Environmental Engineering and Consulting
Remediation and Management Services

March 2, 2009

Colorado Department of Public
Health and Environment HMWMD-RP-B2
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

Attention: Mr. Mark H. Rudolph

Subject: Work Plan – Identification and Confirmation of Soils Requiring Long Term Management, Valmont Butte Property, 3000 North 63rd Street, Boulder, Colorado

Dear Mr. Rudolph:

Enclosed is a work plan for sampling of soils at the Valmont Butte Property, located in Boulder County. This work plan has been prepared by Casey Resources, Inc. (CRI) on behalf of the City of Boulder. Also included with this submittal is a tentative schedule for the development of the VCUP Application and VCUP implementation.

We request that you provide a copy of this work plan to Mr. Ethington. Please contact Terry McGowan or me at 303-940-7800 should you have any questions.

Sincerely,
CASEY RESOURCES, INC.

Paul L. Casey, P. E.
Principal

Enclosure:

cc: Elizabeth Temkin, Esq. - TWHL

Environmental Engineering and Consulting
Remediation and Management Services

WORK PLAN

IDENTIFICATION AND CONFIRMATION OF SOILS REQUIRING LONG TERM MANAGEMENT

VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

March 2, 2009

Prepared For:

City of Boulder
1720 13th Street
Boulder, Colorado 80306

Prepared By:

Casey Resources Inc.
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TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

The City of Boulder (the "City") owns an approximate 101-acre parcel of land locally known as the Valmont Butte property (the "Property"). The Property is located in Boulder County approximately four miles east of the City's central business district and more specifically 1.5 miles east of the Foothills Parkway and Pearl Street intersection. The Property in bounded on the north by Valmont Road and on the west by North 63rd Street. The main entrance to the Property is listed as 3000 North 63rd Street (Figure 1).

Historically there was a processing plant located on the western end of the Property for the milling of fluorspar and gold ores. The waste rock slurry, or tailings, from the processing plant were deposited in two tailings impoundments located on the east side of the Property and referred to as the primary and secondary tailings impoundments (Figure 2). The fluorspar tailings, estimated by URS Operating Systems, Inc. ("URS", 2005) at 327,000 cubic yards in the primary tailings impoundment and 70,000 cubic yards in the secondary tailings impoundment, contain naturally occurring radioactive materials ("NORM"). The gold tailings, estimated by URS (2005) at 45,000 cubic yards, contain elevated concentrations of certain metals.

In 1971, Allied Chemical Corporation ("Allied Chemical") obtained a modification to its Radioactive Materials License issued by the Colorado Department of Health (currently the Colorado Department of Public Health and Environment ["CDPHE"]). This modification allowed for the transportation and burial on the Property of up to 1,500 cubic yards of radium-226 contaminated demolition debris from a construction project in the City. This material was disposed in a 90-foot diameter pit located west of the primary tailings impoundment (Boulder City-County Health Department, 1976). The Radioactive Materials License for the storage of NORM expired in 1980 and was not renewed.

Tusco Corporation ("Tusco") purchased the Property in 1977. From approximately 1977 to 1985, Hendricks Mining Company ("Hendricks") leased the Property from Tusco for processing gold ore. Tailings from the gold ore processing were deposited on top of the fluorspar tailings in the primary impoundment and consisted predominantly of silica sand. According to CDPHE

(1999b), after milling operations ceased, Tusco placed approximately one to two feet of clean soil on the tailings impoundments and seeded the area. The cap soil was obtained from a borrow pit located on the hillside south of the primary tailings impoundment.

The Property was purchased by Valmont Butte Corporation in 1994. Valmont Butte Corporation proposed to remediate the Property through capping the primary and secondary tailings impoundments with clean backfill and to attach covenant restrictions to the Property to protect the remediation cap. Valmont Butte Corporation continued to place backfill material over the tailings and completed excavation of impacted soil from around the Property based on radiation surveys conducted by CDPHE in 1998 and 1999 (CDPHE, 1999a). CDPHE did not conduct a metals survey. CDPHE (1999b) concluded that the impacted soil areas outside the tailing impoundments resulted from wind blown deposition of fluorspar tailings. This report states that most of these impact areas were excavated and the impacted soils placed in the tailings impoundments. Some areas were capped in place with two or more feet of clean fill. In addition, no remediation was completed in several areas due to "*steepness of the area or isolation due to topography*". The CDPHE (1999b) report states, "*These areas are located in the hillside south of the Primary and Secondary tailings ponds, the hillside along the Valmont Butte north of the Primary tailings pond, a drainage on the northwest side of the site below the Valmont Butte and Valmont Road, and an area north of the wood shop and over the slope where an old slurry line from mill operations previously existed. The Department has determined that the areas represent low potential for exposure or environmental impact. The final Department survey verified that all identified areas of contamination had either been remediated or were approved by the Department for no further action*". Figure 3 shows the approximate locations where impacted soils were left in place without being remediated (CDPHE, 1999a).

In October 1999, CDPHE and the then current land owner entered into an "*Agreement and Declaration of Covenants*" (CDPHE, 1999c) to ensure protection of public health and the environment through maintenance of the tailings impoundments and inert cap cover and through other covenant restrictions. With the covenants in place and remediation completed and approved by CDPHE, the Radioactive Materials License for the Property was terminated (CDPHE, 1999b).

The most recent investigations conducted at the Property were completed by URS (2005) on behalf of the U.S. Environmental Protection Agency ("EPA"). The EPA report concluded:

- The cap on the tailings impoundments was compromised by burrowing animals;
- Portions of the tailings impoundments may not be appropriately capped;
- Surface soil grab samples from areas outside the tailings impoundments indicated that there were five areas exhibiting elevated radiation and approximately 18 sampling locations that exhibited total lead concentration greater than 400 milligrams per kilogram ("mg/Kg");
- Remediation of elevated radiation areas along the Valmont Butte hillside "*is not warranted or recommended*"; and
- The surface water and groundwater pathways are not complete and were determined not to be a concern for the Property.

2.0 PURPOSE

This Work Plan has been prepared for the following purposes:

- To further define the areal extent and depth in soil of elevated radiation areas that were identified by CDPHE (1999a,1999b) and confirmed by URS (2005);
- To further define the areal extent and depth in soil of the elevated metal concentration areas identified by URS (2005);
- To screen the surface soil in the remainder of the Property for previously unidentified elevated metal and/or radiation areas; and
- To confirm that any waste materials remaining in onsite structures has been identified and sufficiently characterized.

This Work Plan presents the sampling procedures that will be utilized for the field investigations, including soil sample screening procedures and procedures for establishing the areal extent and depth of known elevated total lead concentration and radiation areas at the Property. The results

from this investigation will be used in the development of a specific remediation and closure plan for the Property to be included in a Voluntary Cleanup Plan ("VCUP") Application to the CDPHE. CDPHE has confirmed the Property's eligibility for inclusion in the VCUP Program.

Limited perched groundwater could be present in the primary tailings impoundment area. Groundwater was also identified in the claystone bedrock unit immediately underlying the Property; however, the groundwater occurrence is sporadic, suggesting discontinuous lithologic lenses and limited flow. The bedrock deposits are low permeability and high porosity, which limits groundwater migration. The groundwater samples collected from the existing monitoring wells indicate naturally occurring inorganic chemical contribution from the marine deposits of the Pierre Shale. Monitoring well MW-6 is located in the far southeastern corner of the Property and groundwater elevation data suggest this well represents background conditions. The chemical quality of groundwater in MW-6 is similar to the chemical quality of groundwater in monitoring well MW-1 located downgradient of the secondary tailings impoundment, suggesting background load contribution of radium 226/228 to groundwater. Water supply wells near the Property have been sampled and no impacts to offsite water supplies have been identified. The existing onsite groundwater monitoring well network may be sampled once the VCUP is approved and funded to document and confirm pre-closure conditions. The VCUP will include a requirement for appropriate post-closure groundwater monitoring.

3.0 SCOPE OF WORK

The following sections provide a detailed discussion of the work activities that will be completed as part of the field investigations.

3.1 RADIATION AND TOTAL LEAD SCREENING CRITERIA

At this time, ultimate land uses for the Property have not been established. The VCUP Application for the Property will propose remediation cleanup values that will support commercial and recreational use of the Property. Previous investigators identified elevated radiation and metals concentrations at the Property as the key environmental concerns. Review

of soil sample laboratory results from the 2005 EPA report indicates that, in general, areas that exhibited concentrations of total lead greater than 400 mg/Kg also exhibited concentrations of total arsenic greater than 10 mg/Kg. This correlation supports the use of total lead concentration as the indicator parameter for metals impact associated with the milling of gold ore at the Property. This Work Plan will focus on defining radiation values and total lead concentrations across the Property in sufficient detail to support the VCUP Application and final site remediation and closure.

The data obtained during this investigation will be evaluated using the following criteria.

Total Lead

- Total lead concentration ≤ 800 mg/Kg = screening value for soils meeting commercial/recreational land use (CDPHE, 2007); and
- Total lead concentration > 800 mg/Kg = screening value for soils requiring management (CDPHE, 2007).

Radiation

- Radiation concentration ≤ 60 micro-roentgens per hour ("µR/hr") = screening value for soils meeting commercial/recreational land use (EPA, 2004); and
- Radiation concentration > 60 µR/hr = screening value for soils requiring management (EPA, 2004).

3.2 DOCUMENTATION

Bound field log books will be issued to field personnel to document all activities conducted at the Property. Field personnel will document field measurements, sampling procedures and locations, type of samples, sample lithology and condition, equipment used, personnel working onsite, and site conditions. Each page of the log book will be numbered sequentially. The date and name of field personnel entering the log (logger) will be placed on the top of the first page for that day. On

finishing the day's entry, the final page will be signed by the logger, dated again, and any unused space below will be marked out. All errors or markouts on the entries will be initialed by the logger.

3.3 SAMPLE LOCATIONS

EPA (URS, 2005) identified approximately 18 locations that exhibited total lead concentrations greater than 400 mg/Kg and five areas that exhibited radiation values three times or more, greater than background. The five areas with elevated radiation overlap areas with elevated total lead concentrations.

These areas will be further delineated to determine the areal extent and depth of elevated radiation and total lead concentrations in soil. These areas will be evaluated on a 50-foot grid system (one composite sample per 2,500 square feet) as illustrated on Figure 4. The sampling grid will be expanded as necessary until total lead concentrations and/or radiation values are less than the threshold values discussed above.

The land area between the covenant defined tailings impoundment and the prairie dog barrier fencing as shown on Figure 5 will be surveyed on a 100 foot grid to identify any area that may need to be excavated and returned to the tailings impoundment. Investigation of the covenant defined tailings impoundments will not be conducted at this time as these areas will receive new soil cap material during VCUP implementation.

Only limited sampling has been completed on the balance of the Property. The areas beyond the prairie dog fencing will be systematically sampled for radiation values and total lead concentration also on a grid system, but larger sampling area of 200 feet (one composite sample from 40,000 square feet) as illustrated on Figure 6.

The sampling grids will be laid out on the ground surface using a Trimble GPS unit and survey instrumentation. The four corners of each grid will be marked with survey stakes and flagging.

A labeled flag or marker will be placed at the center of each grid for identification of the sample grid.

3.4 FIELD SCREENING PROCEDURES

The sampling grids will be initially sampled using field screening equipment to tentatively identify the areal extent of the known and unknown elevated metals and radiation areas. Metals screening will be completed using a field portable X-ray fluorescence ("XRF") analyzer to assist in determining total lead concentrations in shallow soil at the Property. The XRF analyzer selected for this project is the Alpha Series XRF manufactured by Innov-X Systems. As discussed previously, field screening will use total lead as the indicator parameter for assessing metals in soil. Radiation monitoring will be completed using a Ludlum Model 3 with 44-2 probe (MicroR low level radiation survey meter) or similar.

3.4.1 XRF Screening Procedure

Prior to conducting the initial XRF screening, a correlation will be established to account for the XRF response to onsite soils. Two grids, one background area assumed to contain total lead concentration less than 400 mg/Kg and one with known total lead concentrations greater than 800 mg/Kg, will be selected to establish this correlation. In-situ measurements will be collected from each corner and center of the selected sample grid and recorded. Prior to the in-situ measurement, each sampling location will be cleared of rock and vegetation to expose fresh soil. Following in-situ measurements, a surface soil sample (approximately four ounces) from each in-situ location will be collected using a decontaminated stainless steel scoop and placed in a sealable plastic baggie. The five soil samples will be composited into one sample and analyzed using the XRF. The composite sample will then be dried, ground down to a powder consistency, and selected aliquots measured using the XRF. This procedure will generally follow EPA Method 6200 for XRF analysis. One aliquot from each grid will then be submitted for laboratory analysis of total lead (EPA Method 6010). The data obtained from this exercise will be compared and evaluated to determine the appropriate use of the XRF as a screening tool.

Assuming reasonable correlation is established for in-situ measurements of total lead concentration using the XRF, the XRF screening of soils will entail in-situ measurements at each corner and center of each grid. The in-situ measurements will be collected for a minimum of 60 seconds and a maximum of 120 seconds. The XRF readings from each grid will be averaged to obtain one value for the grid. The intention of this initial screening is to quickly locate the known and unknown areas that exhibit total lead concentrations greater than 800 mg/Kg. For quality assurance purposes, composite samples from every 20th sampling grid will be prepared according to EPA Method 6200 and analyzed by XRF and also submitted to an environmental laboratory for analysis of total lead.

The grid areas identified as containing total lead concentration greater than 800 mg/Kg will be further delineated with the XRF to assess areal extent of the total lead concentrations. Depth of total lead concentration will also be assessed for these areas. At least one quality assurance sample will be collected from each of the areas that are further delineated. The quality assurance sample will be analyzed for total lead to confirm XRF results.

3.4.2 Radiation Screening Procedure

The radiation detector will be calibrated and checked (gamma check source) before completing the radiation screening survey. Prior to conducting the survey, background for the instrument in use will be calculated by taking measurements in an area geologically similar to the area to be surveyed but known to be free of elevated radiation. EPA collected background information at Legion Park on Arapahoe Road southeast of the Property and at Munson Farms located at 75th Avenue and Valmont Road east of the Property. The background measurements will be averaged and this value will be used as an approximate measurement of the instrument background for that day. Past investigators have identified background from 15-18 µR/hr and 18-22 µR/hr depending on the radiation detector used (EPA, 2004)

Each grid center line will be traversed east to west and north to south with the radiation detector. The traverse lines will be walked slowly with the detector approximately six inches to one foot above the ground. Field personnel will monitor for increases in audible response or needle

deflection as the traverse lines are walked. If an increased measurement of 60 µR/hr or greater is noted, the location will be marked with flagging or spray paint. The measured radiation value and GPS location will be recorded in the field log book. Additional monitoring at those locations with radiation values greater than or equal to 60 µR/hr will be conducted to further define the areal extent of radiation values greater than 60 µR/hr. This will be accomplished by surveying radial lines outward from the location until measurements are less than 60 µR/hr. This process will be used until the elevated radiation area is fully defined and staked. For quality assurance purposes, composite samples from every 20th sampling grid will be collected and submitted to an environmental laboratory for analyses of radium 226/228.

3.5 SURFACE SOIL SAMPLING PROCEDURE

Confirmation surface soil samples will be collected from every 20th grid. For grid sampling, a decontaminated stainless steel scoop will be used to collect soil samples from each corner and center of the grid (each in-situ sample location). At each sampling location, any miscellaneous debris such as larger rock and gravel, wood, metal, and/or vegetation will be removed from the surface to expose fresh soil. The stainless steel scoop will then be used to collect a soil sample from the exposed surface to approximately one-quarter to one-half inch below the exposed surface. Approximately four ounces of soil will be collected. Collected soil samples will be placed into plastic sealable freezer storage bags and thoroughly mixed for sample analysis (XRF and laboratory analysis for total lead and radium 226/228).

At least one confirmation sample will be collected from each area that requires further delineation. These soil samples will be collected as single grab samples using a decontaminated stainless steel scoop and placed into plastic sealable freezer storage bags and thoroughly mixed for sample analysis (XRF and laboratory analysis of total lead and radium 226/228). Field personnel will record the GPS location, soil lithology, and the screening results in the project field log book for each soil sample collected.

3.6 SUBSURFACE SOIL SAMPLING PROCEDURE

It is likely that areas exhibiting concentrations greater than the threshold values have resulted from wind blown deposition, former stockpiles, or accidental releases, and generally will have impacted only a thin veneer of the surface soils. To confirm this assumption and for VCUP remediation planning, those areas that exhibit metals concentrations and/or radiation values greater than the commercial/recreation screening values will need to be assessed to determine the depth of the impact. In order to define the depth of soils exceeding the screening values, at least one shallow boring to approximately six inches below ground surface ("bgs") will be hand excavated with a decontaminated shovel and a sample collected for radiation monitoring and/or XRF analysis. If the sample exhibits readings greater than the commercial/recreational screening values, the shallow boring will be excavated another six inches and sampled as above. The boring will be excavated on six inch intervals until the sample results are less than the commercial/recreational screening values or until the depth of excavation is approximately two feet deep. If the soil at a depth of two feet still exhibits concentrations greater than the commercial/recreational screening values, the area will be documented and additional delineation may be necessary to assess material volume.

3.7 ARCHEOLOGICAL CONSIDERATIONS

The Northern Arapaho and certain other Indian Tribes (the "Tribes") will be consulted in advance as to ground disturbing activities associated with the implementation of this Work Plan. To protect any remains and artifacts encountered, the City will provide for a monitor, acceptable to the Tribes, to be present onsite during any subsurface sampling work in all sensitive areas.

3.8 BUILDING INSPECTION AND SAMPLING

Previous investigators have removed and arranged for proper disposal of asbestos containing material, hazardous materials, and non-hazardous materials from the mill and associated buildings. For confirmation purposes, the mill and associated buildings on the Property will be inspected to assess whether any impacted materials remain within these structures, especially in

those areas where ores were processed. If impacted materials are identified, a grab sample will be collected, if possible, to assess the concentrations of total lead and radiation values by use of the XRF and radiation detector, respectively. Areas identified as containing impacted materials will be further assessed to determine the approximate volume of material involved.

3.9 DECONTAMINATION PROCEDURE

Equipment used for sampling will be decontaminated as follows:

- Scrub with laboratory-grade detergent;
- Rinse with potable water;
- Rinse with distilled water; and
- Dried with paper towels and/or air dried.

After decontamination, the sampling equipment will be stored in plastic bags or covered with plastic sheeting.

Rinse water will be contained in 55-gallon drums onsite. If possible, rinse water from elevated metal concentration areas will be segregated from rinse water generated from elevated radiation areas. On completion of the sampling program, the drum contents will be analyzed for total lead and radium 226/228. Based on the laboratory results, the rinse water will be discharged onsite or removed and treated by Arvada Treatment Center.

Field vehicles will be inspected and any large quantities of mud removed from the underside of the vehicles and tires. If necessary a decontamination wash area will be constructed and the wash water collected in 55-gallon drums.

4.0 REPORTING

A data report describing the investigation activities and results will be prepared for submittal to CDPHE. The report will include description of sampling procedures, sampling locations, and any deviations from this Work Plan. The data collected during the investigation will be discussed and presented in table format along with appropriate figures. Quality assurance and quality control sample results will also be evaluated and discussed.

5.0 REFERENCES

Boulder City-County Health Department, 1976: *Special Environmental Health Report*. November 1, 1976.

City of Boulder, 2002: *Memorandum of Understanding*. August 17, 2002.

Colorado Department of Public Health and Environment (CDPHE), 1999a: *Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division, Uranium and Special Projects Unit, Technical Evaluation of Surface Gamma Radiation Survey, Valmont Butte Corporation Site, Boulder, Colorado*. July 27, 1999.

CDPHE, 1999b: *Decision Analysis: Assurance of Equivalent Protection to Public Health and Environment in the Absence of a Colorado Radioactive Materials License, for Valmont Butte Site, Valmont Butte Corporation, Boulder, Colorado*. October 6, 1999.

CDPHE, 1999c: *Agreement and Declaration of Covenants.* October 12, 1999.

Environmental Protection Agency (EPA), 2004: *Letter Report – Valmont Butte Radiological Survey (DRAFT–rev.1).* November 4, 2004.

URS Operating Services, Inc., 2005: *Analytical Results Report for Site Reassessment, Valmont Butte/Allied Piles, Boulder, Colorado.* Prepared for the U.S. Environmental Protection Agency. January 1, 2005.

FIGURES

CASEY RESOURCES, INC.

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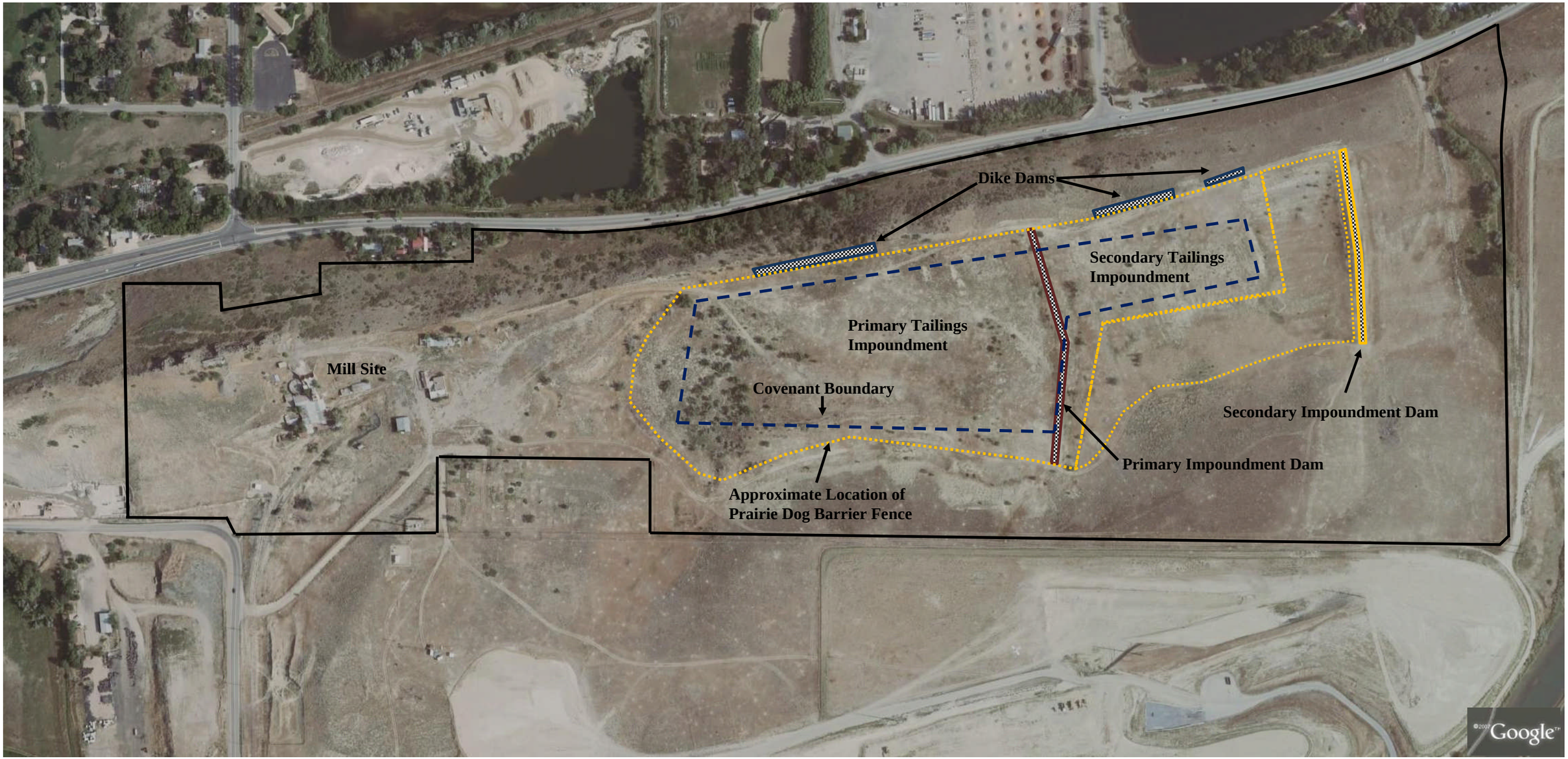
FIGURE 1

VICINITY MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

Property Boundary

Scale 1.0 inch = 300 feet
Source: Google Earth

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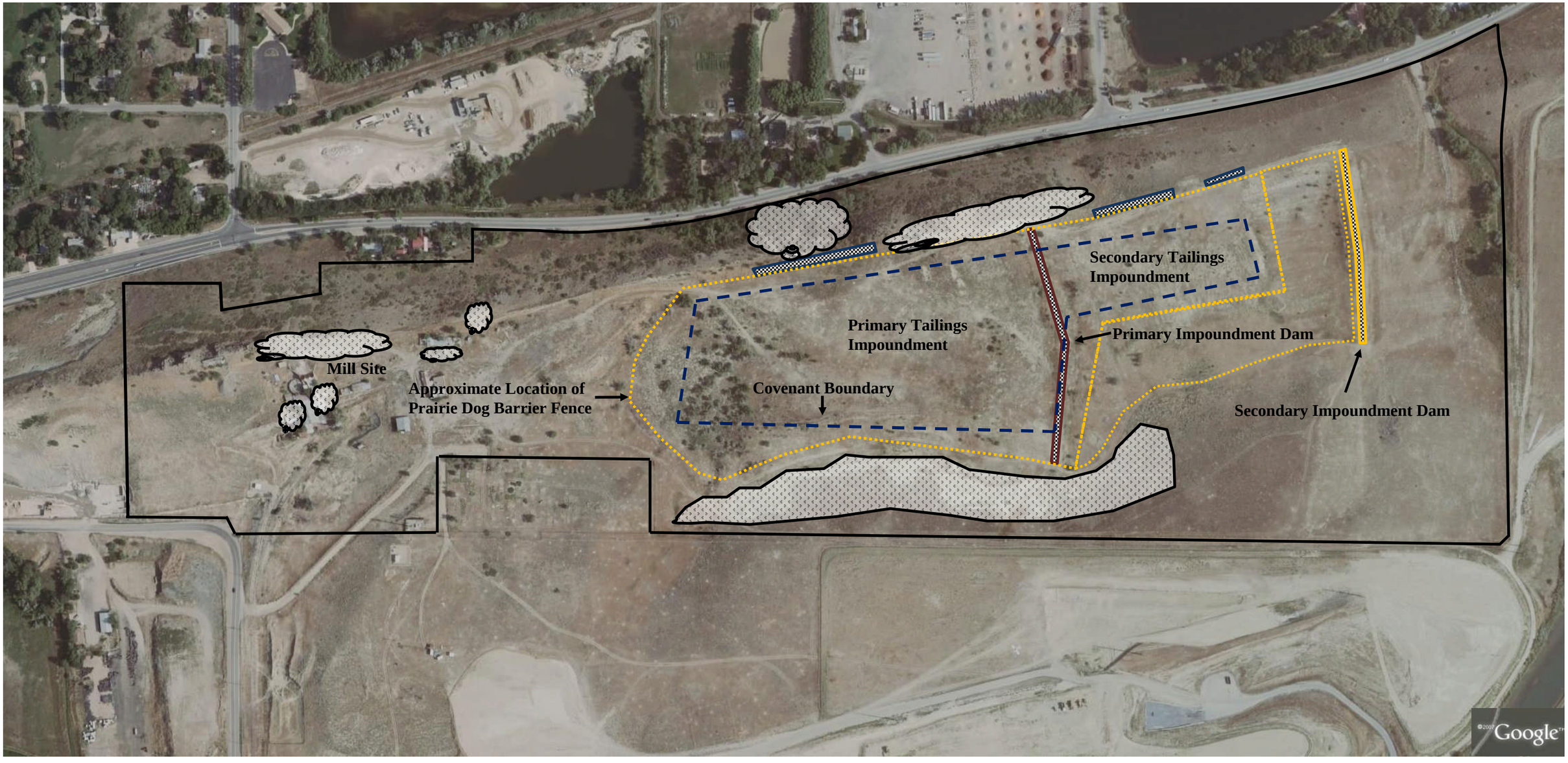
FIGURE 2

FACILITY MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

Property Boundary

CDPHE (1999b) Non-remediated areas with radiation values greater than 30 micro roentgens per hour (µR/hr)

Scale 1.0 inch = 300 feet
Source: Google Earth

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FIGURE 3

CDPHE NON-REMEDIATED ELEVATED RADIATION AREAS
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO

EXPLANATION

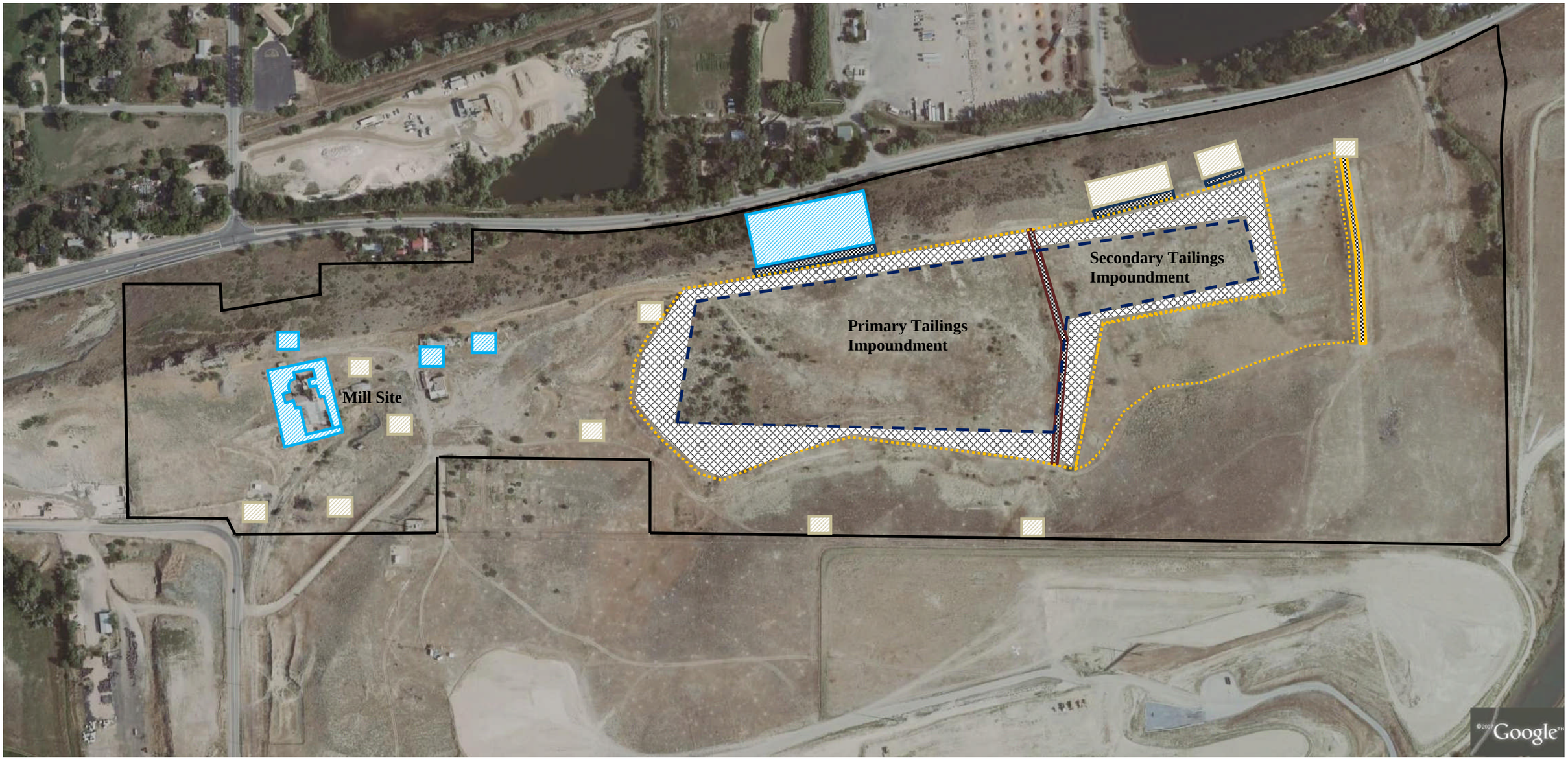
- Property Boundary
- Covenant Boundary
- Prairie Dog Barrier Fence
- 50-Foot Grid Sampling Area, Tan = Elevated Metals Area, Blue = Elevated Metals & Radiation Area
- VB-SG-04 — URS (2005) Soil Sample Number

N

Scale 1.0 inch = 300 feet
Source: Google Earth

FIGURE 4

50-FOOT GRID SOIL SCREENING AREAS
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

- Property Boundary
- Covenant Boundary
- Prairie Dog Barrier Fence
- 50-Foot Grid Sampling Area, Tan = Elevated Metals Area, Blue = Elevated Metals & Radiation Area
- 100-Foot Grid Sampling Area

Scale 1.0 inch = 300 feet
Source: Google Earth

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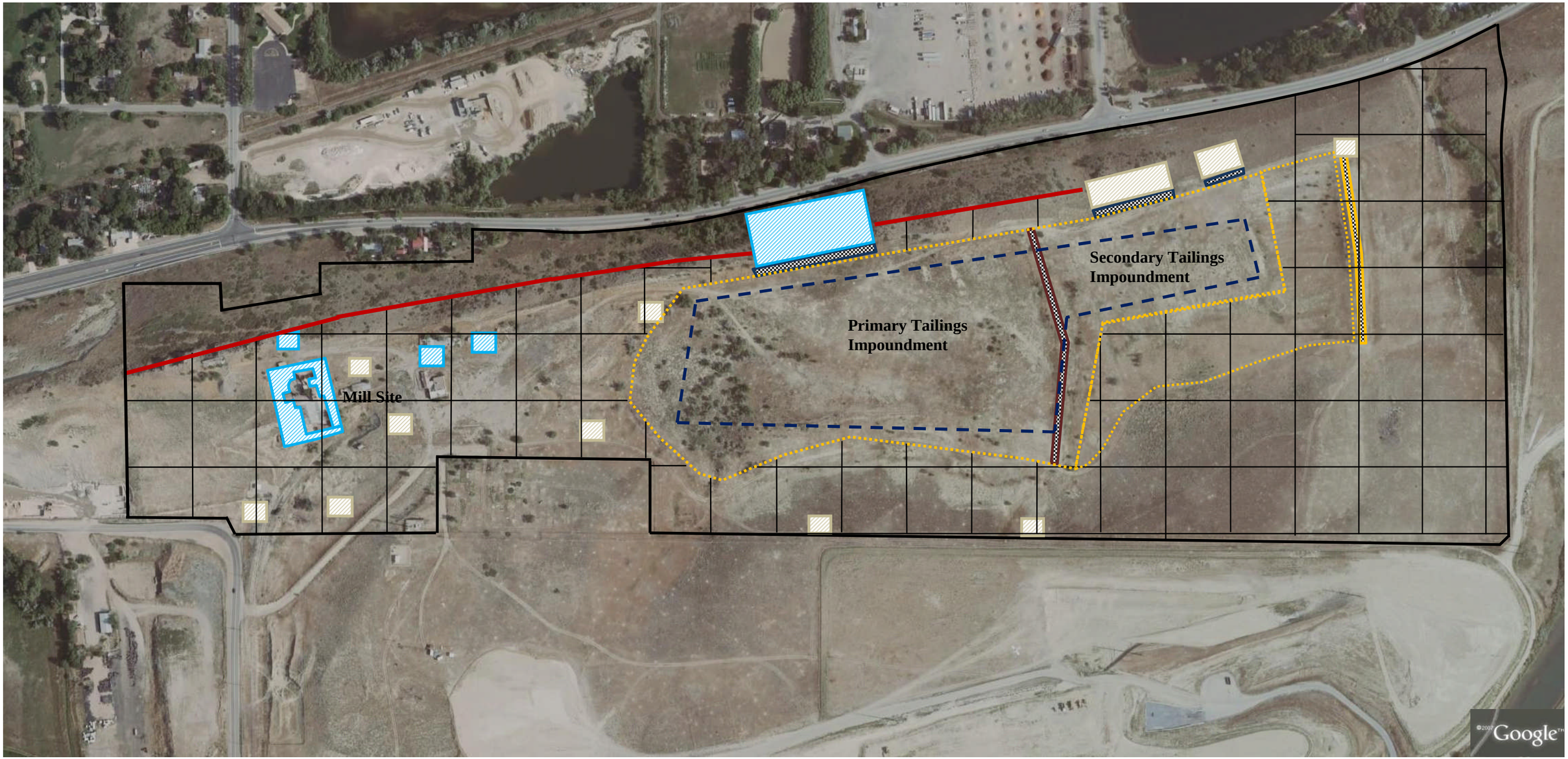
FIGURE 5

100-FOOT GRID SOIL SCREENING AREAS
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO



EXPLANATION

- Property Boundary
- Covenant Boundary
- Prairie Dog Barrier Fence
- 50-Foot Grid Sampling Area, Tan = Elevated Metals Area, Blue = Elevated Metals & Radiation Area
- 200-foot grid
- Valmont Butte Ridge

N

Scale 1.0 inch = 300 feet
Source: Google Earth

FIGURE 6

200-FOOT GRID SOIL SCREENING AREAS MAP
VALMONT BUTTE PROPERTY
3000 NORTH 63RD STREET
BOULDER, COLORADO