with blowing dust and dying vegetation from sulfuric and cyanic acids, sulfide mill tailings and smelting lab wastes. The report also mentions potential burning of cyanide wastes and cyanide leachate in an on-site landfill (Daniels 1996).

A site inspection (SI) report for the Bauer Dump and Tailings was prepared by the Utah Department of Health in August 1984. This report discusses in more detail the site history, geology, hydrology, geology, and hydrology, outlines potentially affected populations, and presents the analytical results of surface water, soil, and tailings samples collected from the site. Several heavy metals were detected in soil, tailings, and surface water at the site, and an observed release to the air was documented through direct observations of dust clouds emanating from the site and the collection of a downwind sample of dusty "fallout". Tailings were also noted to have been washed off-site to the north (Daniels 1996).

A SI was also conducted for Bauer Tailings in 1985 by Ecology and Environment, Field Investigation Team (E&E- FIT), a contractor for the EPA. Two temporary monitoring wells were installed at the site during this site inspection. One was located approximately upgradient of the site, and one was located approximately downgradient of the site. Both wells were screened at or near the water table which was encountered between 80 and 195 feet below ground surface. The Analytical Results report from the SI documents a release of arsenic and sulfate to groundwater, but the groundwater flow direction was uncertain based on water levels. Soil and tailings samples were collected from the surface and at depths down to 22 feet. Elevated concentrations of several metals were detected in both soil and tailings (Daniels 1996).

An expanded site inspection (ESI) was conducted by UDEQ/DERR in 1995. Analysis of the source characterization samples taken for the ESI demonstrated consistently elevated levels of aluminum, arsenic, calcium, copper, iron, lead, magnesium, manganese, potassium, and zinc. The samples showed that mill tailings contained arsenic in a range from 1,000-7,000 mg/kg, cadmium at levels up to 90 mg/kg, lead at levels up to 15,000 mg/kg, and zinc at levels up to 11,000 mg/kg. Samples taken from the tailings spillover area and the windblown tailings area contained concentrations of lead ranging from 4,000 to 7,430 mg/kg. The highest concentrations of lead contaminated material appear to be located in the tailings area with lead concentrations decreasing the farther downwind the sample was taken (Daniels 1996).

During the Site investigation and subsequent follow-up visits, evidence of livestock, animal and vehicular traffic was observed on known “contaminated” areas of the Site. Numerous spent bullet casings and empty shotgun shells along with target objects and the remains of bonfires and discarded beer bottles, suggest that the property is being used for recreational activities. Areas bordering the Site are currently being used for sheep and cattle grazing. The presence of heavy metals in the tailings pose a potential threat to human and animal trespassers that may traverse the Site. It was observed during the 1996 site investigation that an operating gravel pit is located directly downwind from the Site. Data gaps identified at the site include minimal sampling at areas downwind of the Site, a lack of characterization of the gravel pit area, and incomplete characterization of the settling pond and associated areas of the Site.

3.4 PHYSICAL CONDITIONS

3.4.1 HYDROGEOLOGY

Groundwater near the Site exists primarily in alluvial deposits and sediments of historic Lake Bonneville. Depth to groundwater is 100 feet with the primary aquifer of concern located approximately 250 feet below ground surface. This aquifer ranges in thickness 3,000 to 7,000 feet. The regional groundwater flow is believed to be to the north toward the Great Salt Lake. However, groundwater data from the 1986 exploration of the Blackhawk site indicates local hydrogeological conditions may be different and more complex than regional groundwater data indicates (Daniels 1996).

3.4.2 HYDROLOGY

The topographic layout of the Site and immediate area is a flat valley bounded by a large sedimentary gravel deposit to the south, and mountain foothills to the east and west. The Tooele Valley opens to the north and slopes gently down to the Great Salt Lake. The mine tailings were slurried into place in a natural drainage basin at the site, which overfilled and flowed off to the north. Historic discharge water flowed through the Honerine Tunnel, through the historic Bauer town, and out towards the northern edge of the site (Bauer 1996). Following the collapse of the Honerine Tunnel surface water no longer flows across the Site, and it is unknown if historic

flows continue in culverts or have ceased. A stock watering pond still remains present to the north of the Site indicating a nearby source of water.

3.4.3 GEOLOGY

The Oquirrh Range, home of the Stockton Mining District, is made of sediments, mostly limestone and quartzite, deposited in interbedded lenses. Dikes, sills, and small stocks appear to have been extruded along pre-existing faults providing the mechanism for extensive lead, silver, zinc, and copper ore veins. The valley floor consists of inter fingered lake sediments, alluvial fans, deltas, and shore deposits from the historic Lake Bonneville. Significant gravel bars, such as the Stockton Bar, rise from the valley floor and intermix with these historic deposits (Daniels 1996, Hebdon 1984).

3.4.4 METEOROLOGY

The average annual precipitation for the town of Tooele, which lies three miles north of the site, is 17.25 inches. Average pan evaporation near the site is 7.64 inches (WRCC 2021). Precipitation exceeds evaporation only during December and January. The average frost-free period for this area is 179 days, from April 28-October 24. During Site visits it was observed that the wind appeared to blow from the south of southeast to the north of northwest.

3.5 PRELIMINARY PATHWAY ANALYSIS

3.5.1 WASTE SOURCE CHARACTERIZATION

The tailings and impoundment and overflow areas comprise approximately 160 acres. The depth of the tailings is unknown, however based on the Site history and horizontal extent of the tailings pond it has been estimated that 10,000,000 tons of tailings are present in the impoundment and overflow area (Daniels 1996).

Excess exposure to lead can result in a wide variety of adverse effects in humans. Chronic low-level exposure is usually of greater concern for young children and fetuses than older children and adults. Children are more likely to have hand to mouth activities that result in higher ingestion rates. Elevated lead levels have been linked to reduced neurobehavioral development (decreased IQ and eye hand coordination, and shortened attention span), decreased red blood cell development, and reduced body size. Fetuses have similar health effects when the mother has elevated blood lead levels. Adverse health effects of lead exposure in adults include high blood pressure and the inability to absorb vitamin D.

Chronic exposure to arsenic can result in carcinogenic and non-carcinogenic health adverse effects in human receptors. Carcinogenic effects associated with exposure to environmental arsenic include skin cancer, bladder cancer, stomach cancer and lung cancer. Non-carcinogenic effects associated with exposure to environmental arsenic include irritation of the mucosal membranes of the mouth, throat and stomach and a thickening of the skin and the formation of

corns on the palms of hands and soles of feet. Arsenic exposure can cause death at very high concentrations.

3.5.2 SOIL EXPOSURE PATHWAY ANALYSIS

Direct exposure via inhalation and incidental ingestion of soil contaminated with heavy metals is the most likely pathway of concern. Heavy metals are not only present within the tailings located on-site, but may also have been transported by wind. The Bauer Tailings are located in a remote area with no on-Site population. The nearest residential population is located one mile south of the Site in the town of Stockton. The Tooele Army Depot is located just over half a mile to the north and the city of Grantsville is located approximately 10 miles to the northwest of the site. Public access to the Site is virtually unrestricted. Fencing does not surround the Site and fencing that does exist is easily breached. No warning signs indicating the potential hazards associated with tailings and other onsite contaminants are present at the Site. Site visits have indicated a high volume of recreational activity at the Site. Several ATV trails cross the tailings area, campfire rings, and evidence of shooting range activities are present across the majority of the Site. Based on analytical results of the sampling that was previously conducted at the Site, there exists a threat to human health at areas on and downwind of the Site but it is unclear what the lateral extent of contamination is at this time.

3.5.3 SOIL VAPOR INTRUSION PATHWAY

Soil vapor and subsurface intrusion occurs when contamination in soils or groundwater vaporizes into the interstitial space between soil particles and seeps into basements, sewer lines, and other openings and gathers there, potentially causing human health impacts. This is most commonly found in sites that are contaminated by volatile organic compounds (U.S. Environmental Protection Agency 2017).

Contaminants of concern at the Site are lead, cadmium, and arsenic, as well as other heavy metals, in surface and subsurface soils. Contamination at the Site is associated with silver and lead ore smelting waste. Smelter wastes are not likely to vaporize. Soil vapor is not considered a pathway of concern and no soil vapor samples are planned.

3.5.4 GROUNDWATER EXPOSURE PATHWAY ANALYSIS

The nearest drinking water well is located approximately 3.5 miles north of the Site and is owned and operated by the Tooele Army Depot. The well serves a user population of 541 people. There are five drinking water wells within a four-mile radius of the site. Two of these are owned and operated by the Tooele Army Depot, two are owned by Tooele County, and one is owned by the city of Stockton.

Results from previous sampling events have indicated that elevated concentrations of arsenic and sulfate are present in groundwater underlying the Site and a release to groundwater from the Site

is likely. While there remain some unknowns, such as the direction of groundwater flow at the Site, groundwater sampling was considered to be beyond the scope of this investigation.

3.5.5 SURFACE WATER PATHWAY ANALYSIS

There are two surface water drinking water intakes located along streams nearly 15 downstream miles of the Site. Runoff from the tailings would have to travel an overland distance of approximately two and a half miles before entering into a perennial stream. From there a series of seasonal streams, washes, and canals transport water from the Tooele Valley to the Great Salt Lake. There are no recreational fisheries located downstream of the Bauer Tailings. As the area used for free range cattle grazing it is possible that run-off from the tailings would enter nearby stock watering ponds, and seasonal ponds, but it is unlikely that the tailings run-off are having a significant effect on the health of the cattle or local wildlife (Mandal 2017).

3.5.6 AIR EXPOSURE PATHWAY ANALYSIS

None of the tailings are covered and they do not appear to support vegetative growth. Site conditions are capable of creating substantial amounts of airborne dust as was witnessed during site visits. There are at least 2,720 persons living within four miles of the Site, who are potential targets for exposure to contaminants in the air. Residences in the area are clustered immediately to the south of the site, locally referred to as the ranchette properties, and to the north directly in the pathway of windblown tailings from the Site. An operating gravel pit lies directly northwest of the site and employs approximately 30 people that may be exposed to metal-laden dust (Daniels 1996). Very fine particles entrained in the normal turbulence of the atmosphere could remain suspended in the air for many days and be carried long distances; the health threat posed by the dust generated onsite could be significant and will be assessed by soil sampling in potential deposition areas.

4.0 FIELD PROCEDURES

This section identifies the Site sampling concept of operations, schedule, safety, and Site access issues.

4.1 CONCEPT OF OPERATIONS

Site sampling activities will comply with the Data Quality Objectives (Table 2) as described in the DERR Quality Assurance Project Plan (QAPP) (DERR, 2020) and environmental sampling collection procedures as outlined in the EPA's Contract Laboratory Program Guidance for Field Samplers (EPA, 2014). A Site Conceptual Model (SCM) has been completed to evaluate the potential pathways for contaminant migration and to assist in the selection of appropriate sampling locations (Table 1). The scope of the investigation includes the collection of approximately 80 composite surface soil samples, ground hyperspectral imagery, and an unmanned aerial vehicle flyover (Appendix C). All samples will be analyzed for metals using a

handheld x-ray fluorescence unit (XRF), and 16 samples will be sent to a Region 8 laboratory for confirmation metals sampling. For purposes of quality assurance/quality control (QA/QC), an additional blind field duplicate sample will be collected as an external check on laboratory procedures. Three laboratory duplicate samples will also be collected for internal laboratory QA/QC purposes.

4.1.1 SCHEDULE

Preliminary site sampling is tentatively scheduled for the spring of 2021. Additional sampling may be completed as needed in summer of 2021. Sampling is contingent on the EPA's approval of this work plan. Field activities are expected to occur in two parts with the first to last up to five days depending on conditions at the Site, and the second, approximately two months later, to last up to three days depending on conditions at the site. The first part of sampling will consist of surface soil sampling by UDEQ. The second part of sampling will consist of the flight of an unmanned aerial vehicle equipped with hyperspectral imaging equipment by CDM Smith. Coordination with the landowners, lessees, laboratories, and the local health department is on-going and concurrent with this Work Plan. All logistical functions will be arranged by the Project Manager in advance of field sampling.

4.1.2 SAFETY

On-site personnel will avoid direct dermal contact, inhalation, and ingestion with potentially contaminated materials. Sampling will be conducted in Level D personal protective equipment unless the Site Health and Safety Officer, upon evaluation of Site conditions, deems an upgrade necessary. A detailed health and Safety Plan (HASP) will be prepared and reviewed with field personnel prior to the beginning of any fieldwork (Appendix A). A Tailgate Safety Meeting will be conducted by all personnel prior to the start of activities on each field day.

4.1.3 SITE ACCESS AND LOGISTICS

Site access and logistics will be coordinated by the UDEQ project manager with assistance from the EPA as needed prior to the start of sampling. All property owners will be asked to sign a "Consent for Access to Property" form prior to sampling (Appendix B). Any additional logistical functions will be arranged by the project manager.

4.2 SAMPLE LOCATIONS

All 80 sample locations have been pre-identified (Figure 2, Appendix C-Figure 1). UDEQ staff will locate sampling locations in accordance with the locations noted in Figure 2. If the designated location cannot be sampled, the reason will be hand noted in the field notes log book and electronically recorded in the Survey123 field sampling application, and the sample location will be moved to the nearest upwind location that can be sampled. In the event that a location needs to be moved, staff will place a new survey marker, and record the GPS location of the

northwest corner of the 1 meter square described below. Planned samples will be named BT_000 through BT_079. Quality control samples will be named BT_080 through BT_089. Any opportunistic samples not co-located with a planned sample will be named BT_090 through BT_100 or greater depending on need. Opportunistic samples co-located with a planned sample will be named BT-000 through BT-079 with an alphabetic identifier- eg, BT_000a, BT_000b, BT_000c etc. Required sampling containers are outlined in Table 3.

4.3 SAMPLING METHODS

Sampling will proceed according to methods outlined in the DERR CERCLA Quality Assurance Project Plan (QAPP) of January 2020 and other relevant EPA guidance documents. All sampling events will be recorded in a field log book. All sample collection will proceed following strict chain-of-custody procedures. Soil sampling will proceed as follows. UDEQ staff will collect soil samples from the field, and transport them to a mobile field laboratory for processing and analysis using the XRF unit. Soil samples collected at the site will be surface composite samples. Conditions permitting samples will be sieved on-site using one gallon plastic resealable bags with internal sieves. Conditions not-permitting, samples will be transported to the UDEQ office laboratory for drying, sieving, and sampling. UDEQ staff will collect approximately 80 soil samples from the field. These samples will be analyzed using the XRF prior to sub-sampling. Once XRF analysis is complete, soil samples will be taken to the UDEQ office. There split, quality control, and laboratory samples will be taken and remaining soil will be archived at UDEQ until the project is completed.

4.3.1 SOIL SAMPLE COLLECTION

At each sample location a 5-point composite sample will be collected from a 1-meter square template placed on the ground. The square template will be oriented in a north-south and east-west direction, with the north west corner of the template located at the planned sampling location. The GPS coordinates of this location will be recorded. Five individual aliquots samples will be collected from the template for compositing. The aliquots locations include the four corners of the square and one from the approximate center of the square. The surface at each aliquot location will, if possible, be cleared of stones, vegetation, snow, etc to expose bare soil. The cleared areas should each be a minimum of 15 cm (6 inches) square. At each of the five composite sample locations a clean stainless steel spoon will be used to remove soil from a space approximately 10cm x 10cm x 2.5cm. Spoons will be discarded after use. Soil from each of the five aliquots locations will be placed into the sieve bag located inside the one gallon resealable bag. The sieve bag has 2mm openings. Subsamples will be homogenized in the sieve bag, and then shaken through the sieve into the plastic bag. The sieve bag will then be discarded. This sieved material is what will be analyzed on-site, and then sub-sampled for additional analysis. Sieved samples will be placed in a cooler immediately after collection and sieving is complete. Opportunistic samples of soils of interest, including crusts and visibly different soils, will be collected from surface soils using a clean stainless steel spoon and placed in a plain one gallon

resealable bag. These will be denoted separately as outlined above. Spoons will be disposed of after use.

4.3.2 MOBILE FIELD LABORATORY AND FIELD XRF ANALYSIS

All samples collected in the field will be shuttled to the mobile field laboratory. At the mobile field laboratory, samples will remain in their individual bags to be analyzed using the XRF. Prior to beginning analysis and after every 20 samples the XRF will be calibrated using the proper standards, following the protocol as laid out in the XRF operators manual. Each sample will be analyzed at three locations on the bag with the XRF for two minutes and all three results will be recorded for each sample (CDM Smith 2020). The three results will be compared to each other to verify sampling accuracy and both averages and unique values will be assessed for each sample.

4.3.3 SUB-SAMPLING

Following completion of XRF sampling, split samples from each composite sample location will be shipped to project partners CDM Smith, and EPA Region 8 Site Assessment for calibration of and analysis by the backpack spectrophotometer, calibration of unmanned aerial vehicle sensors, and possible laboratory spectral analysis. At least 20 percent of samples collected will be sub-sampled and sent to the EPA Region 8 CLP laboratory for wet chemistry analysis- assuming 80 samples collected this means that 16 samples will be sent to the laboratory (Table 4). These samples will be selectively chosen to represent the range of metals concentrations found at the site instead of being randomly selected. Additional sub-sampling to meet field quality control procedures will be conducted as detailed below. Should it be deemed necessary, at least 20 percent of samples will be dried and sieved using a U.S. Standard Number 60 sieve (250 microns) by DERR staff and re-assessed using the XRF to determine if finer particle size impacts the accuracy of the XRF results and their correlation to laboratory analysis. Should this re-assessment take place, all sample ID numbers will have the letter "s" attached to their identification number to denote that it was a separately analyzed and sieved sample. The sample ID will then appear as follows- BT_####s.

4.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) is not anticipated at this time. Should any IDW be collected, it will be disposed of in accordance with appropriate local, state, and federal regulations. Disposable sampling equipment will be removed from the Site and disposed of as a non-hazardous waste.

5.0 FIELD QUALITY CONTROL AND ASSURANCE PROCEDURE

Samples will be handled and preserved as per the criteria of the QAPP revised January 2020 (DERR 2020). At least three samples going for laboratory analysis will be selected as laboratory

duplicate samples and an additional sub-sample will be taken. One sample will be selected as a field duplicate and an additional sub-sample will be taken (Table 4).

Whenever the XRF is turned on or turned off, a set of standards will be analyzed. Similar to laboratory control samples, the standards are matrices that have been spiked with a known concentration of metals, including lead and arsenic. The XRF readings will be recorded on field forms and compared to the known concentrations. A control chart will be developed for the specific hand-held XRF instrument used for this work and will be used to monitor whether the instrument is performing within acceptable limits. Once the control chart has been developed, the standard used to create it will be analyzed once for every twenty (20) field samples analyzed. The concentration measured by the XRF will be plotted on the control chart along with the date and time. Statistically speaking, 95% of these measurements should be contained within the plus or minus two standard deviation (2SD) lines and 99% should fall within the three standard deviation (3SD) lines. If a measurement falls outside the 2SD line, the field technician/geologist will make sure the mylar covering the standard is not wrinkled or ripped and re-shoot the standard. If it is back within the 2SD lines then there is not a problem and use of the instrument may continue. However, if it is still outside the 2SD lines, they will check the battery (if it is low, replace), re-standardize the instrument and re-shoot the standards. If a measurement falls outside the 3SD lines the field technician/geologist will re-initialize the instrument and re-shoot the standards. If this does not correct the problem, the field technician will contact the project manager, as further troubleshooting of the instrument and corrective action is required. If the measurements begin to trend in one direction or another, this also indicates an issue with the XRF instrument. The field staff will cease analysis with the instrument until the issue can be resolved. This could be a low battery; however, it could also indicate that the XRF tube is going bad (AECOM 2019).

Correlation between laboratory samples and XRF results will be assessed using an R^2 test.

6.0 CHAIN OF CUSTODY

Chain-of-Custody forms will be prepared with the EPA approved “Scribe” software. All samples will be collected using strict chain-of-custody procedures and submitted to an EPA Region 8 Contract Laboratory.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

Stage 2B data validation and Scribe data entry will be performed by an EPA contractor. At the completion of sampling, a Field Activities Summary Report will be drafted within 14 days of sampling completion, outlining and documenting the procedures following the sampling event. The Field Activities Summary Report will be included in the draft Site Reassessment Analytical Results Report which will be prepared following receipt of validated data from the contract laboratory and submitted to EPA Region 8 for review and approval.

8.0 REFERENCES

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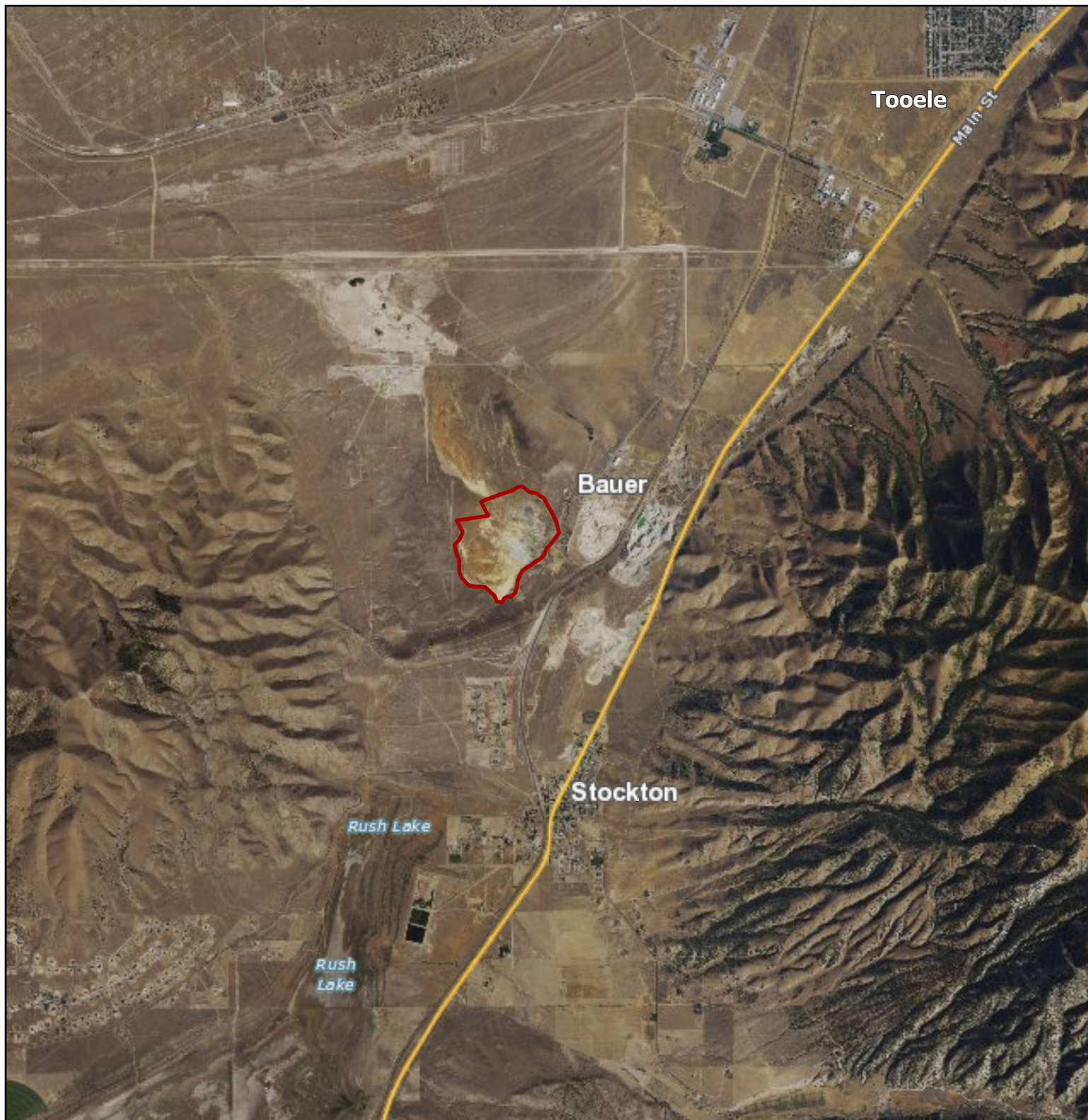
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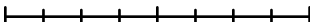
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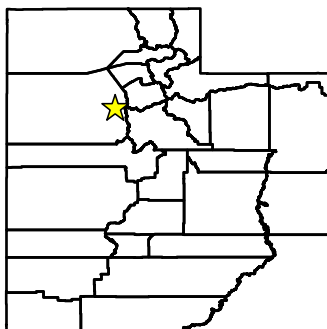
FIGURES



 Site Perimeter



0 0.38 0.75 1.5 Miles




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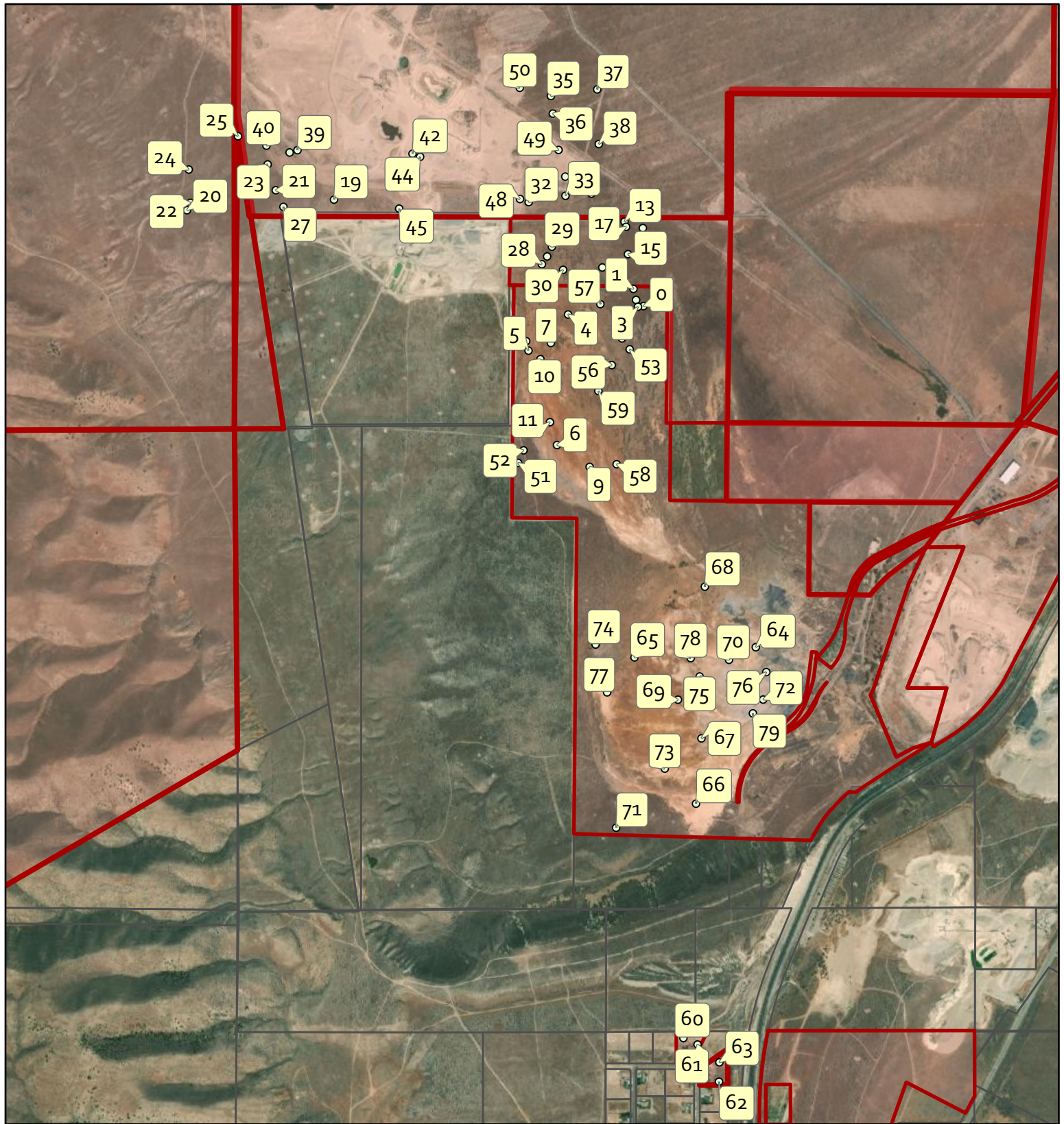
Figure 1: Site Map
 Bauer Tailings Work Plan
 Tooele County, Utah

Prepared by: Hannah Marty

Date: 3/15/2021

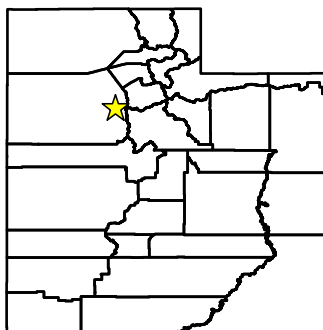
Reference Scale:
 1:60,000

UTN:
 90635528



- Access Granted
- Sample Locations

0 0.1 0.2 0.4 Miles



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& REMEDIATION**

Figure 2: Proposed Sample Locations Bauer Tailings Work Plan Tooele County, Utah

Prepared By: Hannah Marty	Date: 4/20/2021
Reference Scale: 1:17,000	ID Number: UTD980635528

TABLES

Table 1. Bauer Tailings
Site Conceptual Model

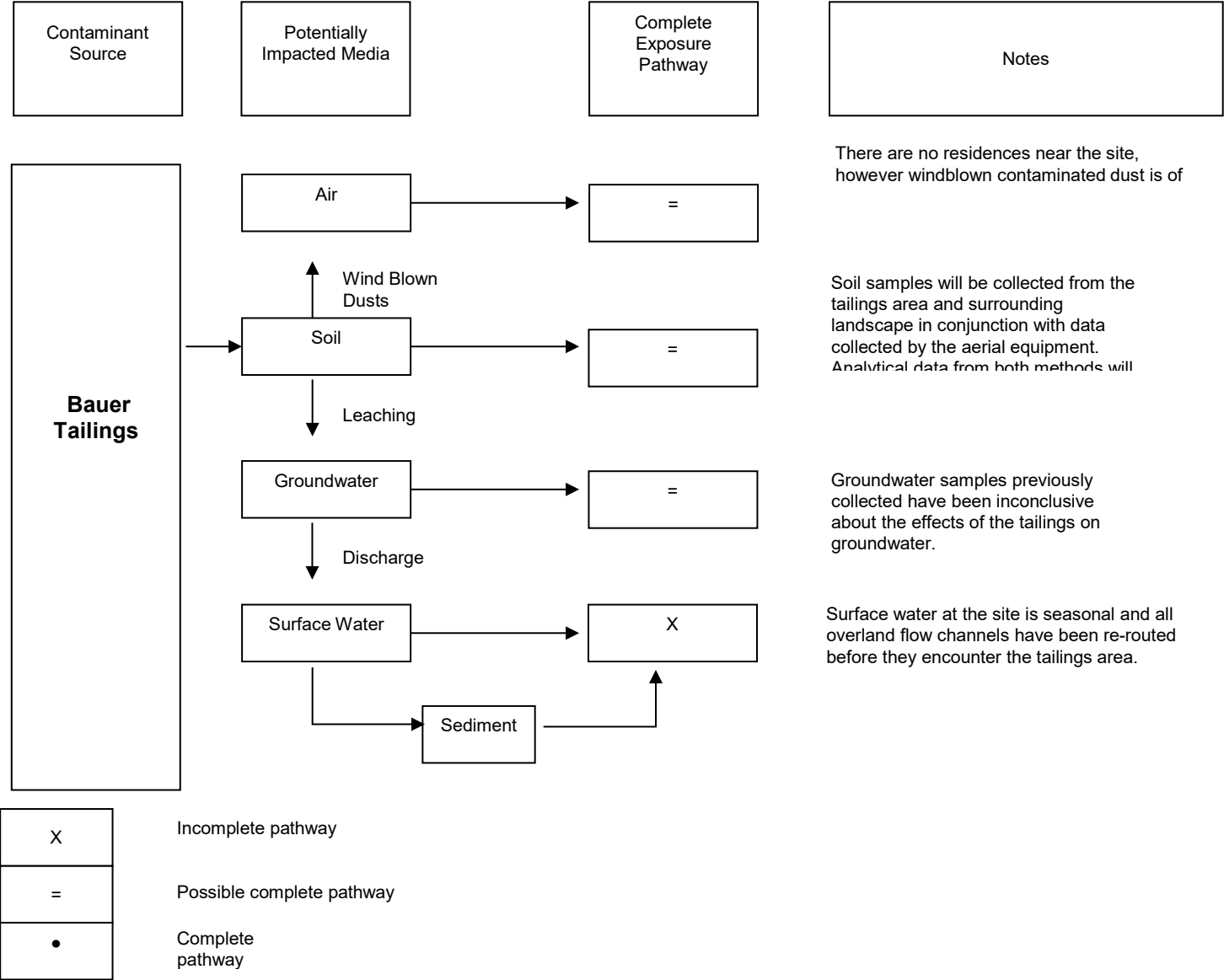


Table 2: Data Quality Objectives

Step 1 Problem Statement	Step 2 Identifying the Decisions	Step 3 Decision Inputs	Step 4 Study Boundaries	Step 5 Decisions Rules	Step 6 Tolerance Limits on Errors	Step 7 Optimization of Sample Design
The Bauer Mine and Tailings area operated from the 1920's to 1979 processing and dumping smelting waste into the tailings pond. The site was sampled as part of a Site Inspection in 1985. Since the site inspection there has been significant wind based movement of tailings contamination off the site. Sampling as part of this Site Reassessment will involve the collection of hyperspectral imagery both from a handheld unit and an aerial flyover unit, and collection of confirmation soil samples.	Does soil and dust from the tailings pond present a risk to human health and the environment? The primary human health concern is that tailings from the pile may be impacting the nearest downwind gravel pit and the workers there. Additionally there is uncontrolled recreational access to the site, and previous investigations have detected high levels of lead and arsenic in tailings soils. As there are not permanent residences on the site previous investigations have not shown direct impacts to human health, however the migrating staining on the landscape is approaching population centers to the north and places of employment.	The information that is required to arrive at a decision for this site includes: <ul style="list-style-type: none">Collection of soil and hyper-spectral imagery from the site.Collected samples will need to be analyzed for a full suite of inorganic metals.Evaluate analytical data to determine the horizontal extent of surface contamination at the site.DERR will compare analytical data to appropriate Regional Screening Levels and data generated by the remote sensing devices to assist the EPA in determining if additional action at the site is necessary.	The targets of interest are the Bauer tailings area, downwind landscapes including the gravel pit, and near-by areas that could be impacted by wind transport of tailings.	Based on the available analytical data, the likelihood of chronic human exposure at the site is low, however the impacts to downwind areas have not been characterized. If contaminants are detected in more populated areas such as the gravel pit, re-evaluation of the extent of the Bauer tailings would be warranted.	<p>The laboratory analytical results will be compared to Regional Screening Levels and to EPA health-based benchmarks for the soil and air pathways. If screenings are exceeded, additional sampling and analysis at the site may be warranted. The results of the site reassessment will help to determine the next steps for addressing the contamination at the Site.</p> <p>All data collected will be shared with agencies involved in the data collection effort. If the data warrants, the collected analytical data may be shared with other agencies involved in protection of human and environmental health for the site.</p>	Sampling conducted under the site reassessment includes the collection of 80 surface soil composite samples that will be analyzed using an XRF with a subset sent for laboratory analysis, followed by an unmanned aerial vehicle flyover of the entire sampling area to collect hyper spectral imagery. The sample locations were randomly selected within planned sample areas to evaluate risk, provide ground truthing to the flyover data, and provide additional data points in determining if contamination is migrating at the site.

Table 3. Required Bottles and Containers

Soil

Sample type	Container Type	Number
Composite soil sample (~2,000 grams)	Gallon size plastic bags with internal disposable sieve	80
Sample for laboratory analysis	8 oz short wide mouth glass jars	24
Split samples (~200 grams)	Quart sized plastic bags	200
Opportunistic grab sample	Gallon size plastic bag	20

Table 4. Sample Analyses Checklist

SITE NAME: Bauer Tailings
LOCATION: Bauer, Utah
CITY: Bauer

SITE ID NUMBER: UTD980635528
PROJECT LEADER: Hannah Marty
SAMPLING DATE: Spring 2021

Sample Location	Media	Laboratory Analyses															QA/QC					Other		
		Volatiles	Semi-Vols	Pesticides	Tot. Metals	PCB	Cyanide	Sulfide	Ammonia	NO3 - NO2	Anions	Asbestos	Spec. Org.	BTEXN	TPH	O&G	Explosives	Field Dup	Lab Dup	Split	Spike	Blank	Opportunity	Background
BT_005	Soil				X																			
BT_007	Soil				X																			
BT_013	Soil				X													X						
BT_015	Soil				X																			
BT_025	Soil				X																			
BT_029	Soil				X																			
BT_035	Soil				X												X							
BT_040	Soil				X																			
BT_046	Soil				X													X						
BT_048	Soil				X																			
BT_051	Soil				X																			
BT_057	Soil				X																			
BT_064	Soil				X																			
BT_069	Soil				X																			
BT_072	Soil				X														X					
BT_076	Soil				X																			
BT_081	Soil				X													X						

APPENDICES

APPENDIX A

**SITE HEALTH AND
SAFETY PLAN**

Health and Safety Plan

Bauer Tailings

Stockton, Utah; Tooele, Utah

A. Site Hazard Evaluation

Previous sampling at the Site has detected concentrations of lead, arsenic, and cadmium. Contaminants were detected in moderate to high concentrations in soils at the site. The primary exposure pathways include accidental inhalation and ingestion. No other known environmental or chemical hazards exist at the site. No special site entry procedures will be necessary. On-site hazards include slip, trip, and falls; weather related hazards; and hazards associated with working on land used for recreation including broken glass, and the potential for all terrain vehicle encounters.

B. Site Investigation Team - Responsibility

Hannah Marty	Project Manager
TBD	Site Health & Safety Officer

C. Personal Protection Equipment (PPE)

Based on the minimum exposure expectation at the Site, Level D personal protective equipment (PPE) will be worn by workers at all times. However, if site conditions change during the sampling activity, all work on-site will stop and the appropriate PPE level will be re-evaluated.

In accordance with the Utah Department of Health Public Health Order 2021-5 all workers will wear a properly fitting face mask when within 6 feet of any other worker.

D. Surveillance and Monitoring Equipment

On-site air monitoring will not be required based on characteristics and concentrations of likely exposure.

E. Disposal of Investigation Derived Material

Decontamination solutions and used PPE will be handled, stored, and disposed of appropriately.

F. Emergency Information

Police, Fire, Medical and other Emergencies:	911
Mountain West Medical Center (route map attached)	1-435-843-3600
2055 N Main St, Tooele, UT 84074	
Local City/County Health Department:	435-277-2300
Poison Control Center:	1-800-456-7707
Blue Stake Location Service:	1-800-662-4111

15 min (7.8 miles)

via UT-36 N

Fastest route, the usual traffic



Bauer

Utah 84071

> Follow Bauer Rd to UT-36 N

2 min (1.1 mi)

↩ Turn left onto UT-36 N

10 min (6.4 mi)

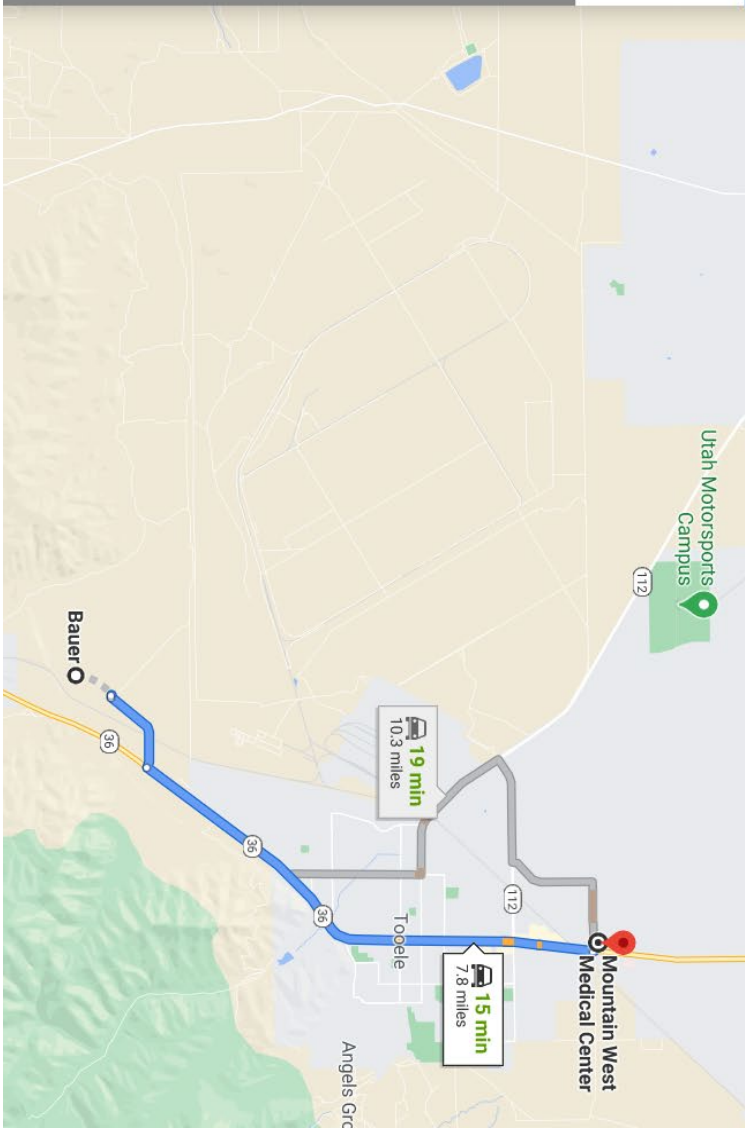
> Continue on E 2000 N to your destination

1 min (0.2 mi)

Mountain West Medical Center

2055 N Main St, Tooele, UT 84074

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



APPENDIX B

CONSENT FOR ACCESS TO PROPERTY

GRANT OF ACCESS TO PROPERTY

_____, is the owner of record, title holder, or authorized agent for the record owner of certain real property located at _____, Utah (Property).

I hereby grant to the employees and/or authorized representatives of the Division of Environmental Response and Remediation (DERR) and the U.S. Environmental Protection Agency (EPA) access, including ingress and egress, to the Property for the following purposes:

1. The taking of soil samples,
2. Conducting an unmanned aerial vehicle (UAV) flyover, and
3. Any other action related to the taking of the above samples or the definition of the contamination, if any, on the Property as may be necessary and appropriate.

The DERR will notify property owners a few days prior to starting sampling activities. I understand that these actions are taken pursuant to the authorities provided in the Utah Environmental Quality Code, Utah Code Section 19-1-101 et seq., (General Provisions), Section 19-6-301 et seq. (Hazardous Substance Mitigation Act), and the Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA), 42 U.S.C. 9601 et seq.

By granting access, I make no admission of liability or responsibility for any contamination that may be found on the Property. This grant of access is given voluntarily with knowledge of my right to refuse access. I further acknowledge that no promises, representations or claims of any kind, either written or oral, have been made by DERR to induce my consent.

Please check one of the following statements:

- ☐ I wish to obtain splits of all samples collected on the Property. I understand that I must provide the necessary sample containers to obtain these splits and that the responsibility of choosing an analytical laboratory and the cost of analysis is mine.
- ☐ I waive my right to obtain split samples. I understand that DEQ will provide me information relating to the sampling results for my property at no cost to me.

Owners Name _____ Address _____

Daytime Phone Number _____ Email (optional) _____

Signature

Date

Special Considerations:

APPENDIX C

Site Sampling Maps CDM Smith

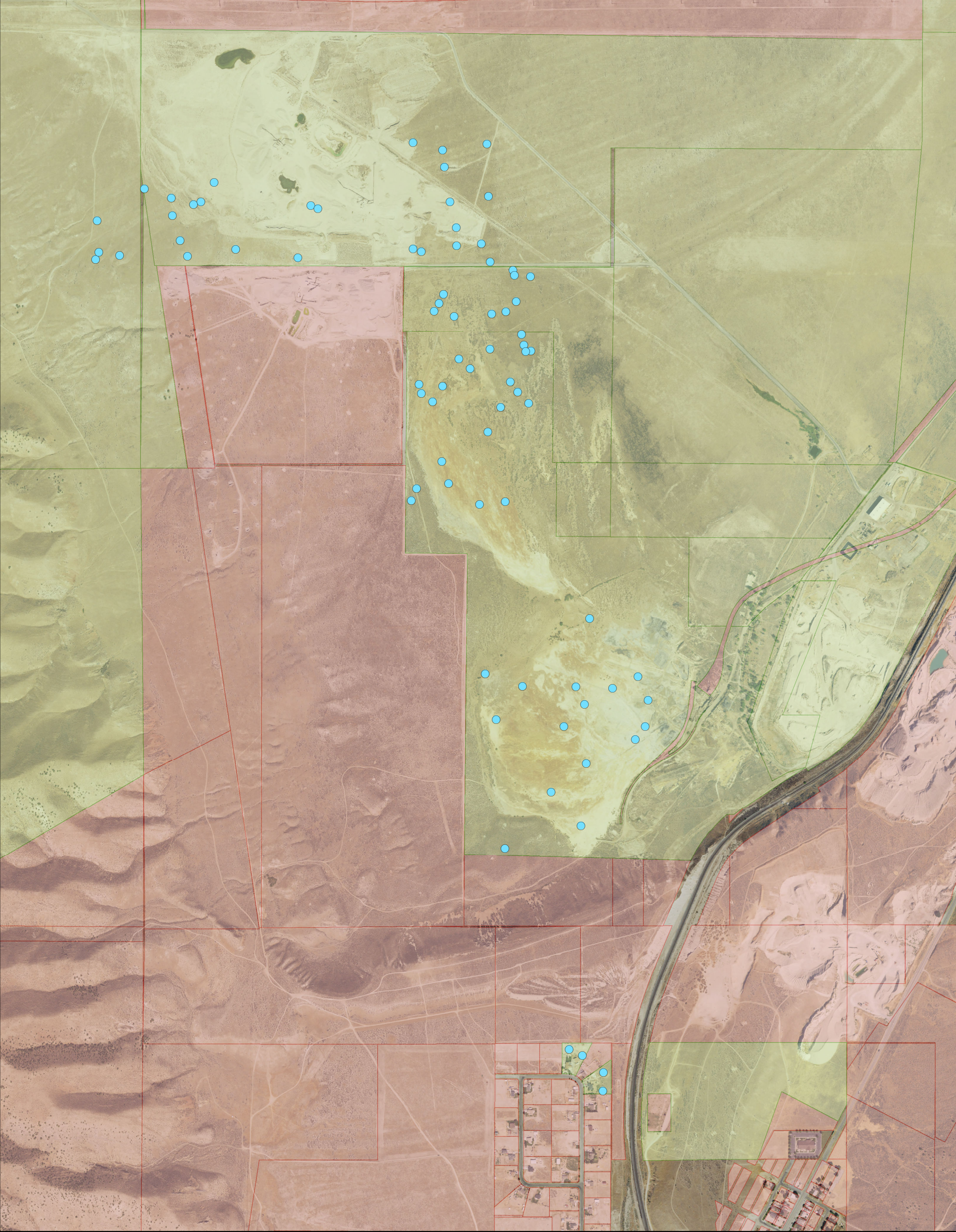


Figure 1

Orthophoto Source: NAIP 2018

Bauer Mill Tailings Site, Stockton, Utah

Sampling Location

● Soil Surface Sample

Parcels

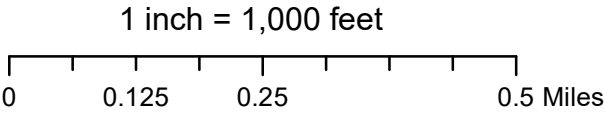
Access Agreement

No Access

Soil Surface Sampling

Planned for April 2021

Anticipated to be 5 day event



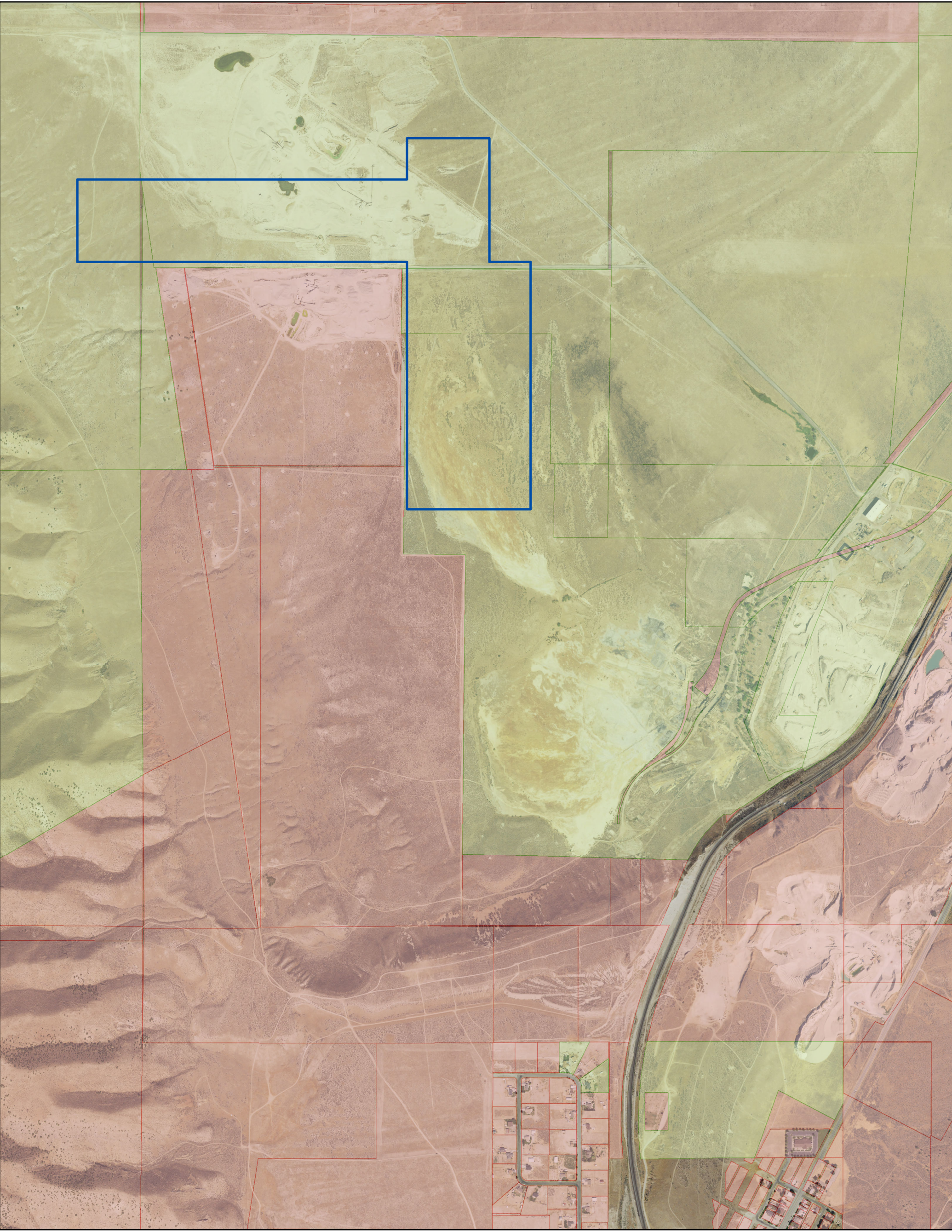


Figure 2

Orthophoto Source: NAIP 2018

Bauer Mill Tailings Site, Stockton, Utah

Flight Area

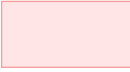


UAV Flight

Planned for July 10 - August 10, 2021

Anticipated to be 3 day event

Parcels

-  Access Agreement
-  No Access

