ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED MINERAL VALLEY MORMON BASIN PLACER GOLD MINING OPERATION (EA # DOI-BLM-OR-050-2009-EA)

Prepared for

Bureau of Land Management
Vale District

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1 INTRODUCTION

1.1 BACKGROUND

This environmental assessment (EA) is for the proposed Mineral Valley, LLC Placer Gold Mining Operation at Mormon Basin (Project) (EA # DOI-BLM-OR-050-2009-EA). The Project is located approximately five air miles southeast of Clarksville, in Malheur and Baker counties, Oregon, in the Mormon Basin Mining District.

The Bureau of Land Management (BLM) Baker Field Office, in the Vale District, is the reviewing office for this EA. The applicant for the project is Mineral Valley, LLC (Mineral Valley). No State lands or U.S. Forest Service administered public lands exist within the project boundaries.

Mining is currently taking place on private land in Mormon Basin under the terms of an Oregon Department of Geology and Mineral Industries (DOGAMI) permit and Conditional Use Permits from Malheur and Baker counties. In addition to the mining areas, there are three processing sites located on private land including stockpile areas, settling ponds, trommels, sluices, conveyors, and other gold recovery equipment. No chemicals are used in the recovery process. Under a Notice filed under the Surface Management Regulation (43 CFR 3809), the existing operation on the BLM claims consists of road improvements, positioning a flexible hose on the surface of public lands from Reservoir #1 to reach the processing site on private land at Section 16, and exploration.

The Proposed Action would be to mine and extract gold, process placer gravels, and use and maintain the existing equipment maintenance shop located on unpatented mining claims administered by the BLM within the Mormon Basin.

A Plan of Operation (PoO) was submitted to the BLM in accordance with the requirements of 43 CFR 3809, Use and Occupancy under the Mining Laws (43 CFR 3715), and the Federal Land Policy and Management Act of 1976, as amended (Public Law 94-579). The PoO includes reclamation of disturbed surface areas due to gold extraction activities.

The PoO has been amended numerous times, including but not limited to the items summarized below, to address BLM's concerns. The PoO that was originally submitted on March 29, 2007, was amended on May 28, 2007 to expand the project area to include a newly filed claim. It was further amended on August 24, 2007 to reflect protection of the wetlands and again amended on January 23, 2009 to reflect that the clean-up shed on California Gulch would not be used. The most recent and final amendment on December 2, 2009 (Appendix A) reflects the change in ownership, change in equipment and materials, expansion of private land included, reduction in size of the mining area to target areas which can be mined at a profit based on prior testing, design features related to reservoir water levels, and the removal of references to processing within the pit at California Gulch (Alexander 2008, Jay 2009). The project area includes approximately 317 acres of private land: 157 acres of patented surface and mineral estate and 160 acres of private surface patented under the Stockraising Homestead Act, where mining claims have been filed on the Federal minerals. The project area also includes 152.5 acres of BLM mining claims held by Mineral Valley located in Sections 16, 17, 20 and 21 of Township 13 South, Range 42 East, Willamette Meridian. The total of private land and BLM claims for this project is 469.5 acres. The 152.5 acres of BLM-managed public lands included in this project are located within a broader analysis area of approximately 311 acres. Those lands are administered by the BLM Baker Field Office (Figure 1). The analysis area is larger than the 152.5 acre Proposed Action on BLM claims as much of the area initially intended for mining has been removed from the project area.

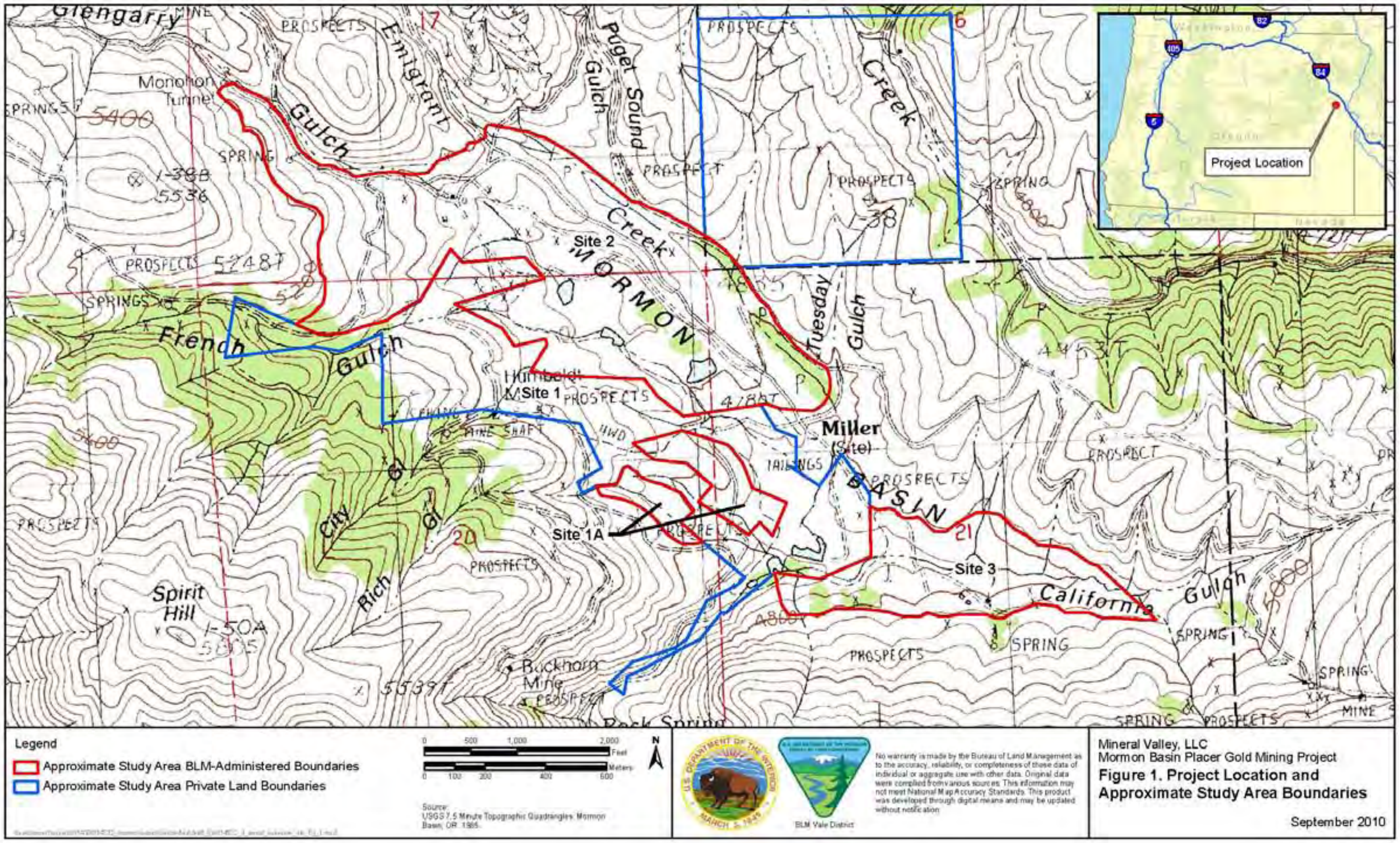
Mormon Basin was mined as early as 1883. Topsoil was not saved during historic mining entries, and many areas of dry rock dams and bare rock tailings exist in the Basin today. Some of the areas of previous disturbance would be re-mined and, for the purpose of the PoO and Reclamation Plan, all mining related activities by Mineral Valley would be considered new disturbance, subject to reclamation requirements. Because of the prior mining activity in the Basin, and the diversion of streams to bring water to various areas for processing activities, it is likely that more wetlands than would occur under natural conditions are present in the area today. Mineral Valley does not propose any mining in the wetland areas.

1.2 Purpose and Need

The requirements of 43 CFR 3809, Surface Management Regulations, the Mining Law of 1872 (30 U.S.C. §§ 22-24, 26-28, 29-30, 33-35, 37, 39-42 and 47, May 10, 1872, as amended 1875, 1880, 1921, 1925, 1958, 1960 and 1993.), the Federal Land Policy and Management Act of 1976, and the Mining and Minerals Policy Act of 1970 mandate that BLM will review and respond to a PoO within 30 days of receipt (43 CFR 3809.411). As per §3809.411, BLM will review the received PoO, determine if it is complete, respond to the proponent, and complete the environmental review required under the National Environmental Policy Act (NEPA). The Secretary of the Interior is responsible for carrying out this policy in administering programs under the Secretary's authority (30 U.S.C. § 21a). As per § 3809.1, the primary purpose of the subpart is to prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws. Anyone intending to develop mineral resources on public lands must prevent unnecessary or undue degradation of the land and reclaim disturbed areas. This subpart establishes procedures and standards to ensure that operators and mining claimants meet this responsibility.

The Proposed Action is to mine and extract gold from placer gravels as described in the PoO submitted by Mineral Valley on December 2, 2009.

Figure 1. Project location and approximate analysis area boundaries.



1.3 DECISION TO BE MADE

Through the NEPA process of environmental documentation, BLM will review the three alternative courses of action and decide which best meets the purpose and need and the conditions under which that action will be allowed.

1.4 SCOPING AND ISSUES

A scoping letter describing the proposed project was sent to the three grazing permittees, the one adjacent landowner, Baker County and Ironside Road Departments, Oregon DOGAMI, Oregon Department of Environmental Quality (DEQ), and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The scoping letter indicated that BLM would be available to meet with CTUIR and tribal staff to discuss any concerns regarding the proposed project. BLM did not receive a request for a meeting or any tribal concerns from CTUIR.

Internal scoping within the agency generated four important resource concerns: (1) potentially jurisdictional wetlands, (2) water resources, (3) Columbia spotted frog (*Rana luteiventris*) habitat, and (4) redband trout (*Oncorhynchus mykiss gairdneri*). Working closely with the BLM, Mineral Valley has amended the proposal to protect these resources. Effects analyses presented in Section 4 discuss potential impacts to project area wetlands, water resources, and habitat, in addition to all resources within Mormon Basin.

1.5 CONFORMANCE

The Proposed Action (Alternative 2) as described below is in conformance with the Baker Resource Management Plan (RMP) and Record of Decision (BLM 1989). The project area is located within the Pedro Mountain Geographic Unit of the Baker RMP. Major resources identified for the unit include minerals, forest, and wildlife; minor resources include range, watershed, recreation, and cultural. The singular locatable minerals objective for the Pedro Mountain unit is to “allow exploration and development on 23,809 acres of public land consistent with the ‘unnecessary or undue degradation’ standard (43 CFR 3809; Baker RMP Record of Decision, p. 69-72).”

2 ALTERNATIVES

There are three alternatives. Alternative 1 is a No Action alternative. Alternative 2 is the Proposed Action alternative which would provide for placer gold mining and processing. Alternative 3 is a combination of Alternative 2 with restoration of previous mining impacts.

2.1 ALTERNATIVE 1: NO ACTION

The No Action Alternative is a baseline for comparison of effects of implementation of either of the two Proposed Action Alternatives. It represents the condition and circumstances of the site should the Proposed Action not take place.

2.1.1 SUMMARY

Under the No Action alternative, mining would continue to take place on private land in Mormon Basin under the terms of the existing Oregon State DOGAMI permit. Private lands within the project area total 317 acres with up to 300 acres of disturbance in Sections 16, 17, 20 and 21, of Township 13 South, Range 42 East, Willamette Meridian. No testing would take place within the 152.5 acre portion of the proposed project area on public lands managed by BLM because testing has been completed in this area. The only activities on the BLM claims would be, use of the roads and use of a flexible 6-inch hose laid upon the surface from Reservoir #1 to the private land processing site in Section 16. However, small-scale mining activity could take place in the future outside the 152.5 acre portion of the project area administered by BLM.

The storage reservoirs, streams, Humboldt shaft, and domestic well would continue to be used as water sources. Heavy equipment would avoid direct impacts to wetlands and perennial streams, by maintaining at least a 20-foot unmined buffer adjacent to all wetlands and perennial streams. In addition, mining would not occur within five small areas within the 152.5 acre project area where the project hydrologist identified a risk for mining activity to increase or decrease spring and stream flows or to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers.

2.1.2 AREA OF NO ACTION

The area included in the No Action Alternative includes 152.5 acres of BLM claims located in Malheur and Baker counties in Sections 16, 17, 20 and 21, in Township 13 South, Range 42 East, Willamette Meridian. Existing roads, fords, and gullies would not be improved. Areas of bare rock piles and flat tailings within the proposed project area would remain in their current state.

2.1.3 EMPLOYMENT

Employment associated with Alternative 1 would include 2 to 3 miners working at each private land processing site, and an additional 4 or 5 miners conducting the excavation of placer gravels on private land; no miners would work within the 152.5 acres of BLM claims described above.

2.2 ALTERNATIVE 2: PROPOSED ACTION

2.2.1 SUMMARY

The Proposed Action involves placer gold mining of areas of known mineral values and processing of pay gravels at processing sites located on adjacent private land. Later in the operation, a processing plant would be installed on BLM administered claims near Reservoir #1 (described below in Phase 3). Heavy equipment would be used in the mining operation and in reclamation of mined out areas. Reclamation that is ongoing with the mining operations would result in only a minimum of ground being open at a given time. A maintenance shop located on BLM administered claims would be used. Roads would be improved, gravel would be hauled to the wash plants, and washed gravel would be hauled back to the excavations to refill them. The operation and reclamation is estimated to last 13 years.

2.2.2 AREA OF PROPOSED ACTION

The Proposed Action would take place in Sections 16, 17, 20 and 21, of Township 13 South, Range 42 East, Willamette Meridian. The elevation in the project area ranges from 4,800-5,200 feet above mean sea level; the highest elevations are near the headwaters of Basin Creek. The project area is comprised of 152.5 acres of BLM-managed public lands located within a 311 acre analysis area. In addition, 317 acres of private lands would be mined in conjunction with the Proposed Action. This EA focuses on impacts which would occur to the BLM-administered public lands. A discussion of cumulative effects resulting from past, present, and reasonably foreseeable future actions is included in Section 5

The project area on BLM-managed public lands is divided into three sites (Areas 1A, 2, and 3) totaling 152.5 acres (Figure 2). The private land parcels (Site 1, Figure 1) consist of approximately 317 acres adjacent to and surrounding the public lands managed by BLM on which the mining would take place. Site 1A is comprised of two centrally located parcels totaling 35.5 acres. Site 2 is 102 acres in the north and west of the project area. Site 3 is the most southeastern portion of the project area and is 15 acres. The mining area on the private lands would be limited without the ability to also mine the adjacent public lands due to the irregular boundaries of the patent which also encompass landlocked areas of BLM claims. In order to efficiently mine the private lands, portions of the BLM claims must be mined at the same time, resulting in a connected action Approximately 45 acres of potentially jurisdictional wetlands are located adjacent to and throughout the project area on both the private and public lands. These wetlands would be protected with buffers during the mining operation.

The mining area on the private lands would be limited without the ability to also mine the adjacent public lands due to the irregular boundaries of the patent which also encompass landlocked areas of BLM claims. In order to efficiently mine the private lands, portions of the BLM claims must be mined at the same time, resulting in a connected non-Federal action. Were mining not to occur on public lands, mining on the adjacent private lands would likely still occur; however, the Proposed Action and its effects would be likely be modified.

The connected non-Federal action cannot be prevented by BLM decision-making, but its effects can be modified by BLM-decision-making; therefore changes in the effects of the connected non-Federal action are analyzed as indirect effects of the BLM proposed action.

2.2.3 SEQUENCE – THE PHASES OF THE PROJECT

2.2.3.1 Summary of Phases

The operation is designed to take place in a logical and sequential manner. The first phase of the operation occurs when the mining sites are prepared for mining, roads are improved (Figure 4), and equipment is hauled in and maintained in the shop, while mining continues on private land. The second phase involves mining and ongoing reclamation on both private and BLM-administered public lands with processing occurring only on private lands. The third phase involves the addition of a wash plant on BLM managed claims. The fourth phase involves final reclamation. And finally, the fifth phase involves monitoring, and reseeding if necessary.

2.2.3.2 Phase 1

Phase 1 involves testing pay gravel to ascertain the gold value per cubic yard and continued mining on private lands with no exploration on BLM-administered public lands in the project area (testing in the public lands area is considered complete). Testing involves excavation of test holes and trenches to reveal the depth of the overburden, depth of the gravel and the values per yard of gravel processed. Once economic values are confirmed, additional excavation takes place on all sides of the test site to ascertain the width of the ore body. Small areas within the Basin, but outside the project area on BLM-administered public lands, may be tested in the future, and impacts of this reasonably foreseeable action are included in Section 5. The shop would be used during Phase 1 in support of the mining operation on private land and during preparation of mining sites on public lands. Phase 1 is expected to take place for several weeks during the first year of operation.

2.2.3.3 Phase 2

As shown in Figure 1, mining in Mormon Basin would take place on the adjacent private land and on the 102 acres of BLM-administered public lands within Site 2. Pay gravel from mining in these areas would be processed at the French Gulch or at the Section 16 private land processing facilities. In addition, 50.5 acres within sites 1A and 3 would be mined during Phase 2. Pay gravels from Sites 1A and 3 would be processed at the California Gulch private land processing facility. Approximately 45 acres of potentially jurisdictional wetlands (Appendix E, Figure 4) would be avoided during the mining operations on both the private and public lands. Mining activities would take place both east and west of Glengarry Creek and its associated wetlands; mining would also take place south of California Gulch and its associated wetlands. Mining activity traditionally takes place from spring through fall depending on road accessibility. Snowfall typically limits access in the winter.

During the Phase 2 mining activities, small parcels between 2 and 2.5 acres in size would be mined and reclaimed in an ongoing manner. Each parcel would be cleared of the overlying topsoil, cobble, and clay, which would be stockpiled separately for reclamation at the end of the season, or as that portion of the pit is mined out. These parcels would be 12 to 40 feet deep (average depth of 26 feet): six feet of topsoil, cobble, and clay plus up to 20 feet of gravel. In areas where minable gravel is less than 26 feet deep, additional surface area (up to 10 acres in the north part and 10.5 acres in the south part of the project area on BLM-administered public lands) may be disturbed in one season. Hillsides would be mined as benches from the top down. If an area within a parcel is determined to have reduced economic values after the initiation of mining and processing (such as when bedrock comes up and the deposit is too shallow to mine), that area would be immediately backfilled, topsoil would be replaced, and mining would shift to a different area within the parcel. Reclamation activities to be conducted concurrent with mining activities are discussed in Section 2.2.10. Phase 2 is expected to take place in project years 1 through 10.

2.2.3.4 Phase 3

Phase 3 includes continuation of the Phase 2 activities described above with the addition of a processing site at Reservoir #1 on the BLM-administered public land. Construction of this processing site would facilitate processing of placer gravels from the adjacent areas. Details regarding the location of the Phase 3 processing site are described in the PoO and the processing plant layout is depicted on the mining sketch 6A included in the PoO. Since installation of this processing site would entail additional surface disturbance, the reclamation bond with BLM would be increased as necessary. Phase 3 would take place in years 8 through 10.

2.2.3.5 Phase 4

Phase 4 allows for a 2-year period of final mining site reclamation activity after the mining activity is completed. The continued reclamation action would be the same as the reclamation activities to be conducted concurrent with mining activities in Phases 2 and 3 and is discussed in Section 2.2.10. Remaining topsoil, gravels, and tailings materials would be returned to the last of the pits. Areas of bare soil would be reseeded. In addition, mining equipment and temporary structures located on public lands would be removed. Phase 4 would take place in years 10 through 11.

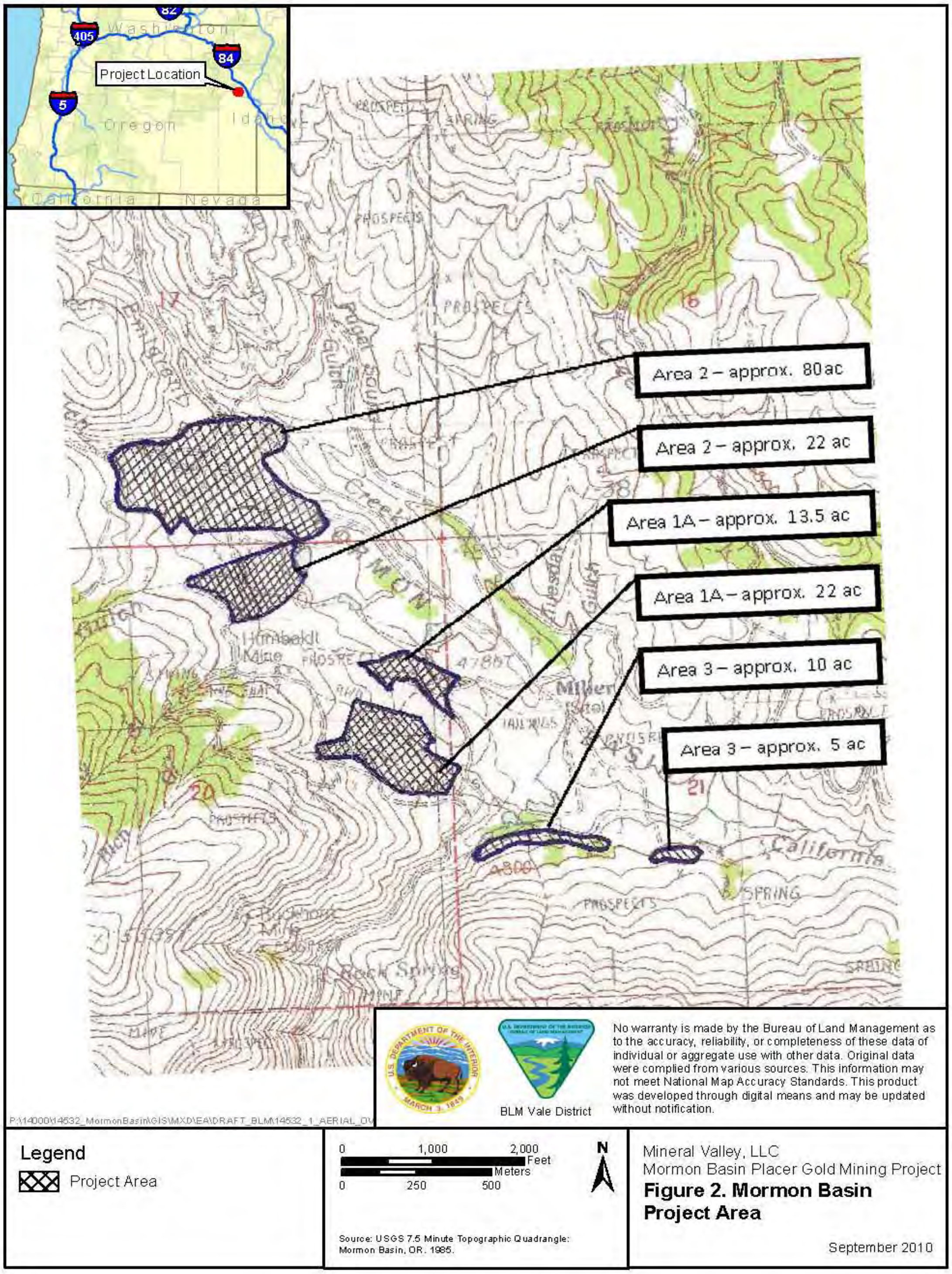
2.2.3.6 Phase 5

Phase 5 would be implemented as continued post-reclamation monitoring, with reseeding as necessary, following the completion of Phases 1 through 4. With ongoing reclamation occurring each project year, it is expected that Phase 5 activities would only involve the areas disturbed for mining during the preceding 2 years. It is anticipated that, by project years 10 through 13, the areas disturbed and reclaimed prior to the last 3 mining years would be adequately revegetated to productive grazing and forest lands. If BLM determines that additional monitoring is necessary, the project proponent is receptive to amending the Phase 5 timeline. Phase 5 is expected to take place during years 10 through 13.

Table 1. Schedule of Operations according to the Plan of Operations

Project Phase	Operation Years	Description
1	1	Exploration would continue on private land. On public lands: use of roads, placement of a hose to take water from Reservoir #1 to the Section 16 private land processing site, use of the shop, and preparation of public lands for mining.
2	1 – 10	Mining would take place in 2- to 2.5-acre parcels, plus overburden storage disturbance areas, as follows: Years 1-10: Site 2 Years 1-6: Site 3 Years 2-7: Site 1A The schedule can be revised as necessary.
3	8 – 10	Mining would take place in 2- to 2.5-acre parcels on Site 2. A processing plant will also be established on BLM claims at Reservoir #1 on 1.5 to 2 acres in the rock tailings area. Additional bonding may be necessary.
4	10 – 11	Final reclamation and equipment/structure removal.
5	10 – 13	Post-reclamation monitoring and reseeding would take place as necessary.

Figure 2. Mineral Valley mining area boundaries.



2.2.4 Equipment and Methods and Design Features

2.2.4.1 Mobile Equipment

Heavy equipment including an excavator on tracks, a D8-sized cat, two wheel-loaders with five yard buckets, and one or two 30-ton dump trucks would be used to mine the northern part of the project area from which gravel would be processed at the French Gulch or Section 16 private land processing sites. Eventually, an identical operation would be set up to mine and process gravel in the southern part of the project area at the California Gulch private land processing site. A road grader and water truck would also serve these operations. In addition, other vehicles and equipment such as pumps, welders, a generator at the shop, portable generators, a lowboy, a double-axle equipment trailer, four-wheel drive pick-ups, ATVs, and UTVs would be used on public lands in support of the mining operation.

2.2.4.2 Preparation

The camping area (to be located on private land), mining sites, and processing sites would be constructed and maintained to minimize visual impacts. Wherever possible, mining and processing sites would be screened from public view using mounds of washed rock tailings or by placing the processing facilities to take advantage of the existing topography to screen the site from view.

In the wide valley floor area, the land would be mined in strips that are approximately 100 to 200 feet wide and 300 feet long, paralleling the streams. All wetlands and perennial streams would be avoided during the mining operation and an undisturbed riparian buffer of at least 20 feet from the high water mark would be left on either side of the streams and around ponds, springs, and wetlands. The perennial sections of the following streams would be protected: Emigrant Creek, French Gulch Creek, Glengarry Gulch Creek, City Gulch, Rich Gulch, California Gulch, and Basin Creek. Ephemeral snow melt channels and ditches, which are dry during the mining season, would be mined after snowmelt and would be returned to their original configuration the same year they are mined.

Five small areas within the 152.5 acre project were identified by the hydrologist as having a risk for mining activity to increase or decrease spring and stream flows or to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers. These areas are described in the Supplement #3 to the Watershed Existing Condition Report, prepared by the project hydrologist on September 9, 2010. This supplement is included in Appendix D, and the supplement includes a map of these risk areas identified as Areas A, B, C, D and E boundaries on Map 2 in Appendix D). No mining would occur in these areas, and a 20-foot unmined buffer will be maintained adjacent to these areas, thus the risk of sediment entering the waters, or stream dewatering would be eliminated.

During preparation of the mining sites paralleling the streams, rocks and boulders on the surface would be pushed as far from the stream as is feasible. Overburden material, primarily clay, would also be stockpiled on the side of the excavation farthest from the stream. In some of the proposed mining areas there is almost no topsoil left. In the uplands and the few valley bottom areas that do contain topsoil, it would be stockpiled adjacent to the excavation and used as soil cover during reclamation. The shop would be used during preparation to store parts and mining supplies and to provide a secure, sheltered facility in which to conduct oil changes and maintain equipment.

A groundwater hydrology model was included on pp. 8-11 in the May 24, 2009 Supplement to Mormon Basin Placer Mine Watershed Existing Condition Report and Watershed Effects Report (Appendix D). Based on the groundwater model, groundwater would likely be encountered in excavations along the perennial streams, since water in test holes excavated as close as 30 feet from Glengarry Creek was observed and measured by Darden Engineering in 2008 and 2009. It was not necessary to pump the water out of these test holes in order to extract the placer gravels. Thus during the mining operation, there is no proposal to dewater the mining excavations. As the topography rises away from the stream, only minimal amounts of groundwater are expected to be encountered.

2.2.4.3 Excavation and Mining

Following site preparation, the excavator, loader, and cat would be used to mine and remove the placer gravel down to a maximum depth of 40 feet below the surface. Mining may take place from benches within the pit. Placer gravel may be dozed into the pit, where it would be loaded into a dump truck and hauled to the processing site, or an excavator may place material directly into the dump truck for haul.

Where mining is adjacent to a stream, the cut nearest to the stream would be maintained at a 1:1 or gentler slope.

Reclamation, which takes place concurrently with excavation of new ground, is a necessary part of the mining operation. As the mining operation moves ahead, breaking new ground, the mined out area would be backfilled with oversized, washed, gravel and clay substrate. Topsoil would be replaced and the reclaimed surface would be replanted. For a complete discussion of reclamation see 2.2.10 (Reclamation Plan). Rock outcrops, lode deposits, wetland areas, streams, springs, and ponds within the project area would not be mined.

Processing would take place on private land until Phase 3, when a processing site would be established on BLM land near Reservoir #1.

2.2.4.4 Wash Plant Equipment

The washing plants are mobile units consisting of 500 cubic yard per day trommel/sluice systems powered by generators. Each plant is fed placer gravel using a loader. The gravel enters a hopper which conveys measured amounts of gravel to the trommel. Each trommel uses about 600 gpm of water to wash and break up the gravels and separate the gold from the sand and rocks. Water used in processing enters a series of ponds within which the silt settles out of the water. The water is then reused over and over in the washing process (see 2.2.5, Water/Sediment Management). Deflocculating the process water in a properly designed pond system takes 24 hours. By having a three pond system and having approximately three days plant water operating volume, the deflocculating process is confined to the first pond. If there are variations in water flow or the processed gravels vary, some settling may occur in the second pond.

2.2.4.5 Design Features to Minimize Effects

The following design features have been incorporated into the Proposed Action to reduce and avoid adverse effects. Additional design features are also described in the PoO. All design features would be implemented as an integral part of both action alternatives.

Five small areas within the 152.5 acre project were identified by the hydrologist as having a risk for mining activity to increase or decrease spring and stream flows or to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers. These areas are described in the Supplement #3 to the Watershed Existing Condition Report, prepared by the project hydrologist on September 9, 2010. This supplement is included in Appendix D, and the supplement includes a map of these risk areas identified as Areas A, B, C, D and E boundaries on Map 2 in Appendix D. No mining would occur in these areas, and a 20 foot unmined buffer will be maintained adjacent to these areas, thus the risk of sediment entering the waters, or stream dewatering would be eliminated.

Wetlands and perennial streams would be protected with 20 foot non-disturbance buffers during the mining operation, and no direct wetland or perennial stream impacts from heavy equipment would occur. In addition, mining would not occur within five small areas within the 152.5 acre project area where the project hydrologist identified a risk for mining activity to increase or decrease spring and stream flows or to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers.

To minimize the potential for dewatering or sediment delivery to water bodies, mining near streams and wetlands would include the following procedure. Dig one or more small test holes with a backhoe or excavator to an appropriate depth beyond the minimum 20-foot stream/wetland buffer. Measure the depth from the original ground surface to the water table immediately after the hole is dug. Let the test hole(s) fill with water for 24 hours. Use a level and rod to measure the water surface elevation at the stream and adjacent hole, perpendicular to the stream, for each test hole test location. Record this information in a log book. Mark the test hole location(s) on a site map and put a site code on the map and in the log book. If the hole does not fill with water, or the original water level does not change, or the water level in the hole(s) is the same or higher than the stream, then mining may begin. After 24 hours, if the water level is lower than the stream, and water appears to be seeping out of the hole, and stream flow appears to be affected by this, the hole would be filled, and if stream water remains clear, 1 or more test holes would be dug another 10-20 feet away, with all procedures repeated, until a negligible effect is detected. Based on the results of this procedure, a new buffer width would be established between the upslope edge of the stream or wetland and the mining operation. Mining along streams would be conducted with the shortest footprint of the excavation along the stream and the longest side of the excavation away from the stream. Reclamation of these areas would be ongoing using washed gravel mixed with dried silt and sand that is removed from the settling ponds.

Water from the well near French Gulch would be used to maintain water levels in Reservoir #1, as required.

Fish screens and/or bypass devices would be installed and maintained at water diversion intakes to protect fish and frog tadpoles against injury or death resulting from entrainment. Fish screen and bypass specifications will be consistent with ODFW guidance (WRPPIT 2008), which generally follows National Marine Fisheries Service criteria (NMFS 1995).

Roads within the project area would be rocked or wet down when dust is problematic. If the roads are rocked with materials served from the claim a minerals material contract may be required by the BLM.

Access roads would be regularly maintained. Road maintenance will occur only within the existing road berm and any widening of roads on BLM land will require BLM authorization.

Surface disturbances, including widening of haul roads, would be reclaimed.

Cleared topsoil, cobble, and clay would be stockpiled separately for ongoing and/or end-of-season reclamation. To avoid promoting weed proliferation, stockpiled soils will be seeded with native species (squirreltail and Idaho fescue) and crested wheatgrass. Reclamation would include contouring slopes and replanting with the goal of establishing native vegetation.

A permit would be obtained for the burning of wood debris, such as brush and limbs on private land, and BLM crews would perform burning on public lands.

A permit would be obtained for the removal or placement of fill in jurisdictional waters, such as is described in Alternative 3 for road ford stabilizations and culvert removals and/or replacements, unless these activities meet the requirements of a Department of State Lands General Authorization and U.S. Army Corps of Engineers Regional General Permit or Nationwide Permit.

Cultural Resource sites 14532-10, 14532-11, 14532-16IF would be avoided or mitigated if additional testing determined them to be eligible for the NRHP.

Mining and processing sites would be screened from public view using mounds of washed rock tailings, or the processing facilities would be placed to take advantage of the existing topography to screen the site from view whenever feasible.

Seeding would take place using certified all states noxious weed free seed.

2.2.5 WATER/SEDIMENT MANAGEMENT

Water for processing would be supplied by the four existing reservoirs which have water storage rights under Certificate of Water Right HB-2153. The amount of water entitled to be stored and used each year under the water right is not more than 35.0 acre-feet, which is comprised of 20.0 acre-feet in reservoir 1, 4.0 acre-feet in reservoir 2, 8.0 acre-feet in reservoir 3, and 3.0 acre feet in reservoir 4. The reservoirs are filled using water out of Glengarry Creek, French Gulch Creek, California Gulch and Basin Creek under Certificate of Water Right 1574, priority date 1896 for 1.25 cfs and priority date 1909 for an additional 1.25 cfs and under Certificate of Water Right 1552, priority date 1863 for 2.0 cfs. Water from the Humboldt mine shaft can be used on 157 acres of private land under Certificate of Water Right 18635, priority date September 28, 1948 for 1 cfs. Certificates of Water Rights are included in the PoO in Appendix A. A water right has been applied for to use the domestic well on private land, the application number is G17310.

Settling/recycling ponds are used at the processing sites to receive muddy process water. These ponds would be sized at approximately 30’ x 60’ x 10’ each and, during Phase 2, all process ponds would be on private land. At each processing site, water from the settling ponds is pumped through the trommel into the series of settling ponds, and then recycled back through the trommel. There is no discharge of process water to streams or wetlands.

There would be three active settling/recycling ponds at each site and an additional two ponds where muddy process water, which cannot be recycled any more, would be pumped so that the active ponds can be refilled with clean water. Where a hydrocyclone or sand screw device is used, fewer ponds would be necessary. Mineral Valley has a mobile WPCF setting pond permit in place which can be used at any of the processing sites and has applied to DEQ for an individual WPCF setting pond permit to cover all the processing sites. Water for processing is supplied by three of the four existing storage reservoirs. Basin, Glengarry, and French Gulch Creeks, the Humboldt shaft, and a well also supply process water.

There is sufficient water to run for an 8 hour shift. The mobile wash plant would be a trommel fed by a metering grizzly/feeder combination. The tailings would be fed to a stacker conveyor. Gold will be processed through a 3 foot wide sluice box handling 3/8-inchgravels.Water is circulated through the trommel, and the sluice box at a rate of approximately 600 gpm. After the sluice, water is routed to a three pond system which consists of two settling ponds and a clean water pond, and from that point, the water is recycled back to the trommel. The ponds would be approximately 135,000 gallons each and would be approximately 30 feet by 60 feet by 10 feet deep. These would be pit type ponds with low berms.

Makeup water would be pumped intermittently at the rate of 150 gpm from a source along Glengarry Gulch. The average amount of water used for makeup will be approximately 60 gallons per minute if run on a continuous basis. This water would be transferred to the clean water supply pond. The pump would be operated on an “as needed” basis which maintains the clean water pond level with a freeboard of no less than two feet.

Total water at the plant would be used at the rate of 600 gallons per minute in a closed loop cycle. Makeup water would replace any water lost to evaporation.

The processing facilities would be located more than 50 feet from the active stream channels of Glengarry, French Gulch, Emigrant, Basin, and California Creeks. The large, stationary washing plant, which may be used on private land in the future, uses approximately 1,000–1,300 gpm of recycled water; the smaller mobile plants use about 350–600 gpm of water.

The settling ponds used in this operation would all be pit type ponds and there would be no discharge of process water. During an 8 hour day, up to 480,000 gallons of recycled water are pumped and re-pumped through the processing plant. The three ponds contain approximately one acre-foot of water each. Whether 1,000 cubic yards are processed at one location, or two 500 cubic yard plants are used at separate locations, most of the rock and gravel would be deposited in a pile beside the washing plant by using a conveyor belt system; silt and sand is deposited in a sediment trap pond. The sediment trap is usually cleaned out daily and this material is then stockpiled to dry. The settling/recycling ponds contain the muddy water but do not receive much solid material.

Above ground water supply and distribution lines would be used to transport water from the clean water supply reservoirs and on-site wells. The 6 inch existing hose takes Glengarry Creek water from Reservoir #1 on public lands east to private land. This line would have a “T” installed in year 8 of the operation, and another 50 feet of 6 inch line would provide water to the wash plant on public land immediately east of Reservoir #1 (See sketch in PoO). A generator would supply power to the wash plant, and an above ground MSHA-approved electrical line would run down to power the pump that would recycle water back up to the trommel from the third pond. The lines would be drained at the end of each season.

All stormwater is contained on site. Surface water drainage control would be accomplished by diverting storm water, isolating facility runoff, and minimizing erosion. All settling ponds would be contained within berms (MSHA requirement) and surface flows during wet weather and snow melt would be diverted around the facilities via shallow ditches constructed outside the bermed pond areas. Any leakage of water from the trommel and sluices would be isolated within the bermed area and diverted into the settling ponds. Rain that enters the ponds directly is contained in those ponds by maintaining at least two feet of freeboard. In the fall, settling ponds would be left dry, or have only minimal amounts of water in them, so when the snow that enters the pond areas melts in the spring, there is no chance of overtopping. By diverting surface flows around the facility, through vegetated ground or rock tailings areas, the potential for erosion is minimized.

2.2.6 Buildings and Ancillary Facilities

An existing privately owned structure on BLM-administered public land, an equipment maintenance shop, would be used during the Proposed Action. The existing building was constructed in 1957 and was determined not to be eligible for the National Register of Historic Places. No construction other than rewiring to bring it up to code to meet the Mine Safety and Health Administration regulations is needed to enable its use for the Proposed Action. The building would be used during Phases 2 and 3 of the operation. The shop building, which includes a parking area, would be used year-round for equipment and supply storage including concentrating equipment, hand tools, generators, pumps, and other small equipment.

Two lay down yards for pipe, scrap metal, and supplies would be located on private lands. Other ancillary facilities on public lands include generators, power lines (at the shop and at the processing site during Phase 3), road improvements, water supply ponds, and water supply lines (6 inch line going to Section 16 with a “T” and another 6 inch hose going to the processing site during Phase 3). Chemical toilets would be temporarily located on private and public lands near the active mining sites.

The Proposed Action includes establishing several facilities and implementing ground disturbing activities. A list of the general components and the acres of anticipated surface disturbance are listed in Table 2.

Table 2. Proposed Action components and disturbance area estimates.

Project Component	Disturbance Area Estimates (acres)		
	Public Lands	Private Lands	Total
Placer Plants	1.5*	4.5	4.5 – 6*
Equipment Maintenance Shop	2	0	2
Concentrate Processing Facility	0	1	1
Mine Office/Training/Eating Facility/Crew Housing	0	1	1
Clean Water Reservoirs	3	5	8
Ancillary Facilities	0	4	4
Disturbance to Potentially Jurisdictional Wetlands	0	0	0
Mining Operation	<152.5	<317	<469.5

*These estimated areas assume that Phase 3 of the Proposed Action is implemented.

2.2.7 EMPLOYMENT

Employment associated with the Proposed Action would vary during the life of the project. The project proponent would employ two to five miners at each processing facility. The mining operation would be conducted by an additional eight to ten miners. A manager and administrative staff would be employed throughout the length of the project. Crews would work 40-hour weeks, 8-10 hours a day.

2.2.8 ROADS AND PUBLIC ACCESS

The project area includes many existing roads (Figures 3a, 3b, 3c). Four-wheel drive vehicles and equipment such as excavators, dozers, loaders, backhoes, dump trucks, ATVs, and UTVs would use these roads as needed. Roads would be maintained including active dust abatement measures; they would be rocked and wet down as needed to control dust. These activities would result in additional disturbance in the project area.

Access to the project area is via Clarks Creek, Basin Creek, and Rye Valley county roads as well as the historic road system within the Basin that originally supported the mines of the late 1800s. This same system still supports current day mining operations. There are various mine access routes within the private and public lands. Crews would primarily use the Basin Creek road and all equipment haul would be via the Basin Creek road as the Clarks Creek road is narrow and has sharp corners.

During the mining phases on BLM-administered public lands (Phases 2 and 3), the area impacted by temporarily constructed access routes would be included in the bond for disturbance. Existing roads would be maintained by grading with a dozer or a road grader. Drainage features would be installed on haul roads according to standard engineering protocol and site specific conditions on the ground. The Baker County and Ironside Road Departments would be contacted if any county roads must be disturbed or plowed of snow. During certain operations to ensure public safety, the public would be provided alternate routes around the mining areas; however, BLM would still have access to these areas as needed for administrative purposes including use by forestry contractors and loggers. When the operation is completed, the original road system would be reestablished. The public would always be able to drive the county road through Mormon Basin, and from Mormon Basin they would always be able to drive Rye Valley Road to Rye Valley. Although mine access roads on BLM lands may be closed during certain operations to ensure public safety, the public would be provided with alternative access either on the County roads or on connecting roads on BLM lands. The public would be provided access to the old tailings piles and roads that are used by vehicles, motorcycles, and 4-wheelers for recreational purposes. The private road in Section 16 would be closed on private land, but the road would remain open where it is a BLM road on public lands. The public would be able to access Sunday Hill on the main BLM access road. Road access onto private lands would be limited in most areas to mining personnel.

Access routes would be constructed to the minimum width needed to bring in equipment, approximately 14 – 16 feet. The roads would be interconnected during the mining operation, so that dump trucks could haul the pay gravel to the closest road for haul to the processing site with various access routes through the mining areas. These temporary roads are located within the 152.5 acre project boundary and are shown on Figure 4. During reclamation of each section of ground, the temporary connecting roads would be obliterated and reclaimed to normal land contours along with the surrounding land being reclaimed to normal land contours. At the conclusion of the operation, the existing road system would be reestablished to the current road density and road width. Roads that have been improved with rocks and waterbars would be left in their improved condition. All temporary access routes and all newly constructed roads would be obliterated and reclaimed to normal land contours. There are road plans in place with Baker and Malheur counties which contain the details for conducting work on county roads. Limited details for construction of temporary access road design features such as water bars, rolling dips and construction of fords are included in the PoO. All temporary access routes would be located within the 152.5 acre mining area. Information regarding reclamation of road features is provided in Section 2.4.18.

Figure 3a. Mormon Basin road system.

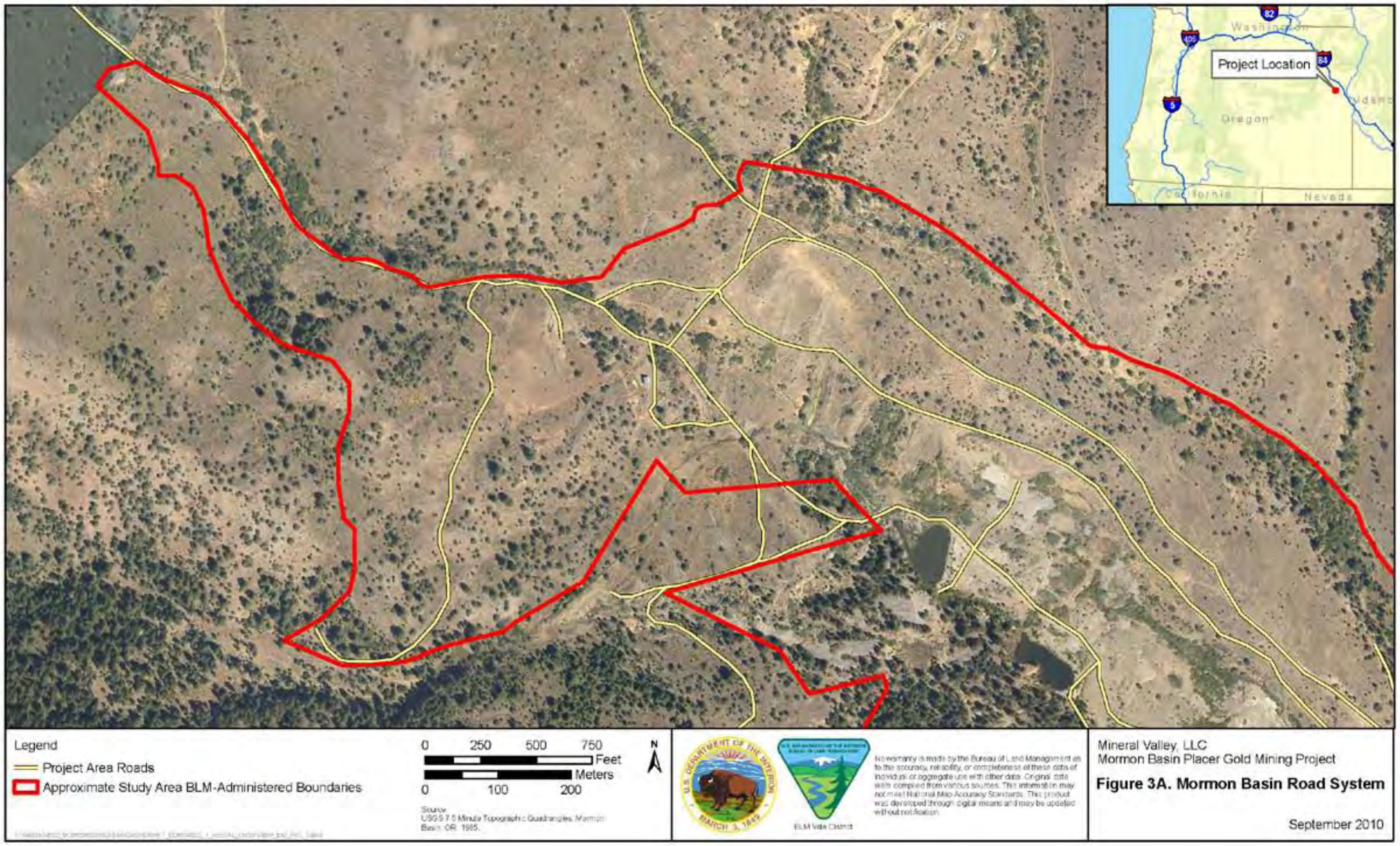


Figure 3b. Mormon Basin road system.

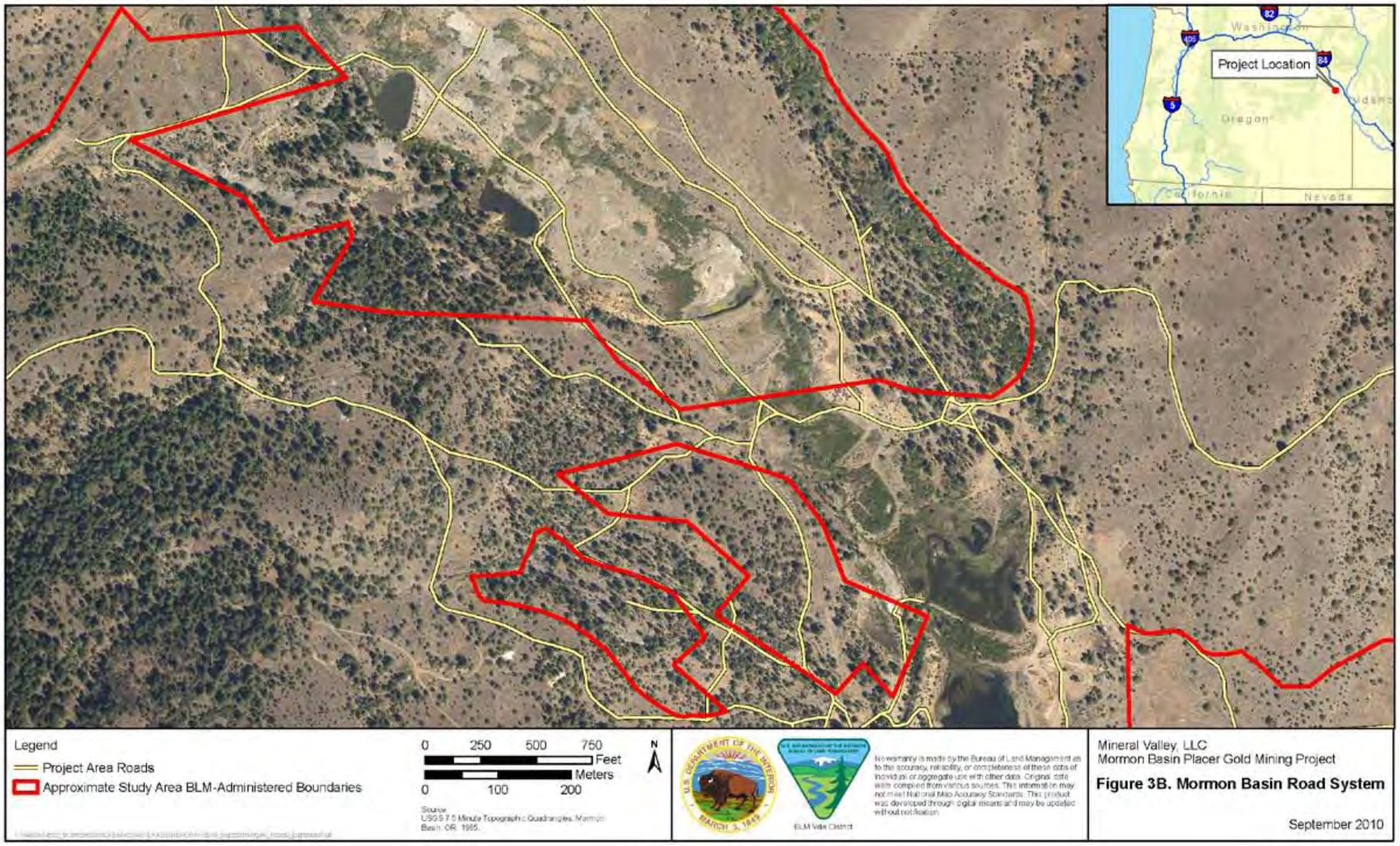


Figure 3c. Mormon Basin road system.

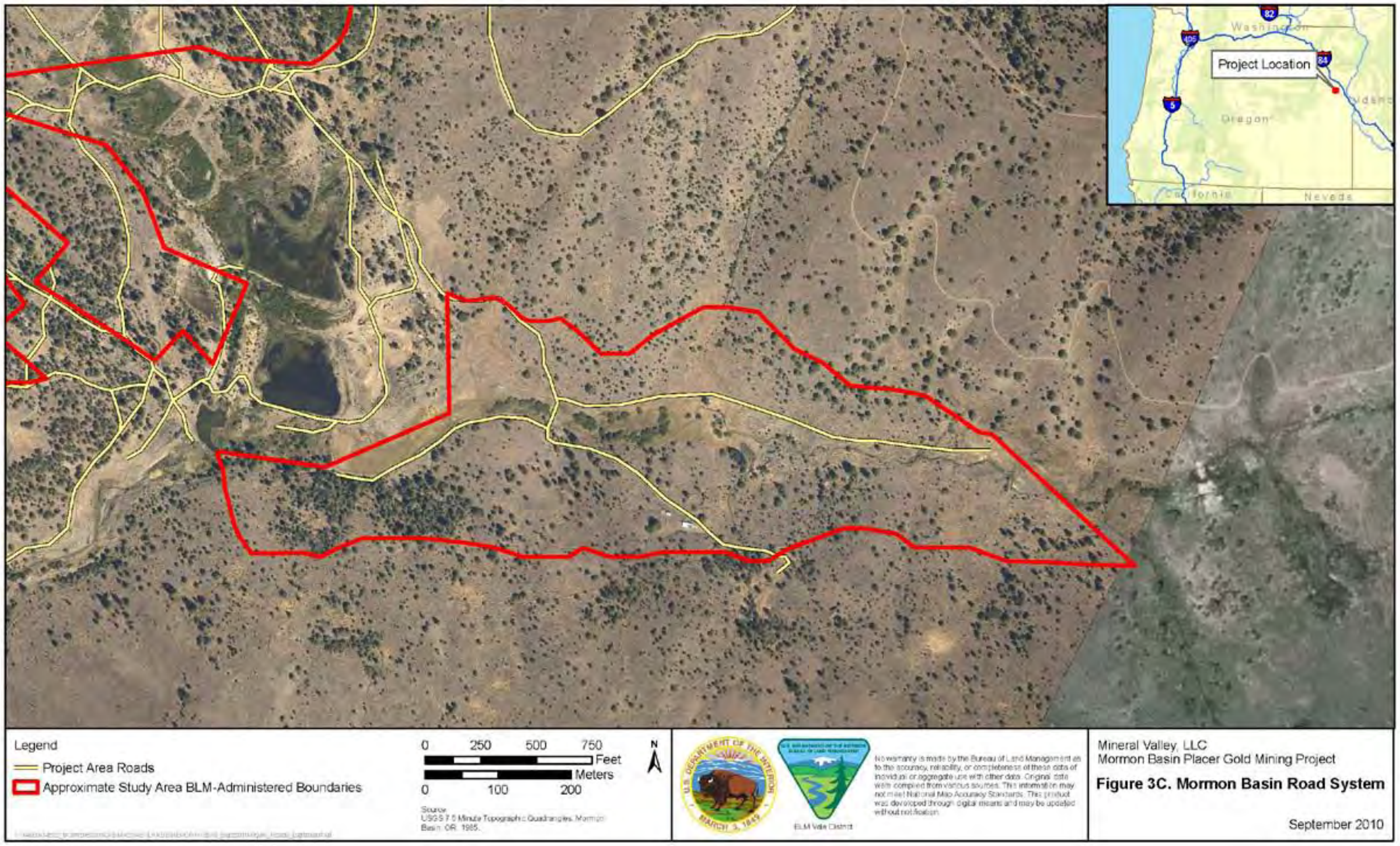
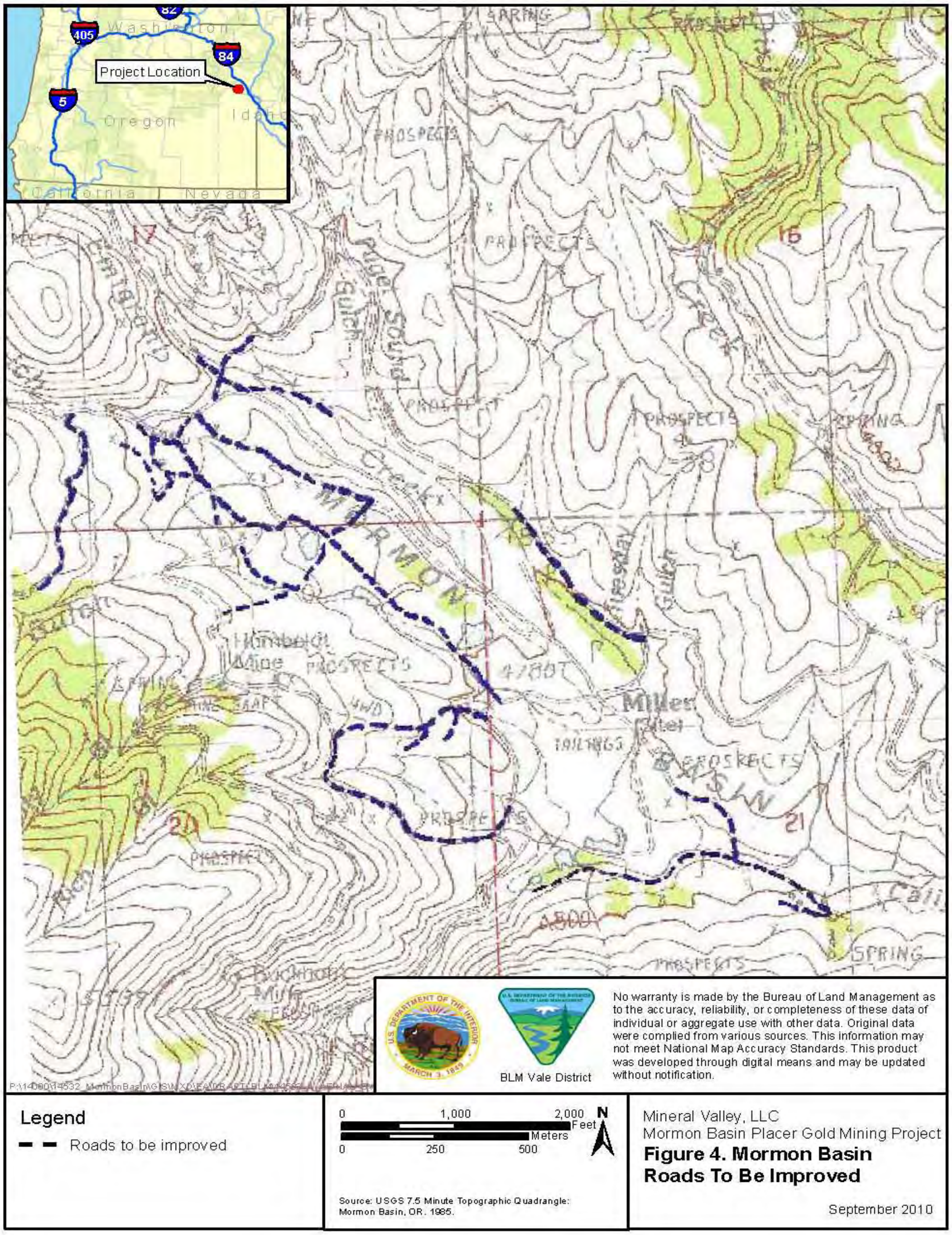


Figure 4. Mormon Basin roads to be improved.



2.2.9 Spill Prevention, Containment and Countermeasures

No hazardous and/or toxic materials are used in the proposed mining process. Fuel, oil, lubricants, used oil, brake fluid, antifreeze, and other products normally used in equipment maintenance would be located in the fuel storage area on private land. These products would also be located inside the equipment maintenance building on public land. Small amounts of these products would be transported to the mining sites daily via pick-ups and the service truck. No equipment would be refueled within close proximity (50 feet) of streams or wetlands. The Spill Prevention, Containment, and Countermeasures Plan is included in the PoO.

2.2.10 Reclamation Plan

Reclamation activities would be completed in accordance with BLM and DOGAMI regulations. BLM is responsible for preventing undue or unnecessary degradation of BLM-administered public lands, which may result from operations authorized by the mining laws and conducted under the BLM regulations (43 CFR 3809 and 43 CFR 3715). In addition, the State of Oregon requires that a reclamation plan be developed for mining projects on both public and private lands (ORS 517). Measures are included for dry draw head cutting rehabilitation, wildlife habitat enhancement, growth medium placement, weed control, and self-sustaining vegetation establishment.

Reclamation is planned so that mined out excavations are refilled with washed gravel as new ground is opened up. Any topsoil left stockpiled over the winter would be seeded with desirable grasses such as a mix of native squirreltail and bluebunch wheatgrass to minimize the potential for erosion or colonization by noxious weeds. If noxious weeds become established within the topsoil, the area will be treated with herbicide and the topsoil will not be used until the noxious weeds are eradicated. Implementing the project in this manner ensures that a minimum amount of ground is disturbed at any given time. In addition, areas reclaimed and replanted in the fall would be expected to have vegetation growth established by the following spring. The maximum amount of mining disturbance on public land would vary from 10.5 to 20.5 acres per year for Alternative 2 and 3.In the south part of the project area, the maximum mining disturbance per year would be 5.5 acres (comprised of 2.5 acres of stockpiles, 2.5 acres of excavated area and access routes, and a 0.5 acre pit south of California Gulch) The reclamation plan is described briefly below, and additional information is provided later in Section 2.

Final grading and reclamation of the valley floor east and west of the wetlands would be conducted, reshaping the area to blend in with the existing topography; topsoil or growth medium would be spread; and the area revegetated to BLM/DOGAMI standards. Settling ponds that hold water could be modified to provide improved amphibian habitat by creating a shallow shelf around the pond edges. At least some of the bare tailings areas would be covered with growth medium and revegetated using native grasses and shrubs. If revegetation is not successful the site will be reseeded. The second seed mixture may contain up to 2 pounds per acre of non-native grass seed which is consistent with Oregon Department of Fish and Wildlife (ODFW 2005) Small wet areas that are disconnected from streams and that are disturbed during mining would be restored to at least the same size wet area with the same type of vegetation, as required by BLM. The shop building would be removed by dismantling the structure and removing all metal and non-burnable building material from public lands. Boards will be piled for burning in the fall. The concrete foundation would be broken up and covered with soil. Noxious weeds would be controlled both during the mining operation and for three years following the operation (Phase 5 monitoring years 10-13).

Conifers with timber value would be cut and decked to BLM specifications and would be offered for sale by BLM. Mineral Valley has no need for timber; however, juniper trees and some of the timber removed from the uplands would be placed in a variety of locations during the reclamation process: on reclaimed areas to help stabilize the soil against erosion; in the head cuts at pond outlets to reduce further head cutting; or in the channels of reclaimed dry draws or ditches to slow flows during snow melt and minimize sediment delivery to intermittent gulches. The channels of dry draws would be rocked and left with dips in the bottom to reduce erosion. The highbars and hillsides would be left in a stable, safe, benched condition and the hillsides between benches would be sloped so that the hillside eventually blends in with the existing topography.

2.3 Alternative 3: Proposed Action PLUS Restoration of Previous Mining Impacts

2.3.1 Summary

All mining actions listed under Alternative 2 also apply to Alternative 3. Additionally, resource concerns caused by historic mining operations have been identified by the project hydrologist both within the project area and outside the project area (Figure 5 and the Existing Condition and Effects Reports in Appendix D). While remediation of the problem areas which lie outside the project area is not the responsibility of Mineral Valley, the company is willing to conduct some of the restoration of areas adjacent to where they are mining; in most cases, this work can be accomplished at little additional cost to the company. Alternately, BLM may hire independent contractors to do the work. Since these are BLM projects, not projects proposed by the mining company, BLM would be responsible for obtaining all necessary permits.

The restoration activities described in Alternative 2 do not change the proposed action in the PoO, (Alternative 2). The following restoration activities were identified as possible BLM projects by the Mineral Valley project hydrologist. These restoration projects are being analyzed so that if/when BLM has funding and/or partners, the restoration would take place. The restoration portion of Alternative 3 is not dependent upon BLM approval of the Plan of Operation.

2.3.2 Health and Safety

The health and safety restoration project components include:

- Removing the outhouse located near Glengarry Creek and filling the hole with clean gravel from adjacent piles, covering it with soil, and planting vegetation on the surface. This activity may include use of a backhoe or excavator.

- Removing debris, such as old car bodies, equipment, tires, and metal. This activity may include the use of a trailer or lowboy, excavator, backhoe, and/or pickup truck. Some equipment may be used off-road to access debris.

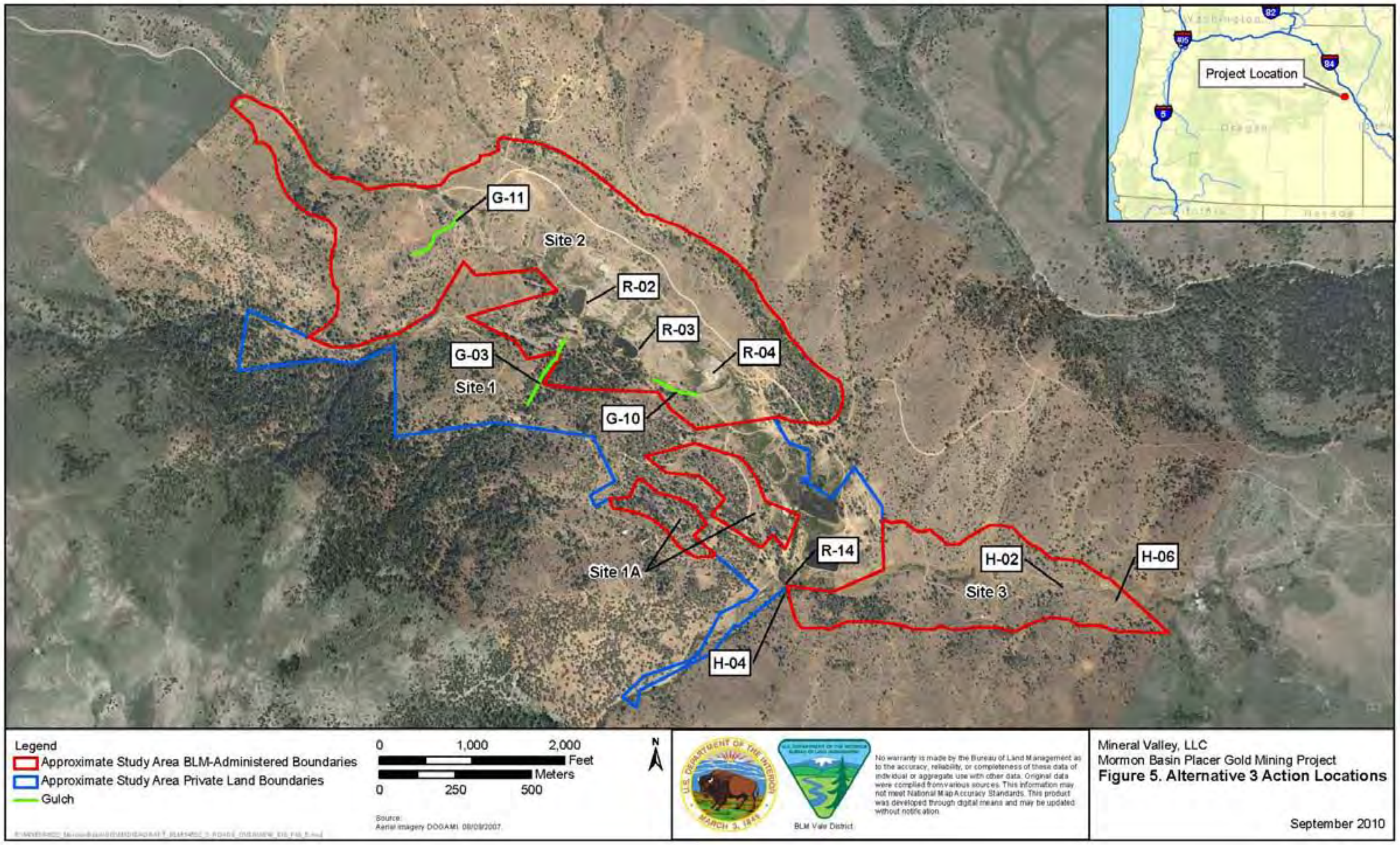
- Permanently closing the shaft near California Gulch by filling it with rock located near the edges of the opening, installing a wood cover, covering it with a soil layer, and reclaiming the area to BLM standards. The surface would be planted with vegetation. A cat or excavator would be used to refill the shaft and dried silt from the process ponds can be used as the growth medium.

2.3.3 Road Ford Stabilization

Many existing road fords in Malheur County, including those on BLM-administered lands, need to be repaired or hardened. This activity may require reshaping some fords with a grader, dozer, or backhoe. Hardening, where needed, would be accomplished with placement of suitable diameter rock obtained from existing rock spoil piles or washed rock from mining operations. Rock would be placed and compacted with a dump truck, backhoe, or excavator. Any road ford stabilization involving placement or removal of material below the ordinary high water mark of jurisdictional waters may require a wetland removal/fill permit from the Oregon Department of State Lands (DSL) and/or the U.S. Army Corps of Engineers (USACE).

Ford locations within the project area are on Glengarry Creek, a tributary to Glengarry Creek, French Gulch, and two intermittent unnamed streams. Ford locations outside the project area but within the Upper Basin Creek drainage area include Glengarry Creek as well as Sunday Hill Creek, Puget Sound Gulch, and Emigrant Creek.

Figure 5. Alternative 3 action locations.



2.3.4 Road Culvert Clean-out, Upgrade, or Replacement

All culverts within the project area are constricted or undersized for the stream flows they convey. These culverts need to be cleared of debris and sediment, upgraded with appropriately sized culverts, or replaced with hardened fords:

- Clean culverts – using hand tools, clean debris from the inlets and outlets of all culverts that would be left under roads. Cleared debris would be placed outside of the stream channel near the culverts. Continue to inspect and clear culverts every spring during the life of the operation.

- Upgrade culverts – replace all existing culverts with metal culverts appropriately sized to convey flow from a 100-year flood event. Some roadways at culvert sites would be raised by at least 2 feet to accommodate the larger diameter culverts, which would not be buried below the bed of the natural channel. A suitable source area for fill would need to be identified such as potential borrow sites in previously mined areas of public lands in lower Glengarry Creek. Culvert upgrades may require the use of a lowboy, stake-side truck, dozer, backhoe, dump truck, or excavator to remove and haul away the old culverts, deliver new culverts, excavate, and refill roads.

- Replace with hardened fords – construct hardened fords through the placement of suitable diameter rock obtained from existing rock spoil piles or washed rock from mining operations. This option would require the use of a dump truck, stake-side truck, dozer, backhoe, or excavator to remove the culverts and to reshape the sites into fords.

Road culverts within the project area are located on Emigrant Creek, Rich Gulch, and California Gulch. Culvert locations outside the project area but within the Upper Basin Creek drainage area include Emigrant Creek as well as Glengarry Creek.

Any culvert improvements involving placement or removal of material below the ordinary high water mark of jurisdictional waters may require a wetland removal/fill permit from DSL and/or USACE.

2.3.5 Road Drainage Improvement

Drainage along various roadways needs to be improved. For example, rain and snowmelt runoff entering roadways as overland flow would be diverted into natural channels. Roads would be cross-ditched appropriately to minimize road surface erosion while maintaining access. This activity may include excavation of earthen waterbars, placement of rock waterbars, or reshaping of the road surface into a rolling dip. Excavation or reshaping would be done with a grader, dozer, backhoe, or excavator. Placement of any rock would be done as described above in the Road Ford Stabilization section.

Road drainage improvement locations are on roadways throughout the project area and within the Upper Basin Creek drainage area as described in Appendix B.

2.3.6 STRUCTURAL WATERSHED IMPROVEMENTS

Potential structural watershed improvement projects are shown in Figure 5 and include:

- Increasing the height and width of the Reservoir R-02 dam and R-03 dam to a minimum of 2 feet higher and 8 feet wider than the normal high water mark is necessary to ensure that the water does not flow over the road during spring run-off. The outlet must also be cleared of brush to maintain the pond level. This work would take place on the existing road and would not increase the amount of water being stored, but would instead increase freeboard to two feet and ensure that the road does not wash out. No work is proposed in-stream and no fill or removal would take place in wetlands or waters; therefore, permits from DSL, Army Corps of Engineers and DEQ are not required. This may be accomplished by increasing the elevation of the road, which would require use of a dump truck and dozer, backhoe, excavator, or grader in upland areas. The source of fill would be local mine spoils or rock mixed with dried tailings from the project processing plant to bind the round rock material.

- Removing the outlet water control structure, buried outlet pipe, and buried overflow pipe from the Reservoir R-04 dam and stabilizing the Glengarry Creek channel and overflow channel with large rock. This activity would require use of a dump truck, lowboy or other truck, and dozer, backhoe, excavator, or grader. The source of rock would be local (east of the reservoir) or washed rock from the project processing plant.

- Stabilizing the City Gulch Creek gully at site G-03. This activity would require use of a dump truck, pickup truck, or backhoe to haul rock or wood and a backhoe to place the wood or rock. The rock source would be rock piles located west of the site. Wood is also available from downed trees adjacent to the site. A chainsaw would be used to cut wood to appropriate lengths so the logs could be fitted to contact the ground and the sides of the gully. A backhoe may be used to excavate keyways into the gully banks and bottom to place rock and wood or the channel may be lined with wood and rock, as appropriate, for erosion control.

- Stabilizing the gully on the steep headwall of a previously mined area, along with smaller rills and gullies, at site G-10, west of Reservoir R-04. This may include placement of earthen waterbars on old roads above the headwall to control runoff and reshaping the headwall or fill placement against the headwall to reduce the gradient. This activity would require the use of a dump truck or excavator to haul/move and place fill against the steep slope and a dozer, backhoe, or excavator to reshape the slope and fill. The fill source would be local mine spoils or rock and soil from the processing plant. The site would also be re-seeded with grass.

- Constructing an earthen barrier to divert flow and sediment from gully G-11 either to the north or to the south of the metal shed and west of either access road. This activity would require use of an excavator or backhoe. The channel may need periodic maintenance as sediment from the gully accumulates in the ditch.

- Planting bare rock tailings sites. The highest priority sites are in the Glengarry Creek drainage from the French Gulch Creek inflow downstream to the private land boundary. Where the rock layer is shallow, bare rock tailings may be removed until a suitable soil medium is encountered, or the tailings may be reshaped and/or covered with suitable soil medium. Revegetation may be accomplished by seeding and/or planting grass, other herbaceous plants, shrubs, and/or trees. Any reshaping or removal of rock or placement of soil medium would require use of a dump truck, excavator, dozer, or backhoe. Soil medium sources may include local mine spoils or dried silt and soil from the processing plant.

- Stabilizing head cuts with rock in upper California Gulch Creek at sites H-02 and H-06 and on Basin Creek at site H-04. Stabilization would require the use of a dump truck and excavator or backhoe to load, haul, and place rock and to shape the head cuts before rock apron placement. Rock apron design, including minimum rock size, would be provided by a BLM authorized representative. Source rock may include existing rock piles and rock from the processing plant. Equipment would travel off-road to access the stream channel. Stabilization at sites H-02 and H-06 could only be done with large diameter rock and site H-04 would require some temporary road construction, which would be obliterated when the project was completed.

2.4 BLM Policy Requirements Applicable to both Action Alternatives

2.4.1 Baker Resource Management Plan

As indicated in the Conformance section above (Section 1.5), all project activities would be in conformance with the Baker RMP for the Pedro Mountain Geographic Unit (Baker RMP Record of Decision, p. 69 – 72).

2.4.2 Plants and Wildlife

Prior to new exploration, excavation, or development under an amendment to this PoO, plant and wildlife surveys would be completed during proper seasons in any areas where BLM has identified special status species as occurring to determine absence or presence of special status or candidate species.

BLM actions in response to discovery of critical or sensitive biological resource values may include a variety of conservation measures including but not limited to project relocation, redesign, protective construction, or abandonment.

If BLM special status species are found before or during ground disturbing operation and maintenance (O&M) activities, the operator would immediately stop work and contact the BLM and/or USFWS to receive instruction on the buffer to be established around the species or population to protect them from mining activities. Activity within the buffer area would only proceed upon verbal or written authorization from the Authorized Officer.

At the direction of the BLM wildlife biologist, settling ponds that remain wet during the summer months would have shallow shelves constructed around the outside edge which would be left in place for amphibian use after mining terminates.

With the exception of emergency repairs, mining related activities in designated areas such as those near wetlands, ponds, streams, or within migratory bird habitat, may be modified or curtailed during sensitive periods for known locations of special status wildlife species (i.e. nesting and breeding periods). If site-specific breeding information is not available, activities in Columbia spotted-frog breeding habitat would be restricted from March 1 to May 31 and activities in migratory bird habitat restricted from March 1 through July 30. These seasonal work restriction windows may be shortened depending upon the results of wildlife surveys conducted prior to the start of the mining season each spring to determine the presence or absence of these species. Any revisions to seasonal work windows would be coordinated with BLM.

To avoid and minimize the possibility of unintentional take of migratory birds, the areas to be disturbed the following spring or summer would be cleared of vegetation the previous fall. This measure would prevent migratory birds from nesting within the area to be disturbed. If migratory birds do nest, then the nests may not be disturbed until the young have fledged and the nest is no longer used for the season.

New fences, if determined necessary by BLM, would be installed to BLM specifications with proper wire spacing and materials requirements necessary to allow safe passage of big game. All fences would be installed with wire stays to reduce incidence of entanglement and death and with a smooth wire bottom strand to reduce big game injury.

Mining operations would not convert wetland habitat to upland habitat through management activities including, but not limited to: water diversions, road construction, and maintenance.

Mining operations would not degrade wetland habitat or water quality for Columbia spotted frogs due to implementation of the following:

- Where possible restore wetlands for Columbia spotted frog. Digging in channels would be for restoration purposes only and would require protection of Columbia spotted frogs.

- Best management practices would be implemented to prevent commercial road use, including hauling/blading by mining equipment, from contributing to siltation off the road into Columbia spotted frog habitat.

- Do not allow in-channel, in lake, or shoreline digging where removal of substrate occurs or significant disruption where Columbia spotted frog spawning or rearing habitat occurs (e.g., in-stream gravel mining or dredging).

- Activities will not reduce the amount of vegetative cover to the point of creating streambank instability. Maintain 90 percent streambank stability for Columbia spotted frogs.

- In reservoirs which can provide Columbia spotted frog habitat, allow maintenance or development of shallow water habitat with emergent vegetation through July to provide egg laying and development.

- Limit activities within the Riparian Management Areas to those that have either a neutral or beneficial effect on aquatic objectives. Timing of those activities will be outside Columbia spotted frog egg laying/hatching for that area. If not known, restrict activities from March 1 to May 31.

- Habitat connectivity will be maintained through properly functioning streams, marsh, in stream, and floodplain vegetation. Restore native sedges, rushes, and willows and protect Columbia spotted frog.

2.4.3 INVASIVE SPECIES

Noxious weeds and other invasive plants would be aggressively treated annually in the spring and fall where they threaten quality wildlife habitat and other biological resources. BMPs to prevent infestations from occurring would be applied. Noxious weed inventories, treatments, including the use of herbicides and applicators approved by BLM, and monitoring would continue for the duration of the project. To reduce the spread and possible introduction of noxious weeds, machinery and off-road vehicles used during mining related activities would be cleaned off site prior to the start of ground disturbance.

2.4.4 WATER QUALITY BMPS

Waterbars and drainage control measures would be installed on haul roads. All settling ponds would be contained within berms (MSHA requirement) and surface flows during wet weather and snow melt would be diverted around the facilities via shallow ditches constructed outside the bermed pond areas. Any leakage of water from the trommel and sluices would be isolated within the bermed area and diverted into the settling ponds. Rain that enters the ponds directly is contained in those ponds by maintaining at least two feet of freeboard. In the fall, settling ponds would be left dry, or have only minimal amounts of water in them, so when the snow that enters the pond areas melts in the spring, there is no chance of overtopping. By diverting surface flows around the facility, through vegetated ground or rock tailings areas, the potential for erosion is minimized

2.4.5 RANGE

To improve the success of restoration of livestock range areas, livestock grazing would be excluded from reclaimed areas for 3-5 years consistent with the 1989 Resource Management Plan. Fencing to exclude cattle would be constructed to BLM specifications and proper wire spacing would be used to facilitate wildlife passage including a smooth bottom wire.

Range permittee access would not be impacted.

2.4.6 PUBLIC ACCESS

During the project, public access to and upon the roads and public lands within the project area would not be impacted or restricted except where necessary to provide for all lawful purposes. The exception would be those specific areas designated as restricted by the Authorized Officer in order to protect the public health and safety. Additionally, the Authorized Officer has the authority to restrict uses and access as necessary to protect resource values.

2.4.7 RECLAMATION

Seeding of all areas disturbed under this PoO would take place utilizing the seed mixture recommended by BLM and included in Section 2.4.15. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)/acre. The seed will be certified "all states noxious weed free". Viability seed testing would be done in accordance with State standards prior to purchase. Commercial seed would be either certified or registered seed. The seed mixture container would be tagged in accordance with State law and available for inspection by the Authorized Officer.

2.4.8 PUBLIC HEALTH AND SAFETY

Any excavations or ponds created that have a steep entrance would be tapered or sloped to reduce hazards.

Any new water developments (i.e., temporary settling ponds) would have limited potential for providing mosquito breeding areas, since the water moves through the ponds and is recycled back to the wash plant in a continuous cycle. In addition, the water will contain silt, which minimizes use by mosquitoes.

Mine operators would comply with all applicable state and federal safety laws and regulations including those issued by the Mine Safety and Health Administration (MSHA).

Mine operators would comply with all aspects of the Spill Prevention, Containment, and Countermeasures Plan including measures to insure against equipment leaks near or above waterways.

2.4.9 OCCUPANCY

BLM would encourage the use of flat-lying areas with low erosion potential as the preferred site for all facilities.

All operations would be kept clean and free of debris and would provide a safe environment for mine employees and other public land users. All operations would strictly adhere to MSHA regulations.

Petroleum products (not fuel) would be stored inside the shop on public lands, and would consist only of those chemicals and petroleum products essential for mining, maintaining equipment, and processing.

Public lands and public entry would not be restricted or closed unless necessary to ensure public health and safety.

All land would be reclaimed according to the BLM *Solid Mineral Reclamation Handbook* (H-3042-1).

The use of the shop would conform to federal and state environmental standards, all needed permits would be in place, and a financial guarantee would be posted before any use of the shop for maintaining equipment takes place.

2.4.10 STAGED RECLAMATION BOND

The reclamation bond amount would be in concurrence with 43 CFR 3809 regulations and IM OR-2009-032 and based on the systematic and phased operation designed to take place over a 10 – 13 year time-span. Bonding would include both ground disturbance and eventual removal of the shop structure, which would be used in support of the mining operation. If mining areas are increased in size, and if two mining shifts are instigated, the life of this operation would be shortened. Under this PoO, mining is planned of areas in which economic values in gold are verified. Exploration of other areas within the analysis area, where values are not yet confirmed, would take place as time allows, under a separate PoO amendment, and the reclamation bond for that testing would be separate from the bond for the mining operation.

The reclamation bond for mining on 217 acres of private land has been posted with DOGAMI and is based on five acres of mining disturbance at a given time near each processing site Reclamation of mined areas would be ongoing. As the mining operation moves onto public lands, additional bond would be posted to cover the part of the operation on BLM claims. The bond would be increased during phase 3 when a processing site is located on BLM claims.

2.4.11 ONGOING RECLAMATION OF MINING SITES

Complete details of the reclamation plan are described below in Phase 4 – Continued Reclamation on Public Lands. A brief summary is provided here.

Once each 2.5- to 5-acre area is mined out, the excavation would be filled in with the oversized, washed gravel and clay overburden by pushing the stockpiles over the surface, beginning at the end that is mined out. In areas where topsoil was present prior to mining, topsoil would be separately stockpiled and replaced on top of the gravel and clay overburden. For areas where no topsoil was present, as silt and sand is cleaned from the settling ponds and stockpiled to dry, this material would be used as topsoil. Ultimately, the area would be reclaimed to pre-disturbance contours, topsoil replaced, and the excavation expanded into new ground. As the new area is excavated, the overburden would be stockpiled upslope of the excavation and seeded with native squirrel tail to prevent erosion, and mining and reclamation would take place as described above.

All reservoirs, ponds, wetlands, and perennial streams would be protected with a minimum 20 foot non-disturbance buffer. Existing riparian vegetation around the ponds and along the perennial streams will provide stream shade, bank stabilization, and a seed source for willow and alders to grow in the reclaimed areas where the water table is high enough to support these species.

Once the gentle hillsides paralleling the creeks and wetlands have been mined and reclaimed, another strip adjacent to, and upslope of the first one, would be mined.

2.4.12 Reclamation Plan

Reclamation activities would be completed in accordance with BLM and DOGAMI regulations and the reclamation plan included in the PoO. The valley floor east and west of the wetlands would be reshaped to blend in with the existing topography, topsoil or growth medium would be spread, and the area would be revegetated to BLM/DOGAMI standards. At least some of the bare tailings areas would be covered with growth medium and revegetated. Small wet areas that are disconnected from streams and are disturbed during mining would be restored to at least the same size wet area with the same type of vegetation, as BLM requires.

Junipers and other timber removed from the uplands may be placed in a variety of locations during the reclamation process: on reclaimed areas to help stabilize the soil against erosion; in the head cuts at pond outlets to reduce further head cutting; or in the channels of reclaimed dry draws or ditches to slow flows during snow melt and minimize sediment delivery to intermittent gulches. In-stream placement of wood would be at the direction of BLM. Timber in excess of the reclamation needs would be sold by BLM in a separate sale. The channels of dry draws would be rocked and left with dips in the bottom to reduce erosion. The highbars and hillsides would be left in a stable, safe, benched condition and the hillsides between benches would be sloped so that the hillside eventually blends in with the existing topography.

2.4.13 Measures to Prevent Unnecessary and Undue Degradation

All areas disturbed or modified under this operating plan would be reclaimed in accordance with performance standards described in 43 CFR 3809.420 and Oregon mining, water quality, and air quality regulations. Specific measures that would be taken during operations and at closure of the mining operations include the following:

1. All regulated components of the facility would be designed and constructed to meet or exceed BLM and DOGAMI design criteria;

2. All pits, tailings settling ponds, and dewatering ditches would be properly backfilled and contoured;

3. All regulated wastes would be managed according to relevant regulations;

4. Surface disturbance would be minimized;

5. Fugitive dust emissions from disturbed and exposed surfaces would be controlled;

6. Surface water drainage control would be accomplished by diverting storm water, isolating facility runoff, and minimizing erosion;

7. Where suitable as a growth medium, surface soils and alluvial material would be managed as a reclamation resource and removed, stockpiled, and replaced during reclamation;

8. To minimize the potential for dewatering or sediment delivery to affect water bodies, the following procedure would be implemented for mining near streams and wetlands. Dig one or more small test holes with a backhoe or excavator to an appropriate depth beyond the minimum 20-foot stream/wetland buffer. Measure the depth from the original ground surface to the water table immediately after the hole is dug. Let the test hole(s) fill with water for 24 hours. Use a level and rod to measure the water surface elevation at the stream and adjacent hole, perpendicular to the stream, for each test hole test location. Record this information in a log book. Mark the test hole location(s) on a site map and put a site code on the map and in the log book. If the hole does not fill with water, or the original water level does not change, or the water level in the hole(s) is the same or higher than the stream, then mining may begin. After 24 hours, if the water level is lower than the stream, and water appears to be seeping out of the hole, and stream flow appears to be affected by this, the hole would be filled, and if stream water remains clear, 1 or more test holes would be dug another 10-20 feet away, with all procedures repeated, until a negligible effect is detected. Mining along streams would be conducted with the shortest footprint of the excavation along the stream and the longest side of the excavation away from the stream. Reclamation of these areas would be ongoing using washed gravel mixed with dried silt and sand that is removed from the settling ponds.

9. A reclamation plan would be implemented which addresses earthwork and contouring, revegetation and stabilization, and monitoring operations necessary to satisfactorily reclaim the disturbance including: roads, building sites, power lines, fences, water lines, settling ponds, and mining disturbance.

2.4.14 Growth Medium

Topsoil and growth media from sediment deposited in settling ponds would be stockpiled at or near the processing sites for later use in reclamation. The materials in excess of the excavation reclamation needs would be used to enhance bare rock tailings areas. Soils from road construction would be stockpiled as berms. Soils from previously undisturbed areas and suitable growth media salvaged prior to excavating would be stockpiled near the site from which it is removed. This would minimize the distance that topsoil/growth media must be moved, as concurrent reclamation is conducted.

2.4.15 Revegetation Procedure

During final reclamation, suitable growth medium would be placed over the surface of areas that were disturbed during the mining operation. If the growth medium has become compacted while stockpiled, it would be loosened prior to replacement in an attempt to reduce soil compaction and move toward the pre-disturbance bulk densities. Controlled dozer tracking may be performed during placement of the growth medium as a means to roughen the surface, lightly compact the soil, increase water retention, and prevent erosion.

1. Compacted surfaces would be loosened and left in a rough condition by disking, followed by dozer tracking or other acceptable methods.

2. The prepared surfaces would be seeded using the mixtures and seeding rates previously approved by the BLM and DOGAMI (Tables 3a and 3b). Pending the results of the concurrent reclamation, changes to seed mixes and rates may be implemented following approval by the appropriate agencies. Seeding would be performed using a rangeland drill or by broadcasting and chain harrowing unless precluded by geographic controls. The first year an early seral perennial grass (i.e. squirrel tail) would be seeded, and later seral species identified in Table 3a would be seeded the following year. Trees would be reestablished by planting seedlings grown from a seed source that is appropriate for the elevation and climate of Mormon Basin and would be approved by BLM.

3. If natural drainages cross reclaimed slopes, the natural drainage channel would be re-established and best management practices (BMPs) would be implemented.

Table 3a. Proposed revegetation seed mixture.

Scientific Name	Common Name	Pure Live Seed (lb/acre)
Pseudoroegneria spicata ssp. *spicata*	bluebunch wheatgrass ("Secar" variety)	7
Festuca idahoensis	Idaho fescue	3
Purshia tridentate	bitterbrush	2
Sitanion hystrix	squirreltail	3
Leymus cinereus	Great Basin wildrye	2
Poa secunda	Sandberg's bluegrass ("Sherman" variety)	2
Bromus carinatus	mountain brome	2
Lupine sericeus	silky lupine	1
Achillea millefolium	yarrow	1
	Total	**23.0**

Table 3b. Proposed revegetation trees

Scientific Name	Common Name	Trees (# per acre)
Pinus ponderosa/ Pseudotsuga menziesii	Ponderosa pine/ Douglas-fir	302
	Total	**302**

2.4.16 Control of Non-native Species

The proposed surface disturbance would create conditions favorable for invasive species establishment. Noxious weeds such as knapweed would be controlled using herbicides on both private and public lands. On the public land, BLM policy for weed control would be implemented, including washing equipment off-site to minimize noxious weed spread. Desirable species of grass, shrubs, and trees would be planted with the intended goal of current plant densities being achieved over time and planted species out-competing noxious weeds.

2.4.17 Interim and Concurrent Reclamation

Interim reclamation is temporary reclamation completed on lands disturbed during operations. Although not at final reclamation contours, interim reclamation provides temporary stabilization. Areas that are temporarily reclaimed would be disturbed again at a later project stage and therefore would undergo concurrent or final reclamation during a later project year. For example, areas that are likely to require interim reclamation may include cut and fill slopes along some roads.

Concurrent reclamation is a major component of the Proposed Action. Backfilling excavation pits would be conducted as part of the ongoing mining process and contouring and seeding would be conducted at the end of each mining season.

2.4.18 Reclamation of Road Features

All constructed temporary roads would be obliterated and reclaimed when the surrounding land is reclaimed to normal land contours. Any damage to existing roads that was caused by the operators would be repaired at project conclusion. Likewise, any widening and/or improvement of access roads would be reclaimed at the conclusion of operations. In some cases, repair or reclamation of roads may occur in an ongoing manner. Steep sections of roads, or roads BLM identifies as potential erosion hazards, would have waterbars installed or would be contoured with rolling dips as necessary. Equipment access ways would have waterbars installed and/or would be scarified to reduce soil compaction, where needed. All reclaimed areas would be seeded with a BLM-approved seed mix on public lands, and DOGAMI-approved seed mix on private lands. The road system in the BLM-managed portion of the project area would be similar to the road system that existed before the Proposed Action.

2.4.19 Post Mining Land Use and Reclamation Goals

Major resources identified for the Pedro Mountain Geographic Unit include minerals, and wildlife; minor resources include range, watershed, recreation, and cultural. Major land uses in the project area include livestock grazing, forests and forestry, wildlife habitat, dispersed recreation, and mineral exploration and development. Following mine closure, the project area would support these current uses. All post-closure land uses would be in conformance with the BLM Baker RMP and the Malheur and Baker County zoning ordinances. The reclamation program objectives are:

- To minimize erosion damage and protect water resources through control of water runoff;

- To establish surface soil conditions conducive to stable plant community regeneration through stripping, stockpiling, and re-applying soil material of suitable densities;
- To revegetate disturbed areas with a diverse, self-perpetuating plant species mixture in order to establish long-term productive plant communities and species composition compatible with existing land uses; and
- To maintain public safety by stabilizing or limiting access to land forms that could constitute a public hazard.

The final grading plan for the Project is designed, in part, to minimize the visual impacts of unnatural lines and forms. Slopes would be graded to blend with surrounding topography, interrupt straight-line features, and facilitate revegetation. The sideslopes would be graded and variable slope angles established to resemble natural landforms and to comply with OAR §632030-0027(1)(2). The roads would be graded to blend with the surrounding topography. All tailings settling ponds would be backfilled and graded to blend with the surrounding topography. The mined areas would be backfilled as part of the mining operation. These areas would be contoured to promote drainage within the gulches. The reclaimed area would include the width of the gulch plus approximately 50 feet on both sides of the mine disturbance to allow blending of the mine disturbance with existing topography and to address some of the historic mining disturbance. Due to the mining process, the post-mining contours would resemble the pre-mining contours. Essentially all of the excavated material, minus the gold particles, would be returned to the excavated areas.

2.4.20 Reclamation Constraints

Reclamation time may be influenced by many variables including but not limited to weather constraints. The time estimate for completing reclamation assumes that average weather for the area prevails. Unusual weather events of any type could extend the time needed to implement reclamation. Each mining area that is mined out and reclaimed that season would be contoured before the onset of winter. Seeding would be conducted as soon as the earthwork has been completed, generally during late fall. Any earthwork or seeding that cannot be done prior to winter would be completed the following spring. Seeding and tree planting may be delayed until the following fall to take advantage of fall and winter moisture and to allow seedlings to mature prior to out-planting.

2.4.21 Surface Water Sediment Control

Surface waters would be protected during this operation. Flat areas near streams would be reclaimed and revegetated before upland areas are mined. In doing this, a wider vegetated buffer would exist along the streams when the hillside mining takes place. The goal is to protect water quality and fish habitat. All reclamation would be designed to limit erosion and soil movement.

2.4.22 Disposal of Ancillary Facilities

Once mining is complete and structures (i.e., maintenance shop, chemical toilets, pole and tarp structures for small processing equipment, etc.) are no longer necessary to support the mining operation, they would be dismantled and materials would be salvaged and removed from the site. Concrete foundations would be broken up and buried in place in such a manner as to prevent ponding and to allow vegetation growth. Reclamation of the areas where the buildings were located would entail scarification and revegetation. Reclamation would proceed within 90 days unless an extension was approved by BLM.

2.4.23 Post Reclamation Monitoring

Mineral Valley would monitor all reclaimed facilities for a minimum of three years after the cessation of mining, except for areas for which concurrent reclamation has been completed and the reclamation has been approved by BLM and DOGAMI. Post reclamation monitoring and maintenance would include annual inspections of all surface features, including roads, mined areas, building sites, ponds, etc. The sites would be inspected for visible signs of erosion (rills and gullies). Vegetation monitoring would be conducted to determine if the vegetation percent cover and species variety meet the vegetation standards.

2.5 Summary of Alternatives

Table 4 provides an at-a-glance summary of the various actions by alternatives.

Table 4. Summary of actions by alternative.

COMPONENT	ALTERNATIVES		
	1	2	3
Mining			
Site 1 (317 acres private land, minus the wetlands)	X	X	X
Sites 1A, 2, 3 (152.5 acres BLM) – Phase 2 (years 1-10)		X	X
Processing Sites			
Site 1 (6 acres private land)	X	X	X
Sites 2 (1.5-2 acres BLM) – Phase 3 (years 8-10 or earlier)		X	X
Ongoing Reclamation			
Site 1 (317 acres private land)	X	X	X
Sites 1A, 2, 3 (152.5 acres BLM) – Phases 2 & 3 (years 1-10)		X	X
Final Reclamation			
Sites 1A, 2, 3 – Phase 4 (years 10-11)		X	X
Equipment & Structure Removal			

COMPONENT	ALTERNATIVES		
	1	2	3
Sites 1A, 2, 3 – Phase 4 (years 10-13)	X	X	X
Monitoring & Reseeding			
Sites 1A, 2, 3 – Phase 5 (years 10-13)		X	X
Road Access for Mining Activities			
Private Roads (2.8 miles) (outside project area)	X	X	X
Roads on BLM (6.9 miles) (includes county roads)	X	X	X
Exercise of Water Rights			
Private lands	X	X	X
Public lands	X	X	X
Forest and Woody Debris Management			
Forestland (10 acres) to be mined, deforested, burned(piles), seeded, replanted, and reclaimed with woody debris		X	X
Health and Safety			
Remove old outhouse			X
Clean-up and remove old equipment, old car body, tires, metal, etc.			X
Cover and fill the shaft near the clean-up shed on California Gulch			X
Road Maintenance			
Stabilize existing road fords on haul roads			X
Stabilize up to 14 existing road fords		X	X
Clean out, replace or remove culverts on haul roads		X	X
Clean out, replace or remove up to 10 (not haul road) culverts			X
Improve drainage of segments of haul roads		X	X
Improve drainage of up to 29 other road segments			X
Wildlife			

COMPONENT	ALTERNATIVES		
	1	2	3
Maintain riparian health		X	X
Structural Watershed Improvements			
Increase height and width of Reservoir R-02 dam			X
Increase height and width of Reservoir R-03 dam			X
Remove outlet water control structure, buried outlet pipe and buried overflow pipe from Reservoir R-04 dam; stabilize Glengarry Creek and overflow channels			X
Stabilize the City Gulch Creek gully at site G-03			X
Stabilize gullies and rills on steep headwall of previously mined area at site G-10			X
Construct earthen barrier to divert flow and sediment from gully G-11 to north or south metal shed		X	X
Vegetate bare rock tailings		X	X
Stabilize head cuts in upper California Gulch Creek at sites H-02 and H-06 with rock			X
Stabilize head cut of Basin Creek at site H-04 with rock			X

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

No other alternatives were developed for consideration.

3 AFFECTED ENVIRONMENT

This section describes the existing environment of the proposed project area and how it may be affected by the Proposed Action. Table 5 summarizes the elements of the human environment that must be considered according to statute, regulation, policy, or executive order (BLM 2008 Appendix 1) as well as potential "unique characteristics of the geographic area" as outlined in the 2008 BLM NEPA Handbook.

Table 5. Elements of the human environment specifically designated for consideration in the 2008 BLM NEPA Handbook*

Element	Present Y/N	Affected (Y/N)	Section	Authority or Designation
Air and Atmospheric Values (3.1)	Y	Y	3.1	Clean Air Act, as amended
Areas of Critical Environmental Concern	N	N	N/A	43 CFR 1610.7-2
Caves	N	N	N/A	43 CFR 37
Cultural Resources (only sites not eligible for the National Register would be affected)	Y	Y	3.3	National Historic Preservation Act, as amended
Environmental Justice	N	N	N/A	E.O. 12898
Essential Fish Habitat	N	N	N/A	Magnuson-Stevens Act Provision: Essential Fish Habitat: Final Rule
Floodplains	Y	Y	N/A	E.O. 11988, as amended
Forests and Rangelands	Y	Y	3.4	Healthy Forests Restoration Act of 2003
Hazardous Wastes (petroleum products and chemicals such as antifreeze and brake fluid that are normally used in equipment maintenance)	Y	Y	N/A	Resource Conservation and Recovery Act of 1976 Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
Migratory Birds	Y	Y	N/A	Migratory Bird Treaty Act of 1918, as amended E.O. 13186
Native American Religious Concerns	N	N	N/A	American Indian Religious Freedom Act of 1978

Element	Present Y/N	Affected (Y/N)	Section	Authority or Designation
Prime and Unique Farmlands	N	N	N/A	7 CFR 657.5
Threatened or Endangered Species (no listed species, but there are bureau special status species and candidate species)	Y	Y	3.2.3	Endangered Species Act of 1983, as amended
Water Quality (Drinking – Ground)	Y	Y	N/A	Safe Drinking Water Act, as amended Clean Water Act of 1977
Wetlands/Riparian Zones	Y	Y	3.11	E.O. 11990
Wild & Scenic Rivers	N	N	N/A	Wild and Scenic Rivers Act, as amended
Wilderness (designated and Wilderness Study Areas)	N	N	3.2.5	Federal Land Policy and Management Act of 1976 Wilderness Act of 1964

*Formerly known as critical elements.

In addition to the elements listed in Table 5 that are present within the project area and likely to be affected, the following resources are analyzed within this EA (Section):

- Biological Resources (3.2)

  Fish and Wildlife (3.2.1)

  Vegetation (3.2.2)

  Invasive Non-native Species (3.2.4)

- Geology and Soils (3.5)
- Public Roads and Access (3.6)
- Recreation and Visitor Experience (3.7)
- Socioeconomics (3.8)
- Visual Resources (3.9)
- Water Resources (3.10)

3.1 AIR AND ATMOSPHERIC VALUES

The project area is located within the U.S. Environmental Protection Agency (EPA), Region 10, Eastern Oregon Intrastate Air Quality Control Region. The air quality in the region is generally good and typical of large rural areas within the Great Basin and Owyhee Uplands. Wind measurements for the site have not been recorded. However, measurements have been recorded at Hereford, which lies approximately 28 miles northwest of Mormon Basin. Wind averages 3 miles per hour and generally blows from the southwest (USBR 2008).

The average annual precipitation is approximately 8.6 inches (records from October 1998 to October 2008) (USBR 2008). The average daily temperature over a similar period of time is approximately 45ºF (USBR 2008). The principal source of air contaminants in the project area is wind-blown dust generated from dry rangelands in the region and occasional traffic on the local native surface roads. During the summer months, dust storms and rangeland wildfires may reduce air quality.

The temperature of the planet's atmosphere is regulated by a balance of radiation received from the sun and the amount of that radiation absorbed by the earth and atmosphere. Greenhouse gases (e.g., carbon dioxide and methane), as well as water vapor and particulate matter in the atmosphere keep the planet's temperature warmer than it would be otherwise; allowing the planet to sustain life. While these gasses and particles have occurred naturally for millennia, there has been a marked increase in their atmospheric concentration since the start of the industrial age, contributing to observed climatic variability beyond the historic norm. As appropriate, this plan describes (1) the effects that a changing climate may have on the resources in the planning area, and (2) how the reasonably foreseeable activities under each alternative would affect climate change.

3.2 BIOLOGICAL RESOURCES

This section describes the existing Biological Resources within the proposed project area. It includes information on the vegetation cover types, general fish and wildlife species, special status plant, fish, and wildlife species, and invasive species. The information is based on site visits and consultations with BLM personnel, Oregon Natural Heritage Program (ONHP; currently known as the Oregon Biodiversity Information Center, ORBIC) personnel, and the ONHP database. Field surveys were conducted on June 12, June 19, and July 3, 2008. All habitats were walked during the June 12, 2008 reconnaissance survey. The June 19th site visit was specifically designed to survey for rare plant species and to develop a plant species list. During the July 3rd site visit, all creeks and reservoirs were surveyed for rare amphibians. Information about potentially occurring species was provided by Jean Findley, BLM Botanist; Melissa Yzquierdo, BLM Botanist/Wildlife Biologist; and John Quintela, BLM Fisheries Biologist. Results of the field surveys and consultations are provided in the Final Report: Threatened, Endangered, and Sensitive Plant and Animal Clearance Survey: 310 Acre Mormon Basin Placer Gold Mining Project, Malheur County, OR (Vision Air Research 2008) (Appendix C).

3.2.1 FISH AND WILDLIFE

During the site visits, no native fish were found in the creeks or reservoirs within the project area. However, native interior redband trout (*Oncorhynchus mykiss gairdneri*) are historically known and currently presumed to occur in Willow Basin, including all perennial and intermittent streams within the project area(DEQ 2010; personal communication, John Quintela 2010). Basin Creek is an intermittent stream in the project area and goes subsurface downstream of the project area and likely does not currently provide habitat for redband trout; however, potential impacts to redband trout are evaluated due to the presence of historic habitat in the project vicinity.

One reservoir had approximately 100 goldfish (likely *Carassius auratus*) present. This species is introduced and non-native and appears to over winter in the reservoir. The goldfish ranged in size from 2 – 6 inches. The goldfish is a relatively small member of the carp family; it is a domesticated version of a dark-gray/brown carp native to East Asia (Bristol Aquatics Society 2008).

The project area provides habitat for a variety of wildlife species common to sagebrush steppe habitat. It also supports big game winter and summer range (personal communication, Melissa Yzquierdo 2010). Table 6 lists the species observed by Vision Air Research as well as those species anecdotally known or assumed to occur in the project area by BLM.

Table 6. Fauna species observed during June and July 2008 site visits, and/or assumed present by BLM* within the Mormon Basin placer gold mining project area.

Category	Common Name	Scientific Name
Amphibians & Reptiles		
	rubber boa	*Charina bottae*
	gopher snake	*Pituophis melanoleucus*
	Pacific chorus (tree) frog	*Pseudacris regilla*
	Columbia spotted frog	*Rana luteiventris*
	sagebrush lizard*	*Sceloporus graciosus*
	common garter snake	*Thamnophis sirtalis*
Birds		
	red-winged blackbird	*Agelaius phoeniceus*
	cinnamon teal	*Anas cyanoptera*
	black-chinned hummingbird	*Archilochus alexandri*
	lesser scaup	*Aythya affinis*
	great horned owl	*Bubo virginianus*

Category	Common Name	Scientific Name
	red-tailed hawk	*Buteo jamaicensis*
	ferruginous hawk*	*Buteo regalis*
	whip-poor-will	*Caprimulgus vociferus*
	turkey vulture	*Cathartes aura*
	greater sage-grouse	*Centrocercus urophasianus*
	killdeer	*Charadrius vociferus*
	common nighthawk	*Chordeiles minor*
	Northern flicker	*Colaptes auratus*
	turkey	*Meleagris gallopavo*
	barn swallow	*Riparia riparia*
	red-naped sapsucker	*Sphyrapicus nuchalis*
	house wren	*Troglodytes aedon*
	American robin	*Turdus migratorius*
	mourning dove	*Zenaida macroura*
Mammals		
	elk*	*Cervus canadensis*
	Townsend's big-eared bat*	*Corynorhinus townsendii*
	spotted bat*	*Euderma maculatum*
	black-tailed jackrabbit*	*Lepus californicus*
	white-tailed jackrabbit*	*Lepus townsendii*
	fringed bat*	*Myotis thysanodes*
	mule deer	*Odocoileus hemionus*
	Columbian ground squirrel	*Spermophilus columbianus*
Fish		
	interior redband trout*	*Oncorhynchus mykiss gairdneri*

Source: Vision Air Research. 2008. Final report: threatened, endangered, and sensitive plant and animal clearance survey. Vision Air Research, Inc., Boise, ID. & BLM Baker District*

3.2.2 VEGETATION

Vision Air Research conducted botanical surveys in June 2008 and described vegetation cover types within the project area as fairly diverse and intermingled. Wet meadows are present in California Gulch and near the reservoirs in Site 2; willow (*Salix* spp.) and aspen (*Populus tremuloides*) are present along Emigrant Creek; big mountain sagebrush (*Artemisia tridentata vaseyana*) steppe (personal communication, John Rademacher 2010) with scattered juniper (*Juniperus occidentalis*) dominate the south- and west-facing slopes of the project area; ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) forests dominate the north- and east-facing slopes; and Carey's balsamroot (*Balsamorhiza careyana*) and bunchgrass communities are also present (Vision Air Research 2008).

Native species dominate vegetation cover on lands that were not previously mined. The south-facing slopes consisted of fairly intact native plant communities with Carey's balsamroot, bunchgrasses, and silky lupine (*Lupinus sericeus*). The wet meadows also were fairly intact and consisted of large numbers of wild iris (*Iris missouriensis*), Oregon checkerbloom (*Sidalcea oregano*), false hellebore (*Veratrum californicum*), rushes (*Juncus* spp.), and sedges (*Carex* spp.). Some reestablishment of trees and understory vegetation has occurred on old mine tailings, but many areas continue to have limited understory biodiversity or support invasive species. Table 7 lists vegetation species observed during the site surveys and their prevalence on the site (Vision Air Research 2008).

Table 7. Vegetation species observed within the Mormon Basin placer gold mining project area during June and July 2008 site visits.

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
Trees					
	western juniper	*Juniperus occidentalis*			x
	ponderosa pine	*Pinus ponderosa*			x
	narrowleaf cottonwood	*Populus angustifolia*		x	
	aspen	*Populus tremuloides*		x	
	Douglas-fir	*Pseudotsuga menziesii*			x
Shrubs					
	wavy leaf alder	*Alnus incana*	x		
	Saskatoon serviceberry	*Amelanchier alnifolia*		x	

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
	big mountain sagebrush	*Artemisia tridentata*			x
	Oregon grape	*Berberis repens*			x
	redstem ceanothus	*Ceanothus sanguineus*	x		
	mountain mahogany	*Cercocarpus ledifolius*	x		
	rubber rabbitbush	*Chrysothamnus nauseosus*			x
	green rabbitbush	*Chrysothamnus viscidiflorus*		x	
	red osier dogwood	*Cornus stolonifera*		x	
	black hawthorn	*Crataegus douglasii*	x		
	chokecherry	*Prunus virginiana*		x	
	antelope bitterbrush	*Purshia tridentata*			x
	wax currant	*Ribes cereum*		x	
	wild rose	*Rosa* sp.			x
	willows	*Salix* sp.			x
	snowberry	*Symphoricarpos albus*		x	
	lilac	*Syringa vulgaris*	x		
	gray horsebrush	*Tetradymia canescens*	x		
Grasses, Sedges, and Rushes					
	mountain brome	*Bromus carinatus*		x	
	pine grass	*Calamagrostis rubescens*		x	
	elk sedge	*Carex geyeri*		x	
	sedge	*Carex* sp.			x
	Great Basin wild rye	*Elymus cinereus*		x	
	Idaho fescue	*Festuca idahoensis*			x

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
	rush	*Juncus* sp.			x
	June grass	*Koelaria cristata*		x	
	bulbous bluegrass	*Poa bulbosa*			x
	Sandberg bluegrass	*Poa secunda*			x
	bluebunch wheatgrass	*Pseudoroegnaria spicata*			x
	squirreltail	*Sitanion hystrix*		x	
Forbs					
	yarrow	*Achillea millefolium*			x
	nettleleaf horse mint	*Agastache urticifolia*		x	
	false dandelion	*Agoseris glauca*		x	
	wild onion	*Allium acuminatum*		x	
	fiddleneck	*Amsinckia* sp.		x	
	pearly everlasting	*Anaphalis margaritacea*		x	
	pussy toes	*Antennaria dimorpha*		x	
	red columbine	*Aquilegia formosa*			x
	rock cress	*Arabis divaricarpa*	x		
	foothills arnica	*Arnica sororia*	x		
	white sagebrush	*Artemisia ludoviciana*			x
	Carey's balsamroot	*Balsamorhiza careyana*			x
	arrowleaf balsamroot	*Balsamorhiza sagittata*		x	
	brodiaea	*Brodiaea douglasii*			x
	cat's ear	*Calochortus lyallii*		x	
	Indian paintbrush	*Castilleja* sp. *(2)*			x
	chaenactis	*Chaenactis douglasii*		x	

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
	vase flower	*Clematis hirsutissima*		x	
	narrow leaf collomia	*Collomia linearis*		x	
	hawksbeard	*Crepis* sp.			x
	willow weed	*Epilobium minutum*	x		
	field horsetail	*Equisetum arvense*		x	
	rayless daisy	*Erigeron aphanactis*		x	
	tall woolly buckwheat	*Eriogonum elatum*	x		
	linear leaf daisy	*Erigeron linearis*		x	
	shaggy daisy	*Erigeron pumilus*			
	parsnip flower buckwheat	*Eriogonum heracleoides*			x
	cushion buckwheat	*Eriogonum ovalifolium*		x	
	woodland strawberry	*Fragaria vesca*		x	
	elkweed	*Frasera speciosa*		x	
	fragrant bedstraw	*Galium triflorum*		x	
	sticky geranium	*Geranium viscosissimum*		x	
	old man's beard	*Geum triflorum*			x
	curlycup gumweed	*Grindelia squarrosa*			x
	Jessica sticktight	*Hackelia micrantha*		x	
	wooly goldenweed	*Haplopappus lanuginosus*		x	
	ballhead waterleaf	*Hydrophyllum capitatum*		x	
	wild iris	*Iris missouriensis*			x
	steppe sweet pea	*Lathyrus pauciflorus*		x	
	prairie star	*Lithophragma bulbifera*		x	
	smallflower woodland-star	*Lithophragma parviflorum*		x	

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
	western stoneseed	*Lithospermum ruderale*		x	
	fernleaf biscuitroot	*Lomatium dissectum*		x	
	nine-leaf biscuitroot	*Lomatium triternatum*		x	
	silky lupine	*Lupine sericeus*			x
	bluebells	*Mertensia oblongifolia*		x	
	seep monkey flower	*Mimulus guttatus*		x	
	sweet cicely	*Osmorhiza chilensis*	x		
	peony	*Paeonia brownii*	x		
	scorched penstemon	*Penstemon deustus*		x	
	firecracker penstemon	*Penstemon eatonii*		x	
	rock penstemon	*Penstemon gairdneri*		x	
	globe penstemon	*Penstemon globosus*			x
	royal penstemon	*Penstemon speciousus*		x	
	narrow leaf phacelia	*Phacelia linearis*		x	
	phacelia	*Phacelia* sp.		x	
	Hood's phlox	*Phlox hoodii*		x	
	cinquefoil	*Potentilla gracilis*			x
	blister buttercup	*Ranuculus sceleratus*		x	
	tall buttercup	*Ranunculus acris*		x	
	dock	*Rumex crispus*		x	
	blue elderberry	*Sambucus cerulea*	x		
	groundsel	*Senecio canus*		x	
	Oregon checkerbloom	*Sidalcea oregana*			x
	false Solomon's seal	*Smilacina racemosa*	x		

Category	Common Name	Species	Frequency		
			Uncommon	Scattered	Frequent
	goldenrod	*Solidago canadensis*			x
	meadowrue	*Thalictrum occidentale*		x	
	pennycress	*Thlaspi arvense*		x	
	yellow salsify	*Tragopogon dubius*		x	
	cattail	*Typha latifolia*	x		
	stinging nettle	*Urtica dioica*		x	
	false hellebore	*Veratrum californicum*			X
	mullein	*Verbascum thapsus*		x	
	goosefoot violet	*Viola purpurea*	x		
	mule's ears	*Wyethia amplexicaulis*	x		
	death camas	*Zigadenus venenosus*		x	
BLM Noxious or Invasive Weed Species					
	cheatgrass	*Bromus tectorum*	x		
	orchard grass	*Dactylis glomerata*		x	
	whitetop	*Cardaria draba*		x	
	Canada thistle	*Cirsium arvense*			X
	bull thistle	*Cirsium vulgare*	x		
	morning glory	*Convolvulus arvensis*	x		
	hounds tongue	*Cynoglossum officinale*		x	
	common St John's wort	*Hypericum perforatum*	x		
	Scotch thistle	*Onopordum acanthium*	x		

Source: Vision Air Research. 2008. Final report: threatened, endangered, and sensitive plant and animal clearance survey. Vision Air Research, Inc., Boise, ID.

3.2.3 THREATENED OR ENDANGERED SPECIES (SPECIAL STATUS SPECIES)

A clearance level survey was conducted within the project area to determine the presence and/or absence of Federal and state threatened, endangered, and candidate plant and wildlife species. According to the best available records and field observations, no federal or state listed species currently occur within the project area. However, there is potential supporting habitat for gray wolves. Gray wolves are listed as endangered under the Endangered Species Act, but there are no documented observations by Oregon Department of Fish and Wildlife (ODFW) or U.S. Department of Fish and Wildlife (USFWS) of gray wolves in the project vicinity. Vision Air Research and SWCA staff conducted an ORBIC database search, and discussed findings with BLM and ORBIC personnel to identify the special status species which could occur in the project area. Potential supporting habitat for USFWS candidate species such as Columbia spotted frog, greater sage-grouse, and streaked horned lark exists in the project area. All potential habitats for these species were searched within the project area during June and July, 2008. There are eighteen wildlife, fish, and plant species potentially present in the project area that are of concern to the USFWS or are BLM special status species. These special status species are either known to breed on public land, use public land for part of their life history requirements, or have potential habitat located within the Mineral Valley project site. These species include: upland sandpiper, bald eagle, white-tailed jackrabbit, spotted bat, Townsend's big-eared bat, fringed myotis, ferruginous hawk, northern leopard frog, sagebrush lizard, woodhouse toad, black-tailed jackrabbit, bobolink, grasshopper sparrow, interior redband trout, Snake River goldenweed, Cronquist's stickseed, Oregon princesplume, and country paintbrush.

Information on the habitat requirements for each species or group of species is discussed in more detail below. Table 8 summarizes these findings for USFWS, BLM, federal and state special status species and includes potential occurrence in the project vicinity.

Table 8. Special Status Species Occurrence Within the BLM Planning Area and Project Area

Wildlife and Plant Names		Habitat Information		Current State and Federal Management Status			Occurrence Status	
Common Name	**Scientific Name**	**Habitat Association**	**Suitable Habitat Present on Public Land?**	**USFWS**	**BLM**	**State**	**Planning Area**	**Project Area**
			USFWS Listed Species					
Gray wolf	*Canis lupus*	Remote, generally forested habitats at the present time into sagebrush valleys	yes	E	S	E	Documented	Suspected
Greater sage-grouse	*Centrocerus urophasianus*	Sagebrush steppe, riparian and wetland	yes	C	C		Documented	Suspected
Columbia spotted frog	*Rana luteiventris*	Aquatic, riparian	yes	C	S		Documented	Documented
streaked horned lark	*Eremophila alpestris*	Open sagebrush	yes	C	S		Suspected	Suspected
			BLM Special Status Species					
			Plants					
Snake River goldenweed	*Pyrrocoma radiate*	Sagebrush-steppe; loam soils on steep rocky hillsides	yes	SC	S	E	Documented	Suspected
Cronquist's stickseed	*Hackelia cronquistii*	Sandy sagebrush slopes between 2060-2460 ft. elevation	yes	SC	S	T	Documented	Suspected
Oregon princesplume	*Stanleya confertiflora*	Sagebrush-steppe, open and sparsely vegetated	limited	SC	S		Documented	Suspected
Country paintbrush	*Castilleja flava* var. *rustica*	Sagebrush-steppe	limited		S		Documented	Suspected
			Wildlife & Fish					
Upland sandpiper	*Bartamia longicauda*	Montane meadows in coniferous forest	limited	SC	S		Documented	Suspected
Bald eagle	*Haliaeetus leucocephalus*	Riparian, canyons, conifer forest	yes	SC	S	T	Documented	Documented
White-tailed jackrabbit	*Lepus townsendii*	Sagebrush steppe, riparian	yes	SC	S		Documented	Documented
Spotted bat	*Euderma maculatum*	Crevices in cliffs, caves, and trees for roosting; shrub-steppe	yes	SC	S		Documented	Suspected

Table 8. Special Status Species Occurrence Within the BLM Planning Area and Project Area

Wildlife and Plant Names		Habitat Information		Current State and Federal Management Status			Occurrence Status	
Common Name	**Scientific Name**	**Habitat Association**	**Suitable Habitat Present on Public Land?**	**USFWS**	**BLM**	**State**	**Planning Area**	**Project Area**
Townsend's Big-eared bat	*Corynorhinus townsendii*	Caves mines and isolated buildings for roosts	yes	SC	S		Documented	Documented
Fringed myotis	*Myotis thysanodes*	Low desert scrub habitats to high elevation coniferous forest; large snags, rock features for roosts, caves and mines for hibernacula,	yes	SC	S		Documented	Documented
Ferruginous hawk	*Buteo regalis*	Sagebrush steppe and juniper	yes	SC	S		Documented	Documented
Northern leopard frog	*Rana pipiens*	Riparian and wetland	limited	SC	S		Suspected	Suspected
Sagebrush lizard	*Sceloporus graciosus*	Sagebrush steppe, riparian and wetland	yes		S		Suspected	Suspected
Woodhouse toad	*Bufo woodhousii*	Sagebrush steppe, riparian and wetland	limited		S		Suspected	Suspected
Black-tailed jackrabbit	*Lepus caifornicus*	Sagebrush steppe	yes		S		Documented	Documented
Bobolink	*Dolichonyx oryzivorus*	Sagebrush steppe, riparian and wetland	limited		S		Documented	Suspected
Grasshopper sparrow	*Ammodramus savannarum*	Sagebrush steppe	limited		S		Suspected	Suspected
Interior redband trout	*Oncorhynchus mykiss gairdneri*	Aquatic	limited	SC	S		Suspected	Suspected

Current state and federal management status: USFWS–LE= federally listed Endangered, **LT**=federally listed Threatened, **SC**=species of concern, **C**= candidate for LT or LE; **ODFW – E**=Endangered, **SC**= species of concern; **WDFW – PS**= priority species; **Occurrence Status (per OR/WA BLM special status species designations): Documented** = species is present based on records and/or observations; **Suspected**= species could conceivably occur on suitable public land, but no information is available to verify breeding, migration, or transitory use of public land

3.2.3.1 Gray Wolf

The gray wolf is a USFWS federal endangered species and was listed under the ESA in 1967 (32 FR 4001). It is a carnivorous habitat generalist that will establish territories anywhere there is a sufficient food source (e.g. deer, elk, smaller wildlife). Pack boundaries and territory sizes vary depending on changes in prey availability, distribution, or conflict with other wolf packs and can range in size from 25 square miles to more than 900 square miles (ODFW 2009).The gray wolf was reintroduced into Idaho and has established breeding wolf packs. Since their establishment in Idaho, the gray wolf has crossed into Oregon via the Snake River and could range into the Mormon Basin project area. Gray wolf sightings have been reported in the Mormon Basin area; however, ODFW has not confirmed these sightings.

3.2.3.2 Greater Sage-grouse

The greater sage-grouse is a federal candidate species for the USFWS and was warranted but precluded from listing under the ESA. The sage-grouse inhabits sagebrush habitat and depends on sagebrush for much of its annual food and cover (Connelley et al. In Press; USGS 2009). The primary threat to this species is habitat fragmentation and loss of habitat due to disturbances caused by development, livestock grazing, exotic plant proliferation, and energy development (Wisdom et al. In Press).

Greater sage-grouse leks or suitable lekking habitat are not known to occur within the project area, or along roads used to access the project area including Clarks Creek Road and Basin Creek Road, but leks do occur within two to five miles of the site (personal communication, Melissa Yzquierdo 2010). Typically, most nests are located within 4 miles of a lek site, but greater sage-grouse are known to nest up to 12 miles from a site (Autenrieth 1981; Wakkinen et al. 1992; Fischer 1994; Hanf et al. 1994). Their winter range habitat is characterized by a tall canopy cover with adequate amounts of sagebrush, especially Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) upon which they feed (Robertson 1991). This species is not expected to form lek colonies within the project area due to lack of suitable lek habitat. However, there is suitable wintering and nesting habitat dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) present within the project area. Greater sage-grouse may potentially utilize this mountain big sagebrush habitat seasonally (personal communication, Melissa Yzquierdo 2010).

A species-specific survey for greater sage-grouse was not conducted. During the general fauna survey no sage-grouse or sage-grouse pellets were observed within the project area. Sage-grouse could potentially use the site for winter forage, cover and dispersal and could be vulnerable to loss of sagebrush habitat or vehicle traffic.

3.2.3.3 Columbia Spotted Frog

The Columbia spotted frog is a federal candidate species for the USFWS that is highly aquatic and lives in or near permanent bodies of water including lakes, ponds, slow streams, and marshes. They breed in ponds that maintain fairly consistent water levels in the early spring; tadpoles live in open water and emerge as fully metamorphosed frogs in late July or in August (USFWS 2010a). Adults and metamorphosed frogs often disperse to other ponds and wetland habitats when stream corridors are present. Frogs overwinter underwater near springs and may use ponds or other suitable nearby areas for breeding. Overwintering sites in northeastern Oregon include ice-covered ponds, warm springs, rivers and seeps in forested habitat (Bull 2005). The primary threat to this species is loss of habitat due to a variety of actions: water diversions, long-term grazing impacts, mining operations, and other habitat modifications that reduce pool and water table depth (USFWS 2010a).

The ponds and reservoirs in the project area are the result of previous mining activity. Columbia spotted frog adults and tadpoles were observed in all but one of the reservoirs (i.e. upper reservoir) in the project area during the 2008 survey. The reservoir in which no frogs were observed has steep banks and little aquatic vegetation, providing little habitat for the species. Columbia spotted frogs were also found in Glengarry Gulch Creek and California Gulch Creek. One group of 8 – 10 individuals was found in a puddle in the middle of a road, and another sighting was in a backwater area formed by a blocked culvert beside a road. Most likely frogs are breeding in the reservoirs and ponds where they were observed and are dispersing into adjacent riparian habitat.

Columbia spotted frogs in the project site are vulnerable to changes in water and breeding habitat and also to vehicle traffic that could disturb or harm adults and juvenile frogs that are dispersing from the site.

3.2.3.4 Streaked Horned Lark

The streaked horned lark is a federal candidate species for the USFWS that was listed under the ESA in 2005 (70FR 24869-24934) and is protected under the Migratory Bird Treaty Act of 1918. This species inhabits bare ground or sparsely vegetated habitats. It nests in agricultural areas, pastures, grasslands, desert shrublands and alpine areas where there is little or no vegetation (Csuti 1984). Gravel roads or roadsides are another common location to find streaked horned larks. The most significant factor in the decline of the streaked horned lark has been the loss of habitat due to conversion of native prairies to agriculture and residential uses and the encroachment of non-native plants in native habitats. The streaked horned lark was not observed in the project area during the breeding season and it is unlikely that it would be impacted by the project.

3.2.3.5 Wildlife Species of Concern and BLM Special Status Species

The Bald eagle is protected under the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755). The bald eagle is also a BLM special status species. It is associated with large water bodies which support fish populations and have large trees for nesting nearby. Although the bald eagle could potentially fly through the project site, the site does not provide important food or nesting opportunities. No bald eagles were observed on the project site and it is unlikely to be affected by the proposed project.

The ferruginous hawk is a BLM special status species as well as a USFWS species of concern. It inhabits large open grasslands and shrub-steppe areas and nests in isolated trees or on rocky sites with expansive views. Although ferruginous hawks could utilize portions of the site for foraging, no ferruginous hawks or their nests were observed; it is unlikely that they would be affected by the proposed project.

White-tailed jackrabbit is a BLM special status species as well as a USFWS species of concern. It inhabits bunchgrass grasslands (ODFW 2006) in sagebrush-steppe and riparian communities. The black-tailed jackrabbit is a BLM special status species that inhabits sagebrush-steppe. Jackrabbits were not observed on the project site but could potentially occur in sagebrush-steppe habitat.

There are three bat species that are BLM special status species and are also USFWS species of concern that could potentially utilize the project site. The spotted bat uses crevices in cliffs, caves, and trees for roosting; the Townsend's big-eared bat uses caves, mines, and isolated buildings for roosting; and the fringed myotis uses large snags and rock features for roosts and caves and mines for hibernacula. The project site provides potential roosting and foraging habitat for these species.

The interior redband trout is a BLM special status species as well as a USFWS species of concern that inhabits streams in the interior Columbia River Basin, east of the Cascade Mountains (Behnke 1992; USFWS 2010b). Although redband trout were not observed in stream segments visually inspected during site visits within the project area, they are presumed to occur within the project area streams or in upstream or downstream reaches outside of the project area (personal communication, John Quintela 2010) and could be directly or indirectly impacted by project activities.

There are five additional special status species that have potential habitat in the planning area but it is unlikely that they would occur on the project site due to the lack of habitat. These species include: two USFWS species of concern (Northern leopard frog, upland sandpiper) and three BLM special status species (woodhouse toad, bobolink, and grasshopper sparrow). Because of limited habitat for these species, it is unlikely that they will be affected by the proposed project.

3.2.3.6 Plant Species of Concern and BLM Special Status Species

Snake River goldenweed is a USFWS species of concern, a BLM special status species, and an Oregon endangered species. It generally is found on steep, rocky hillsides with loamy soils and is often associated with big sagebrush, bluebunch wheatgrass (*Pseudoroegneria spicata*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and Idaho fescue (*Festuca idahoensis*). A known population of Snake River goldenweed in the vicinity of the project was visited by the project biologist in order to confirm plant phenology and establish a search image. No Snake River goldenweed was observed in the project area. Due to lack of suitable habitat for the species within the project site, it is unlikely that Snake River goldenweed would be impacted by the project.

Cronquist's stickseed is listed as a USFWS species of concern, a BLM special status species, and an Oregon threatened species. It generally is found on sandy sagebrush slopes between 2,060 and 2,460 feet in elevation (ODFW 2006). Cronquist's stickseed was not observed on the project site and it is not expected to occur on site due to the high elevation which exceeds its range.

Oregon princesplume is a USFWS species of concern and a BLM special status species. It inhabits open, sparsely vegetated sagebrush steppe. No Oregon princesplume was observed in the project area. Since open sagebrush steppe is not present in the project area, it is unlikely that it would be impacted.

Country paintbrush is a BLM special status species that inhabits Wyoming big sagebrush habitat. No country paintbrush was observed in the project area during the survey. Since Wyoming big sagebrush habitat is present in the project area it is possible that country paintbrush could occur on the site; however, it is unlikely that it would be impacted due to the limited area of potential habitat in the project area.

3.2.4 INVASIVE SPECIES

The BLM follows several guidelines for control of noxious weeds on the lands for which they have jurisdiction and administrative responsibility:

- Federal Insecticide, Fungicide, and Rodenticide Act (1972)
- Federal Noxious Weed Act (1974)
- Federal Land Policy and Management Act (1976)
- Public Rangelands Improvement Act (1978)

During the surveys conducted for special status species, several large patches of whitetop (*Cardaria draba*) and Canada thistle (*Cirsium arvense*) were noted (Vision Air Research 2008). Scotch thistle (*Onopordum acanthium*) has also established in the basin in areas of historic tailings piles. All three of these species are considered noxious weeds by ODA. Many weed sites are situated near and along roadways that provide access to the project site. Weed species can encroach into an area via vehicles, machinery, boots and clothing, livestock, wildlife, and wind. The number of noxious weed species in eastern Oregon is ever increasing and many of these are very aggressive (Harrod 2001).

3.2.5 NON-WILDERNESS STUDY AREA LANDS WITH WILDERNESS CHARACTERISTICS

Wilderness Study Areas (WSA) are not present within the project area and therefore are not discussed further in the affected environment nor the environmental effects analysis.

The disturbance area associated with Proposed Action area has been excluded from any citizen-proposed wilderness characteristic unit. The BLM lands in the Proposed Action area are 152.5 acres which has all been disturbed by historic mining activity. The project area does not meet the size requirement for consideration as a wilderness characteristic unit. The project area is accessed by county roads including Clarks Creek Road and Mormon Basin Road. The County roads are regularly used for recreation and access and are maintained by Baker County and the Ironside Road District.

3.3 CULTURAL RESOURCES

3.3.1 PREHISTORY SITES

Archaeological evidence indicates that northeast Oregon was inhabited by Native American people for millennia; with indications of use in the uplands of the Blue Mountains region dating back as early as 8-10,000 years before the present. Sites that date from the earliest occupation of the region include base camps for seasonal hunting and gathering, lithic procurement, and plant gathering and processing. Prehistoric inhabitants hunted bison, mountain sheep, pronghorn, deer and elk, and other large and small game. Circa 5000 years ago, housepit villages and specialized hunting and gathering sites appear in the archaeological record for the region, with evidence for increased sedentism and reliance on fishing. At the time of early historic contact, the mountainous areas and valleys were occupied and used, on a seasonal basis, by tribes of both the Columbia Plateau and Great Basin areas. Evidence of use prior to the arrival of Euro-American settlers can be found within the Mormon Basin area. The general project area was co-inhabited by tribal groups from both the Great Basin and the Columbia Plateau cultural areas. These tribes include the Cayuse, Umatilla, Walla Walla, Nez Perce, Northern Paiute and Shoshone. Descriptions of the ethnographic lifeways of these tribes are provided in Stern (1998), Walker (1998), Fowler and Liljeblad (1986), Steward and Wheeler-Voegelin (1974) and Murphy and Murphy (1986).

3.3.2 HISTORIC SITES

National events have helped to mold the nature of historic resources within the Planning Area. Early explorers and fur traders traversed the Planning Area, followed by missionaries, emigrants, and military expeditions. Sites reflect the resources and activities that attracted Euro-Americans to the region from the 1840s into the first half of the 20th century. The Planning Area contains historic features including transportation features such as historic trails and stage roads; mining and mining-related sites; and homesteads, ranches, and related facilities, including irrigation ditches.

The Oregon Trail became a key transportation route from the Snake River to the Columbia River for emigrants traveling to the Willamette Valley in western Oregon. Between 1843 and 1855, approximately 60,000 emigrants traveled along the trail through northeast Oregon. In 1978, Congress designated the Oregon Trail as a National Historic Trail.

In addition to the Oregon Trail, routes of several stage and wagon roads dating from the early 1860s to 1900 are present in the Planning Area. A network of freighting and stage roads was established and improved from Umatilla Landing on the Columbia River to gold mining camps, hamlets, and towns on the Grande Ronde and Powder Rivers. The railroad was completed through the Planning Area in the 1880s, facilitating the growth of communities all along the railroad line from Huntington to Hermiston. At the turn of the century, a railroad line was built along the western shore of the Snake River to reach mines near Homestead. Most of the railroad route was inundated when Brownlee Reservoir was filled in the 1950s.

Early prospecting in the area occurred in 1861 when a party of miners discovered gold in gulches southwest of present day Baker City. A gold rush to the Blue Mountain region ensued, and the mining camp of Auburn was quickly established in Blue Canyon. Within three years, mining districts had been established throughout the present day Baker County region, in the Powder River, Burnt River, and Snake River drainages. These historic mining districts still contain remnants of past activities including prospects, shafts, adits, mining ditches, structures, foundations, and debris scatters. Historic placer and lode mining sites date from the late 1860s to the 1940s.Good condition features of the historic Auburn site and the El Dorado Mining Ditch are located partly on public lands.

By the late 1860s through 1870s, cattle and sheep were driven into the region and ranches and homesteads were established within the Planning Area. Large sheep operations were established in Umatilla County. Remnants of ranch or homestead operations include corrals, fences, line shacks and cabins, foundations, and debris scatters. Those who took up the earliest land and water claims in the lowlands built irrigation systems to water fields and grain crops. At the turn of the century in Umatilla County, the federal government launched a program to promote reclamation homestead settlements by developing major irrigation facilities to water dry uplands near the lower Umatilla River.

Common historic sites in the Planning Area that relate to homesteading and historic mining, dating from the late 1800s and early 1900s, include the remains of historic wagon roads, homestead and mining cabin sites, placer mines, ditches, and unassociated trash dumps. Less common historic sites include inscribed aspen trees, historic cemeteries, historic mining camps or buildings, and former sawmill sites.

3.3.3 Treaty and Tribal Interest Resources

The project area is not within Tribal Ceded Territory according to the Interior Columbia Basin Ecosystem Management Project (ICBEMP 1996). However, it is in the Traditional Area of Interest to the Confederated Tribes of the Umatilla Indian Reservation and the Burns Paiute Tribe. During the scoping process none of the local or regionally recognized tribes brought forth specific concerns regarding impacts on tribal resources. A predictive model for some traditional plants of cultural interest was developed in collaboration between BLM and the Confederated Tribes of the Umatilla Indian Reservation. The model includes the Mormon Basin Project Area. Results of this model suggest that the project area has very low potential for specific plants of traditional cultural interest. However, the model does not include all species of traditional interest. An approved BLM botanical survey found that there are some types of culturally significant plants within the project area that may be of interest to recognized tribes. However, the majority of these plants appear to be scattered around the Mormon Basin project area and may be more common/abundant in other locations. Culturally significant vegetation noted in the project area during the cultural resource inventory conducted by SWCA includes curl leaf mountain mahogany, basin wildrye, western blue flag iris, western juniper, tarweed, ponderosa pine, choke cherry, squaw currant, broadleaf cattail, and willow (narrowleaf, peachleaf, Pacific, and rigid). Culturally significant vegetation found in Mormon Basin was used prehistorically for medicinal purposes, food sources, fuel, creation of tools and hunting implements, horse or cattle feed, creation of dyes, basket weaving, clothing, and shelter. Many of these uses continue into the historic period, particularly for food sources, timber, and horse or cattle feed. Potential effects of the project to culturally significant plants are addressed in Section 4.3.

BLM is also aware of big game winter range habitat and native fish habitat present within the vicinity of the project area. Impacts to treaty resources are addressed in Section 4.3.

SWCA Environmental Consultants (SWCA) conducted the cultural resources investigation during July and September, 2008. This section contains information excerpted from the resulting report (SWCA 2008). The Mormon Basin project area lies within the northern Great Basin culture area, which is contained within the northern Great Basin province. Themes relating to settlement and subsistence in this area focus primarily on mobility patterns and their associated resource exploitation during the Precontact era. The archaeological record suggests that populations living in the region had high levels of residential mobility during the Paleoindian and Early Archaic periods, which are characteristic of a foraging pattern. Permanent village sites appear during the Middle Archaic period and nucleated village sites are common during the Late Archaic period. Archaeological evidence of mobile foragers is often limited due to a general absence of substantial habitation structures, storage features, or discrete activity areas.

Increased sedentism is often represented by evidence of semi-permanent and permanent village sites with a high diversity of material culture, but may also include resource storage and procurement sites distributed over the local and regional landscape.

3.3.4 GOLD MINING IN EASTERN OREGON

The first reports of gold in eastern Oregon came in 1861, when placer deposits were found at Griffin Gulch, southwest of Baker City in the Blue Mountains. Deposits were subsequently discovered near Auburn the next year (Koschmann and Bergendahl 1978). As the need for water to operate the placer mines increased, large-scale water diversion projects were begun. While the majority of gold mining in the 1860s, 1870s, and into the 1880s was placer mining, the region did have some limited lode mining as early as the 1870s. In the 1880s, the Oregon Short Line was built into the area, opening the way for more extensive lode mining. The peak years of lode mining in the region were between 1913 and 1918 (Gilluly et al. 1933).

3.3.5 MORMON BASIN

The first mining to take place in the Mormon Basin was placer mining, beginning in 1862. Upon discovery of gold in the Mormon Basin, placer mines began to spring up all over the slopes surrounding it. From the mid-1860s, there was a small, but persistent Chinese presence in the Basin, and a small camp referred to as Chinatown sprang up not far from Clarksville (Malheur County Historical Society 1988). The plat of the placer claim of Joseph Miller (then owned by Ransom Beers), located in the heart of the Mormon Basin, indicates a row of "Chinese Cabins" along the road that ran through the basin between Clarks Creek and Amelia, near the Rye Valley Road intersection (Voigt 1895).

Placer continued to be the primary means of extraction through the turn of the twentieth century, and even today there is still some limited placer mining taking place. Because of the scarcity of water, placer mining was never very successful in terms of gold output; lode mining met with better returns. In addition, the geologic makeup of the area served to limit placer mining returns. As gold settled through the soil, it collected on a layer of false bedrock at depths of around 8 to 12 feet. While gold deposits resting upon this false bedrock were fairly rich, it was blasting through the false bedrock to the even richer deposits beneath that resulted in gold returns climbing steeply. Beginning in the 1860s, gold-bearing quartz deposits were also being mined in the Mormon Basin District (Koschmann and Bergendahl 1978, Malheur County Historical Society 1988).

Gold mining in the Mormon Basin failed to become highly developed. While gold veins were numerous, they were not individually extensive, meaning that industrialized recovery would be expensive (Reed and Park 1933). By the early 1880s, placer mining was on the decline in the Basin and surface activity was limited to a few small crews who were washing gravels. By 1901, only one crew remained, reworking abandoned tailings piles (Malheur County Historical Society 1988). Between 1904 and 1915, the largest producer was the Sunday Hill Mine, which included a 15-stamp mill and a cyanide plant. By the 1930s there were no successful large-scale operations in the Basin, and from 1952 to 1959, no gold mining was taking place in the Mormon Basin. (Koschmann and Bergendahl 1978).

3.3.6 Field Study Findings

SWCA Environmental Consultants (SWCA) conducted a cultural resources Class III inventory during July and September, 2008. The inventory was conducted to meet federal requirements to protect cultural resources that are eligible or potentially eligible for the National Register of Historic Places (NRHP) under National Historic Preservation Act of 1966(P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470). SWCA completed a Class I cultural resource inventory including intensive survey of approximately 311 acres of land administered by the Oregon BLM, Vale District in Malheur and Baker counties, Oregon.

Survey results identified 18 cultural resources, each of which was evaluated for its significance and eligibility to be listed in the NRHP. These resources included 15 archaeological resources: one prehistoric site, 12 historic-period sites, one prehistoric isolate, and one multi-component site. Additional subsurface testing was recommended for two prehistoric resources and one multi-component site. The NRHP eligibility of these three sites is currently unevaluated and these three sites will be protected by 20 meter buffer or excluded from the project area. None of the remaining sites represent a significant archaeological resource. SWCA recommended that the other 15 resources were not eligible for listing in the NRHP, and this recommendation was concurred with by SHPO. No additional archaeological studies are recommended. The cultural resource inventory was submitted to BLM and SHPO in December 2008, and SHPO issued a concurrence letter on 4/16/2009 (SHPO Case No. 09-0163)

Above ground resources include three historic-period buildings or building ensembles identified and recorded during the field investigations. Two of these were previously documented by BLM in 2004 and were recommended ineligible; SWCA revisited these structures in 2008 and again recommended them ineligible. Several of the structures appear to date to the 1980s according to BLM records and therefore are not eligible for listing on the NRHP, and no additional studies are recommended. SHPO issued a concurrence letter on 5/18/2009 (SHPO Case No. 09-0163) to utilize structure 14532-15 and remove it upon completion of the project.

The project area has been severely impacted by previous disturbances including extensive mining-related activity for several decades. Historic-period resources that have been identified are in accordance with SWCA's expectations for site types. Most of these resources are sparse scatters of various cultural materials and include several sites that are specific to the mining industry. The identification of prehistoric sites and isolates in the area indicates that there is a potential for further research in understanding the prehistory of Mormon Basin.

3.4 FORESTS AND RANGELANDS

The BLM-administered lands in the project area include public forest land and rangeland. Grazing is a common use of private and BLM-administered lands in the region. Forest uses on BLM lands include past and planned future logging and personal use of the forest resources including collection of firewood and cutting of juniper for fence posts.

The BLM field office manages the schedule and amount of grazing on BLM-administered lands within areas called allotments. Each allotment includes pastures with specific management uses. The project area is located within the Mormon Basin allotment and pasture, which is 9,734 acres of public land. Cattle have access to reservoirs, water troughs, and riparian areas throughout the Basin.

Three permittees operate in the allotment with up to 350 animal unit months (AUMs) on a summer rotational basis. In 2008, cattle grazed the pasture from August 9 to September 1. In 2009, the period was from July 19 to August 9. In 2010, the grazing will return to a time period similar to 2008. The private lands are not fenced, and thus, are grazed in conjunction with the allotment.

The allotment is in good condition and meets all five standards of the Rangeland Health Assessment completed in 2007 (personal communication, Gary Guymon). As an indication of rangeland health, small aspen clones are present in many locations in the basin, on both private and BLM-administered lands. Most clones in brushy and wet areas appear to be successfully reproducing from succors, while clones in more exposed areas are slowly dying due to heavy browsing of succors by elk and cattle.

3.5 GEOLOGY AND SOILS

This section contains information excerpted from the geology section of the cultural resources inventory report referred to above (SWCA 2008). The full report including mapping and in-depth soil type descriptions is included in the Cultural Resources Inventory.

The project area lies within the Blue Mountains physiographic province. This physiographic province consists of distinct geologic terranes associated with the formation of the Blue Mountain Volcanic Arc and its accretion to the North American continent. The Blue Mountain arc consists of the Grindstone, Wallowa, Baker, Izee, and Olds Ferry terranes and ranges in age from Devonian to Jurassic. Descriptions of these terranes and the rocks they contain can be found in Bishop, 2003, Brooks, 1979, and Vallier, 1998.The arc was accreted to the North American continent in the late Cretaceous at which time the Wallowa, Elkhorn, Pedro, and Lookout Mountain batholiths were intruded. Igneous activity again occurred in the mid-Tertiary with the emplacement of rhyolitic volcanic rocks and plateau-type basalts associated with migration of the Yellowstone hot spot. Locally, sediments and volcanic ash accumulated in lake-basins in the late Tertiary.

The dominant geologic signature of the area is the relatively abundant exposures of Paleozoic to Late Jurassic metamorphic rocks. These rocks were later intruded by granitic batholiths and stocks, along with dikes, that up-turned the horizontal formations into vertical sections that surrounded the intrusive bodies, similar to a fortified wall surrounding a fortress. Continued erosion and denudation of the vertical exposures formed rounded hills surrounding the basin and became the source for the majority of valley fill within the Mormon Basin during the Quaternary Period (Brooks 2006, Orr et al. 1992).

Gilluly, Reed and Park (1933) and Brooks 2006 discuss the geology and mines of Mormon Basin in detail. The oldest rocks exposed in the district are quartzite, schist, slate and greenstone of unknown age. These rocks were intruded by mafic igneous including gabbro, dunite among others. These igneous rocks have altered to greenstone, amphibolite, serpentine and talc. Tectonic forces have sheared and foliated these rocks. The lower portions of the basin are covered by Tertiary stream deposits interbedded with dacitic and andesitic flows. Lode gold occurs as veins in the pre Tertiary rocks. The Rainbow Mine was the largest producer of lode gold in the district for the period of 1906 to 1916 when approximately $2.25 million was produce for the entire district. Approximately half came from the Rainbow mine (Oregon Department of Geology Mineral Industries, 1939).

The dominant lithology mapped in the Mormon Basin, within and surrounding the project area, consists of Quaternary alluvium (Qal) within the stream channels that is encapsulated by Pliocene and late Miocene lake and stream deposits (Tsg). The Quaternary alluvium contains gravel, sand, silt, and clay, as well as re-worked gold-bearing gravels that are found within and adjacent to streams on floodplains. These Pliocene and Miocene lake and stream deposits consists of reddish to yellowish brown clay, silt, and sand, with occasional interdigitated pebble lenses, cobbles, and boulders. The matrix is considered poorly sorted and poorly to moderately indurated. The surface deposit is mixed with colluvium derived from the surrounding hills and is manifested by occasional cobbles and boulders of vein quartz and Late Triassic and Permian Burnt River Schist floating in a sand, silt, and clay matrix. Occasional pockets of Pliocene or upper Miocene rhyolitic ash flow tuffs (ignimbrites) are mapped within the western half of the basin (Brooks 2006, Orr et al. 1992). A map of the soils in and around the project area is included in the Cultural Resources Inventory.

The Mormon Basin is a basinal feature formed and resting on top of a much grander formation. Beneath and encapsulating the basin are upper Triassic and Permian metamorphosed sedimentary and volcanic rocks (TRPbs) that extend to great depths. The TRPbs is bordered to the south by upper Triassic and Permian ultramafic rocks (TRPum) as well as the Conner Creek Fault Zone and the Cretaceous and upper Jurassic plutonic rocks (KJi) that intruded and warped the surrounding marine units. The plutonic rocks and their associated aureoles are the source of gold and other important economic minerals in the area (Brooks 2006, Orr et al. 1992).

3.5.1 Soil Quality

Topsoils, ground cover and exposed subsoils were observed in the project area as part of the watershed analysis.

Table 9. Observations of soil properties and conditions in the project area.

Topic	Observation
Soil Age	Topsoil age ranges from less than 100 years (mine spoils) to many thousands of years. Subsoils of residual soils weathered from sedimentary rocks are of great age. Also see Volcanic Ash section.
Soil Texture	In mined areas, surface soils were found to range in texture from pure cobbles and gravels, to extremely cobbly sandy loams and loams, to fine sands and silt loams. On unmined hill slopes, topsoil textures were commonly gravelly loams to silt loams, and subsoils were often gravelly clay loams to clays.
Volcanic Ash	Soil mapping on the nearby Wallowa-Whitman National Forest suggests undisturbed soils in the project area include variable amounts of silt-sized particles of Mt. Mazama volcanic ash which was deposited about 6,800 years ago. About 20 inches of volcanic ash was deposited in NE Oregon. Natural erosion processes removed much of the ash from the project area; the remainder has been mixed into soils primarily by rodents. Recognizable ash layers are absent or uncommon and may exist on alluvial fans and in forested areas on the side of the basin.
Soil Depth	Soil depth ranges from shallow (less than 10 inches) on convex hill slopes to very deep (greater than 5 feet) on concave slope positions and in valleys.
Topsoil Thickness	Topsoils in mined areas are non-existent to thin; they are thickest in floodplains where high organic silts and sands have been deposited in backwaters of reservoirs. Topsoils of upland soils range in thickness from 4 to 7 inches for shallow soils on convex slopes (ridges), to 10 to 20 inches for deep soils on concave slopes (swales).
Soil Biotic Crusts	Soil biotic crusts are uncommon in the project area. One site was found at the mouth of Puget Sound Gulch where about 70% of the ground surface is covered with a microbiotic crust. Rodents destroy the crust with annual tunneling under the snow but the crust grows faster than the rodents can churn the soil surface. Another area with 70-80% moss cover was found in mined forestland in lower Emigrant Creek.
Water Table	Seasonal and permanent water tables vary across the landscape from standing water at the soil surface in wetlands to more than 5 feet from the soil surface on ridges.
Natural Soil Disturbance Mechanisms	The primary natural soil disturbance mechanism is rodent churning of the topsoil which incorporates organic matter and creates bare soil. An example is the ridge NE of Reservoir R-03 where there is up to 50% bare ground due to rodents. The secondary natural soil disturbance mechanism is soil erosion/deposition by surface water runoff. An example is the ridge east of Reservoir R-04 where high sheet erosion has pedestaled grasses, and head cuts and associated gullies in streams.

According to information posted by the USDA Natural Resource Conservation Service (NRCS), the NRCS has not yet published a soils report for the project area. The adjacent Baker County soil survey can be used to identify potential soils and soil properties, but the taxonomy of many of those soils is inaccurate due to the previously unrecognized influence of volcanic ash on soils in eastern Oregon.

Soil quality was observed throughout the project area according to Protocol for Assessment and Management of Soil Quality Conditions (WWNF 2004). Soil quality criteria are listed in Table 9. Soil quality evaluations include intensity and spatial components: measurable soil damage and percent area affected by this soil damage. The twenty percent (20%) break is based on the U.S. Forest Service guidance for Watershed Condition Assessment (1998). The other breaks (5%, 10%, 50%) are fifty percent of the next higher number. The soil quality criteria were applied to sites as well as to the proposed project area. The scale of final use of this methodology would be based on BLM preference.

The term "Detrimental Soil Conditions," as used in Table 10, refers to soil alteration or soil damage severe enough to adversely affect long-term soil productivity. This includes detrimental compaction, puddling, displacement, burning, erosion, and mass wasting as defined by Region 6 of the US Forest Service (USFS 1998). To make mapping of soil damage efficient, WWNF (2004) redefined detrimental soil conditions as follows:

Detrimental compaction and puddling occur when the soil surface is compressed a minimum of 4 inches. Detrimental displacement and erosion occur when one-half of the topsoil is displaced or lost, usually at least 4 inches. These definitions apply to soils at least 20 inches deep, with topsoils at least 8 inches thick.

Table 10. Soil quality criteria –intensity.

Percent Detrimental Soil Conditions	Percent of Area With Acceptable Soil Quality	Soil Quality Rating
0-5%	95-100%	Very High
5-10%	90-95%	High
10-20%	80-90%	Moderate
20-50%	50-80%	Low
50-100%	0-50%	Very Low

Detrimental soil conditions (DSC) and soil quality ratings are reported in Table 11.

Table 11. Soil quality ratings – sample sites within the project area.

Site Rated	Detrimental Soil Conditions	Percent Detrimental Soil Conditions	Percent of Site With Acceptable Soil Quality	Soil Quality Rating

Site Rated	Detrimental Soil Conditions	Percent Detrimental Soil Conditions	Percent of Site With Acceptable Soil Quality	Soil Quality Rating
Roads	Displacement (incl. erosion), Compaction	70-100%	0-30%	Very Low
Mined areas –excavated	Displacement	100%	0%	Very Low
Mine spoils –cobble	Displacement of Fines	100%	0%	Very Low
Mine spoils – mixed, some non-riparian vegetation	Displacement	variable	variable	Moderate to Very Low
Mine spoils – mixed, high water table and riparian vegetation present	Displacement	variable	variable	Moderate
Slightly Disturbed Rangelands and Forestlands	Compaction, Displacement	0-5%	95-100%	Very High

Soil quality at sites within the project area ranges from very low to very high. On mined areas and roads where topsoil has been displaced or compacted the quality is very low to low. Conversely, soil quality is very high in undisturbed forestlands, rangelands and wetlands.

The road up California Gulch was estimated to have 70% DSC because it is a low volume 2-track road. In contrast, most roads in the project area are composed of compacted gravels or native soils, and many are excavated into hillsides or are entrenched uphill slopes.

Although most old mine spoils are in a detrimental condition (displacement, compaction) with very low soil productivity compared with pre-mining condition, the sites with high water tables have a high rate of recovery, plant growth, carbon sequestration, and fine soil accumulation in floodplains.

3.6 Public Roads and Access

The project area may be accessed by county roads from the west via Clarks Creek Road, and from the south via the Mormon Basin Road. Access from Interstate 84 is provided from Shirttail Creek Road and the Rye Valley Road. The Snake River/Mormon Basin Back Country Byway passes through Mormon Basin via the Mormon Basin Road and Clarks Creek Road. Various native surface roads also exist in the project area, for a total of approximately 9.1 miles of roads throughout the project area.

BLM-administered lands in the project area are generally open to public access, but some private land roads are gated to protect fuel storage areas, equipment, valuable minerals, and to protect public safety. No off-road restricted areas or extensive recreation management areas have been designated in the Baker RMP for the Mormon Basin project area (BLM 1989).

3.7 RECREATION AND VISITOR EXPERIENCE

Dispersed recreation occurs throughout the region and the Snake River-Mormon Basin Back Country Byway passes through the project area. Recreation in Mormon Basin includes sightseeing, driving for pleasure, picnicking, camping, hiking, use of off-road vehicles, hunting(big game and upland bird) in the fall, and limited snowmobile use in the winter. BLM-administered lands in the project area are generally open to recreation but some private land roads are gated. No off-road restricted areas, extensive recreation management areas, or areas of high visual quality have been designated in the Baker RMP for the Mormon Basin project area (BLM 1989).

3.8 SOCIOECONOMICS

In the late 1800s, immigrants who previously had continued along on the Oregon Trail, began to settle in eastern Oregon due to the discovery of gold and the agricultural opportunities. Today, Interstate 84 has replaced the Oregon Trail as an important trade and service corridor through the region. The Mormon Basin project area is located on private and BLM rangeland along the boundary of Malheur and Baker counties to the west of Interstate 84. The nearest towns of Baker City, Vale, and Ontario are approximately one hour drive to the north and southeast.

3.8.1 DEMOGRAPHICS

Malheur and Baker counties are sparsely populated rural counties with strong economic ties to nearby central Idaho. As of 2006, Malheur County had a population of 31,247 (3.2 people per square mile) and Baker County had a population of 16,243 (5.5 people per square mile). Since 2000, the counties have decreased in size by 1.2% and 3%, respectively (U.S. Census Bureau 2008). Most of the population in both counties is located near the two major highways of the region, Interstate 84 and Highway 20.

The median household income in Malheur County is $30,302 and in Baker County is $31,737. Approximately 19.5% of the Malheur County residents have an income below the poverty line while in Baker County 15.2% of residents have incomes below the poverty line.

3.8.2 LAND OWNERSHIP AND ECONOMY

Ranching predominates in Malheur County where 94% of the county is considered rangeland and 67% of the county is administered by the BLM (DOI 2008). Farming is also common in the Western Treasure Valley near Vale and Ontario. According to the Oregon Blue Book, natural resources and mining in Malheur County accounts for 12% (or $25,911,232) of private industry payroll income (OECDD 2006).

In Baker County, federal land ownership is more mixed with U.S. Forest Service managing 33% of land and the BLM managing 19%. Total federal land ownership is 52% of the County (DOI 2008). Farming, ranching, logging, and recreation are the primary economic activities of the county. According to the Oregon Blue Book, natural resources and mining in Baker County accounts for 4% (or $ 4,060,389) of private industry payroll income (OECDD 2006).

3.9 VISUAL RESOURCES

The project area is located outside of any designated Visual Resource Management (VRM) Class I or II areas. Therefore, the area is considered Class III/IV according to the Baker RMP (1989). The objective of VRM Class III is to partially retain the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. The objective of VRM Class IV is to provide for management activities that require major modifications of the existing character of the landscape. Management activities may dominate the view and be the major focus of view attention. However, every attempt should be made to minimize the impact of these activities through carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

The Proposed Action would occur primarily along the alluvial slopes of Glengarry Creek and California Gulch, but is also proposed along French Gulch, Emigrant Gulch, Puget Sound Gulch, Rich Gulch, and City Gulch. Alluvial deposits include reddish to yellowish brown clay, silt and sand covered with scattered hillside vegetation predominated by sagebrush and juniper. Wetlands and riparian vegetation exists at the base of gulches and streams.

In 1991, the Snake River-Mormon Basin Back Country Byway was designated by Congress under the National Scenic Byways Program of the Federal Highway Administration. Clarks Creek Road and Mormon Basin Road in the project area are segments of the Snake River-Mormon Basin Back Country Byway. Mining activities and some tailings piles would be visible along portions of those roads in Mormon Basin.

3.10 WATER RESOURCES

Surveys were conducted by Bliss Enterprises to map and describe the existing water resources conditions (Appendix D). The project area is located in the rain shadow of the Cascade Range and Blue Mountains with typically low rainfall (9-18 inches annually) and high evapo-transpiration rates (EPA 2003). The local hydrological unit is the Basin Creek subwatershed, which ultimately feeds into the Middle Snake River and Columbia River. The subwatershed has not been officially divided further, but Basin Creek above Reservoir R-14 dam (located just below the California Gulch/Rich Gulch inflows) (Figure 5) would be an appropriate next level drainage area (Bliss 2008)

3.10.1 STREAMS AND DITCHES

Streams within the subwatershed include various reaches of Glengarry Creek, French Gulch Creek, City Gulch Creek, Emigrant Creek, Puget Sound Gulch Creek, Tuesday Gulch, Rich Gulch Creek, California Gulch Creek, and Basin Creek. Reaches of all streams are first and/or second order except for Basin Creek, which is a third order stream.

All streams have intermittent reaches at some time of the year or during drought years. The beginning point and terminus of stream surface flow changes from spring snowmelt to late summer as local water tables drop below stream channels. The best time of year to observe and determine whether a stream reach is perennial or intermittent is the month of September, before the first hard frost shuts down evapo-transpiration of shrubs and trees in riparian areas. Intermittent streams can become seasonally perennial after the onset of cold weather (Bliss 2008).

Peak snowmelt discharge from the Mormon Basin is estimated to occur in April each year. Bank-full discharge for Basin Creek is approximately 2 cubic feet per second (cfs) while summertime flows, including other streams, are less than 0.18 cfs (Bliss 2008).

Seven ditches were found in Mormon Basin. Most ditches represent permanent stream diversions. Ditches can be sources of sediment, but local ditches appear to have relatively stable bottoms. Ditches divert perennial and intermittent streams to reservoirs, and to, or around, previously mined areas. Some ditches collect water or have potential to collect water from hill slopes, so they act as an extension of the drainage network (Bliss 2008).

3.10.2 Floodplains

Floodplains are located along streams at a range of 1.4 feet wide in upper Rich Gulch to 10 feet wide in Basin Creek. Most wetlands are also within the floodplain and range from small 5 feet wide areas to about 600 feet wide in the backwaters of valley-wide reservoirs (Bliss 2008).

The alluvial bottoms of streams of Mormon Basin range from about 20 feet to about 700 feet wide. Over time, the streams have occupied most of the width of the alluvial bottoms. A tree falling across a floodplain can quickly move an active floodplain from one side of a valley to the other and a beaver dam across a valley can inundate the whole valley. For these reasons, the entire flatter portion of the alluvial bottom is considered floodplain (Bliss 2008).

3.10.3 Reservoirs, Dams, and Ponds

The Mormon Basin project area includes 35 reservoirs, with 25 on streams and 10 on dry hillsides. The range of total surface water area is 7 to 16 acres (and a capacity of 15-70 acre feet), depending on the season and precipitation. Total evapo-transpiration is expected to exceed 17.5 acre-feet per year (Bliss 2008).

Where reservoirs are located along streams, most streams would cut a notch through reservoir dams at the spillway or another low spot in the dam, especially as they reestablish their natural meander pattern and gradient in stored sediments. In Mormon Basin, the natural breaching of reservoir dams by streams is countered by beaver, which have built mud-and-willow dams in the outlets of various reservoirs (Bliss 2008).

The project area includes eleven ponds surrounded by well-developed riparian areas. These are all constructed ponds used historically for mining purposes. The ponds were constructed many decades ago, and natural development of riparian has occurred over time. Total maximum water surface area of these ponds is about 0.30 acre, with about 0.60 acre-feet of storage. Ponds are perennial or intermittent depending on the status of the local water table. All ponds appear to be related to past gold mining activity (Bliss 2008).

3.10.4 GROUNDWATER HYDROLOGY

Depth to the groundwater table in Mormon Basin varies from surface level to more than five feet below the soil surface. On dry hill slopes and ridges, the water table is often 10 to 30 feet below the original soil surface. Near perennial springs and streams (and intermittent springs during seasonal flow) the ground water table is usually parabolic-upward. Other reaches of perennial streams (where stream flow decreases as it loses water to groundwater) and dry intermittent springs and streams have parabolic-downward water tables (Bliss 2008). Further details on groundwater hydrology are included in the reports prepared by the project hydrologist in Appendix D.

3.10.5 AREAS WITH NO SURFACE WATER FLOW

Three large areas without surface water flow were created by past placer mining of valley bottoms along Glengarry Creek and French Gulch Creek. The ground surface of these mined areas ranges from approximately 3 to 15 feet, which creates dozens of small basins with no surface water outflow potential under current conditions. Although these three areas include unmined uplands that have potential for water runoff, and in some places do have short ephemeral runoff channels, all such surface water runoff flows into the mined land basins where it percolates into ground water. Typically the ground water table is deeper than five feet. Where the ground water table is at or near the surface, there is no potential for surface water to rise above the mine spoils. Small wetlands exist in some of the miniature basins (Bliss 2008).

3.10.6 GULLIES AND HEAD CUTS

Several gullied streams and head cuts are present within the project area. Head cut/gully progression upstream is slow and recovery of the channels and riparian areas below the head cuts has been relatively rapid in most areas due to the presence of sedges and rushes along the stream banks. Continued watershed stability depends on the absence of large wildfires, which have not occurred recently and can prompt head cutting and gully progression.

3.10.7 ALTERED HYDROLOGY AND HYDROGRAPHY

Mormon Basin has been altered by various activities associated with mining, grazing, and access into the area. Changes include: large areas with no surface water outflow potential, reservoirs and associated dams, ditches and associated dams, roads and old water conveyance ditches, adits, sediment deposits in floodplains, loss of hardened or sealed channel bottoms in mined stream channels, and gullies and head cuts.

3.10.8 ROADWAY STREAM CROSSINGS

Roadways commonly ford streams in the project area. Ten fords are located within the project area and 9 are located downstream of the project area but within the analysis area. Fords are sources of sediment for streams as vehicles pass through them. They widen and deepen over time and generate wakes of water that wash fine sediment from the stream banks downstream. Fine sediment from streams also settles into deepened/widened fords, which function as miniature ponds.

Some roadways bridge streams and waterways with culverts. Thirteen are located at 8 sites in or near the project area. Undersized and blocked culverts may result in overtopping of roads or dams with subsequent erosion. All culverts need maintenance.

3.10.9 WATER QUALITY

3.10.9.1 Water Temperature

Summer water temperatures two miles below Mormon Basin at Basin Creek are well above the DEQ standard of 68ºF, which is why Basin Creek is included on the 303(d) list for exceeding summer water temperature for redband trout. Conditions near the BLM measurement site that could affect water temperature may include naturally low summertime stream flows, north-south stream orientation, high summertime air temperatures, and past mining of the channel which may contribute to low or subsurface flow. As a note, water temperatures of low-elevation, low-discharge streams in eastern Oregon, like Basin Creek, may naturally exceed DEQ summer water temperature standards (Duncan D. et al 2002 and Bliss 2002).

Water temperatures of source springs in Mormon Basin were not measured. However, they are predicted to be about 41º F to 45º F for springs emerging between 5,200 and 4,800 feet elevation (Bliss 2001). Water temperatures of in-and-out streams, like those in Mormon Basin, cool 10-25ºF in the summer as they pass from perennial to intermittent to perennial reaches with emergent temperatures commonly in the mid-50’s º F to low-60’s º F (Bliss 2002).

3.10.9.2 Turbidity

Sediment transport out of upper Basin Creek is very low compared to pre-mining conditions because reservoirs, wetlands, and floodplains trap all bedload and most suspended sediment. Reservoirs are often turbid due to algae growth and beaver activity, although cattails at some reservoirs filter out sediment. Sediment deposits in source streams for Mormon Basin indicate most current bedload transport into reservoirs in upper Basin Creek consists of gravel (up to 3-inch diameter), sand, and silt. Cobble is a very small component of bedload transport and actively moves in only a few short reaches of a few streams.

3.10.9.3 Sediment

The Sediment Delivery Ratio to Basin Creek below Mormon Basin is very low, estimated to be below one percent because of the high sediment storage in upper Basin Creek. Current sediment transport out of Mormon Basin consists primarily of floodwater silt and small-diameter gravel, sand, and silt that the stream flushes past cattails at the lowest reservoir. Overall, Basin Creek below the Cumulative Watershed Effects Analysis Area point is sediment starved compared with the pre-mining, pre-reservoir condition.

3.11 WETLANDS

Wetlands within the project area were delineated during a site visit conducted in July, 2008 by SWCA with additional data for private lands provided by Bliss Enterprises (Appendices D and E). The methodology used for determining the presence of wetlands and waters and delineating wetland boundaries followed the routine wetland determination methodology and plant community approach of the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Arid West Interim Regional Supplement* to the 1987 USACE Wetland Delineation Manual, which became effective February 2007 (USACE 2006). The site is located in the Columbia/Snake River Plateau Land Resource Region (LRR B) of the Arid West Interim Regional Supplement. The 1987 Corps Manual and the supplemental Arid West Manual are consistent with the DSL wetland delineation requirements.

Potentially jurisdictional wetlands and waters totaled 18.5 acres on private lands and 26.2 acres on public lands in the study area for a total of 44.7 acres (Appendix E). Floodplain wetlands delineated within the study area are hydrologically influenced by three intermittent drainages that flow through the project area: Glengarry Gulch Creek, Emigrant Gulch Creek, and California Gulch Creek. Hydrology of these drainages is mainly supported by seasonal groundwater springs and snowmelt from surrounding mountains.

Ponds and reservoirs mapped as wetlands within the study area were determined to be potentially jurisdictional features and are remnants of mining features excavated below the groundwater table. Maximum water depth of the ponds and reservoirs was not determined during the SWCA investigation. The majority of these features appear to be shallow; however, it is possible that two of the apparently deeper reservoirs on Glengarry Gulch Creek would be considered waters of the state, depending upon the maximum water depth.

3.11.1 Site 1A – South

Rich Gulch Creek originates from a ground water spring located to the west of the study area. Rich Gulch Creek extends into the north part of Site 1A South and flows northeast through a mosaic of depressional, bermed wetlands located between old mine tailings. Shallow ponding was observed in small depressional swale areas along the creek within Site 1A. The wetland boundary was well defined by a significant increase in topography to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland. The swale and Rich Gulch Creek extend off-site to the east, west, and south.

3.11.2 Site 1A – North

A spring fed depressional wetland was observed in the southeast portion of the Site 1A North study area. The concave emergent wetland slopes downward to the south and extends off-site. The wetland was dominated by soft rush (*Juncus effusus*) and small spikerush (*Eleocharis parvula*). Soils were saturated at the surface during the July 17, 2008 site visit. The wetland boundary was defined by a topographic increase to the adjacent mine tailing mounds. An approximately 5 foot high upland berm is present along the northeastern perimeter of the wetland which separates it from a larger reservoir to the northeast. The reservoir is mainly located off-site to the north with only a portion extending on-site.

3.11.3 Site 2

Several ponds, three large reservoirs, spring fed wetlands and palustrine scrub-shrub and emergent fringe wetlands associated with Glengarry Gulch Creek, French Gulch Creek, and Emigrant Gulch Creek were determined to be present within the Site 2 study area.

A spring fed wetland that originates from the hill slope in the north portion of the study area flows northeast off-site into Glengarry Gulch Creek. The wetland is a concave sloped spring-fed wetland and is mapped on the National Wetland Inventory (NWI) map. The wetland was dominated by Pacific willow (*Salix lasiandra*), cottonwood (*Populus trichocarpa*), mountain alder (*Alnus incana*), hooded ladies-tresses (*Spiranthes romanzoffiana*), California false hellebore, and soft rush. Shallow ponding was observed throughout the wetland. Surface water flows from the downslope edge of the wetland across the adjacent road before flowing into Glengarry Gulch Creek off-site to the north. The wetland boundary was defined by a topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

Another small emergent spring seeps across the road downslope of the larger NWI-mapped wetland. It too discharges along the adjacent road before joining Glengarry Gulch Creek off-site to the north.

Glengarry Gulch Creek enters the study area from the north and flows in a southeasterly direction within a defined channel through the site. A willow and cottonwood dominated riparian corridor is present along the defined channel. The channel is approximately 2 feet wide and appears to be intermittent. Approximately 4 inch deep flow was present within Glengarry Gulch Creek during the July 2008 field investigations.

A palustrine emergent fringe wetland was delineated adjacent to Glengarry Gulch Creek in the north part of the study area. It was dominated by soft rush, redtop (*Agrostis alba*), and areas of California false hellebore. The wetland boundary was defined by a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

The downstream portion of Glengarry Gulch Creek lacks a defined channel and flows through a series of ponds and two permanently flooded reservoirs. Outflow at the downslope end of each reservoir is constricted by man-made dams associated with historic mining operations. However, surface water seasonally spills over, around, and/or under the berms, hydrologically connecting the reservoirs. A narrow fringe of soft rush and/or willow is present along the perimeter of the reservoirs. Aquatic vegetation was also present. Therefore, the reservoirs were determined to be wetland based on having wetland hydrology and a hydrophytic vegetation community. The wetland boundary associated with the reservoirs was well defined by the topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

The scrub-shrub wetland community near the outer wetland edge of one of the larger downstream reservoirs was dominated by a large community of willow and soft rush. The lower elevation areas of the reservoir were inundated. Surface soils were layers of sandy loams and sands underlain by silty clay and a clay pan restrictive layer. The water table was observed at approximately 18 inches below ground surface (and rising) during the July 16, 2008 site visit. These areas were determined to be wetland based on having a hydrophytic dominated vegetation community along with the presence of hydric soil and wetland hydrology indicators. The wetland boundary was mostly defined by a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

French Gulch Creek is an intermittent spring-fed stream that enters the site from the southwest and flows on-site into Glengarry Gulch Creek. Willow-dominated riparian fringe wetland communities are present along on-site portions of French Gulch Creek. Very shallow flow (average approximately 1 inch deep) was observed within on-site portions of French Gulch Creek during the July 2008 site visits. Average bankfull width was approximately 2 feet.

City Gulch Creek enters the site from the southwest, south of French Gulch Creek. The stream flows in a northerly direction through a depressional wetland before flowing into one of the on-site reservoirs. The average bankfull width was approximately 1 foot, and this stream is likely intermittent.

Emigrant Gulch Creek is intermittent and flows southeast along the northern boundary of Site 2. Hydrology is supported by upslope, off-site, groundwater springs. Flow was absent within Emigrant Gulch Creek during the July 2008 site visits. A large mosaic of scrub-shrub and emergent depressional wetlands located between old mine tailings was delineated within the downstream floodplain of Emigrant Gulch Creek. Wetlands extend to the southeast. The convex ridges associated with the mine tailings support non-hydrophytic vegetation species. The scrub-shrub wetland conditions associated with the on-site downstream end of Emigrant Gulch Creek are dominated by narrowleaf willow (*Salix exigua*), small spikerush and redtop. Emergent depressions associated with Emigrant Gulch Creek were dominated by soft rush and redtop. The wetland boundary associated with the on-site floodplain of Emigrant Gulch Creek was defined by a natural topographic rise to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

3.11.4 SITE 3

California Gulch Creek enters the Site 3 study area from the east and flows west through the study area within a defined channel. Willow dominated scrub-shrub wetlands and soft rush, slender cinquefoil (*Potentilla gracilis*), and redtop dominated emergent floodplain wetlands were mapped along California Gulch Creek. Floodplain wetlands associated with California Gulch Creek extend to the east and to the west. The wetland conditions of emergent floodplain wetlands associated with California Gulch Creek were dominated by soft rush, slender cinquefoil, and redtop. The wetland boundary was defined by a natural topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

A groundwater spring discharges from the hill slope south of Site 3. Discharge flows north downslope through a narrow, well defined channel (tributary to California Gulch Creek) within the project area. The tributary outfalls into a small concave depression located slightly upslope from the California Gulch Creek main stem. The depressional wetland was dominated by soft rush, meadow foxtail (*Alopecurus pratensis*), and slender cinquefoil. Shallow flow approximately ½-inch deep was present within the tributary and lower elevation areas of the emergent wetland during the July 16, 2008 site visit. Drainage patterns consisting of flattened down vegetation were visible within the upslope edge of the wetland. The wetland boundary was defined by a distinct topographic rise to the adjacent upland to the south and to the west along with a change in the vegetation community from soft rush and meadow foxtail to big sagebrush, slender cinquefoil and northern bedstraw (*Galium boreale*) in upland. The depression extends into emergent floodplain wetland associated with California Gulch Creek to the northeast.

The downstream portion of California Gulch Creek flows through a small depressional emergent wetland located immediately upstream of a dirt road crossing and is mapped on the NWI map. The wetland was dominated by pond weed, soft rush, Oregon checkermallow (*Sidalcea oregana*), and western blue flag (*Iris missouriensis*). Approximately 4 inch deep ponding was observed in lower elevation areas of the wetland with surface soil cracking along the perimeter during the July 15, 2008 site visit. The wetland boundary was defined by an increase in elevation to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland.

Shallow flow (average approximately 2 inches deep) was observed within California Gulch Creek within the study area during our July 2008 site visits. California Gulch Creek is an intermittent stream. It flows off-site to the southwest into Basin Creek.

3.12 Resources Considered but Not Affected

The following elements have been considered and have been determined not to be affected: None of the resources listed below were determined to be present in the project area, with the exception of hazardous wastes, and those would be limited to petroleum products and chemicals such as antifreeze and brake fluid that are normally used in equipment maintenance.

- Areas of Critical Environmental Concern
- Caves
- Environmental Justice
- Essential Fish Habitat
- Hazardous Wastes (Processing Chemicals)
- Native American Religious Concerns
- Wilderness, Wilderness Study Areas (WSA), and Lands with Wilderness Characteristic (LWC)
- Prime and Unique Farmlands
- Wild and Scenic Rivers

4 ENVIRONMENTAL EFFECTS

This section analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing each alternative. Direct and indirect effects are analyzed for each resource while cumulative effects are described in summary for all resources at the end of the section. Potential impacts are described in terms of type, context, duration, and intensity.

Type describes the classification of the impact as beneficial or adverse, direct or indirect:

Beneficial: A positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Context describes the area or location in which the impact would occur. Are the effects site-specific, local, regional, or even broader?

Duration describes the length of time an effect would last, either short-term or long-term:

Short-term impacts generally last only as long as the annual mining or restoration activities. Mining related resources generally resume their pre-mining conditions by the following spring.

Long-term impacts last beyond the annual mining period (i.e. 5 to 20 years) or restoration activities (i.e. 1 to 5 years). Mining related resources may not resume their pre-mining conditions by the following spring.

Intensity describes the magnitude, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major.

Negligible: The resource would not be affected, or effects would not be measurable. Any effects to the resource would be slight and short-term and would occur in a relatively small area.

Minor: Effects to the resource would be detectable, but would affect a small area. If design features or mitigation were needed to offset adverse effects, they would be relatively simple to implement and would likely be successful.

Moderate: Effects to the resource would be readily apparent and would occur over a relatively large area. Design features or mitigation would probably be necessary to offset adverse effects and would likely be successful.

Major: Effects to the resource would be readily apparent and would substantially change the resource over a large area. Extensive design features or mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Effects generally take place each mining season over 10 years (for mining) or 13 years (for mining and reclamation). Disturbance associated with the No Action Alternative (Alternative 1), would be generally less than 317 acres on private land, use of roads and water on BLM administered lands. No testing would take place in the 152.5 acre public lands portion of the project area, since testing is considered complete in this area. Disturbance associated with Alternatives 2 and 3 is generally less than 317 acres on private land and 152.5 acres on public land for a total of 469.5 acres, along with use of roads and water. Disturbance on public land would vary from 10.5 to 20.5 acres per year for Alternative 2 and 3.

4.1 AIR AND ATMOSPHERIC VALUES

4.1.1 DIRECT EFFECTS

Alternative 1 – Impacts to air quality are expected to be negligible (not measurable) to minor (detectable in a small area), long-term (longer than one mining season), and adverse as a result of mining that is occurring on private land. The No Action Alternative would create fugitive dust in the local area from vehicle travel along local native surface and gravel roads, and from mining activities associated with private land. Diesel and gas-powered vehicles and mining equipment would also contribute exhaust into the local area. Mining operations would take place on private land up to six days a week from spring through fall for the life of the project. Roads would be rocked or wet down when dust is problematic.

The removal of some vegetation by pile burning may also occur (though some would be used for erosion control) and a permit would be obtained for the burning of wood debris. This activity is occurring on private land under the No Action Alternative.

Alternative 2 – Impacts to air quality are expected to be minor, long-term, adverse, and local. Design features would be implemented to minimize these effects. The Proposed Action would create fugitive dust from vehicle travel along local roads, road improvement activities and construction of temporary access roads, and from mining activities associated with placer mining and reclamation on public land managed by the BLM on up to 20.5 acres per year. Diesel and gas-powered vehicles and mining equipment would also contribute exhaust into the local area. Mining operations would take place at least six days a week from spring through fall for the life of the project. Roads would be rocked or wet down when dust is problematic.

The removal of some vegetation by pile burning may also occur (though some would be used for erosion control). BLM crews would conduct any burning on public lands. A permit would be obtained for the burning of wood debris on private lands.

The direct effects to air quality from use of the shop would be negligible. Air pollutants such as gases from combustion, particularly from the generator and vehicle emissions, and fugitive dust generated by unpaved roads and pollutants from burning wood in the stove would result. But the use of a properly maintained and constructed shop building would contain some of the fugitive emissions from vehicles.

The Proposed Action may cause direct effects on greenhouse gas levels as a result of energy use (e.g. fuel consumption in vehicles or equipment). Effects are expected to be negligible, long-term, adverse, and local.

Alternative 3 – Impacts to air quality are expected to be minor, long-term, adverse, and local. Design features would be implemented to minimize these effects. In addition to the impacts described for Alternative 2, restoration activities, including road improvements and structural watershed improvements, would create some additional fugitive dust. The direct effects to air quality and on climate change would be the same as those described for Alternative 2, negligible to minor, long-term, adverse, and local.

4.1.2 INDIRECT EFFECTS

Alternative 1 – Impacts to air quality are expected to be negligible to minor, long-term, adverse, and local. Mining on private land would expose bare soils to wind erosion, which would contribute to fugitive dust over a period of years.

Alternative 2 – Impacts to air quality are expected to be minor, long-term, adverse, and local. Design features would be implemented to minimize these effects. Up to 152.5 acres of public lands would be impacted by mining of up to 20.5 acres each year, exposing soils to wind erosion. Road improvement activities and construction of temporary access roads would further expose soils to wind erosion. These activities would contribute to fugitive dust over a period of up to 13 years.

A BLM decision to allow mining on public lands would result in an increase in mining occurring on adjacent private lands. Indirect effects on air quality would result due to vegetation removal, mining activities, road improvements, and use of diesel and gas-powered vehicles and mining equipment.

During shop removal and reclamation, indirect effects include minimal amounts of fugitive dust from bare soils until the area is vegetated indirect. Effects would be negligible, long-term, adverse, and local.

The Proposed Action may cause indirect effects on greenhouse gas levels by cutting or clearing vegetation that may result in net emissions of greenhouse gases. Impacts are expected to be negligible (not measurable), long-term (longer than one mining season), adverse, and local.

Alternative 3 – Impacts under Alternative 3 would be similar to Alternative 2. However, restoration activities would create additional areas of bare soil which would be exposed to erosion by wind until vegetation establishes. Effects on air quality would be negligible, long-term, adverse, and local.

Indirect effects on climate change would be the same as those described for Alternative 2, negligible, long-term, adverse, and local.

4.2 *BIOLOGICAL RESOURCES*

Because some mining activity is currently occurring in Mormon Basin, the types, causes, and context of direct and indirect impacts are similar among all of the alternatives including the No Action alternative. However, the intensity and duration of the impacts differs by alternative. The common thread of adverse impacts among these alternatives is the relative difficulty in reestablishing a native plant community after the mining operation. Changes in vegetation impact wildlife through habitat fragmentation and non-native and noxious weed introduction and/or encroachment. These changes result in loss of forage, cover, and breeding sites.

The assumption is that reclamation and restoration efforts would be successful on the site due to design features that would be implemented to reduce colonization of invasive species and promote a native plant community. Mountain big sagebrush communities have a higher site potential for restoration than Wyoming big sagebrush (Lesica et al. 2007). Also, stockpiling topsoil and replacing it after mining provides a matrix for reestablishing vegetation; however, the viability and/or vitality of the topsoil could become compromised if soils are stockpiled for a long period of time and/or noxious and other invasive weed species colonize the soil because of the availability of weed sources in the region. To avoid promoting weed proliferation, stockpiled soils will be seeded with native species (squirreltail and Idaho fescue) and crested wheatgrass; seeding with only native seeds in the past failed to establish a native plant community.

4.2.1 FISH AND WILDLIFE

4.2.1.1 Direct Effects

Alternative 1 – The only fish species observed during surveys in the project area was a non-native introduced goldfish found in one reservoir. However, native redband trout have historically occurred and are currently presumed to occur within the project area; they are addressed in Section 4.2.3.

Wildlife impacts would consist of habitat loss and degradation on private lands. As this is a phased project, the loss of wildlife habitat, forage, and cover would be sequentially replaced by concurrent reclamation. The noise and human presence resulting from ongoing mining activities as well as vehicle travel on project roads may cause temporary displacement of rodents, reptiles, amphibians, birds, mule deer, and other wildlife species that may occur in the project area. Physical injury to less mobile species such as reptiles or species crossing roads may occur as a result of project activities. Effects to wildlife would be minor, short-term, adverse, and site-specific because impacts due to ground disturbance would occur in a relatively small area compared to the overall landscape and reclamation would restore wildlife habitat.

Alternative 2 – In the short-term (annual mining season), the effects to wildlife within the project area are similar to those described above for Alternative 1 (minor, adverse, and site-specific) based upon the mobility of wildlife utilizing the site and the implementation of non-disturbance buffers to protect perennial streams, wetlands, and riparian habitat. In the long-term, the effects to wildlife within the project area would be minor, adverse and site-specific; and depend upon successful reclamation. Even if reclamation activities did not restore wildlife habitat to its pre-disturbance condition and therefore resulted in some loss in habitat quality, long-term impacts would still be considered minor, adverse and site-specific because the project area would disturb a relatively small area compared to the overall landscape.

Potential effects to wide-ranging wildlife species as a result of Alternative 2 are likely to be minor, site-specific, adverse, and short-term. Birds and large mammals, including mule deer and elk, may be displaced during mining operations but are capable of using adjacent habitat and avoiding the mining sites. ODFW has designated portions of the Mormon Basin area as important winter and summer range for big game species (personal communication, Melissa Yzquierdo 2010). The project site is located outside of the mule deer winter range designated in the Baker 1989 RMP. Impacts to big game species utilizing winter range would be avoided because mining would not occur in the winter. Impacts to summer range would be minor, short-term, adverse, and short-term because these species have ample food and cover in adjacent habitat.

Impacts to some individuals with limited mobility and small home ranges, such as small mammals and reptiles, would be major (effects to the resource would be readily apparent), site-specific, adverse and permanent to those individuals that are unable to move out of the path of the mining operation. In addition, habitat within the footprint of the excavation sites would be temporarily lost, resulting in a short-term, site-specific, adverse effect to a limited number of non-mobile species.

Habitat degradation and wildlife species displacement would result at each of the mining sites, as vegetation is removed for mining. Reclamation of these areas following mining would restore wildlife habitat. As a result, direct effects on wildlife from mining activities would be adverse, long-term, site-specific and minor.

Hydrology changes to water levels in reservoirs due to pumping for process water would likely be adverse, short-term, site-specific and minor to moderate depending on the volume of water pumped. Effects on wildlife due to drawdown of reservoirs would be minimized by pumping water into the reservoir from the domestic well as needed to maintain reservoir water levels. The following spring, the water table in the reservoirs would replenish until reservoirs were pumped down again to provide mining process water. Wildlife utilizing the reservoirs for watering could find other water sources on the site and in the vicinity. Amphibians using reservoirs for breeding could be affected depending on the amount of water loss and the schedule for pumping if it occurred during the breeding season. To reduce the potential for amphibians (e.g. tadpoles, egg masses) to be impacted during pumping, fine mesh screens would be installed on intake pumps. Direct effects to amphibians would be adverse, short-term, site-specific, and minor to moderate.

Alternative 3 – The restoration alternative encompasses both the excavation area of the Proposed Action as well as contouring and restoring historically mined sites within the basin. Many of the direct impacts to wildlife as a result of this alternative are similar to what has been described above for Alternative 2, including effects due to water management. However, in the short-term, there would be site-specific, minor to moderate, adverse effects associated with greater site disturbance as the historically mined sites also undergo new ground disturbance. Ultimately, if restoration of the historically mined sites is successful there are likely to be site-specific, minor to moderate, long-term, beneficial effects to wildlife because of the bare rock tailings restoration, dam improvements, and hillside and gully erosion control which would improve the quality of terrestrial and aquatic habitat in the project area.

4.2.1.2 Indirect Effects

Alternative 1 – Mining on private land, use of roads and use of water in the area may change wildlife use in the basin, particularly for wide ranging species such as deer, elk, cougar, and bear. These species would be expected to avoid the area during mining activities due to increased noise and human activity and seek alternative locations. Some trees would also be removed reducing some potential nesting and foraging habitat for birds. Indirect effects are expected to be site-specific, minor, long-term, and adverse.

Alternative 2 – The noise and human presence resulting from mining activities as well as vehicle travel on project roads may cause temporary displacement of wildlife currently using the project area. The vegetation communities and habitat provided by wetlands and riparian areas would remain in their current physical condition due to protection of these features with non-disturbance buffers. However, temporary local changes in the surface flow and/or groundwater transport could occur. Any hydrology change due to increased pumping from reservoirs for process water would likely be adverse, short-term, site-specific, and moderate depending on the volume pumped and the time it takes for the water table to equilibrate. Effects of drawdown on reservoirs would be minimized by pumping water into the reservoir from the domestic well as needed to maintain reservoir levels. The following spring, the water table in the reservoirs would replenish until reservoirs were pumped down again. Wildlife utilizing the reservoirs, ponds, and streams for watering could find other water sources since there are a variety of options on the site and in the vicinity of the project area. Following reclamation after mining operations are complete, the wetlands and streams would likely return to pre-mining water levels and ultimately support similar wildlife habitat as the current conditions. Indirect effects to wildlife would be site-specific, minor, short-term, and adverse.

A BLM decision to allow mining on public lands would result in an increase in indirect effects because additional mining would also occur on the adjacent private lands as a result of the BLM decision. Mining on private lands would result in an increase in the disturbance area due to mining activities and would therefore increase indirect effects to wildlife.

Alternative 3 – Many of the previously mined areas are bare or have been colonized by patches of invasive species. Restoration of these areas through control of noxious weeds and establishment of native species as well as restoration activities undertaken to improve water quality and reduce sediment from access road runoff would result in improvements to wildlife habitat. Indirect effects are likely to be site-specific, minor, long-term, and beneficial.

4.2.2 VEGETATION

4.2.2.1 Direct Effects

Alternative 1 – The effects to vegetation are expected to be negligible, site-specific, and adverse in the 152.5 acre BLM administered project area, since the only activities are use of roads and water. The area of disturbance is all on private land; specific areas are identified for vegetation removal, and reclamation and seeding of test and mining sites takes place each fall. The length of time required for the new vegetation to adequately establish would be long-term.

Improvements in the quality of the vegetation are possible with contouring and topsoil additions in areas which were previously disturbed and currently have little native vegetation. However, all ground disturbances have the potential to trigger invasive species encroachment, even with the addition of topsoil and application of native seed. Native vegetation could take decades to establish to pre-mining conditions, and because of this, on private land, a mix of non-persistent exotic species and native species would be used to control weeds, and produce a rapid vegetative cover.

Upon project completion, the shop would be removed and the footprint reclaimed. The direct effects from this action would be negligible and site-specific. The footprint of the shop is small. With satisfactory revegetation, the footprint would change from a bare ground area to one with established vegetation.

Alternative 2 – Direct effects to vegetation within the mining area under Alternative 2 are moderate, site-specific, and adverse in the short-term. Design features would be implemented to minimize these effects over the long-term. Direct effects to vegetation within the project area would be negligible to minor over the long-term because of reclamation to be conducted concurrent with the mining operation, including the establishment of a native vegetation community in mined areas. The area of impact at any one time during the mining season would be minimized, with reclamation taking place concurrently with the mining. Topsoil would be salvaged and replaced and areas of bare soil would be seeded with all states certified noxious weed free seed, with the intent of establishing native vegetation by the following spring. Thus, the site-specific, adverse effects are expected to be negligible in bare rock areas to minor in vegetated areas over the long-term with successful reclamation.

The Proposed Action includes disturbance of up to 152.5 acres, mined in small parcels for up to 10 years with reclamation of each pit occurring prior to excavating another site. In areas which are currently bare ground or in which invasive native or non-native species exist, there would be a site-specific, beneficial effect to vegetation quality because of reclamation efforts. In areas consisting of desirable native plant communities the direct effect to vegetation would be site-specific, long-term, adverse, and minor.

Continued use of the shop building would result in negligible effects. There is no vegetation where the shop building is located and only sparse vegetation in the parking lot. Continued use of the shop would result in maintaining the non-vegetated state of the area. Effects resulting from shop removal and reclamation are the same as those described in Alternative 1.

Alternative 3 – The direct effects to vegetation are similar to Alternative 2, since the same area and duration of mining excavation and processing is proposed, along with disturbance of additional areas due to restoration projects. The effects due to occupancy and shop removal are also the same. With successful restoration efforts, the effects to vegetation are site-specific, moderate, and adverse in the short-term and site-specific, negligible to minor and beneficial in the long-term. Current mine tailings areas could see improvement in vegetation quality, since some of these tailings areas are bare, have limited species composition, or are dominated by invasive species. Removing invasive species will also reduce their ability to encroach into future soil disturbance areas.

Monitoring the success and adaptively managing the restoration efforts, making changes to the approach and species seed mix when necessary would enhance the potential for successful restoration. Monitoring activities are described in Section 2.2.3.6 as well as in the PoO.

4.2.2.2 Indirect Effects

Alternative 1 – The indirect effects as a result of Alternative 1 would be minor to moderate, site-specific, long-term, and adverse. Results of previous mining would not be reclaimed under this alternative. These bare rock piles and flat tailings areas within the basin would remain bare ground or weed patches and would likely contribute to weed proliferation in disturbed soil areas in the project site.

The possibility exists that indirect effects from shop removal could be minor, adverse, and site-specific over the long-term if native species cannot establish due to competition from noxious weeds.

Alternative 2 – Indirect effects to vegetation could be caused by potential weed proliferation in the project area that could reduce plant diversity by out-competing native plants and preventing establishment of native species in reclamation areas. Indirect effects as a result of Alternative 2 would be site-specific, negligible, adverse, and long-term for bare rock areas and minor to moderate, site-specific, long-term, and adverse for areas with established native vegetation. Effects are beneficial for bare rock tailings areas that would be rehabilitated. Design features would be implemented to reduce potential weed spread and minimize adverse effects.

A BLM decision to allow mining on public lands would result in an increase in indirect effects because additional mining would also occur on the adjacent private lands as a result of the BLM decision. Mining on private lands would result in an increase in the disturbance area due to mining activities and would therefore increase indirect effects.

Alternative 3 – Indirect effects as a result of Alternative 3 would be similar to those described for Alternative 2.

4.2.3 THREATENED OR ENDANGERED SPECIES (SPECIAL STATUS FISH, WILDLIFE, AND PLANTS)

According to the best available records and field observations, no federal or state listed species currently occur within the project area. However, one federal candidate species, Columbia spotted frog, is documented to occur in the project area. There is potential supporting habitat for gray wolf, a federal endangered species, as well as potential supporting habitat for federal candidate species including greater sage-grouse and streaked horned lark in the project area. Potential habitat also exists in the project area for 14 BLM special status wildlife and fish species. There was limited suitable habitat in the project area for BLM special status plant species.

4.2.3.1 Direct Effects

Alternative 1 –

Gray Wolf

The gray wolf is a federal endangered species that was recently reintroduced into Idaho and has crossed into northeastern Oregon by via the Snake River and could range into the Mormon Basin project area. Due to its current distribution, large territory size, and generalist behavior direct effects would be local, long-term, negligible, and adverse.

Greater Sage-grouse

Greater sage-grouse is a federal candidate species and BLM special status species that inhabits sagebrush habitat. Although suitable lek habitat was not observed on site, there is a documented lek located within several miles of the project. Sage-grouse could use the site for winter forage, cover and dispersal and would be vulnerable to loss of sagebrush habitat or vehicle traffic. Effects to sage-grouse would be limited due to the timing of mining operations outside of the period that sage-grouse would most likely be using the site and due to restoration of sagebrush habitat. Overall, Alternative 1 would have long-term, local, adverse effects, which are negligible to minor in magnitude.

Columbia Spotted Frog

The Columbia spotted frog is a federal candidate species and BLM special status species that inhabits the reservoirs, ponds, streams, and riparian portions of the project site. Since Columbia spotted frog adults and tadpoles were observed in all but one of the reservoirs (i.e. upper reservoir) during the July 3, 2008 survey, it is assumed that they use most of the reservoirs and ponds for breeding and disperse to the streams. However, specific egg laying times are unknown. Spotted frogs could be adversely affected by intake pumps sucking them out of the reservoirs during processing if they are in the reservoirs at that time. Design features would be implemented to minimize these effects. To avoid impacts, prior to pumping water out of the reservoirs, the reservoirs would be surveyed for frogs (i.e. egg masses, tadpoles, adults) and if present, intake pumps would be screened with a mesh fine enough to exclude all frog life stages and be fitted with a structure to reduce entrapment at the screen. Spotted frogs are also vulnerable to vehicle traffic that could disturb or harm adults and juvenile frogs that are dispersing from the ponds. Eliminating the puddle in the haul road where the spotted frogs were observed may reduce the potential for loss of individuals by vehicular traffic as well as slightly reducing stream siltation, resulting in a beneficial impact to Columbia spotted frog populations. With implementation of these design features, direct effects to Columbia spotted frog would be local, short-term, minor, and adverse.

Settling ponds that remain wet during the summer months will have shallow shelves constructed around the outside edge which would be left in place to provide amphibian habitat after mining terminates. The ponds would result in local long-term beneficial effects.

Streaked Horned Lark

The streaked horned lark is a federal candidate species and BLM special status species that inhabits flat bare ground or sparsely vegetated habitats (70FR 24869-24934). Mining operations would provide sparsely vegetated habitats in the early stages after planting and would provide increased habitat. Direct effects to streaked horned lark would be local, long-term, moderate, and beneficial.

Wildlife Species of Concern and BLM Special Status Species

Currently, the bald eagle is delisted from the USFWS ESA list. However, the bald eagle is still protected by the Bald and Golden Eagle Protection Act of 1940 and is a special status species for the BLM and an Oregon listed threatened species. Although bald eagle could potentially fly through the project site, the site provides limited food sources (e.g. fish). Because of the limited critical habitat features and its large home range, direct effects would be negligible, short-term, local, and adverse.

The ferruginous hawk is a USFWS species of concern. Although ferruginous hawks could utilize portions of the site for foraging, no ferruginous hawks or their nests were observed. Because of the limited critical habitat features such as food sources, direct effects would be negligible, short-term, local, and adverse.

White-tailed jackrabbit is a BLM special status species and a USFWS species of concern, and the black-tailed jackrabbit is a BLM special status species. Jackrabbits were not observed on the project site but could potentially occur on site in sagebrush-steppe habitat that will be mined and restored. Direct effects to jackrabbits would be short-term, minor, local, and adverse.

There are three bat species that are USFWS species of concern and could inhabit the site: spotted bat and fringed myotis could use trees and Townsend's big-eared bat could use isolated buildings and mine shafts for roosting (Csuti et al. 1997). If present on site they could continue to forage and roost during the mining process due to the protection of trees in the non-disturbance buffers adjacent to perennial streams and wetlands; therefore, direct effects would be negligible, short-term, local, and adverse.

The sagebrush lizard is a BLM special status species. Mining would reduce sagebrush-steppe and forest habitats until restoration activities resulted in reestablishment of native steppe and forested communities. Direct effects would be long-term, minor, local, and adverse.

The interior redband trout is a USFWS species of concern, a BLM special status species, and an Oregon sensitive-vulnerable species. Although they were not observed during field surveys, Mormon Basin streams are historically known to support this native species (DEQ 2010; personal communication, John Quintela 2010), and they are presumed to be present within the Willow subbasin (4th HUC). Mining operations would continue on 317 acres of private lands within Mormon Basin. All perennial streams would be avoided during mining operations and an undisturbed riparian buffer would be maintained on either side of the streams. Ephemeral snow melt channels and ditches would be mined after snowmelt, so they would be dry during the mining season; they would be returned to their original configuration the same year they are mined and while conditions remain dry. Water removal activities associated with mining could entrain redband trout resulting in adverse impacts. Intake pumps would be fitted with protective fish screens and/or bypass devices to minimize the potential for these effects. Direct impacts to redband trout from these activities would be negligible, short-term, local and adverse.

Alternative 2 – The direct effects to BLM special status species for Alternative 2 are similar to the effects described under Alternative 1. However, because there is a broader area of mining impact, incrementally, adverse, local effects are expected to be somewhat greater in scale and intensity.

Columbia Spotted Frog

As described above under Alternative 1, to avoid impacts to Columbia spotted frog, prior to pumping water out of the reservoirs, the reservoirs would be surveyed for frogs (i.e. egg masses, tadpoles, adults) and if present, intake pumps would be screened with a mesh fine enough to exclude all frog life stages and be fitted with a structure to reduce entrapment at the screen. Perennial streams and wetlands are excluded from mining activity and would be protected with a non-disturbance buffer of a minimum of 20 feet from the ordinary high water line. Muddy areas and pools would continue to be available within and along the creek beds, and it would seem reasonable to assume any Columbia spotted frogs present in the project area would migrate to these pools and puddles. In addition, shallow mining ponds that remain wet for most of the year are to be left with a shallow shelf around the edges for habitat providing improved frog habitat and local long-term beneficial effects. With implementation of these design features, direct effects to Columbia spotted frog would be local, short-term, minor, and adverse.

Redband Trout

Water removal activities associated with mining could entrain redband trout resulting in adverse effects. Design features have been incorporated into the project (EA section 2.2.4.5) such as fitting intake pumps with protective fish screens and/or use of bypass devices to minimize the potential for these effects. Protective devices would be consistent with ODFW requirements With implementation of these design features, direct effects to redband trout would be local, short-term, negligible and adverse.

Direct effects to redband trout could also result due to road improvements in locations where roads are in proximity to drainages and due to stabilizing existing road fords in locations where small intermittent drainages are crossed by existing roads and no culverts are present. Short-term impacts could result from sedimentation into drainages due to minor grading and placement of fill material (gravel) to stabilize road fords. Direct impacts would occur in a subset of the approximately 2.5 stream miles in the project area, and impacts would be confined to areas downstream of water removal activities or road improvement activities in proximity to streams. The total stream miles in the project area comprises less than 4 percent of the approximately 70 stream miles (USGS National Hydrography Dataset 2011) within the Basin Creek subwatershed (6th HUC). Impacts would be localized to a subset of project area streams and in the context of the subwatershed, impacts of the project to redband trout would be negligible to minor, local and adverse in the short-term. Road improvements and ford stabilizations would reduce sedimentation over the long-term and would result in minor, local, and beneficial effects to water quality and wildlife dependent upon aquatic habitat.

Alternative 3 – Direct effects to BLM special status species for Alternative 3 are similar to the effects described under Alternative 2.

Restoration activities including road ford stabilization, culvert upgrade or replacement, road drainage improvement, and structural watershed improvements (Section 2.3) would result in direct effects to redband trout due to these activities being conducted in close proximity to drainages. Short-term impacts could result from sedimentation into drainages due to minor grading, placement of fill material (gravel), and culverts. Impacts would be greater than for Alternative 2 due to the increased number of temporary disturbance locations; however, impacts would still be confined to streams within the project area which comprise less than 4 percent of the stream miles within the Basin Creek subwatershed. Impacts would be minor, local and adverse in the short-term. Road improvements and ford stabilizations would reduce sedimentation over the long-term and would result in minor, local, and beneficial effects to water quality, aquatic species, and other wildlife.

4.2.3.2 Indirect Effects

Alternative 1 – Indirect effects of current mining activities on private land, and continued use of roads and water on public lands would include potential siltation of ponds and streams and are expected to be negligible to minor, short-term, local, and adverse for the special status species described above as potentially inhabiting the site.

Gray Wolf

Due to its current distribution and generalist behavior indirect effects of noise and siltation would be negligible, short-term, local, and adverse.

Greater Sage-grouse

Due to its specialized habitat requirements, indirect effects of noise during the mining season and siltation to streams would be negligible to minor, short-term, local, and adverse.

Columbia Spotted Frog

The Columbia spotted frog breeds in most reservoirs and ponds on the project site and could be adversely affected by dewatering reservoirs if it occurs during the breeding season (March 1 to May 31). Fluctuations in water levels can leave egg masses out of water where they can freeze or desiccate and never develop into frogs. To avoid impacts, prior to pumping water out of the reservoirs, the reservoirs would be surveyed for all life stages of frogs (i.e. egg masses, tadpoles, adults) and if present, intake pumps would be screened with a mesh fine enough to exclude all frog life stages and be fitted with a structure to reduce entrapment at the screen, and/or egg masses would need to be moved by a trained biologist to another reservoir or pond where they could develop. The limited potential for additional silt movement into ponds resulting from high runoff associated with severe thunderstorm activity could also degrade reproductive habitat by hindering egg development but buffers and erosion control measures around the ponds would assist in reducing the potential for sedimentation. With implementation of these design features, indirect effects to Columbia spotted frog would be short-term, minor to moderate, local, and adverse.

Streaked Horned Lark

Due to its specialized habitat requirements of bare ground or sparsely vegetated habitats, indirect effects to streaked horned lark would be negligible, short-term, local, and adverse.

Wildlife Species of Concern and BLM Special Status Species

Bald eagles potentially forage on the project site, but due to their large home range, indirect effects would be negligible, short-term, local, and adverse.

Ferruginous hawk potentially forage on the project site, but due to their large home range indirect effects would be negligible, short-term, local, and adverse.

White-tailed and black-tailed jackrabbits potentially inhabit the project site, but due to their specialized habitat requirements indirect effects would be negligible, short-term, local, and adverse.

Spotted bat, fringed myotis, and Townsend's big-eared bat could forage in the project site, but due to their specialized habitat requirements, indirect effects would be negligible, short-term, local, and adverse.

Sagebrush lizards would potentially inhabit sagebrush-steppe and forest habitats in the project site, and indirect effects would be negligible, short-term, local, and adverse.

Redband Trout

Summer water temperatures in Basin Creek (two miles below Mormon Basin) are currently 303(d) listed for exceeding the temperature requirement for redband trout. Under Alternative 1, water would be pumped from nearby reservoirs and streams on private and public lands. Removing additional water from the watershed could exacerbate the adverse impact to redband trout or habitat by further increasing water temperatures. Stream and reservoir waters would be used according to stipulations indicated in the certificates of water rights for mining purposes. This water use and the water-use design features would be conducted as outlined in Section 2.2.4.5 to limit potential impacts to redband trout from decreased water quantity and quality within or downstream of the site. Effects to water quality and quantity are further discussed in Section 4.10, and the potential indirect effects of the mining operations on redband trout are adverse, negligible to minor, local to regional (downstream), and short-term.

Alternative 2 – Indirect effects to BLM special status species for Alternative 2 are similar to the effects described under Alternative 1. However, because there is a broader area of mining impact, due to mining on public lands as well as the additional mining on private lands which would result from the BLM decision, effects are expected to be somewhat greater in context and intensity for most BLM special status species.

Redband Trout

As described above under Alternative 1, pumping water from nearby reservoirs and streams on private and public lands could potentially result in indirect effects to redband trout by further increasing water temperatures in the reservoirs and streams. Indirect effects on water resources are discussed further in Section 4.10.2. This would be mitigated by implementing design features such as using water from the domestic well to limit drawdown of the reservoirs (section 2.2.4.5). Stream and reservoir waters would be also used according to stipulations indicated in the certificates of water rights for mining purposes to limit potential impacts to redband trout from decreased water quantity and quality in project area streams or downstream of the site. The potential indirect effects of the mining operations on redband trout are adverse, negligible to minor, local to regional (downstream), and short-term.

Columbia Spotted Frog

The wetlands are to remain in their current physical condition. However, changes in the surface flow and groundwater transport could occur as increased amounts of water are pumped for processing. These effects would be minimized by pumping water into the reservoirs from the domestic well to limit drawdown. Hibernating frogs, both along the pond edges and within the creeks, may be compromised with a change in water regime. In addition, some frogs may be lost while migrating between the wetland areas through mining activity. This is likely to occur even with a buffered corridor, since some roads cross creeks. Indirect effects on the Columbia spotted frog are likely to be negligible to minor, short-term, local, and adverse.

Alternative 3 – Indirect effects to BLM special status species for Alternative 3 are similar to the effects described under Alternative 2.

Columbia Spotted Frog

One reservoir would be breached when the headworks are removed. The reduced storage capacity of the reservoir would lower the adjacent water table elevation causing wetland species to relocate over time nearer to the new water table and reservoir wetted banks. Even with the restoration project implementation, increased sedimentation (particularly during periods of thunderstorm activity) could occur over the short-term until vegetation is established in the restored areas. This may affect some individuals during migration or other activity outside of the breeding season where pools of water are required. Indirect effects on the Columbia spotted frog as a result of Alternative 3 are likely to be negligible to minor, short-term to long-term, local and adverse, because of the additional acreage of impacts and the fact that removal of the water control structure and its associated culverts at R-04 would result in a change to hydrology of wetlands and floodplains.

4.2.4 INVASIVE SPECIES

4.2.4.1 Direct Effects

Alternative 1 – Effects to the land from invasive species as a result of Alternative 1 are expected to be negligible to moderate, long-term, local, and adverse. The relatively small size of the previous ground disturbance on the 152.5 acres of BLM managed public lands, and the planned revegetation efforts, and control of noxious weeds on private land would contribute to lessening the potential adverse impacts. Successful restoration and control measures are the key to reduced impacts. Under the current activity on private land, DOGAMI requires treatment of noxious weeds and other invasive plants where they threaten quality wildlife habitat and rangeland. Operators must apply best management practices to prevent infestations from occurring. Noxious weed treatment, as defined by regulations, requires inventory, treatment, and monitoring; treatment would continue for the duration of the project.

There are pockets of invasive species within the project area. The current bare gravel piles and tailing areas provide a place for invasive species to take hold. Any ground disturbance, even small areas of impact, would minimally increase the potential for noxious weeds to establish. This includes shop removal and reclamation.

The potential for noxious and invasive species seed to gain access to areas of bare soils is high. Seeds are easily transported by heavy equipment and vehicles, people, wildlife, and wind. Once established on site, weed species can spread throughout the project location and along access roads into the project site. The number of potential invasive species has increased in eastern Oregon with the invasion of species that were previously not known to occur here 10 years ago (e.g., rush skeletonweed). All disturbed ground provides an opportunity for invasive species to establish.

The required use of erosion control measures such as certified weed-free seed mixes and straw bales can reduce the potential for weeds to establish. Keeping heavy equipment and vehicles weed free can also reduce the spread of weeds.

Alternative 2 – The direct effects to the land of invasive species as a result of Alternative 2 are similar to those described for the No Action alternative (negligible to moderate, long-term, and adverse). However, the scale of mining impacts is broader as the mining moves onto BLM-administered public lands, and the duration is longer. Design features would be implemented to minimize these effects.

There is no vegetation where the shop building is located and only sparse vegetation in the rocked parking lot. The direct effect of continued use of the shop would be to maintain the non-vegetated state of the area, which has negligible effects on the establishment of new infestations of invasive weeds.

Alternative 3 – The effects from invasive species as a result of Alternative 3 are likely to be similar to those described for Alternative 2. However, restoration efforts will likely result in moderate, long-term beneficial impact by reducing overall invasive species cover.

4.2.4.2 Indirect Effects

Alternative 1 – With proper BMPs (e.g. weed free seed, straw, and equipment) in place, indirect impacts to the land from invasive species as a result of Alternative 1 are likely to be negligible. Invasive and noxious species have the potential to spread, depending on the amount of traffic using the access roads into and through the area and the size of noxious weed populations along the roads. With the control of noxious weeds on site by the operator and off-site on county access roads by Baker County weed control staff, indirect effects would be minor. Removal of the shop would provide a small bare soil area in which invasive species could establish.

Alternative 2 – Additional traffic on access roads to and through the mining project area could increase the distribution of invasive species, since roadsides provide significant sources of invasive and noxious weeds. Other equipment used in the mining operation could result in additional means of weed seed distribution from one area to another. With proper BMPs in place, indirect impacts from invasive species as a result of Alternative 2 are likely to be minor, long-term, local, and adverse. Design features would be implemented to minimize these effects.

Invasive species can reduce species diversity and degrade wildlife habitat. Invasive species management in the project area will reduce potential impacts to native plant communities and wildlife habitat resulting in potential minor, long-term adverse effects.

A BLM decision to allow mining on public lands would result in an increase in indirect effects because additional mining would also occur on the adjacent private lands as a result of the BLM decision. Mining on private lands would result in an increase in the disturbance area due to mining activities and would therefore increase indirect effects.

Alternative 3 – The indirect effects of invasive species as a result of Alternative 3 are expected to be similar to Alternative 2 (minor, long-term, local, and adverse).

4.3 CULTURAL RESOURCES

4.3.1 DIRECT EFFECTS

Alternative 1 – No impacts to cultural resources on BLM-administered lands are expected due to Alternative 1. Because there would be no exploration or mining within the 152.5 acre project area of BLM-administered public lands, no impacts to cultural resources would take place.

Alternative 2– Impacts to cultural resources that are not eligible for listing on the NRHP as a result of Alternative 2 are likely to be negligible to moderate, detrimental and permanent. The Cultural Resources Inventory identified 18 cultural resources on BLM-administered lands within the assessment area (private lands were not surveyed for cultural resources). Fifteen of those cultural resources have been recommended ineligible for listing in the NRHP by SWCA, and this recommendation has been concurred with by SHPO. Mining activities under the Proposed Action may disturb those sites and structures, which would result in a permanent, major, adverse impact to the resources. The remaining three cultural resources (Resource Nos. 14532-10 (Smithsonian Trinomial Number 35ML 1531, 14532-11 (Smithsonian Trinomial Number 35ML 1532), and 14532-16IF) were recommended for further testing in an effort to determine their eligibility for the NRHP. Those three resources would be avoided and protected with a 20 meter buffer and would not be impacted by Alternative 2.

Treaty and tribal interests include culturally significant vegetation used for medicinal purposes, food sources, fuel, creation of tools and hunting implements, horse or cattle feed, creation of dyes, basket weaving, clothing, and shelter. Mining activities would limit access to the 152.5 acre project area, and mining activities would remove areas of vegetation potentially containing culturally significant plants. Because these plants are all fairly common and widespread in the Mormon Basin, these plants could be obtained in other areas of the basin; therefore, effects to this tribal resource due to the Proposed Action would be negligible to minor, site-specific, adverse, and short-term.

Additional tribal interests in the vicinity of the project area include big game winter range habitat and native fish habitat. The project site is located outside of the mule deer winter range designated in the Baker 1989 RMP. Direct effects to big game species utilizing winter range would be avoided because mining would not occur in the winter. Redband trout are historically known and currently presumed to occur in Willow Basin, (DEQ 2010; personal communication, John Quintela 2010). Streams in the project area likely do not currently provide habitat for redband trout; however, there is the potential that water removal activities could affect redband trout, including downstream of the project area. Intake pumps would be fitted with protective fish screens and/or bypass devices to minimize the potential for these effects. Direct impacts to redband trout from these activities would be negligible, local, adverse, and short-term.

Alternative 3 – The direct effects to cultural resources are similar to Alternative 2: negligible to moderate, detrimental and permanent, since the same area and duration of mining excavation and processing is proposed, along with disturbance of additional areas due to restoration projects. Direct effects to tribal and treaty resources would also be similar to Alternative 2: negligible to minor, site-specific to local, adverse, and short-term.

4.3.2 Indirect Effects

Alternative 1 – Indirect effects to cultural resources as a result of Alternative 1, due to factors such as surface erosion and weather-related deterioration from private land, use of roads and use of water would be negligible.

Alternative 2 – Indirect effects to cultural resources as a result of Alternative 2 would be the same as those described for Alternative 1, but would also include effects within the project area on BLM administered lands. Environmental factors, including surface erosion and weather-related deterioration, would have a negligible effect on cultural resources in the project area.

Alternative 3 – Indirect effects to cultural resources as a result of Alternative 3 would be the same as those described for Alternative 2. Environmental factors, including surface erosion and weather-related deterioration, would have a negligible effect on cultural resources in the project area. No additional indirect effects are expected as a result of the restoration component of this alternative.

4.4 Forests and Rangelands

4.4.1 Direct Effects

Alternative 1 – The No Action Alternative would have, if any, a negligible (not measureable), impact on grazing activity in the project area. The BLM allotment does not include the privately owned lands designated for mining, but cattle do graze there. No BLM-administered lands are proposed for testing under the No Action Alternative, since testing is considered complete within the 152.5 acre area of BLM-administered public lands.

Alternative 2 – Direct effects to rangelands as a result of Alternative 2 are likely to be negligible. Water availability from springs, streams, and gulches throughout the project area would not be impacted and there would be relatively minor loss (<8%, or less than 1% for any given year) of range resources from surface disturbance associated with the proposed project. It is unlikely to have more than a negligible, long-term, adverse impact on the total livestock grazing activity for the allotment. Effects to forest vegetation would be site-specific and minor due to the removal of approximately 10 acres of forests within the mining area. The effects would be adverse and long-term, until forest cover is reestablished.

Alternative 3 – No additional effects would result other than those discussed under Alternative 2.

4.4.2 INDIRECT EFFECTS

Alternative 1 – No indirect effects are expected.

Alternative 2 – No indirect effects are expected.

Alternative 3 – Restoration of waterways would reduce erosion potential and improve riparian habitat. Long-term minor beneficial impacts may include improved forage for cattle and less erosion associated with grazing.

4.5 GEOLOGY AND SOILS

4.5.1 DIRECT EFFECTS

Alternative 1 – Impacts to geology and soils are expected to be negligible (not measureable) to minor (detectable over a small area), long-term, and adverse due to use of roads to access private land. Impacts associated with transporting gravels to and from the processing plant(s) would be that soils overlying roads would be further compacted and existing puddling may be exacerbated. No other important geological resources would be impacted.

Effects from the removal of the shop are negligible. The reclamation plan for shop removal requires that this area be returned to pre-disturbance topographic patterns during reclamation. Reclamation would entail removal of the building, breaking up and burying the concrete foundation, covering it with soil, and revegetating. BLM would require Mineral Valley to employ the erosion prevention and control techniques listed in the BLM Reclamation Manual. All human-made slopes would be designed to prevent sheetflow runoff, and early vegetative cover would be encouraged to stabilize soil and newly graded surfaces.

Alternative 2 – Impacts to geology and soils are expected to be moderate (readily apparent and occur over a relatively large area), long-term, and adverse. Due to the nature of mining, the magnitude of compaction and puddling exacerbation increases as the size of the mining area increases. As equipment and structures are placed and removed from active mining areas, additional displacement and compaction is likely.

Design features would be implemented to minimize these effects. As mining progresses onto BLM-administered public lands, each parcel would be cleared of the overlying topsoil, cobble, and clay, with each material stockpiled separately. No matter how carefully topsoil is cleared, stockpiled, and ultimately replaced, it would be mixed and structurally altered. The subsoil horizon and the overburden soil would undergo similar changes. Smaller organic ground cover would be removed and mixed with the stored topsoil and subsoil. During reclamation reseeding and planting, soil would also be slightly mixed and displaced. Total disturbance over the life of the project would be up to 152.5 acres of BLM administered public lands. Ground disturbance at any one time would vary from 2.5 to 7 acres including excavation, stockpile, and processing sites, and the maximum annual amount of mining disturbance on public land would vary from 10.5 to 20.5 acres. During reclamation, the stockpiled materials would be replaced and slopes would be contoured and revegetated. Areas reclaimed and replanted in the fall would have seed plant growth established the following spring.

The topography of some landforms such as benches, ridges, hill slopes, swales, and valleys would be altered by mining. Native soils not disturbed during previous mining actions would be highly altered by overburden removal, stockpiling, and eventual replacement. Local surface soil temperatures would likely change when trees, shrubs, and herbaceous groundcover are removed. Surface soil temperatures would rise several degrees (F) during the summer and fall several degrees lower (F) in winter months. South-facing slopes would dry out faster and north-facing slopes would remain moister longer. Rock outcrops, lode deposits, wetland areas, streams, springs, and ponds within the project area would not be mined. No other important geological resources would be impacted.

Monitoring and reseeding would include areas of overland human foot traffic, on-road vehicle traffic, and possibly off-road ATV use. Foot traffic would cause shallow soil displacement and compaction which is usually noticeable for only 1 or 2 years. On-road vehicle traffic would cause little or no change in compaction/puddling of road surfaces. Off-road ATV use would cause shallow soil compaction and displacement, which would be more severe than human foot traffic and may be noticeable for a few to several years, especially if there is more than one pass and equipment is operated on steep slopes.

The continued use of the shop and the ultimate removal of it would have negligible effects on geology or soils. Continued use of the shop building, road, and parking lot would result in soils remaining compacted.

Alternative 3 – In addition to effects discussed under Alternative 2, restoration projects would result in minor, long-term, beneficial impacts to soils from improvements to fords and culverts. In addition, as each equipment or facility is removed for restoration, additional soil compaction, displacement, and relocation would occur. Where holes are being filled (e.g. latrine pit and old mining shaft) there would be a greater level of soil relocation and displacement.

Soils above and below the water level of fords would be reshaped and compacted and covered with rock. Soils of roadways adjacent to fords would be slightly disturbed and compacted by heavy equipment. Culvert replacement would involve soil excavation from the roadway above the culvert and temporary soil storage on the roadway. Equipment would displace and loosen/compact soils on road surfaces as rolling dips, waterbars and/or cross-drains are constructed and maintained. Wheels and tracks of vehicles that travel over roads would also compact and puddle road surface soils. Soils may be covered by gravel in certain areas to improve trafficability and to construct waterbars. Road surfaces may be graded to remove ruts; this would loosen then compact soils of road surfaces. In general, restoration actions would result in the direct effect of displaced and compacted soils.

4.5.2 INDIRECT EFFECTS

Alternative 1 – Indirect impacts are expected to be negligible to minor, long-term, and adverse. Increased soil erosion may occur until reclamation activities of prior test sites, including revegetation, stabilize disturbed soils. Indirect effects associated with BLM not authorizing use of the shop include oil changes and machinery maintenance conducted over bare ground. As such, there is the risk of long-term, adverse effects if petroleum products spill onto the ground. These effects would be mitigated by BMPs that require the use of absorbent materials and other measures to capture de minimis spills (see Spill Containment Plan).

Alternative 2 – Indirect impacts are expected to be minor, long-term, and adverse. Design features would be implemented to minimize these effects. Increased soil erosion may occur until reclamation activities, including revegetation, stabilize disturbed soils.

A BLM decision to allow mining on public lands would result in additional mining occurring on the adjacent private lands which would contribute to indirect effects.

Alternative 3 – Indirect impacts are expected to be minor, long-term, with increased soil erosion occurring until reclamation activities, including revegetation, stabilize disturbed soils, resulting in a beneficial effect.

4.6 PUBLIC ROADS AND ACCESS

4.6.1 DIRECT EFFECTS

Alternative 1 – The No Action Alternative would have a negligible (not measureable) to minor (detectable over a small area), long-term (longer than one mining season), and adverse impact on public roads and access over the life of the project. Existing roads would continue to be used for mining on private land, access to water sources and testing outside the 152.5 acre BLM-administered public lands.

Table 12 provides a summary of existing roads.

Table 12. Road miles –no action alternative.

Unit	Maintained Roads	Impassable Roads	Total
1A – BLM	0.4	-	0.4
2 – BLM	3.7	0.5	4.2
3 – BLM	0.9	0.1	1.0

Unit	Maintained Roads	Impassable Roads	Total
Other BLM	0.7	-	0.7
Private Land	2.8	-	2.8
Total Miles	8.5	0.6	9.1

Alternative 2 – Public roads and access would experience minor, long-term, adverse impacts over the life of the project from increased mining-related traffic. More traffic would enter and exit Mormon Basin and the additional mining would increase the number of temporary overland routes and temporary closures. The increased traffic may accelerate roadway deterioration and create congestion, though the project proponent would regularly maintain access roads and reclaim any additional disturbances, such as roadway widening.

All maintained and impassable roads listed in Table 12 may be used. More roads may be graded and/or graveled and some roads may be temporarily obliterated by mining, then reconstructed. Some closed roads may be reclaimed following use and all temporary roads would be reclaimed following use. Total level of soil displacement and compaction would be higher under this alternative due to more extensive, intensive and prolonged road use.

Alternative 3 – In addition to effects discussed under Alternative 2, restoration projects would result in minor, long-term, beneficial impacts to roads from improvements to fords and culverts.

4.6.2 INDIRECT EFFECTS

Alternative 1 – Indirect effects are likely to be negligible with less traffic on all the roads than would occur under either action alternative. When the shop building is removed, there would also be less wear and tear on this road without miners driving back and forth from the shop for parts and supplies.

Alternative 2 – Indirect effects are likely to be negligible. These effects stem from continual wear and tear on the roads as miners drive back and forth to the mining and processing areas, and to and from the shop for parts and supplies, as well as snow removal. Since the miners must maintain the roads, the effects would be mitigated.

A BLM decision to allow mining on public lands would result in additional mining occurring on the adjacent private lands which would contribute to indirect effects.

Alternative 3 – Indirect effects are the same as those described for Alternative 2.

4.7 RECREATION AND VISITOR EXPERIENCE

4.7.1 DIRECT EFFECTS

Alternative 1 – The No Action Alternative would have negligible (not measureable) to minor (detectable over a small area), short-term (one mining season), adverse impacts on recreational activity in the project area due to some temporary access changes, noise, and mining related traffic to and from private land. On BLM-administered lands within the 152.5 acre project area, use of roads and use of water would be a continuation of the current condition.

Alternative 2 – Dispersed recreation occurs throughout the Mormon Basin and recreational uses include sightseeing, pleasure driving along the Snake River-Mormon Basin Back Country Byway, picnicking, camping, hiking, use of off-road vehicles, hunting in the fall, and limited snowmobile use in the winter. Recreational activities including picnicking, camping, hiking, use of off-road vehicles, and hunting would be affected by the Proposed Action. Recreation users would be excluded from less than 10 acres in the average year (or up to 152.5 acres over the life of the project) of BLM-administered lands being actively mined in the project area. Mine access roads on BLM lands would only be closed during certain operations to ensure public safety, and the public would be provided with alternative access either on the County roads or on connecting roads on BLM lands. Displacement of wildlife from the project area due to the mining disturbance would result in an additional adverse effect to big game and upland bird hunting. Direct effects to recreation and visitor experience are likely to be minor, long-term, site-specific, and adverse. Mining related traffic and noise may also similarly impact the visitor experience in Mormon Basin. Winter recreational activities such as snowmobiling would not be affected because mining would not occur in the winter. Improvements to access roads may promote additional visitation, especially along the Back Country Byway, which would have a minor, long-term, local, beneficial effect on recreation.

Alternative 3 – Effects in the short-term would be similar as described above under Alternative 2: minor, site-specific, and adverse. However, in the long-term restoration activities would result in beneficial effects to recreational users. Restoration activities resulting in improvements to wildlife habitat would have beneficial effects on hunters, and improved recreational access due to road improvements would have beneficial effects for campers, hikers, and users of off-road vehicles. Higher scenic values resulting from removal of debris and structures would also have beneficial effects for recreational pursuits such as camping, hiking and picnicking. Restoration activities would have minor, long-term, local, and beneficial effects.

4.7.2 INDIRECT EFFECTS

Alternative 1 – No indirect effects are expected.

Alternative 2 – Mining activity (vehicle traffic and/or visual resource disturbances) may discourage some recreation users from visiting Mormon Basin, which would have a minor, long-term, adverse impact. Conversely, the mining activity may encourage some recreation users who want to see an active gold mine, especially when associated with the history of the Back Country Byway, could have a minor, long-term, beneficial effect.

A BLM decision to allow mining on public lands would result in additional mining occurring on the adjacent private lands which would contribute to indirect effects.

Alternative 3 – Mining activity (vehicle traffic and/or visual resource disturbances) may discourage some recreation users from visiting Mormon Basin, and may encourage other visitors. The effects would be similar to those described for Alternative 2.

4.8 SOCIOECONOMIC RESOURCES

4.8.1 DIRECT EFFECTS

Alternative 1 – Local economic impacts associated with the No Action Alternative are expected to be negligible (not measureable) to minor (detectable over a small area), long-term (longer than one mining season), and beneficial. Under the No Action Alternative, mining-related employment would continue on private lands in the project area. Two to 3 miners would work at each processing site on private land and additional miners would conduct the mining, (approximately 8 total) with support from administrative staff in nearby towns for the life of the project.

At least 15 fewer miners would be needed, and the life of the mine would be shorter, if mining on public lands is not approved. Direct effects to mining crew members under the No-Action alternative would be major to the individuals, short-term with the potential to become long-term, and adverse. Crew members that are dependent upon their mining jobs to support their families may suffer increased financial burdens such as loss of salary.

If BLM does not approve use of the shop, direct economic effects to the project proponent would be minor, short-term, and adverse. A shop on private land would need to be constructed which would require purchase of building materials and hiring of additional workers to construct the shop. This would result in additional cost to the project proponent.

The County road from Bridgeport is steep and narrow and if the company mechanic cannot repair a piece of equipment it must be loaded and hauled into town for repairs or hauled down the Basin Creek road. Without the shop and a supply of parts readily available, Mineral Valley must pay a mechanic from town for three hours travel time, and often because of the weather, the mechanic cannot work a full day out in the open. Other monetary adverse effects include replacement costs of contaminated disassembled machinery from windblown dust, extra time and effort needed to protect these parts from contamination, no hoist available to lift heavy engines and machine parts, and increased machinery downtime. All this would result in lost production.

Alternative 2 – The Proposed Action would provide 15 or more additional mining jobs compared to Alternative 1, and the life of the operation would be extended, creating a minor (detectable, over a small area), long-term, beneficial economic impact. Direct effects would be major, long-term, and beneficial to crews as they would be engaged in mining activities for a longer period of time than would occur under Alternative 1.

Effects to the project proponent of approved shop use to maintain and repair equipment represents a minor, long-term (life of the project), benefit to the company. Denying use of the shop would result in the need to construct a new shop on private land which would result in additional cost (adverse effect) to the project proponent. Use of a shop to be built on private land would result in a minor, short-term, adverse effect due to the need to purchase building materials and hire workers to construct the shop. A shop on private lands would be located further away from the proposed mining operation proposed on public lands as compared to the location of the existing shop on BLM lands; therefore, minor, long-term, and adverse impacts would occur due to additional downtime and loss of revenue resulting from the increased time needed to transport equipment to be repaired to the shop.

Under the Action Alternatives, BLM would act to ensure that use of the shop is reasonably incident to prospecting, mining, and processing

Alternative 3 – Impacts associated with Alternative 3 are expected to be minor, long-term, and beneficial. Restoration activities associated with Alternative 3 would create additional employment activity as well as additional expenditures on waste removal, equipment rental, and road construction materials.

4.8.2 Indirect Effects

Alternative 1 – The local revenue resulting from the mining on private lands under Alternative 1 would create a negligible to minor, long-term, beneficial impact. Businesses in the towns surrounding the project area would continue to sell supplies and services to miners and administrative staff during the occurrence of private land mining.

Once the private land mining is concluded, indirect effects to local businesses would be minor, short-term to long-term, and adverse. Depending on how long the miners are out of work, their spending power would be reduced.

Indirect effects of BLM not approving use of the shop and/or requiring immediate shop removal would be minor, long-term, and adverse because a replacement shop on private land would have to be constructed; since a maintenance shop is needed to support the mining operation. As stated above, these costs represent unnecessary expenditures to the company, since the 43 CFR 3715 regulations are clear that use of the shop building on public lands is acceptable as long as the use is reasonably incident to the mining operation (see Plan of Operation occupancy request).

Indirect adverse effects would occur if delays in the mining operation occurred. By this time, miners may have found other work, and the company would have to hire new miners with the additional cost of training them. Effects would be adverse, major and long-term to the original crew members, and beneficial to the new miners.

Alternative 2 – The increased local revenue resulting from Alternative 2 would create a minor, long-term, beneficial impact. Businesses in the towns surrounding the project area would continue to sell supplies and services to miners and administrative staff, and since the life of the mine would be extended, the benefit to businesses would last for a longer period, up to 13 years.

Indirect effects to the project proponent would be moderate, long-term, and beneficial. Worker safety is improved with the ability to use secure hoisting and jacking systems in the shop building as opposed to working on equipment out in the open on dirt surfaces. This reduces the risk of accidents and costly claims against the company.

A BLM decision to allow mining on public lands would result in additional mining occurring on the adjacent private lands which would contribute to indirect effects.

Alternative 3 – The increased revenue resulting from the Alternative 3 restoration activities would create a minor, long-term, beneficial impact. Businesses in the towns surrounding the project area would continue to sell supplies and services to miners and administrative staff. Indirect effects to the project proponent would be similar to those described for Alternative 2.

4.9 VISUAL RESOURCES

4.9.1 DIRECT EFFECTS

Alternative 1 – Visual impacts during mining would be minor (apparent over a small area) to moderate (readily apparent over a relatively large area), long-term, and adverse with disturbance on private land, with use of roads and use of water on public land. The mining and processing areas, including equipment, office trailer, and shop are all on private land. After mining is complete at each site, contouring and revegetation would soften adverse impacts to visual resources over time. Nonetheless, tailings piles and older disturbed areas on private lands would continue to create a minor, long-term, adverse impact long after reclamation is complete due to the slow growth rate of plants and color contrast of newly exposed soils. The effects of the No Action alternative on visual resources would be consistent with BLM Class III/IV VRM management objectives.

Alternative 2 – Visual impacts during mining would be moderate, long-term, and adverse with up to 152.5 acres of disturbance to BLM administered public lands in the project area. The mining and processing areas, including equipment and office trailer, may be visible from Clarks Creek Road and Mormon Basin Road from within the Basin. Equipment would be parked outside the shop and would also be visible from the county road. Mining and processing sites would be partially screened from public view using mounds of washed rock tailings. The processing facilities would be placed to take advantage of the existing topography to screen the site from view. Lighting for night security and safety may also create a night-time visual disturbance. After mining is complete at each site, re-contouring and revegetation would soften adverse impacts to improve visual resources over time. Nonetheless, tailings piles and other disturbed areas would continue to create a moderate, long-term, adverse impact after mining and reclamation are complete due to the slow growth rate of plants and color contrast of newly exposed soils. The effects of the Proposed Action on visual resources would be consistent with BLM Class III/IV VRM management objectives.

Alternative 3 – Restoration activities associated with Alternative 3, such as debris removal, would further reduce the adverse impacts to lessen the visual resources impacts from the proposed project and create a long-term, minor, beneficial impact.

4.9.2 INDIRECT EFFECTS

Alternative 1 –Mining activity (vehicle traffic and/or visual resource disturbances) would adversely impact the scenic values attributed to the Snake River/ Mormon Basin Backcountry Byway and may also discourage some recreation users from visiting Mormon Basin, which would have a minor, short-term, local, adverse impact.

Alternative 2 – Effects would be similar as described above under Alternative 1: minor, short-term, local, and adverse.

A BLM decision to allow mining on public lands would result in additional mining occurring on the adjacent private lands which would contribute to indirect effects.

Alternative 3 – Effects in the short-term would be similar as described above under Alternative 2: minor, local, and adverse. However, in the long-term restoration activities would result in beneficial effects to visual resources as historic mining sites are contoured and revegetated and historic mining debris and structures are removed. Improvements to visual resources would have minor, long-term, local, and beneficial effects to recreational users such as campers, hikers, and picnickers.

4.10 WATER RESOURCES

4.10.1 DIRECT EFFECTS

Alternative 1

Exploration – No direct effects to surface water resources are expected under the No Action Alternative as a result of Alternative 1 activities on private land and any future exploration outside the project area, due to buffer widths, small size of the excavations, gentle topography, and implementation of BMPs. Where excavations intercept the groundwater table; turbidity of exposed groundwater occurs as one excavates into a water table. The turbidity naturally diminishes over time as the soils and water in the excavation are left undisturbed. The only design feature to minimize turbidity in such holes is to wait for it do diminish and to eventually fill the hole to above the water table when mining is done which prevents new turbidity and allows all sediment to settle and natural, clean groundwater flow through the affected area to be reestablished. The site-specific effects to groundwater will be continually mitigated, since ongoing reclamation of excavations is planned.

Mining –Direct effects of drawdown in wells and reservoirs would be adverse, local to regional (downstream), minor to moderate, and both short-term and long-term. The effects will be short-term within the mining season since it is expected that groundwater levels would recover each spring; however, a long-term seasonal drawdown effect would occur during the entire 10 year mining operation. The effect to groundwater in excavation areas and applicable design features are the same as described above under exploration.

Processing – Processing on private land over the next 10 years would have no direct effects on adjacent public land water resources. Water rights as described in Section 2.2.5 would be exercised, and clean process water would be pumped from nearby wells, reservoirs, and streams on private and public lands with the appropriate use of fish and amphibian screens. Nearby mining pits may also be used as clean water ponds or settling-recycling ponds. Water levels of wells, reservoirs and streams would temporarily or seasonally decline as water is pumped from them. Indirect effects associated with the exercise of water rights and the seasonal decline inwater tables are discussed below in the indirect effects section.

Shop Occupancy – There would be no direct effects to water resources if BLM would not approve use of the shop.

Reclamation – Reclamation on private land and reseeding of previously reclaimed areas within the project area would have negligible direct effects on public lands within the project area. Direct effects of shop removal and other site reclamation activities will be site-specific, negligible, long-term and beneficial with respect to building removal, and site-specific, short-term, negligible and adverse with respect to ground disturbance related to building removal and other site reclamation activities. Ripped soils would become more porous, which is an immediate benefit. Reclamation activities would produce areas of bare soil that would pose the risk of erosion and subsequent sediment delivery into nearby drainages until the soil surface is revegetated by the project proponent. The shop is 200 feet from the nearest drainage, Glengarry Creek.

Monitoring and Reseeding Public Lands – N/A

Stabilize Existing Road Fords – N/A

Maintain, Replace, or Remove Road Culverts – N/A

Alternative 2

Phase 1 – No direct effects to surface water resources are expected as a result of Alternative 2 exploration activities on private land and outside the project area, since this activity is similar to Alternative 1. The effect to groundwater in excavation areas and applicable design features, although greater in area, is the same described above under Alternative 1.

Phase 2 – Direct effects of drawdown in reservoirs are similar as described under Alternative 1: adverse, local to regional (downstream), minor to moderate, and both short-term and long-term. Effects would be minimized through pumping water into the reservoirs from the domestic well as necessary. Although mining excavations are fairly large (3-5 acres) at least 20 foot wide vegetated buffer would be maintained between the mining site and streams, wetlands or reservoirs/ponds. Mining would not occur within five small areas within the 152.5 acre project area where the project hydrologist identified a risk for mining activity to increase or decrease spring and stream flows or to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers. Where mining is adjacent to a stream, the cut nearest to the stream would be maintained at a 1:1 or gentler slope. The design features to be used near streams and wetlands as described in Secion 2.2.4.5 would minimize the potential for dewatering or sediment delivery to streams. All stockpiles of topsoil and substrate would be located on the side of the excavation away from the water, negating the possibility of direct impacts to water resources.

Phase 3 – A new processing site on BLM-administered public lands may be constructed, and equipment moved into this site adjacent to Reservoir #1, where placer gravels can be processed. The site would be less than 2 acres in size. Effects of drawing clean process water as authorized by the water rights would be the same as those described for Alternative 1 but would continue for up to 10 years. Effects of drawdown are similar as described under Alternative 1: adverse, local to regional (downstream), minor to moderate, and both short-term and long-term and would be minimized through pumping water into the reservoirs from the domestic well as necessary.

Shop Occupancy – The direct effects of shop occupancy would be negligible, short-term and site-specific. Dust in the summer from road travel and berms of plowed snow in the spring could potentially enter nearby waters. The shop is located on flat ground, out of the floodplain of French Gulch Creek. Rainwater is concentrated onto the ground directly beneath the roof eves. Under all action alternatives, BLM would require surface water runoff and erosion controls, including surface runoff control during ongoing operations, interim shutdowns, and final closure which with proper utilization would lead to negligible effects to water resources.

Phase 4 – About 152.5 acres of public land in sites 1A, 2, and 3 would be reclaimed; approximately 10 (up to 20 acres) would be reclaimed each year for up to 13 years. Direct effects of each year's reclamation activities are that mine spoils, subsoils and topsoils would be mixed as they are spread over the mined sites. Since soils disturbed by mining expand up to 30 percent (some expand more, especially those with high clay content), the ground surface of reclaimed mined areas would increase in elevation. Soils would become more porous, based on the physical properties of the particular soil, with soils below the water table having higher water storage capacity and soils above the water table having lower water holding capacity. It would take five or more years following reclamation for ground cover to reach desired minimum levels for erosion control (based on: professional experience of Tim Bliss working at mined sites in NE Oregon from 1989 to 2005; Tim Bliss observations in Mormon Basin in 2008-2009; Forest Service and Tim Bliss rangeland and forestland vegetation recovery studies).

Reclamation at the site of the shop would take place by year 13 and pose the same effects as described above for Alternative 1.

Phase 5 – N/A

Stabilize Existing Road Fords – Direct effects to water resources as a result of stabilizing haul road fords includes placement of fill into streams and gullies at each location. Turbidity levels within wetted stream channels would increase temporarily during this action and would be adverse, site-specific, short-term and minor. In the long-term, sedimentation into streams at ford crossings would be reduced resulting in minor, site-specific, beneficial effects.

Maintain, Replace, or Remove Road Culverts – Normal road maintenance on haul roads would require cleaning of culverts and the removal of the California Gulch culvert, which washes out each spring. Direct adverse effects to water resources as a result of maintaining, or removing road culverts includes short-term, major, adverse increases in turbidity levels as earth movement in and around streambeds takes place during culvert excavation. The long-term, beneficial effects to water resources where culvert removal takes place without culvert replacement, would be the same as those described above for stabilized road fords.

Alternative 3

Phase 1 – No direct effects to surface water resources are expected as a result of Alternative 3 exploration activities on private land and outside the project area, since this activity is similar to Alternative 1

Phase 2 – Direct and indirect effects to water resources are the same as those described for Alternative 2 Phase 2 activities.

Phase 3 – Direct effects to water resources as a result of processing activities are the same as those described above for alternatives 1 and 2.

Shop Occupancy – The effects of shop occupancy would be the same as those described for Alternative 2.

Phase 4 – Direct effects to water resources as a result of reclamation activities are the same as those described above for Alternatives 1 and 2.

Phase 5 – N/A

Stabilize Existing Road Fords – Direct effects to water resources as a result of stabilizing the existing road fords are the same as those described above for Alternative 2; however, the effects will occur over a larger area and include the historically mined areas.

Maintain, Replace, or Remove Road Culverts – Direct effects to water resources as a result of maintaining, replacing or removing road culverts are the same as those described above for Alternative 2; however, these effect will occur over a larger area and include the historically mined areas.

4.10.2 INDIRECT EFFECTS

Alternative 1

Exploration – Exploration on private land and any exploration that takes place in the future outside the project area is anticipated to have little or no effect on water quality and water quantity of adjacent streams. Exploration holes will be dug/filled within days to weeks and potential effects on water quality/quantity of adjacent streams and wetlands (20+ feet away) will be short-term/less than 1 year. After the hole is refilled, water temperature and water elevation will equilibrate with the surrounding pre-disturbance conditions, and sediment will settle into aquifer pores. Exploration sites would experience a short-term localized increase in erosion; all sediment would be trapped on-site due to the small size and rough surface of exploration sites.

Mining – Under Alternative 1, the No Action Alternative, no mining would take place within the 152.5 acre project area on public lands managed by BLM.

Use of existing open roads would create dust during dry road conditions. The dust would settle on both sides of the roads, sometimes traveling more than 100 feet, with some of it entering streams and wetlands. Snowmelt and rainfall would continue to cause erosion of road surfaces, especially in entrenched and rutted sections. Certain sections of roads located near streams would continue to deliver water and suspended/bedload sediment to streams. Placement of new gravel on road surfaces to facilitate access to private land would reduce the erosion rate and related sedimentation.

Processing – Processing on private land over the next 10 years would have minor indirect effects on adjacent public land soil and water resources. Process water obtained from adjacent private and public land reservoirs would slightly reduce stream flow in Basin Creek on public land below the reservoirs. This would be mitigated somewhat if water from the domestic well is used to limit drawdown of the reservoirs. All processing water would be stored in off-channel settling ponds; some of this water would evaporate and some would slowly percolate into groundwater and return to Basin Creek. When silt and sand from process ponds is cleaned, then hauled from private land back to a mine pit or used as reclamation topsoil, there is a low probability that soil would be deposited or eroded into streams.

While exercising water rights as described in Section 2.2.5, prolonged pumping of substantial quantities of water from reservoirs and streams during summer may cause a measurable increase in reservoir and downstream water temperatures. This would be mitigated somewhat if water from the domestic well is used to limit drawdown of the reservoirs. Early autumn pumping would create warmer water temperatures initially, changing to cooler temperatures later in the season as air temperatures cool. No measurable change in water temperatures during the high-flow spring snowmelt period and no change in the water temperature of wells is anticipated in any season. Prolonged increased water temperature in reservoirs and streams would contribute to increased quantities and rates of growth of algae in reservoirs as well as rapid and increased levels of turbidity development.

These effects would occur over the 10-13 year life of the project.

Reclamation – Reclamation of mined areas would be ongoing on private land and final reclamation would take place when the project is completed. Reclaimed soils would settle to some degree as fines wash into voids. Grass seeding, and natural local plant establishment on reclaimed sites would improve ground cover over several decades until total organic ground cover (litter, wood, biotic crusts, basal area of plants) reaches site potential. If the reclaimed sites are located near streams and reservoirs where ground cover and canopy cover are below potential, and where the ground surface has little or no runoff storage and sediment storage capacity, unpredictable intense rainfall from thunderstorms may cause short-duration sediment delivery to these waters.

Indirect effects of removal of the shop building and reclamation of soil under and around the building site include the risk of erosion from bare soils into surface waters if surface erosion control measures are not in place or are not effective. Effects would be minimal and beneficial in the long-term as rainfall no longer concentrates on the ground directly below the eaves of the shop roof and as the surface vegetates.

Monitoring and Reseeding Public Lands – N/A

Shop Occupancy – There would be no indirect effects to water resources if BLM would not approve use of the shop. There is the potential risk that oil changes and machinery maintenance conducted out in the open, could allow petroleum products to spill onto the ground, where water quality off site could possibly be impacted. Regardless of whether spills occur in the shop or the open it is required that BMPs be utilized such as the use of absorbent materials and other measures to capture de minimis spills (see Spill Containment Plan); however, potential risk would be somewhat minimized by shop utilization.

Stabilizing Existing Road Fords – N/A

Maintain, Replace or Remove Road Culverts – N/A

Alternative 2

Phase 1 – The general effects as a result of exploration activities under Alternative 2 are identical as described for exploration under Alternative 1, because no further exploration is proposed on public lands managed by BLM.

Phase 2 – Mining under Alternative 2 is anticipated to have minor (localized detectable over a small area) to negligible (not measurable) adverse effects on surface water quality and water quantity of adjacent streams because sites would be located at least 20 feet from streams and wetlands, stream buffers will be increased if needed to protect water quality, and because standard BMPs will be used to control water and sediment movement from mining sites to streams. If a mining site is located near a stream, and the water table in the excavation is lower than the water table of the stream, and the soils are porous, there is potential for mine interception of stream-associated groundwater (see Bliss Supplement #3). In most areas within the project area, such a condition would cause no more than a negligible, adverse effect on stream flow and water quality. However, there are higher risk areas adjacent to Glengarry and French Gulch (see Bliss Supplement #3) where conditions dictate that a wider buffer than the standard 20 feet be utilized. In these higher risk areas, the additional buffers that would be required to reduce the risk of adverse impacts to water quality, result in the remaining low risk areas being too small to be economically mined. Thus, the risk of impacting water quality in these areas is eliminated.

Water Resources Department considers groundwater within ¼ mile of streams as possibly stream associated. In areas within ¼ mile of streams, mining could cause a negligible to moderate negative effect on stream flow. Lower streamflows may result in a minor increase in stream temperature for that particular stream segment. However, because Basin streams, including Glengarry, sub into the alluvium and flow subsurface near the confluence with Emigrant, when the stream emerges again the water temperature is reduced due to the influence of cool groundwater. Evaporation of water from small pools of intercepted groundwater in mined areas would have a negligible (not measurable) adverse effect on water availability to downstream vegetation and streams. Mined sites would experience an adverse, short-term (mining season) localized increase in erosion. With proper application of BMPs, and since no sediment upstream of the Glengarry Emigrant confluence exists the Basin, the majority of sediment would be trapped onsite. Mined sites would experience a long-term increase in runoff and erosion rates which would gradually decrease over a five to 100-years period until pre-disturbance levels of canopy and ground cover are achieved. Horizontally and vertically concave slopes with bare soils would have greater potential to collect water, erode soil, and deliver sediment to streams and reservoirs during intense rainfall events. Groundwater hydrology would be highly altered by mixing, removal, and puncturing of substratum soil layers that perch water or allow water to percolate horizontally and vertically through the soil. Therefore, long-term, minor, adverse impacts to wetlands and other waters may occur.

A BLM decision to allow mining on public lands would result in an increase in indirect effects because additional mining would also occur on the adjacent private lands as a result of the BLM decision. Mining on private lands would result in an increase in the disturbance area due to mining activities and would therefore increase indirect effects.

Indirect effects on water resources as a result of road use to the shop would be similar to those described for Alternative 1. However, vehicle generated dust from roads, erosion, and sedimentation would be greater due to more extensive, intensive, and prolonged road use and maintenance. These effects would continue to occur throughout the 13 year project.

Phase 3 – Processing sites would experience localized soil erosion, but would be designed to contain all runoff and sediment. Process water obtained from nearby streams and on-stream reservoirs would be contained within the processing site in tanks and ponds, and would be disposed of through evaporation and slow seepage to groundwater. Effects of drawing clean process water under the terms of the water rights would be similar to those described for Alternative 1. However, additional water would be necessary and the effects would continue for up to 10 years on public lands.

Phase 4 – Indirect effects of each year's reclamation activities on public land would be similar to those described for Alternative 1 reclamation activities. These indirect effects would occur each year for 13 years with post-treatment indirect effects occurring until site recovery is complete.

Phase 5 – N/A

Shop Occupancy – Indirect effects of using the shop are negligible, long-term, and beneficial. Oil changes and machinery maintenance would be conducted within the shop building, where petroleum products are contained, and there is only a low risk that water quality off site could be impacted. Effects within the shop itself would be mitigated by BMPs that require the use of absorbent materials and other measures to capture de minimis spills (see Spill Containment Plan).

Stabilize Existing Road Fords –Effects to water resources as a result of stabilizing up to 14 road fords, includes short-term direct adverse impacts to water quality as a result of stabilizing fords with sediment. Indirect effects include an eventual decrease in turbidity levels within wetted stream channels as vehicles fording the stream channels would no longer induce streambed disturbances.

Maintain, Replace or Remove Culverts – Indirect effects to water resources as a result of maintaining, replacing, or removing road culverts in haul roads, such as the one on California Gulch, includes beneficial long-term water quality as flow is unimpeded at this crossing, reducing erosion and scour over time. Where culvert removal takes place without culvert replacement, effects would be the same as those described above for stabilized road fords.

Improve Drainage of Various Road Segments – Indirect effects on water quality as a result of improving drainage on haul roads would be moderate because rolling dips, waterbars and/or cross-drains would reduce sediment delivery from those segments of roads that are hydrologically connected to streams. Changes in timing, duration and quantity of water delivery to streams from road drainage improvements would be negligible because the road-water contribution to stream flow is so small compared with natural flow.

Alternative 3

Phase 1 – Indirect effects to water resources as a result of exploration activities on private land under Alternative 3 are the same as those described above for alternatives 1 and 2.

Phase 2 – Indirect effects to water resources as a result of mining activities under Alternative 3 are the same as those described above for Alternative 2.

Phase 3 – Indirect effects to water resources as a result of processing activities under Alternative 3 are the same as those described above for Alternative 2.

Shop Occupancy – Effects would be minor, long-term, and beneficial. In addition to those effects described above, deflecting the ditched water either to the north or south would stop water from discharging down the gullied hillside. Water and sediment would instead flow into vegetated areas either north or south of the shop, decreasing the amount of sediment being deposited adjacent to the parking area. With the shop gone and the area reclaimed to normal land contours, run-off would have a greater chance to infiltrate.

Phase 4 – Indirect effects to water resources as a result of reclamation activities under Alternative 3 are the same as those described above for alternatives 1 and 2.

Phase 5 – N/A

Stabilize Existing Road Fords – Indirect effects to water resources as a result of stabilizing up to 14 road fords, includes short-term adverse impacts to water quality as a result of stabilizing fords with sediment, with an eventual decrease in turbidity levels within wetted stream channels as vehicles fording the stream channels would no longer induce streambed disturbances.

Maintain, Replace or Remove Road Culverts – Indirect effects to water resources as a result of maintaining, replacing, or removing up to 10 road culverts includes additional beneficial long-term water quality effects as flow is unimpeded at these crossings, reducing erosion and scour over time. Where culvert removal takes place without culvert replacement, effects would be the same as those described above for stabilized road fords.

Improve Drainage of Various Road Segments – Indirect effects on water quality as a result of improving drainage on up to 29 road segments would be similar to what is described for Alternative 2, however, the beneficial effects would be increased because of the increased number of roads treated.

Protect Beaver Habitat – Where natural breaches of beaver dams occur, it is expected that beaver would repair and maintain them. Natural breaches exist in several reservoirs and on stream channels between reservoirs on private and public lands in Mormon Basin, primarily on Glengarry and Basin Creeks. Beaver dam retention, where these dams do not interfere with the mining operation, would maintain beaver-enhanced water and sediment storage, peak flow reduction, and contribute to wetland hydrology in the project area. Beaver-caused turbidity in reservoirs would continue. Beaver dams on culverts and reservoir outlets may cause short-term flow of streams over low spots in roads and reservoir dams during the springtime. Wetland willows would continue to be harvested by beaver for food, lodge construction, and annual repair of existing beaver dams and for construction of new dams in structures that beaver may re-occupy. If beaver continue to construct dens and tunnels in existing earthen dams, which may have to be filled as needed to maintain dam integrity, beaver may need to be relocated. ODFW would be notified prior to any beaver relocation.

Increase Height/Width of Reservoirs R-02 and R-03 Dams – There would be a temporary increase in turbidity of the reservoir and outflow stream if any material placed on the road/dams enters the reservoirs. Small amounts of material may enter the reservoirs or the dam face. Indirect effects would be local, short-term, minor, and adverse.

Remove Water Control and Outflow Structure from Reservoir R-04; Stabilize Glengarry Creek and Overflow Channels – Excavation for removal of the headgate and two pipes and placement of erosion control rock in the channels would cause a local, short-term, minor and adverse increase in turbidity and sedimentation in Glengarry Creek between Reservoirs R-04 and R-05. This effect could occur at the time of the action if there is water flowing or later in time if the channels are dry.

Headgate and culvert removal followed by armored channels construction would eliminate future potential for dam overtopping and dam face erosion. This action would lower the storage capacity of the reservoir by 60% to 80% resulting in local, long-term, moderate, beneficial effects.

Beaver would likely build stick/mud dams on the new outlet channels. Because this is transitory habitat for beaver, effects are likely to be minor to these specific areas.

Water quality may be moderately adversely affected as some of the channel armoring may redistribute down the channel during high flows. Some soil underneath the armoring and between the top of armoring and dam crest may also erode into the channel, however, these materials will likely be contained locally in the Basin Creek subwatershed, since the stream flows subsurface downstream of this proposed project. Moderate long-term beneficial effects may be realized as turbidity and sedimentation are reduced over time.

Stabilize City Gulch at G-03 – Indirect effects during construction are likely to be minor because the level of soil and channel disturbance would be small, and would occur when there is no flow in the channel. Erosion control structures would greatly reduce channel erosion and related turbidity/sediment production resulting in local, long-term, moderate, beneficial effects.

Stabilize Gullies and Rills on Steep Headwall at Site G-10 – Covering the water table and created wetland would reduce evapo-transpiration and allow more water to flow subsurface to Glengarry Creek to the northeast. Reshaping the slope to less than 50 to 60%, placing woody debris on the slope, and revegetating the slope to grass, shrubs, and trees (site potential) would greatly reduce sheet, rill, and gully erosion and would reduce potential for sediment delivery to

Reservoir R-04 and Glengarry Creek. It would take five or more years following reclamation for ground cover to reach desired minimum levels for erosion control. The loss of created wetlands and soil disturbance necessary to reclaim the site would result in moderate impacts. Over time, erosion would be greatly reduced and the water table restored to more desirable subsurface flow.

Construct Earthen Flow Diversion from Gully G-11 – Future water flow from the gully would be deflected either to the north or south instead of both directions. Sediment would continue to accumulate in the drainage channel west of the metal shed, requiring periodic maintenance of the berm or removal of the sediment to maintain function of the channel, or both. Water and sediment would flow into a vegetated area either north or south of the shed. If water is diverted south, additional ditching would be needed to make water flow off of the road onto the vegetated slope. All sediment would be trapped in vegetated areas. During construction, some soil may be deposited in small, linear wetlands and floodplains that are present due to current gully runoff and interception of groundwater.

Stabilize Head Cuts in Upper California Gulch at H-02 and H-06 – There would be a short-term increase of instream turbidity and sedimentation following head cut stabilization when water flow returns to California Gulch. All suspended and bedload sediment would be trapped in California Gulch. Head cut stabilization would prevent loss of the wetland floodplains above the head cuts and prevent the gullies from further head cutting. Placement of the rock structures would have long-term, major, beneficial effects as additional soil erosion and sedimentation would be prevented.

Stabilize Head Cut in Basin Creek at H-04 – There would be a short-term increase of instream turbidity and sedimentation during head cut stabilization. Most sediment would be trapped above or within the dense cattail wetland of Reservoir R-15. Head cut stabilization would prevent loss of the wetland floodplain above the head cut and prevent the gully from head cutting into Reservoir R-14. Indirect effects of this activity on water resources would be major and beneficial because the rock structure would prevent additional soil erosion and coincidental turbidity/sediment production as well as wetland/floodplain loss. Indirect effects during construction would be minor because the level of disturbance would be small, and project-related increases in turbidity and sedimentation would be local and short-term.

4.11 WETLANDS – RIPARIAN ZONES

4.11.1 DIRECT EFFECTS

Alternative 1 – The 18.5 acres of potentially jurisdictional wetlands and waters on private property (and any additional wetlands on BLM-administered lands associated with the No Action alternative) would not be impacted, other than by continued pumping of process water under the water rights – all surface disturbances would occur in upland areas on private land. Any access across streams would occur on existing roads with culverts or fords.

Alternative 2 – The 18.5 acres of potentially jurisdictional wetlands and waters on private property and any potentially jurisdictional wetlands on BLM-administered lands associated with the Proposed Action would not be impacted, other than by continued pumping of process water under the water rights. All surface disturbances would occur in non-wetland areas. Any access across streams would occur on existing roads with existing culverts or existing fords.

Alternative 3 – Many of the restoration activities proposed under Alternative 3 would create minor (detectable over a small area) and moderate (readily apparent over a large area) beneficial long-term impacts by reducing the potential for erosion and/or head cutting along roads, gullies, and streams, which stabilizes slopes and may improve habitat for wetland plant species.

Disturbances associated with restoration work would result in short-term, minor, adverse impacts. Restoration projects are relatively small in scale and soil disturbance associated with construction vehicles and equipment is anticipated to last less than a week.

4.11.2 Indirect Effects

Alternative 1 – Although pumping of groundwater is not proposed, it should be noted that groundwater pumping on private land, other than pumping from wells, could create short-term minor adverse impacts to wetland and other waters on public lands. These impacts may include temporary reduction in the amount of water available to wetlands and surface waters, and plant stress.

Alternative 2 – Groundwater pumping is not proposed by the mining company on public land, however, pumping from reservoirs could temporarily reduce the groundwater available to wetlands and streams. This would be mitigated if necessary by reducing drawdown in Reservoir #1 by pumping water from the domestic well, which is over 600 feet in depth, and unconnected to the perched surface groundwater encountered in mining excavations. Eventually, reservoirs and ponds would recharge the groundwater and downstream surface waters. The effects of groundwater pumping on private land are discussed under Alternative 1.

A BLM decision to allow mining on public lands would result in an increase in indirect effects because additional mining would also occur on the adjacent private lands as a result of the BLM decision. Mining on private lands would result in an increase in the disturbance area and duration of mining activities and would therefore increase indirect effects.

Alternative 3 – Wildlife protection activities may increase the prevalence of beavers in the project area. Beaver dams may alter or enhance wetlands in the project area, creating a long-term beneficial minor impact.

Removal of the water control structure and its associated culverts at R-04 would create a major impact to wetlands and floodplains. The reduced storage capacity would lower the adjacent water table elevation causing wetland species to relocate over time nearer to the new water table and reservoir wetted banks.

Construction of the earthen flow diversion at G-11 would disrupt hydrology to the linear wetland and floodplain features located at the base of the head cut west of the shed. Over time, these features would convert to upland habitat.

5 CUMULATIVE EFFECTS

The Council on Environmental Quality (CEQ) defines cumulative effects as: "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. The geographic scope of the cumulative effects analysis varies depending on the affected resource, but generally includes the Pedro Mountain Geographic Unit, the surrounding Blue Mountains foothills region, and Malheur and Baker counties.

Past and present actions located within the assessment area on both private and public land include: mining activities (including the No Action Alternative and the Proposed Actions), livestock grazing, logging and recreation. Mining activities and grazing have a history dating back to the late 1800s, while recreation (other than hunting) is relatively new.

Reasonably foreseeable future actions in the area include: continued livestock grazing, most likely at current levels, logging (public and private) forest health and fuels reduction activities on public and possibly private lands, and continued recreational activities at a level similar to current levels would likely occur. The BLM is planning a landscape health project in the Mormon Basin area which includes fuels treatments, forest health, commercial thinning and similar activities. Mineral exploration and mining activities would likely continue. They would potentially include further amendments to the Plan of Operation for additional exploration and mining by the proponent if this project were approved.

5.1 AIR AND ATMOSPHERIC VALUES

Past and Present Actions – Cumulative effects to air quality from past and present actions include windblown dust, dust from traffic on unpaved roads, dust from excavations related to mineral testing, and reclamation. The impacts from past and present levels of fugitive dust are considered minor. Greenhouse gas emissions from the Proposed Action would be so small as to be negligible in the context of global and U.S. emissions. Current global emissions of carbon dioxide total 25 billion tons (Denman et al. 2007), and current U.S. emissions of carbon dioxide total 6 billion tons (EPA 2009).

Reasonably Foreseeable Future Actions (RFFAs) – The cumulative effects from RFFAs, including the Proposed Action and other alternatives, future levels of livestock grazing, and recreational use would be minor to moderate. The cumulative effects from RFFAs in the area including the Proposed Action would be so small as to be negligible in the context of global and U.S. emissions.

5.2 BIOLOGICAL RESOURCES

5.2.1 FISH AND WILDLIFE

Past and Present Actions – Historic mining and grazing practices have severely impacted habitat in Mormon Basin both on private and public lands. Despite the fact that native salmonids were not seen during the survey, in stream segments adjacent to the project area, native salmonids (namely redband trout) and their habitat is assumed to be present throughout the Willow Creek Basin. Roads and mining excavations have caused habitat fragmentation. Loss of topsoil from previously mined areas has resulted in degraded wildlife habitat, which affects reptiles and small mammals. These losses ripple through the food chain to species such as raptors which rely on small animals for forage. Today, the Basin has recovered some of the lost habitat. Many historically impacted sites have been restored or re-vegetated.

Terrestrial wildlife habitat for reptiles, mammals, and birds would be destroyed during the proposed mining operations and restored in an ongoing program of reclamation. The replacement of the structural component of the upland vegetation would take longer than reestablishment of vegetation species. The mining activity would result in temporary losses for some species with a narrow range, such as small mammals and reptiles, while impacts on wide ranging species such as deer, elk, cougar, and bear would be less since they can move out of the area. The annual loss and gain of habitat is not equal in the short-term, but with restoration and reestablishment of trees and shrubs and many native vegetation species, over the long-term habitat will be restored. In the short-term, cumulative adverse impacts to fish and wildlife species through additional habitat loss and direct mortality would be high, with decreasing impact with restoration and recovery of habitat over time. Cumulative effects are expected to be local, adverse, and moderate, moving to minor over time.

RFFAs – Mineral extraction disturbances in the project area would increase during either of the action alternatives, disturbing as much as 10.5 acres of non-wetland areas yearly on public lands. Levels of livestock grazing are likely to remain constant, while recreation use of upgraded roads may increase slightly, causing more human disturbance over time. Additional mining operations could take place in areas surrounding the Mormon Basin claims. Ongoing reclamation of mined areas and restoration activities under Alternative 3 could improve wildlife habitat. Cumulative effects are expected to be moderate, moving to minor over time.

5.2.2 VEGETATION

Past and Present Actions – Historic mining operations have left behind bare ground, weedy areas, and areas with impoverished plant communities on the rock mine tailings. Some areas have seen some reestablishment of tree species and understory vegetation components on the north and east facing slopes. Reestablishing native species on south facing slopes has been slow to occur; however, only a very small portion of the project area contains south facing slopes. Past and present recreational activity may have contributed to the spread of invasive species, especially along roads. Livestock grazing has contributed to soil compaction in a few areas, however, Mormon Basin is in good condition and met all five standards of the Rangeland Health Assessment completed in 2007 (personal communication, Gary Guymon). As an indication of rangeland health, small aspen clones are present in many locations in the basin, on both private and BLM-administered lands. Most clones in brushy and wet areas appear to be successfully reproducing from succors, while clones in more exposed areas are slowly dying due to heavy browsing of succors by elk and cattle. Recreational activities in the basin are most prevalent during the fall hunting season. The cumulative effects of past and present actions on vegetation would be adverse and negligible to minor.

RFFAs – Cumulative impacts to vegetation would be minimal with successful restoration activities. However, if noxious weeds are not controlled on reclaimed areas, and if recreational use of the basin increases, additional weed populations could result, with moderate cumulative impacts resulting.

5.2.3 THREATENED OR ENDANGERED SPECIES (SPECIAL STATUS FISH, WILDLIFE, AND PLANTS)

Past and Present Actions – Historic mining likely eliminated some habitat for Columbia spotted frog. However, the mining in the 1980s created more wetlands and ponds with shallow rims for breeding habitat than were historically present, which is beneficial to amphibians. It is difficult to determine if the amount of habitat lost within creek beds was replaced with vegetated habitat in the ponds at an equal amount; the quality of the habitat is surely different. Livestock grazing in and around wetlands has caused erosion, increased trampling, and soil compaction, and increased nitrites. It is likely that pools within a creek must have had shrub and tree cover to keep the muddy substrate cool during the summer dry season and reduce the potential for prey opportunities by providing cover within the breeding habitat and dispersal areas. Another likely adverse impact from historic mining activity was the potential for increased disease spread through dense or limited population centers and/or breeding pools. Fewer breeding areas can increase species vulnerability to frog populations (USFWS 2008).

Past mining operations diverted streams, caused down-cutting, ditched water, and constructed reservoirs and ponds. Redband trout habitat is presumed to be present in Mormon Basin and redband trout have been observed in Basin Creek downstream of the project area. Ground disturbance due to mining and site reclamation activities would create areas of bare soil that would pose the risk of erosion and subsequent sediment delivery into nearby drainages until the soil surface is revegetated by the project proponent. Creation of bare soils would result in short-term, local, minor, and adverse effects. However, ripped soils would become more porous, which is an immediate benefit. Improving stream crossings may reduce the stream sedimentation within the basin over the long-term. Overall, impacts to both Columbia spotted frog and redband trout are expected to be local to regional, minor to moderate, adverse, and long-term.

RFFAs – Continued grazing (Bull and Hayes 2000), logging, mining and recreation activities are expected to result in minor to moderate, regional, adverse, long-term effects to Columbia spotted frog and redband trout within the Mormon Basin area. Provided that future mineral extraction actions within the area include wetland and stream buffer protection, adverse impacts could be minimized but would not prevent impacts from occurring.

5.2.4 INVASIVE PLANT SPECIES

Past and Present Actions –Past mining, grazing, recreation, logging and general vehicle travel through the area have all acted as vectors for the introduction and spread of invasive species. Invasive plant species have proven to be highly effective in establishing along roads. Impacts from these species are adverse, long-term, regional and moderate.

RFFAs – Cumulative adverse impacts from the spread of noxious weeds is expected to be adverse, long-term, local and negligible to moderate, depending upon the success of noxious weed control. The spread of invasive species is accelerating with increased vehicle traffic in support of recreation, mining, logging and grazing related activities. In the absence of aggressive control measures, the spread of invasive species along roadsides is expected to increase. The rate of increase would in part depend upon the amount of traffic, level of disturbance to the road shoulders, and future weather conditions which support growth of weed species over native vegetation. Currently, the herbicides approved for use on public lands are more limited than those that can be used on private land. By using the most integrated weed management which incorporates, prevention, mechanical, cultural and chemical practices into a weed control plan, invasive plant species can be best controlled. Uncontrolled, noxious and other non-native plant species would reduce habitat for all resources and compromise the ability of native species to reestablish in the future.

5.3 CULTURAL RESOURCES

Past and Present Actions – Impacts to cultural resources in the past have occurred from unauthorized collection and excavation, and from inadvertent destruction of cultural resource sites and artifacts from mineral exploration and mining and other developments. Impacts from past actions were moderate. Since the passage of the National Historic Preservation Act of 1966, most impacts from authorized actions have been avoided or mitigated and thus, impacts to cultural resources in geographic scope of this project are considered minor in the present. Cumulative impacts from the Proposed Action and other alternatives would be minor.

RFFAs – Cumulative impacts to cultural resources from the RFFAs would be minor. Should currently unknown cultural resources become exposed during the mining operation, the BLM's Field Manager and archaeologist would be notified immediately.

5.4 FORESTS AND RANGELANDS

Past and Present Actions –The long history of mining in the region and its related disturbances has had moderate impacts on rangelands in the basin. The long history of livestock grazing in the area has contributed to changes in vegetation, fire regimes, and water management.

Past mining likely required the use of wood removed from mining sites and adjacent lands for construction of mine improvements, dwellings and firewood. Logging not related to, or in support of mining, has continued in more modern times and would likely continue in the reasonably foreseeable future. The result of past activities has left some of these forest lands denuded of forest cover or with a later seral forest composition that is outside the historic range of variability (more grand fir and Douglas-fir than historically occurred) and the amount of old growth timber in the project area has been reduced. Overall, cumulative effects related to the Proposed Action are considered minor.

RFFAs – Cumulative impacts to range and forest management from mining RFFAs are expected to be adverse, local, and minor and would decrease over the long-term once the mining is complete. Mining disturbances in the area are small compared to the size of the allotment parcels and available forage and timberlands.

5.5 GEOLOGY AND SOILS

Past and Present Actions – Adverse impacts to geology associated with mineral actions is dependent on the degree and nature of surface disturbance. The lower portions of the basin are covered by Tertiary stream deposits interbedded with dacitic and andesitic flows, and past placer mining has left large areas of old tailings without soil. However, beneficial impacts also resulted from development of the placer and lode mines in the area, historically producing approximately $2.25 million in gold.

Adverse impacts to soils occur when heavy equipment removes vegetation and can compact soils and mix soil horizons making them less productive. A number of past exploration projects have occurred within the area without reclamation. Areas of the Proposed Action and other alternatives have undergone historic mining activity and many acres have been previously disturbed by placer operations. Some of the area has naturally revegetated, and plant growth appears healthy and vigorous. Proposed reclamation would mitigate many of the past adverse impacts. Livestock grazing may impact soils by compaction from trails and in areas of concentrated grazing, may have contributed to increased erosion potential. Recreational activities have had a minor impact on soils, primarily from off-highway

RFFAs – Mineral related disturbance would increase during the placer mining operations which could disturb up to 317 acres of private land under the No Action Alternative or up to 469.5 acres (private land and public lands) for Alternative 2 or 3 over the life of the project. Levels of livestock grazing, logging and recreation are expected to remain relatively similar to present activities. Impacts to soils in mined areas would be moderate if the Proposed Action or other alternatives occur. Reclamation practices would require re-contouring of the affected areas, application of topsoil, and seeding of an appropriate seed mixture which would provide for the eventual establishment of native plants.

5.5.1 SOIL QUALITY

Soil quality is affected by activities that modify soil texture, structure, chemistry, depth, horizon thickness, organic matter content, fertility, and depth to water table. Other impacts can be realized from changes to canopy cover, ground cover, vegetation type, floodplains and other landforms, local climate, and organisms.

Past and Present Actions – Cumulative effects of past actions on soils of Mormon Basin are major for the project area and minor for the sub-basin primarily due to residual effects from historic placer and lode mining, ditching, reservoir creation, road development, and grazing. Other listed past actions have a negligible effect on soils.

Soil quality is most easily determined by evaluating intensity, longevity and acreage of impacts to topsoil and soil cover. Topsoil has been compacted and puddled in places on roads, worksites, and trails by vehicles, equipment, and livestock. Topsoil has been displaced, covered, or mixed with very gravelly subsoil by exploration, mining, and reclamation activities and during construction of roads, ditches, reservoirs, and building sites. Topsoil has been partly to completely eroded by past water releases from reservoirs and ditches and in ruts of non-constructed roads; subsoils are exposed at many sites. As topsoil was being impacted, so were canopy cover, ground cover, potential vegetation, soil fertility, landforms, floodplains, and many soil physical, chemical, and biological conditions. Most of these impacts to topsoils are detrimental and long-term or permanent. It is estimated that about 50% of the project area and 20% of the sub-basin have these highly altered topsoil conditions.

Cumulative effects of present actions on affected soils of the project area and sub-basin are major, primarily due to the high level of soil disturbance that occurs during exploration, mining, processing, reclamation, and temporary road construction. Other present actions have a negligible additional effect on soils. The contribution of present actions to total soil cumulative effects (past plus present) in the project area and sub-basin is negligible because most present actions are merely a continuation of past actions and new mining impacts to soils are limited to 6-7 acres of disturbance at any one time, which includes previously mined sites.

RFFAs – Cumulative effects of RFFAs on affected soils of the project area and sub-basin are major due to the magnitude of adverse effects of proposed placer mining (mining, processing, and reclamation) of up to about 152.5 acres of public land, in addition to private land mining over the next 10 years. Placer mining would have adverse effects with respect to plant canopy cover, ground cover, and runoff, as described under past actions. Other listed RFFAs would have a negligible to major additional effect on affected soils. Enhancements listed in Alternative 3 would have mostly positive effects on soils. The contribution of RFFAs to total soil cumulative effects (past, present and future) in the project area and sub-basin is minor because design features and BMPs would reduce the impact of the Proposed Action of mining on soils. Furthermore, some mining would occur in previously disturbed areas, and residual effects of past actions on soils are so intense, long-term, and large in acreage (rock piles, cutbanks and exposed subsoil and substratum; in valley bottoms, most topsoils and subsoils were washed into streams and ponds and were replaced by course substratum; on the soil surface very cobbly spoils are evident that have little to no evidence of topsoil development) that restoration activities in the small project area can only marginally correct the damage.

5.6 PUBLIC ROADS AND ACCESS

Past and Present Actions – Historical mining activity, livestock grazing, and recreation have all contributed to an extensive network of roads in the area. Mine access roads on BLM lands would only be closed during certain mining operations to ensure public safety, and the public would be provided with alternative access either on the County roads or on connecting roads on BLM lands. Improvements to access roads due to the Proposed Action would provide improved access for recreational users and may promote additional visitation. The mining activity may also encourage increased visitation by recreation users who want to see an active gold mine, especially when associated with the history of the Back Country Byway. Effects would be minor, local, beneficial, and long-term.

RFFAs – Cumulative impacts to public roads and access from mining RFFAs are expected to be minor, long-term, local, and beneficial.

5.7 RECREATION AND VISITOR EXPERIENCE

Past and Present Actions – Impacts to recreation and the visitor experience are expected to be minor. The establishment of the Snake River/Mormon Basin Backcountry Byway has increased the exposure of Mormon Basin to the recreational public. Mining activity could attract additional visitors to the area, and conversely mining activities could be considered to detract from the visual quality of the Byway thus resulting in adverse effects to recreational users of the area. Impacts associated with the mining activities to the various types of recreation available in the basin such as sightseeing, picnicking, hunting and ATV/snowmobile use would include increased traffic, noise, improved roads and limited access to active mining areas. Cumulative effects would be local, minor, both beneficial and adverse, and long-term.

RFFAs – Cumulative impacts to recreation and the visitor experience from mining RFFAs are expected to be minor.

5.8 SOCIOECONOMIC RESOURCES

Past and Present Actions – Impacts to socioeconomic resources are expected to be minor but beneficial. Malheur and Baker counties are currently contracting in population size while employment opportunities are generally limited, especially in rural areas.

RFFAs – Employment from natural resource endeavors and other mining in the region is likely to remain relatively similar to present activities. It is possible that mining activity in the area would increase dependent upon the price of gold. Cumulative impacts to socioeconomics from mining RFFA are expected to be minor but beneficial.

5.9 VISUAL RESOURCES

Past and Present Actions – Visual impacts from recreation and livestock grazing are minor. Visual impacts from historic mining are considered moderate, visual impacts from the existing mining and processing equipment is also considered moderate. Active mining would occur in site-specific areas that move throughout the duration of the project concurrently with reclamation activities and the opening of new mining areas. Since the extent of mining will be limited in area over time the visual effects will be moderate over the life of the project. Once the mining and reclamation activities are complete, and vegetation components increase, it is expected that long-term adverse visual impacts to the local area will be minor. Cumulative effects are considered minor.

RFFAs – Cumulative impacts to visual resources from mining RFFAs are expected to be minor to moderate depending on the amount of un-reclaimed surface disturbance. Mining disturbances would be hidden from view when feasible. Lighting would be focused downward on security areas for safety considerations. Area lighting would be detrimental to the aesthetic value of the night sky.

5.10 WATER RESOURCES

5.10.1 HYDROLOGY

Stream, hillslope, and surface water hydrology are affected by activities that modify canopy cover, ground cover, vegetation type, stream channels and landforms. Evaporation, and consumptive water uses as well as quantity, timing and duration of flow, and surface and subsurface storage changes also affect hydrology.

Past and Present Actions – Cumulative effects of past actions on natural hydrology of Mormon Basin are major, primarily due to residual effects from historic placer and lode mining, ditching, reservoir creation, beaver activity, water use, road development, and grazing. Other past actions have had a negligible effect on hydrology.

Placer and lode mining activities in the 19^{th} and early 20^{th} centuries removed plant cover (trees, shrubs, grasses, and forbs) and ground cover (litter, woody debris, biotic crusts, and basal plant area) from about 50% of the project area and about 10% of the sub-basin. Forestland, rangeland, and wetland canopy and ground cover have greatly improved since then and total wetland acreage is believed to be greater than in pre-mining times. Valley bottoms were mined down to 20 feet deep, which removed stream channel hardpans and increased the porosity of floodplain soils. As a result, there is more subsurface stream flow than during pre-mining conditions. Streams were permanently diverted into ditches in some locations, drying up stream flow and lowering water tables in some valleys and enhancing them in others. Water releases from ditches and reservoirs created most gullies visible on hillsides and in streams. These gullies continue to accelerate water flow from hillsides. Reservoirs constructed in valley bottoms slowed water and sediment flow from the basin; more water is stored in the basin than prior to mining. All of the current bedload sediment and most suspended sediment are now trapped in Mormon Basin above Reservoir R-14. High reservoir surface area and some consumptive water use for mining probably causes more water to evaporate from the basin than in pre-mining times. This is partially offset by little evaporation from bare mined/roaded areas and limited transpiration due to the relative lack of vegetation in mined areas. Beaver dams on reservoirs have greatly enhanced storage, reducing springtime and storm-generated peakflows and enhancing late season baseflows through slow release of stored water. Some roads in the basin function as ephemeral streams, increasing water quantity and shortening the timing and duration of snowmelt and rainfall-generated flow to streams as well as contributing to erosion and sedimentation into streams. 19^{th} century and early 20^{th} century grazing practices caused a severe reduction in grass/forb ground cover of uplands which increased runoff and created some gullies evident in uplands. Since then, rangeland canopy and ground cover has recovered to near site potential except on roads and some mined areas.

Cumulative effects of current actions on current hydrology are minor due to continued use of water for placer mining; use of ditches, reservoirs, and roads for water conveyance; and planned disturbance of up to 5-7 acres at a time. Other present actions such as grazing, logging, and recreational uses have a negligible effect on hydrology. The contribution of current actions onto total hydrology cumulative past effects (past plus present) is minor, local to regional, adverse, and long-term.

RFFAs – Cumulative effects of RFFAs, in conjunction with the Proposed Action, on current existing hydrological conditions are moderate for the project area and minor for the sub-basin due to adverse effects of placer mining (exploration, mining, processing, and reclamation) of up to 152.5 acres of public land and 317 acres of private land over the next 10 years. Placer mining would have adverse effects with respect to canopy cover, ground cover, and runoff as described under past actions. Other RFFAs would have a negligible to minor effects on the hydrological conditions within the project area and negligible effects on the hydrological conditions within the sub-basin. Enhancements described in Alternative 3 would have minor beneficial impacts to hydrological conditions over time. The contribution of RFFAs to total hydrology cumulative effects (past, present and future) are minor because design features and BMPs would reduce the impact of the Proposed Action on the environment, and because residual effects of past actions on hydrology are large and would not be mitigated or corrected, nor are they recommended to be corrected.

5.10.2 WATER QUALITY

Water quality is affected by activities that modify quantity, timing and duration of flow, shading of streams and reservoirs, subsurface stream flow, deep groundwater, stream morphology, water temperature, suspended and bedload sediment, and turbidity.

Past and Present Actions – Cumulative effects of past actions on water quality of Mormon Basin are major for the project area and sub-basin, primarily due to residual effects of historic placer mining, construction of ditches and reservoirs, beaver activity, withdrawals of water to mining process water, and historic grazing practices. Other listed past actions have a negligible effect on water quality.

Water temperatures of reservoirs are believed to be at least several degrees (F) higher in late spring and summer than would occur under natural stream flow conditions, which would increase the temperature of Basin Creek below Reservoir R-14. Water temperatures of streams and reservoirs are typically associated with water withdrawals conducted for mining purposes. Water temperatures are affected by past mining activities, livestock grazing, and ditching of streams that reduced streamside tree and riparian vegetation cover compared to pre-mining/grazing conditions. Some reservoirs have high turbidity due to the presence of algae; beaver activity causes additional turbidity in some reservoirs. Reservoirs trap all bedload sediment attempting to leave Mormon Basin, plus most of the suspended sediment, which creates a sediment starved stream below Reservoir 14 compared with pre-mining conditions. Past mining of stream channels is believed to have caused more subsurface flow than under pre-mining conditions, which results in a beneficial effect by cooling stream temperatures.

Cumulative effects of current actions on water quality within the project area and sub-basin are minor for continued water withdrawals from reservoirs at the processing site, and negligible for all other actions. The contribution of current actions to total water quality effects (past plus present) in the project area and sub-basin are minor, local to regional, adverse, and long-term.

RFFAs – Cumulative effects of RFFAs on water quality are adverse, long-term, moderate to major at the local sub-basin scale due to regional downstream areas because continued water withdrawals from reservoirs and streams for processing, which would continue to increase water temperatures beyond what occurs with current mining operations. Sediment delivery to streams would be reduced by actions included in the restoration alternative and by design features and BMPs in the Proposed Action. Other listed RFFAs would have a negligible effect on water quality within the project area and subwatershed.

The contribution of RFFAs to total water quality cumulative effects on water quality (past, present and future) within the project area and subwatershed are minor because design features and BMPs would reduce the impact of the Proposed Action on the environment, and because residual effects of past actions on water quality are large and would not be mitigated or corrected, nor are they recommended to be corrected.

5.10.3 Watershed Condition Rating

Watershed condition is affected by activities that modify physical, chemical and biological conditions, and geomorphic, hydrologic and biotic integrity, of soil, aquatic and riparian systems. This includes all effects for hydrology, soil quality, water quality and riparian-wetland quality discussed above. The watershed condition rating is a summary cumulative effects rating for a watershed.

Past and Present Actions – The project area and subwatershed have a current watershed condition rating of Class 1 minus for reasons listed in Table 17 of the Watershed Existing Condition Report (Bliss 2008a, 2008b). This is primarily due to residual effects from placer and lode mining, construction of ditches and reservoirs, water withdrawal for mining use, roads, and grazing. Watershed condition is estimated to have been Class 3 plus to Class 2 minus about 100 years ago; however, substantial recovery has occurred since then.

The contribution of current actions on total cumulative watershed condition (past plus present) in the project area and sub-basin is negligible because most current actions are merely a continuation of past actions. Therefore, the project area and sub-basin would be expected to maintain a Class 1 minus watershed condition rating.

RFFAs – The contribution of RFFAs to the cumulative total watershed condition (past, present and future) is major at the project area scale and moderate at the subwatershed scale due to the large acreage of planned placer mining on public and private land, and the intensity and duration of mining effects on slope, hydrology, soils, and vegetation. Placer mining activities would change the watershed condition of the project area to Class 2 plus when about 20% of the project area has been mined. The project area would drop back to Class 1 minus when vegetation, canopy cover and ground cover of reclaimed project area lands approach pre-mining conditions. Placer mining activities in the project area would disturb approximately 17% of the sub-basin acreage because wetlands and low value areas would not be mined. Since mining and reclamation effects would occur over a 13-year period (which allows for ongoing recovery as new mining and reclamation occur), the watershed condition of the sub-basin would remain Class 1 minus but very near Class 2 (Bliss, 2008). Reclamation activities and BMPs that save or/replace native soil, or that will add settling pond “topsoil” to the surface of areas currently with no topsoil after they are mined will contribute to the success reclamation and revegetation of mined areas. In addition, the exclusion of perennial streams, springs, reservoirs/ponds, and wetlands from mining would maintain about 95% of the riparian-aquatic ecosystem intact, which will reduce runoff and erosion from existing roads, and therefore will help to maintain the existing watershed condition throughout the duration of mining operations.

5.11 WETLANDS – RIPARIAN ZONES

Wetlands and riparian areas are affected by activities that modify stream flow, depth to water table, soils, landforms, presence and health of riparian plants. Riparian wetland quality affects hydrology, soil quality, water quality, and aquatic species habitat.

Past and Present Actions – Cumulative effects of past actions on wetland-riparian areas of Mormon Basin are major for the project area and sub-basin. These are primarily due to residual effects of placer mining, ditches, reservoirs, beaver activity, water use, roads, and grazing. Other past actions have a negligible effect on riparian-wetland areas.

Placer mining, reservoir construction, and road construction initially severely reduced acreage of riparian-wetland areas in Mormon Basin. Early intense livestock grazing initially altered plant composition and plant health of riparian-wetland areas. Mining and grazing activities also caused many gullies which are still present and have lowered water tables and dried out or reduced riparian-wetland acreage along streams. Although riparian-wetland areas have substantially recovered from these early impacts, and are currently in good condition at this time, the associated landforms, water tables (see Bliss Groundwater Report) and plant communities in many areas are still highly altered compared to pre-mining and natural conditions.

Cumulative effects of current actions on riparian-wetlands within the project area and sub-basin are negligible to minor, primarily due to continued annual grazing impacts and water use from reservoirs. The contribution of current actions on total riparian-wetland cumulative effects (past plus present) within the project area and sub-basin is negligible because current actions affecting riparian-wetlands are merely a continuation of past actions.

RFFAs – Cumulative effects of RFFAs on riparian-wetland areas are minor for the project area and sub-basin because most RFFAs (including the Proposed Action) are located outside of riparian-wetlands, and because the few RFFAs that affect riparian-wetland areas are watershed improvement projects of the restoration alternative that would maintain or improve riparian-wetland quality. The contribution of RFFAs to total riparian-wetland cumulative effects (past, present and future) within the project area and subwatershed is minor due to the requirement for ongoing reclamation of mined areas, and the riparian-wetland improvement projects proposed in the restoration alternative.

5.12 OCCUPANCY

Past and Present Actions – Overall, there would be negligible incremental adverse effects from the use of the shop. Impacts would be reduced subject to implementing BMPs and conformance with Federal and state regulations. It is estimated that cumulative short-term effects and long-term effects to the environment would be minor and adverse.

RFFAs – Cumulative effects to the environment from continued use of the shop, when added to other reasonably foreseeable future activities in the Basin, are considered negligible, long-term, and adverse. Miners may request to extend their occupancies due to changes in market conditions or other factors, but all approved occupancies must have an estimated period of use and a reclamation schedule when operations would end, in this case 10-13 years. At the end of this period the shop would be removed and the area reclaimed.

5.13 SUMMARY OF CUMULATIVE EFFECTS ON AFFECTED RESOURCES

Overall there would be minor to moderate incremental cumulative impacts. Impacts would be reduced subject to implementing design features, BMPs, and conformance with Federal and State regulations. It is estimated that short-term impacts would be minor to moderate. However, with appropriate design features, BMPs, concurrent reclamation, and final site reclamation, cumulative long-term impacts to the area would be minor.

5.14 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects include:

Tree removal may take place at site 2 on about ten acres, resulting in loss of timber stand and structure. It would take as much as 100 years for these trees to grow back.

Cultural resources not eligible for the NRHP may be disturbed, destroyed, or otherwise adversely impacted.

Completion of reclamation would result in a smoothed topographic profile of the drainages and slopes. The existing, historic mining disturbances would also be reclaimed. This would change the historic visual image of this historic mining area.

The existing view of the landscape, including soils and vegetation, would be impacted by additional mining activity. Although processing and other mining activities would take place out of view from the county roads when possible, some changes to the visual resources in Mormon Basin would occur.

5.15 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The short-term uses in the vicinity include grazing, mining, and recreation. Additionally, the area has historic significance from the middle to late 1800’s, when placer miners discovered gold, and mined the land. Water conveyance and collection features, adits and roads, and some structures, are the most evident features from this earlier period.

The long-term productivity of the land is not anticipated to be impaired by this action. Some vegetation would be disturbed by the Proposed Action and other alternatives. Concurrent reclamation with appropriate seed mixtures and adequate weed control would allow vegetation to become reestablished on the re-contoured slopes and basins. As the vegetation grows, any displaced wildlife species would return and resume normal activities. Alluvial water flow in the gulches would return to near-normal conditions once sediment is naturally sorted and compacted by periodic precipitation events. Wetland and riparian habitat would remain intact due to the 20 foot undisturbed buffer to be maintained adjacent to wetlands and perennial streams.

5.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The exploration and mining of gold from placer deposits represents an irreversible commitment of resources, which is viewed as an acceptable commitment under the Baker RMP. Gravel and sand displaced and moved by the Proposed Action and other alternatives would not return to its original depositional environment. However, the current depositional environment is not inherently natural due to historic mining activity in the project area. The extracted gold would be used for the benefit of the proponent, and is considered a public benefit under the Mining and Minerals Policy Act of 1970. It would not be returned to the project area. Ground vegetation in the project area would require from five to 20 to 30 years to return to the current height and density; conifers would take up to 100 years.

6 Tribes, Individuals, Organizations, and Agencies Consulted

Confederated Tribes of the Umatilla Indian Reservation

Burns Paiute Tribe

Oregon State Historic Preservation Office

7 List of Preparers

Jan Alexander, Permit Writer, Jan Alexander Mine Permitting, LLC

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Appendix A
Plan of Operations

"The Plan will be amended to reflect the EA Decision Record".

Field Manager Ted Davis
Bureau of Land Management Baker Field Office
P.O. Box 947
Baker City, OR 97814

December 2, 2009

Re: Plan of Operation for Mormon Basin, Designation of Jan Alexander as agent

Dear Mr. Davis:

Enclosed please find the revised Plan of Operation for Mineral Valley, LLC. You will see only five changes from the plan submitted by B.P. Gold. These include (1) changes in operator and claim owner (2) minor changes in equipment and materials (3) an expansion of the private land associated with this operation from 157 to 317 acres (4) a mitigation that water from the domestic well located on private land near French Gulch will be used to maintain the water level in Reservoir #1, if drawdown becomes an issue (5) all reference to processing within the pit at California Gulch have been removed.

My plan is to work with BLM in any way necessary to get this Plan of Operation approved. A 500 yard per day wash plant will be set up at the French Gulch private land processing site, and another on the private land in Section 16. A third plant is planned for the California Gulch private land processing site, but this installation may be delayed. Next spring I will concentrate on mining on private land and on public lands in the north part of the project area near Glengerry and French. My intent is to spend some time cleaning up the California Gulch buildings and removing the tank. After that work is completed to BLM satisfaction, I will begin installation of a new wash plant at the processing site formally used by B.P. Gold. There may not be time in 2010 to begin mining in the south portion of the claims, but mining in this area is planned for 2011. If bonding can be staged to reflect this schedule, it would be appreciated.

I am requesting that Jan Alexander act as my agent for this Plan of Operation. Jan takes care of correspondence for Mineral Valley, and she should receive a cc of all BLM correspondence which is sent to me. This includes, but is not limited to, correspondence concerning the Plan of Operation and any information in the BLM file for this Plan. She is authorized to work with your staff on the ground, to meet with you on my behalf, to answer questions, and to relay information from me to you in writing. Jan may have access to the Mineral Valley BLM files. Jan is authorized to work with your staff until such time, either that Jan or I inform you in writing, that she is no longer operating as my agent.

Sincerely,

Steve Jay
Agent for Mineral Valley, LLC
P.O. Box 5075
Bridgeport, OR 97819
446-3436

Enclosure

Cc: Jan Alexander

Mormon Basin, Malheur County

PLAN OF OPERATIONS FOR MINING ACTIVITIES
ON BUREAU OF LAND MANAGEMENT LANDS

Submitted by: Steve Jay, agent for Mineral Valley, LLC

I. GENERAL INFORMATION

A. Name of Mine/Project: Mormon Basin Placer Mining Project

B. Type of Operation: _Placer_Mining
(lode, placer, mill, exploration, development, production, other)

C. Proposed start-up date of operation: ASAP_

D. Expected total duration of this operation: 10-12 years

E. If seasonal, expected date of annual reclamation/stabilization close out: November 30, each season_

F. Expected date for completion of all required reclamation: Reclamation will take place annually as needed, final reclamation will take place when the deposit is worked out.

II. PRINCIPALS AND THE LAND

A Name, address and phone number of operators. Steve Jay, agent for Mineral Valley, LLC, P.O. Box 5075, Bridgeport, OR 97819, 541-446-3436 and Mark Hammond, Manager, Mineral Valley, LLC, 5151 Corporate Drive, Troy, MI 48098

B. Name, address, and phone number of authorized field representative (if other than the operator). Attach authorization to act on behalf of operator.

C. Name, address and phone number of owners of the claims. Mineral Valley, LLC, 22141 Bridgeport Lane, Bridgeport OR 97819

D. Name, address and phone number of any other lessees, assigns, agents, etc., and briefly describe their involvement with the operation, if applicable: agent for Steve Jay is Jan Alexander, P.O. Box 153, Unity, OR 97884, 541-446-3413. Se attached agent designation letter.

E. Tax ID # see attached

Claim Name and Location

ORMC#	Name	Section	Township	Range
153206	Mormon Basin Placer Grp #1	17	13S	42E
153207	Mormon Basin Placer Grp #2	16,17	13S	42E
153208	Mormon Basin Placer Grp #3	20	13S	42E
153209	Mormon Basin Placer Grp #4	20,21	13S	42E
153210	Mormon Basin Placer Grp #5	20	13S	42E
153211	Mormon Basin Placer Grp #6	20,21	13S	42E
153212	Mormon Basin Placer Grp #7	21	13S	42E
151838	Mormon Basin Group 8	21	13S	42E
161231	Mormon Basin Placer Grp #9	17	13S	42E

There are 317 acres (more or less) of private land and 310 acres of BLM claims (more or less) within the Oregon Department of Geology and Mineral Industries (DOGAMI) permit area.. Under this proposal, mining will take place on approximately 158 acres of BLM mining claims, but reclamation of many additional acres of historically mined rock tailings areas is also planned.

Access

Access is via the Clarks Creek County road, the Basin Creek County road and the historic road system within the Basin that originally supported the placer and lode mines in the late 1800s. Over nine miles of open road are contained within this project area, and there are additional old roads that are currently closed to vehicles on both private and public lands that may be reopened for this operation. This road system will support the mining operations today. A detailed map of each area where mining is planned, access routes and haul roads are included in this POO (see pages 6A-6C). During the mining phases (phases II-III) the area impacted by temporary overland access routes will be included in the acres of mining related disturbance on public lands for which reclamation bonding will be in place.

4-wheel drive vehicles, equipment such as the excavators, cats, loaders, backhoe, equipment trailers, and dump trucks will use the road system as needed.

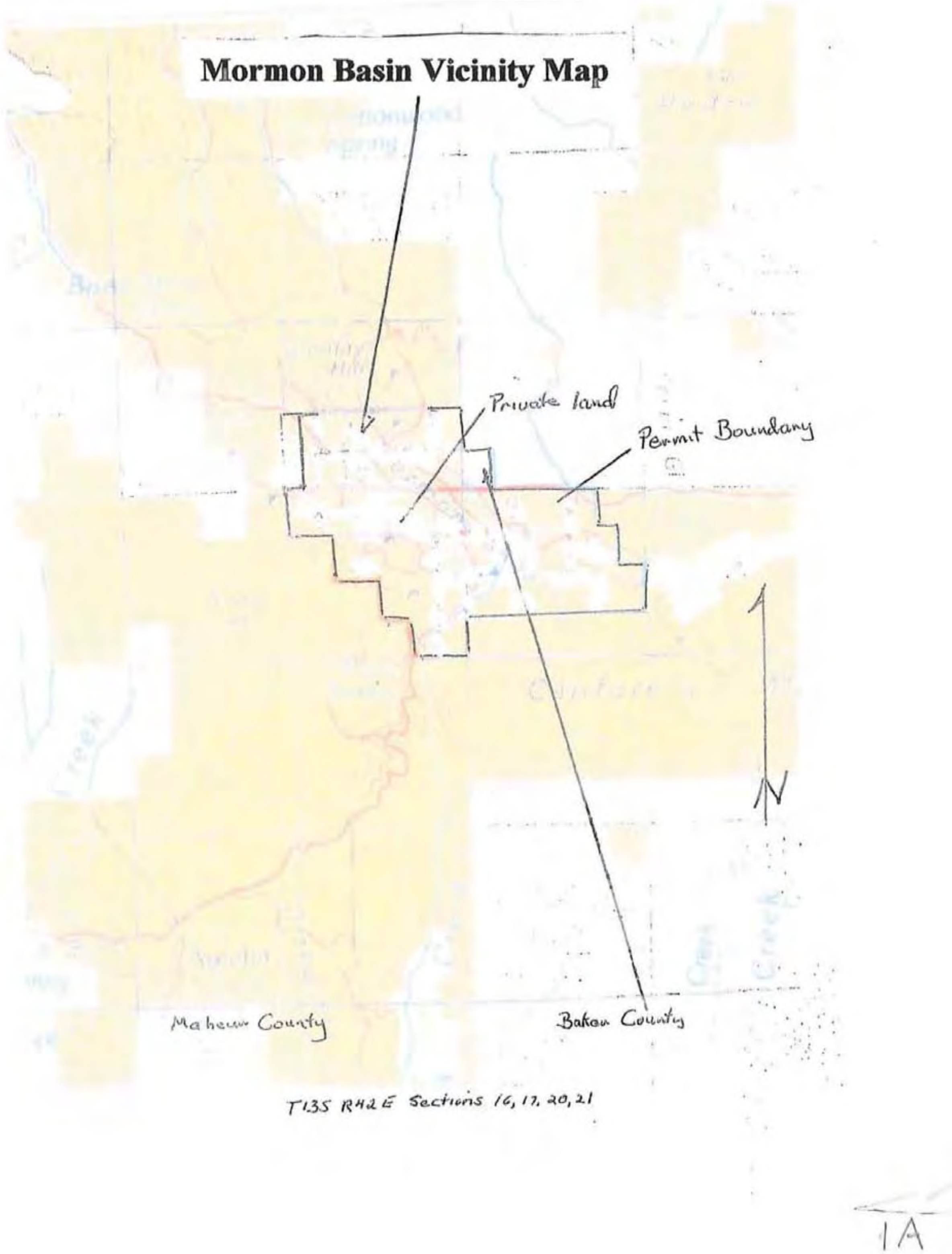
Roads will be maintained by grading with the cat or with a road grader. Drainage features will be installed using standard engineering protocol and site specific conditions on the ground. The Baker and Ironside Road Departments will be contacted if any county roads must be disturbed during mining. The public will be provided access through Mormon Basin during the time that mining takes place. Where necessary, alternate routes will be constructed around the mining areas.

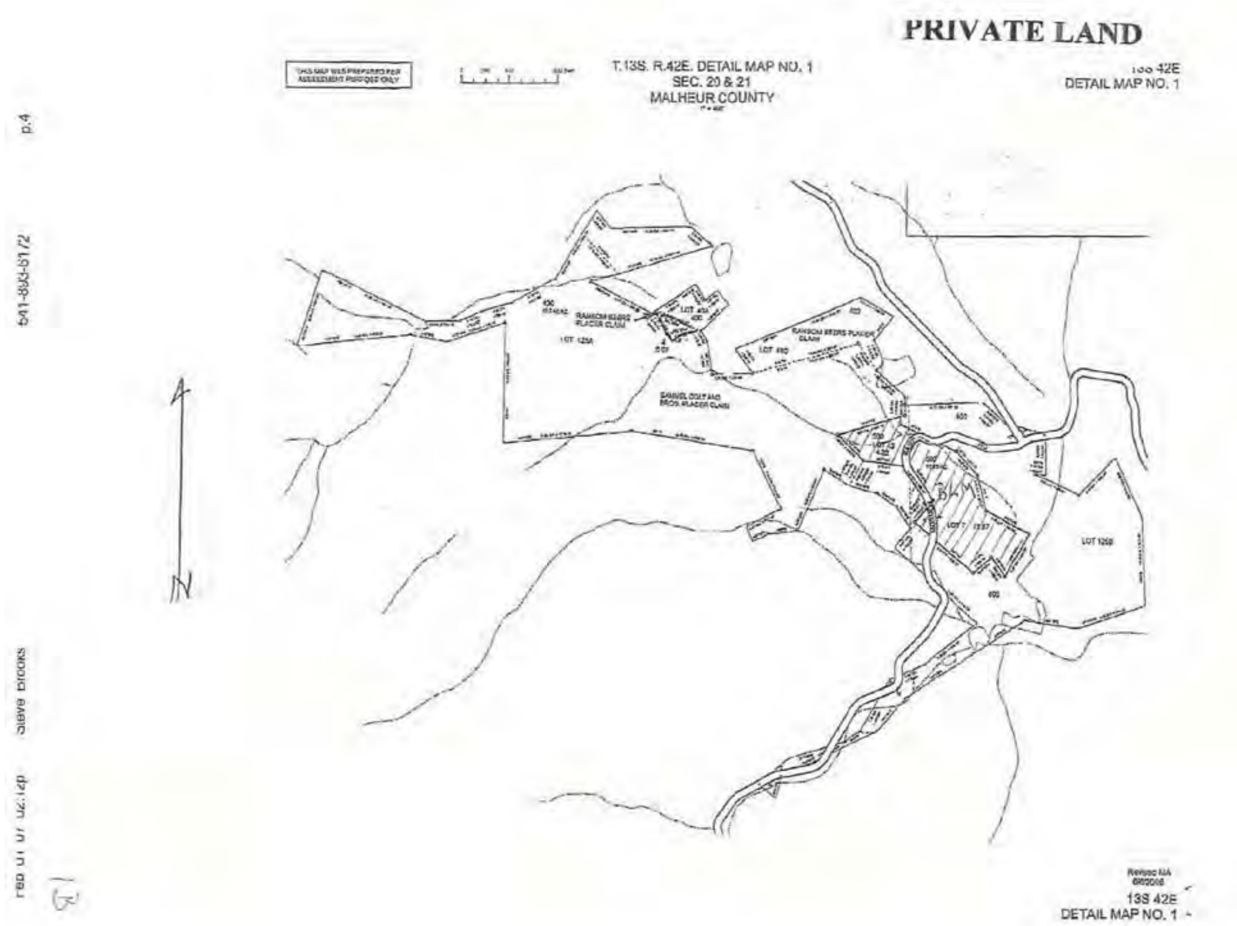
The access routes within each mining area may need to be interconnected during the mining operation, to facilitate haul to the nearest constructed haul road. Construction will entail flattening dangerous side slopes or removal of boulders so that machinery and dump trucks can pass. Width of these accessways will be no more than 12 feet. During reclamation of each section of ground, the temporary connecting routes will be obliterated and these will be reclaimed to normal land contours as the surrounding land is reclaimed to normal land contours. Compacted areas will be ripped and seeded with an approved BLM seed mix. The area will be recontoured to match the surrounding terrain as much as possible as part of the reclamation plan. At the conclusion of the operation, the existing road system will be reestablished to current conditions, unless BLM specifies otherwise. The reclamation bond will include sufficient funds to guarantee reclamation of these routes to County and BLM specifications.

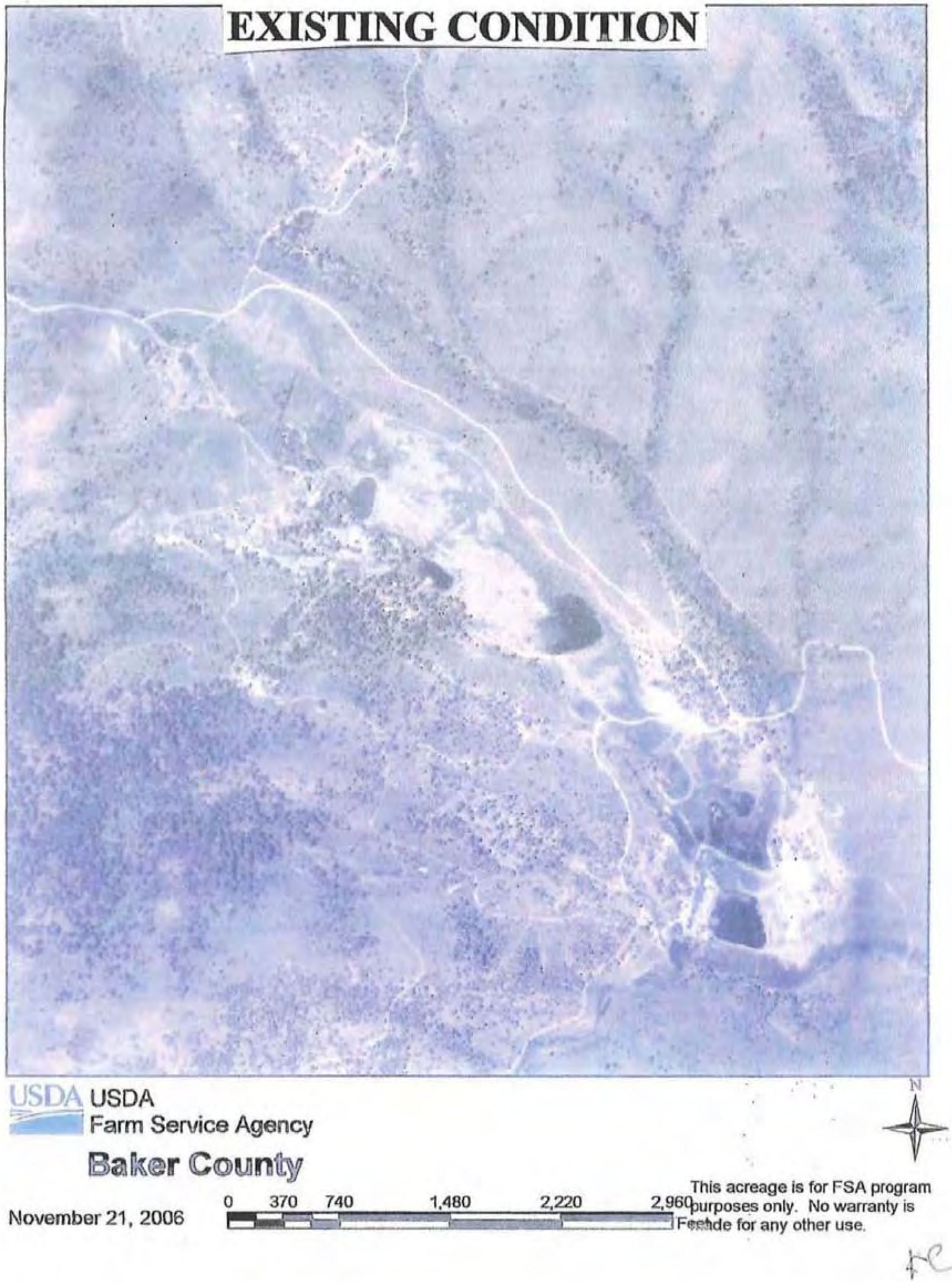
I History of Mining and Existing Condition

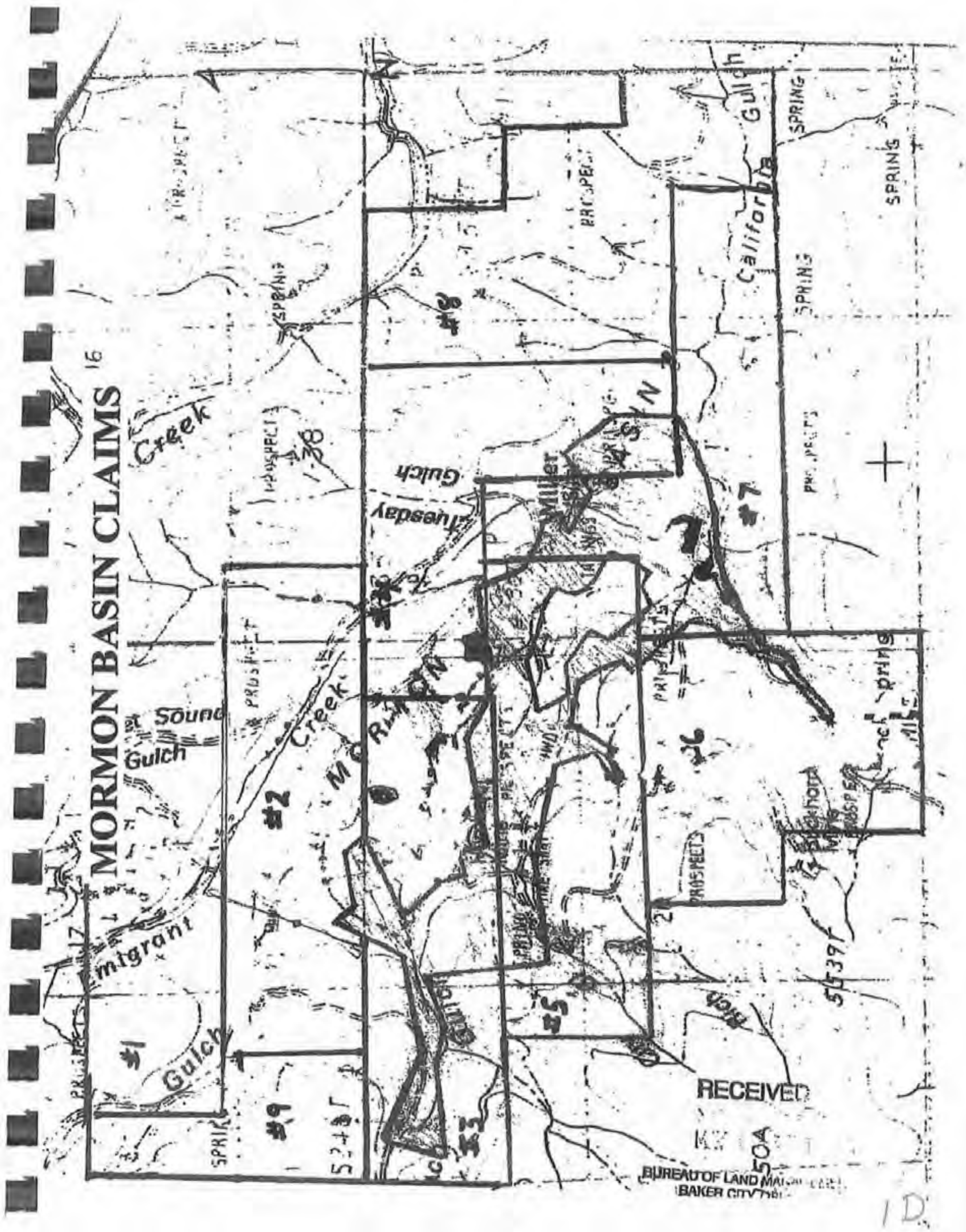
History

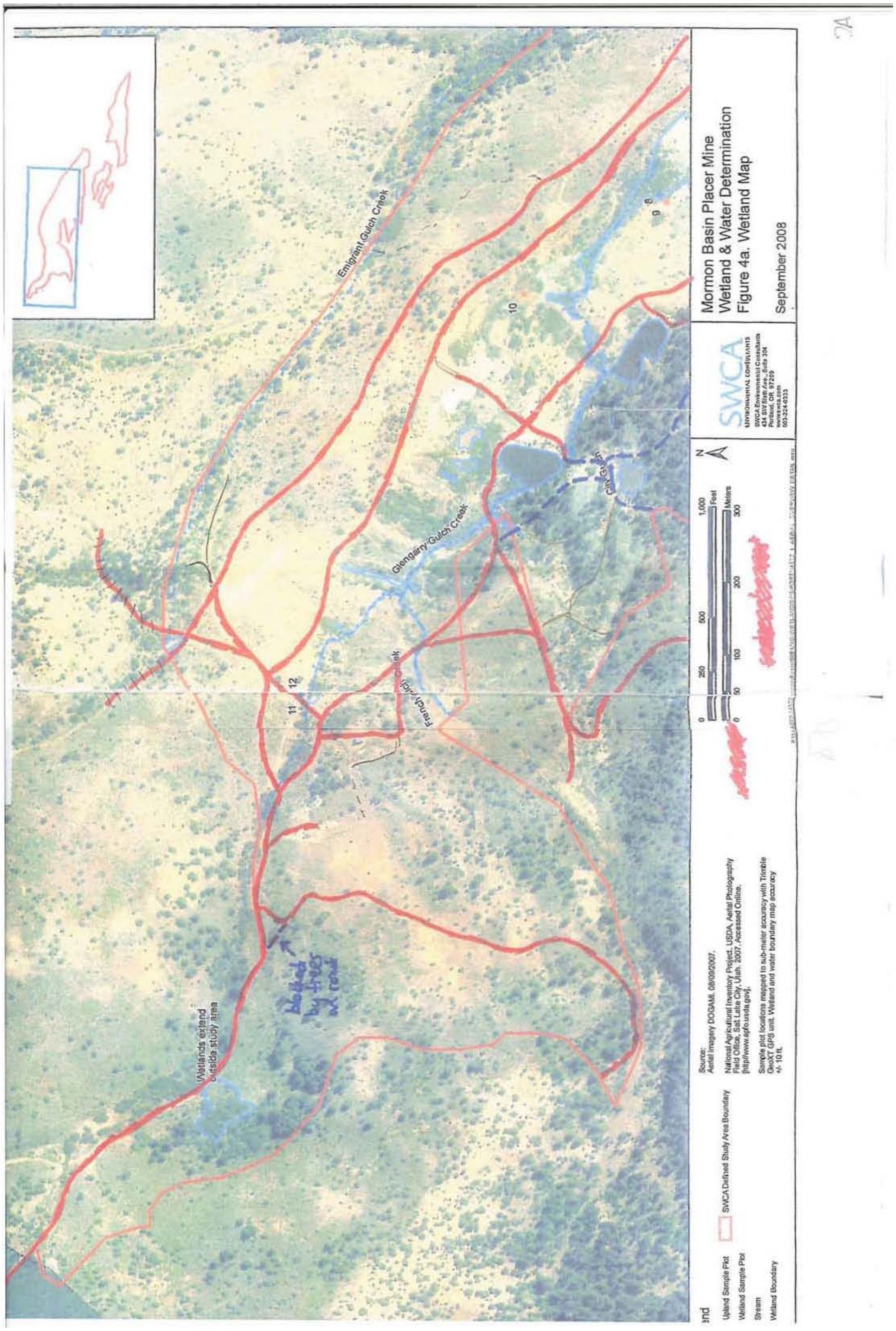
The basin was mined as early as 1883, however, where mining did take place, in most cases, only the first layer of paygravel, approximately 8 foot deep, was mined and processed. The false bedrock is a hard clay or sandstone layer approximately 5 feet or more in depth. In the late 1890s, the Colt Brothers mined at depth in a few places

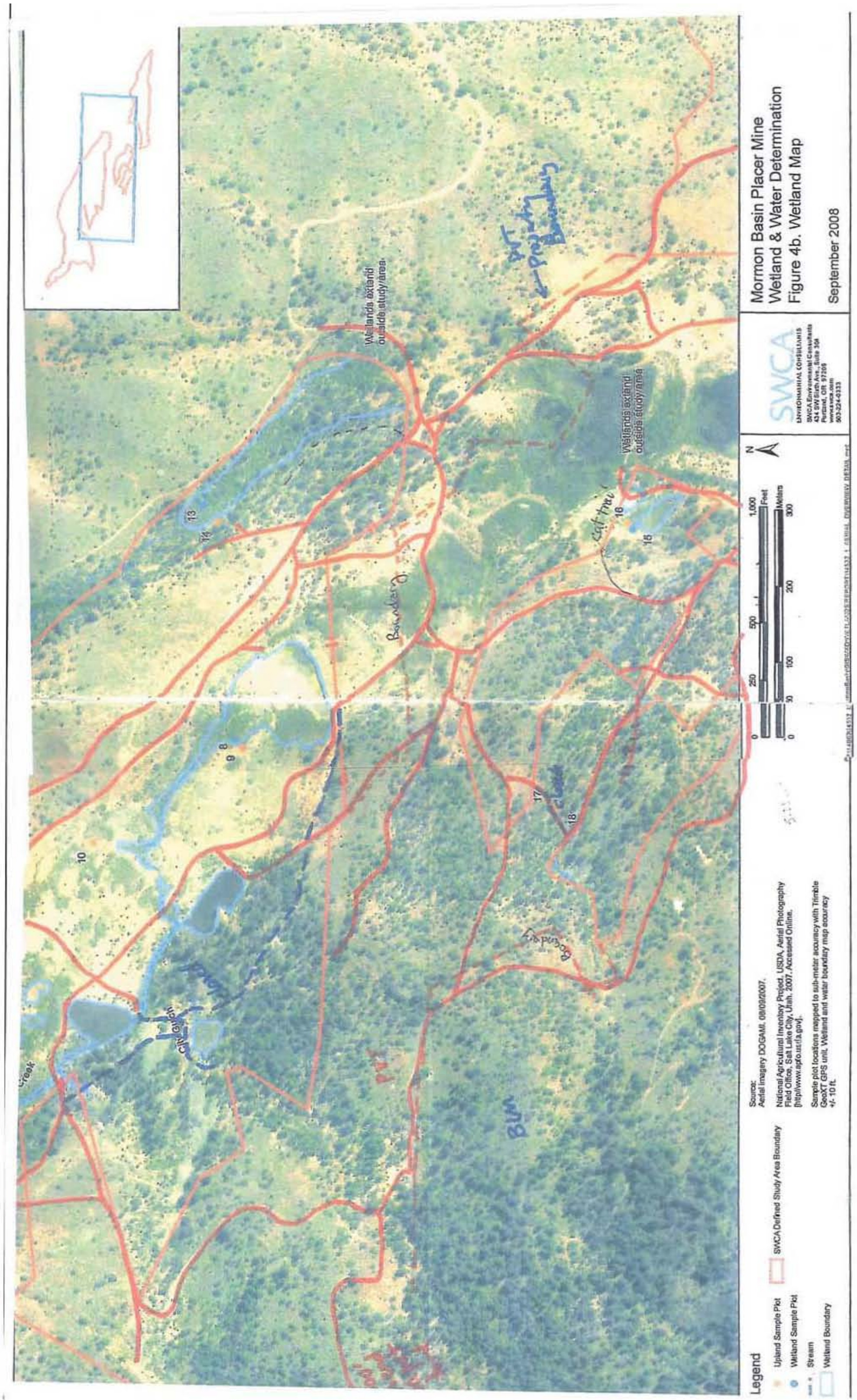

Mormon Basin Vicinity Map
Private land
Permit Boundary
N
Malheur County
Baker County
T13S R42E Sections 16, 17, 20, 21
1A

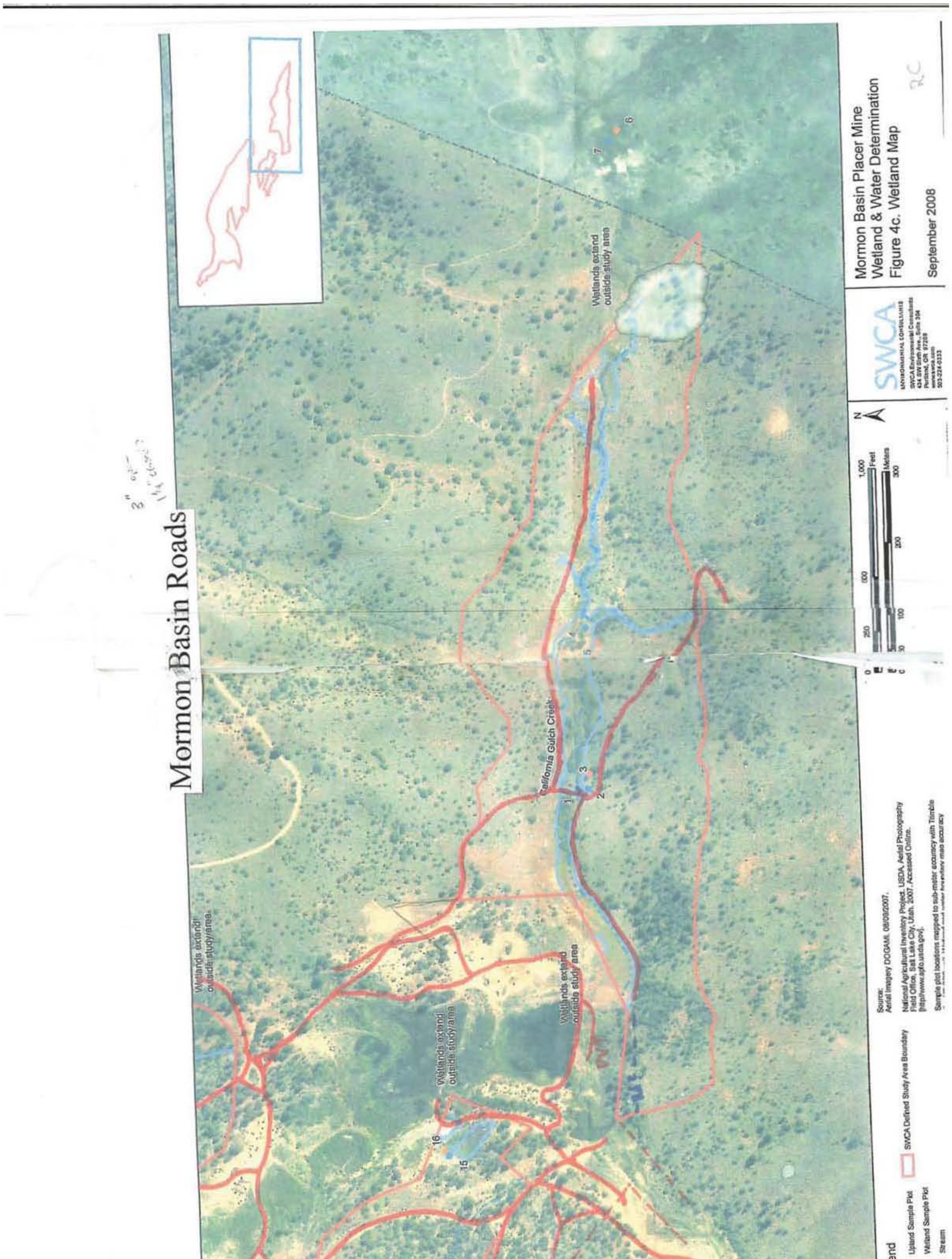

PRIVATE LAND
T.13S. R.42E. DETAIL MAP NO. 1
SEC. 20 & 21
MALHEUR COUNTY
DETAIL MAP NO. 1
13S 42E
DETAIL MAP NO. 1


EXISTING CONDITION
USDA USDA
Farm Service Agency
Baker County
November 21, 2006
0 370 740 1,480 2,220 2,960
This acreage is for FSA program purposes only. No warranty is made for any other use.
N


MORMON BASIN CLAIMS
Creek
Creek
Gulch
Gulch
Emigrant
Sound
Gulch
Tuesday
California
RECEIVED
#1
#2
#7
#9
SPRING


Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4a. Wetland Map
September 2008
SWCA
Emigrant Gulch Creek
Glengarry Gulch Creek
Wetlands extend outside study area
SWCA Defined Study Area Boundary
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary


Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4b. Wetland Map
September 2008
SWCA
Legend
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary
SWCA Defined Study Area Boundary
Wetlands extend outside study area
Wetlands extend outside study area
BLM



Mormon Basin Roads
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4c. Wetland Map
September 2008
SWCA
California Gulch Creek
Wetlands extend outside study area
Wetlands extend outside study area
Wetlands extend outside study area
Wetlands extend outside study area
Legend
Upland Sample Plot
Wetland Sample Plot
Stream
SWCA Defined Study Area Boundary

on the hillside "highbars", and they found excellent values beneath the clay layer. However, this material was so hard that the miners had to blast it before cutting it with the hydraulic giants. There is still an existing hydraulic pit, several acres in size, located north of Emigrant Creek. Bare, steep hillsides provide sediment for a small wetland area. Colt Brothers also dredged the valley bottom using a floating dredge fed with a dragline. Water to form the dredge ponds was pumped from the Humbolt shaft. Even then, the depth of gravel mined was only around 16-20 feet, and mining did not penetrate the clay/sandstone layer. Topsoil was not saved during historic mining entries, and many areas of dry rock dams and bare rock tailings exist today.

Current Mining

Mining on a small scale is currently authorized under an exploration notice on public lands. Mining is also taking place on the private land in Mormon Basin under the terms of an Oregon Department of Geology and Mineral Industries (DOGAMI) permit and a conditional use permit from Malheur County.In addition, a conditional use permit from Baker County has been applied for to cover mining and processing of lands in that county.

The current mining operation near Basin Creek is taking place in an area with known placer values. Areas are being mined in parcels approximately 2-2.5 acres in size, with about the same size parcel available for stockpiles. Processing is taking place at the private land processing site near California Gulch. The Basin Creek deposit extends onto the BLM claims, and the proposal is to begin mining on public lands near the area being mined on private land. As on the private land, small parcels, about 2-2.5 acres in size will be excavated, mined and reclaimed before a new area is opened up. Mining in small parcels, with ongoing reclamation, will result in a minimum amount of ground open at a given time. The result will be that areas reclaimed in the fall will be growing grass the following spring.

In addition, there is an opportunity to reclaim the rock tailings areas, both on private land and on the BLM claims, to a better condition during this project. Silt and sand cleaned from settling ponds can provide growth media for establishing vegetation, and habitat for wildlife and livestock can be enhanced. Control of noxious weeds is a priority on the private land, and the practice of controlling invasive species will be continued on Public Lands.

The Muleshoe Lode claims are accessed via a road that crosses Mineral Valley private land. Access for these miners will be maintained

Wetlands

Wetlands will be avoided while mining takes place (see map). The Mormon Basin reservoirs provide a clean water source for process water, however, off-channel settling ponds are used in processing, and no sediment will be deposited in the reservoirs. All areas proposed for mining under this plan of operation are out of the wetlands. Every effort will be made to protect these sensitive areas during mining in the adjacent areas.

The portion of the Basin where the wetlands have formed, comprise about 45 acres of the project area, and these wetlands are located on both BLM claims and on private lands. Because of the prior mining activity in the basin, today, there are probably more wetlands in the basin than would occur under natural conditions. Along Glengerry, Emigrant, Rich, City and California Gulches, historic mining activity has influenced the number of wetland areas, with small isolated wet areas also present in old minng excavations and below seasonal springs.

Streams

All perennial stream segments will be protected during the proposed mining operation, with unmined buffer strips of sufficient size to prevent impacts to water quality. French Gulch Creek, Glengerry Creek and Emigrant each have perennial segments. Rich Gulch is dry in the headwaters, but there are springs on lower Rich Gulch. City Gulch is perennial in the headwaters but dry in the project area.

The channels of Glengerry Creek, French Gulch Creek, and Emigrant Creeks were relocated many times over the years, to bring water to the various processing sites. All the Mormon Basin streams are intermittent at their confluences. There are headcuts on all streams, ranging in height from 1 to 3 feet, and gullied reaches of similar depth exist below headcuts. Some headcuts have occurred naturally, while others are related to sediment deposits from historic placer mining and from dams, ditches and roads. No streams will be relocated during the proposed mining operation, and all streams will be protected from adverse impacts associated with the mining operation. There are opportunities to repair headcuts and gullies, and to improve the streams in the Basin.

Fish and Wildlife

There are no fish in the Mormon Basin streams, except for goldfish found in ponds between California Gulch and Emigrant Creek. No greater sage grouse are present in the Basin. Big game species are present during the summer months, and water fowl and beavers use the ponds and wetlands. Columbia spotted frogs (Rana Inteiventris) have been observed in the Basin ponds and reservoirs. This species is a candidate for listing under the Endangered Species Act. The ponds and adjacent wetland habitat will be avoided during the mining operation, and there may be opportunities to create additional ponds within the Basin. No sensitive plant species are known to occur in the vicinity of Mormon Basin.

Noxious Weeds

Knapweed, Scotch thistle and whitetop (hoarey cress) are present in the Basin. These invasive species are being controlled on private land, but are expanding on Public Land, especially in the historically mined areas where ground cover is low.

Cattle Grazing

Mormon Basin is included in a BLM grazing allotment. Allotment permittees are allowed unrestricted access to monitor cattle. Cattle grazing has taken place on both the public lands and the unfenced private land for over 100 years. Recent observations of vegetative cover and composition and ground cover in uplands and riparian areas, suggest that range condition is good. Small aspen clones are present in many locations in the basin, on both private and public lands. Most clones in brushy and wet areas appear to be sucessfully reproducing from succors, while clones in more exposed areas are slowy dying due to heavy browsing of succors by elk and cattle.

Recreation

Recreation opportunities in the Basin include sightseeing, picnicking, use of ATVs, hunting in the fall, and possibly snowmobile use in the winter. Some private land roads will be gated to protect fuel storage areas, equipment, and to protect public safety, however, the Basin will remain accessible to the recreating public.

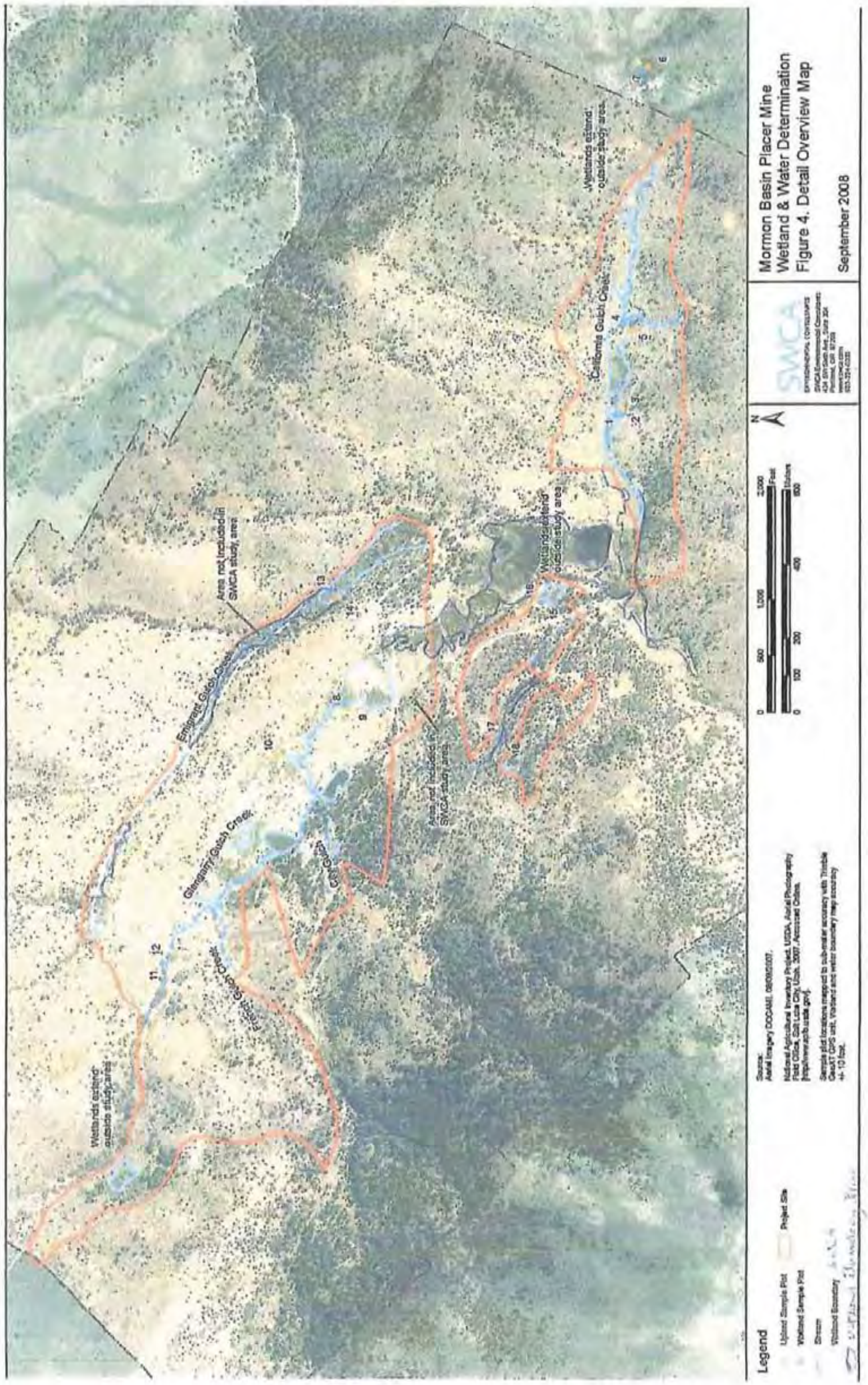
Mitigations Proposed by Mineral Valley to Protect Mormon Basin Resources

No mining is planned within or immediately adjacent to the wetlands. Sufficient buffers around these sensitive areas and along streams and springs, will protect the water resources in the Basin. No adverse impacts are expected to surface water quality in Glengerry Creek, French Gulch Creek, Emigrant Creek, California Gulch, Rich, City or Basin Creek or to the wetlands or springs from this operation, because a protective buffer strip will be left around all these sensitive areas. Brush left along streams within the buffers will maintain stream temperatures. Groundwater that is encountered in excavations is expected to be minimal based on a long standing knowledge of the Basin, two recent seasons of testing, and mining in 2009. There will be no need to pump the groundwater out of the mining excavations. Processing sites will be established on private land, rather than on the BLM claims, during the first phase of mining. Settling ponds will be cleaned in the fall to lessen impacts on amphibiens. No chemicals other than those normally used for maintaining equipment are used in the operation.

Snowmelt channels in the Basin carry run-off water for a short time during the spring, during the summer months all streams have small flow perennial reaches, but by fall, only French Gulch Creek, Glengerry Creek and Emigrant Creek still have any surface flows at all. Beaver activity in many of the ponds within the wetlands is helping to store this water and stabilize the ponds. Beaver will not be trapped or removed from the Basin ponds during this project.

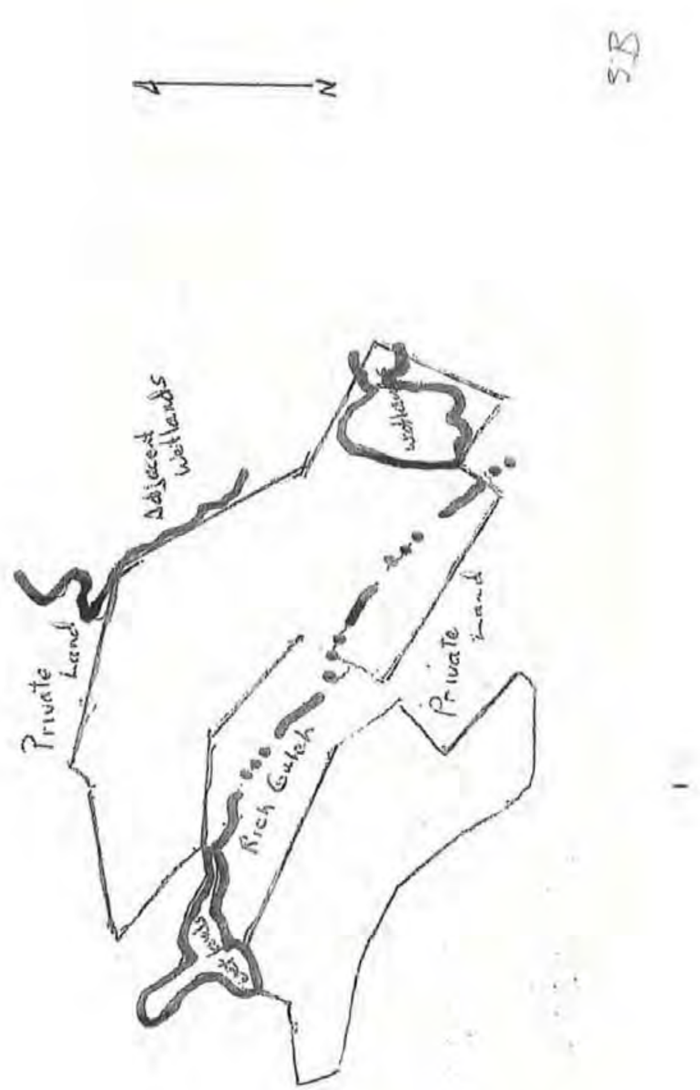
The four existing storage reservoirs with storage water rights, have been in place since 1980. The new off-channel settling/recycling ponds at the processing sites, will prevent muddy water from entering any of the wetlands, reservoirs or streams. Make-up water is taken from the storage reservoirs or from streams, under the terms of the Oregon State water rights, as needed. If the reservoirs drop to undesireable levels, clean water from the domestic

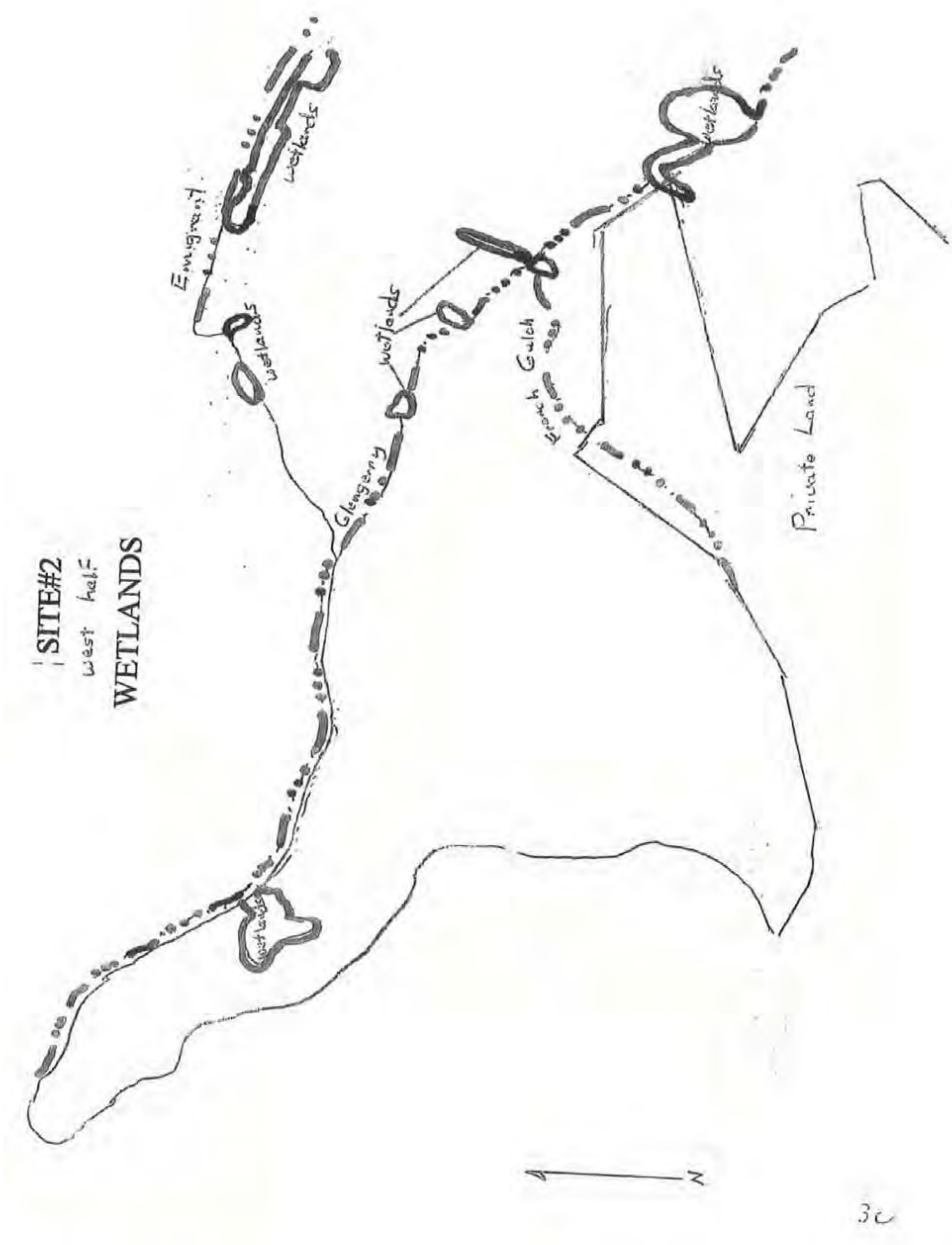
WETLANDS

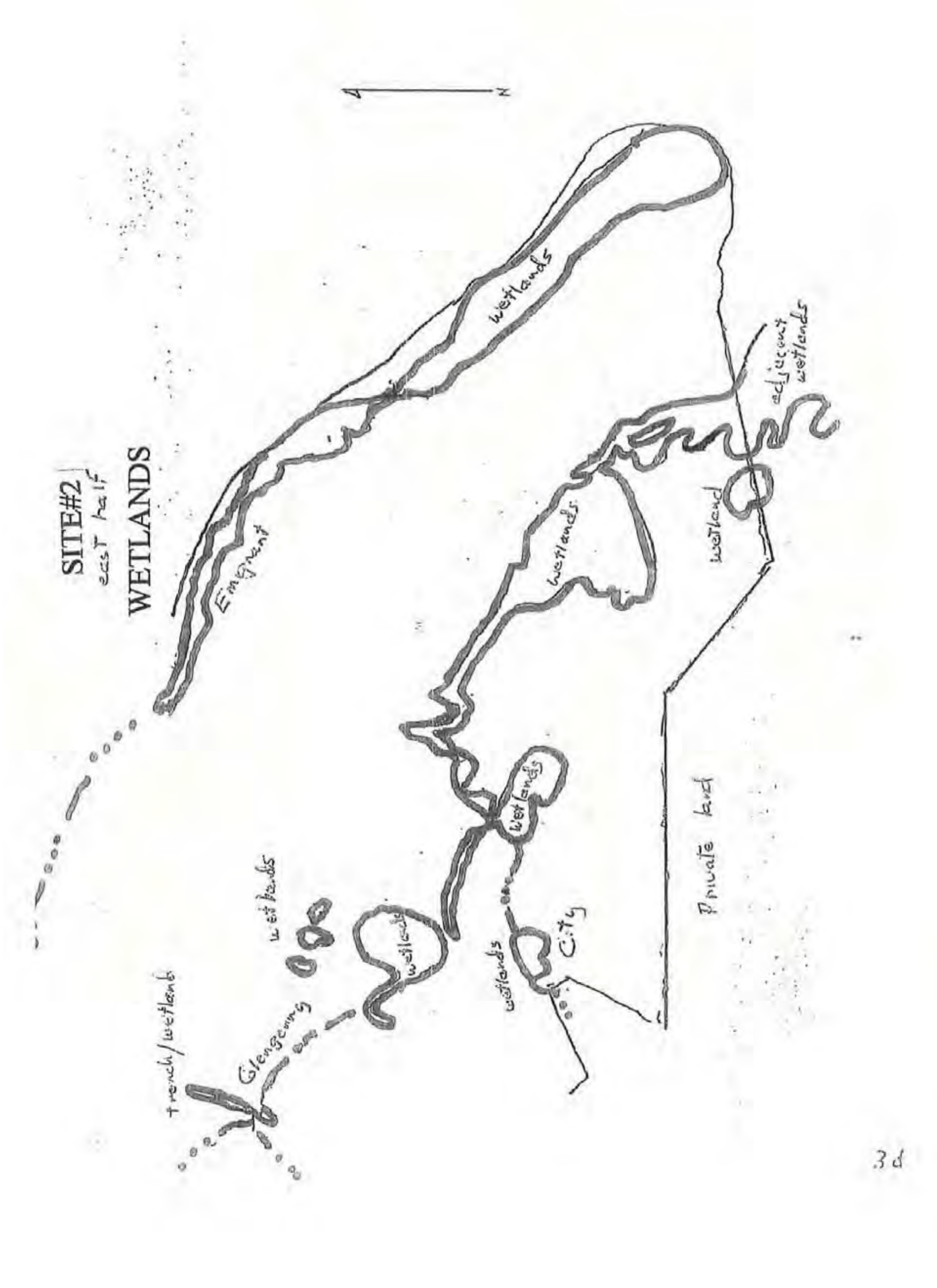

Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4. Detail Overview Map
September 2008
SWCA
Legend
Emigrant Gulch Creek
Glengarry Gulch Creek
California Gulch Creek
Area not included in SWCA study area
Wetlands extend outside study area

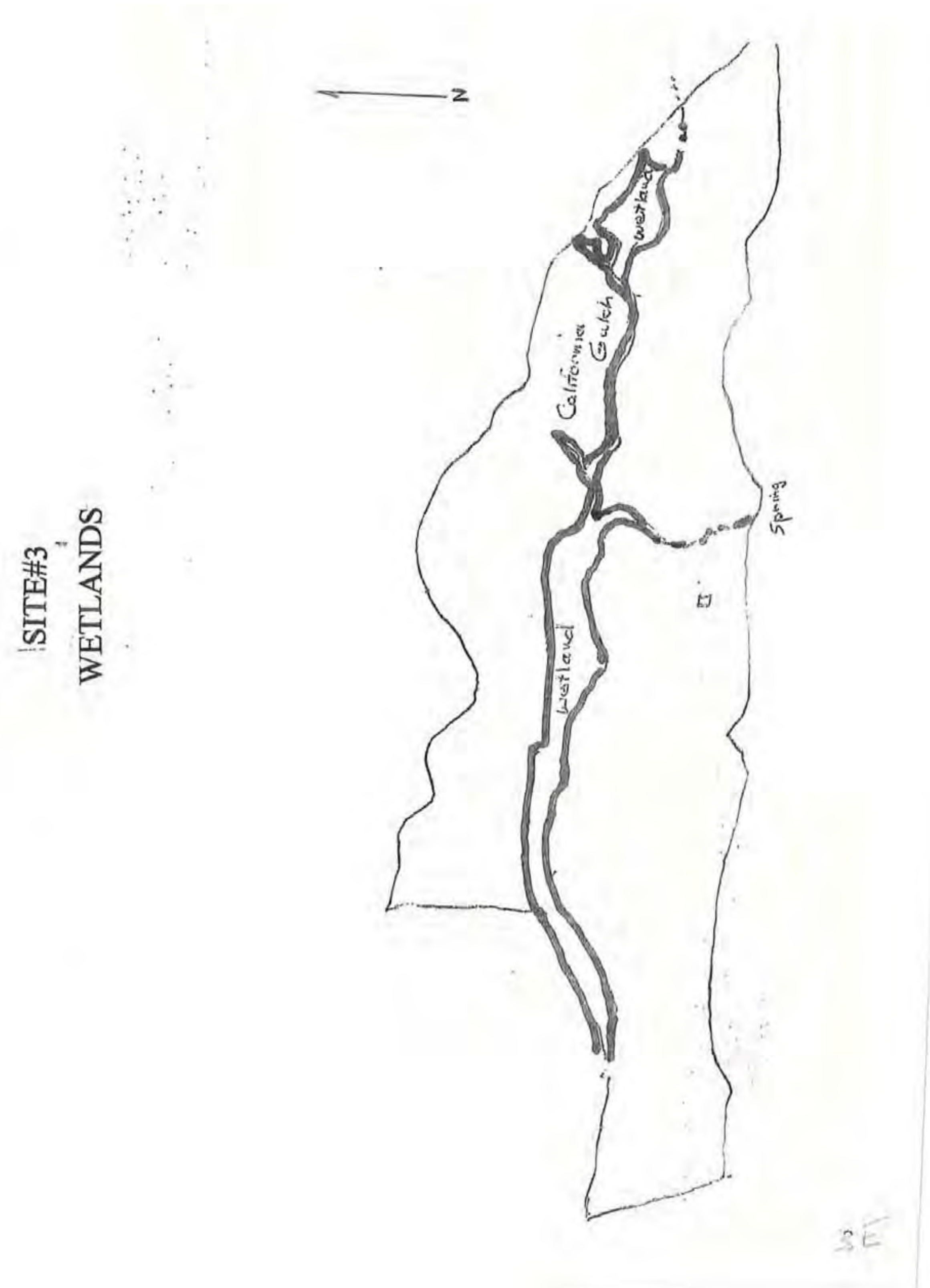
3a

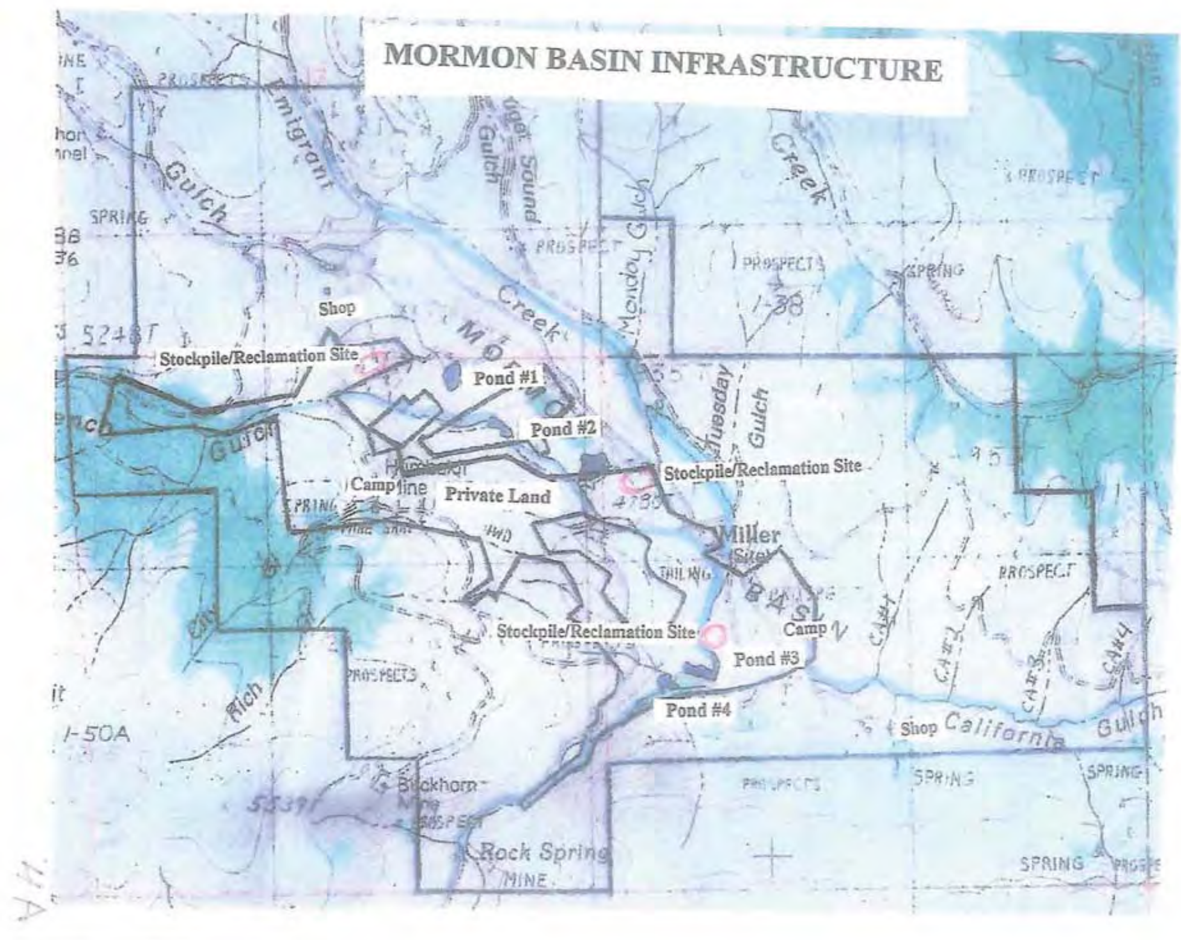
SITE #1-A
WETLANDS




SITE#2
west half
WETLANDS
Emigrant
wetlands
wetlands
Glengarry
wetlands
Branch Gulch
wetlands
Private Land
wetlands
N
3c


SITE#2
east half
WETLANDS
Wetlands
Emigrant
wetlands
adjacent wetlands
wetland
Wetlands
Private land
City
wetlands
trench/wetlands
3d


SITE#3
WETLANDS
N
California Gulch
wetland
wetland
Spring


MORMON BASIN INFRASTRUCTURE
Shop
Stockpile/Reclamation Site
Pond #1
Pond #2
Camp
Private Land
Stockpile/Reclamation Site
Miller
Stockpile/Reclamation Site
Camp
Pond #3
Pond #4
Shop
California Gulch
Rock Spring Mine
Buckhorn

well near French Gulhc will be pumped into the reservoirs to maintain the water levels. Process water is recycled and there is no discharge from any settling ponds into waters of Oregon. Settling ponds that provide amphibian habitat that BLM would like to have left, will have a shallow shelf constructed around the perimiter and these ponds will be left in place.

All stormwate is contained on site. Surface water drainage control will be accomplished by diverting storm water, isolating facility runoff, and minimizing erosion.

Infrastructure
The shop building was constructed during 1956 and 1957. This structure is located on the BLM claims. The shop is needed in support of the mining operation on private land and on BLM claims. There is a well on private land that is used for domestic purposes, the Humbolt shaft provides process water, and there are water rights on all the claims to all the waters in the Basin, including Glengerry Creek, French Gulch Creek, California Gulch and Basin Creek. Four of the reservoirs have storage water rights. There are many rock dams in the Basin. Some of these store water part of the year, others are dry year round. There are also many old mining related ditches in the basin, with sections of five streams currently flowing in some of these ditches.

II. MINING OPERATION

Description of Operation

One excavator will be used at each mining site, and there will be two five yard loaders, one D8 sized cat and one or two 30 ton haul trucks per site. One road grader, and one water truck will serve all the mining areass. A shop on the unpatented mining claim, Mormon Basin #2, will be used to maintain equipment. Placer gravel will be processed using three stationary plants on private land, and a stationary plant on Public Land at Reservoir #1 (phase III). A generator will be located at the shop, and a diesel pump with tank will be used at the processing site at Reservoir #1. From information gathered from exploration during 2007 and 2008, and mining on private land in 2009, mining excavations are expected to be an average of no more than 26 feet deep (range is from 12-40 feet deep, with most excavations 12-14 feet deep). Testing of areas where values are not yet known, will be proposed under a separate amendment to this POO. A processing plant will be set up on private land north of Emigrant and mining willl take place on this private land in 2010.

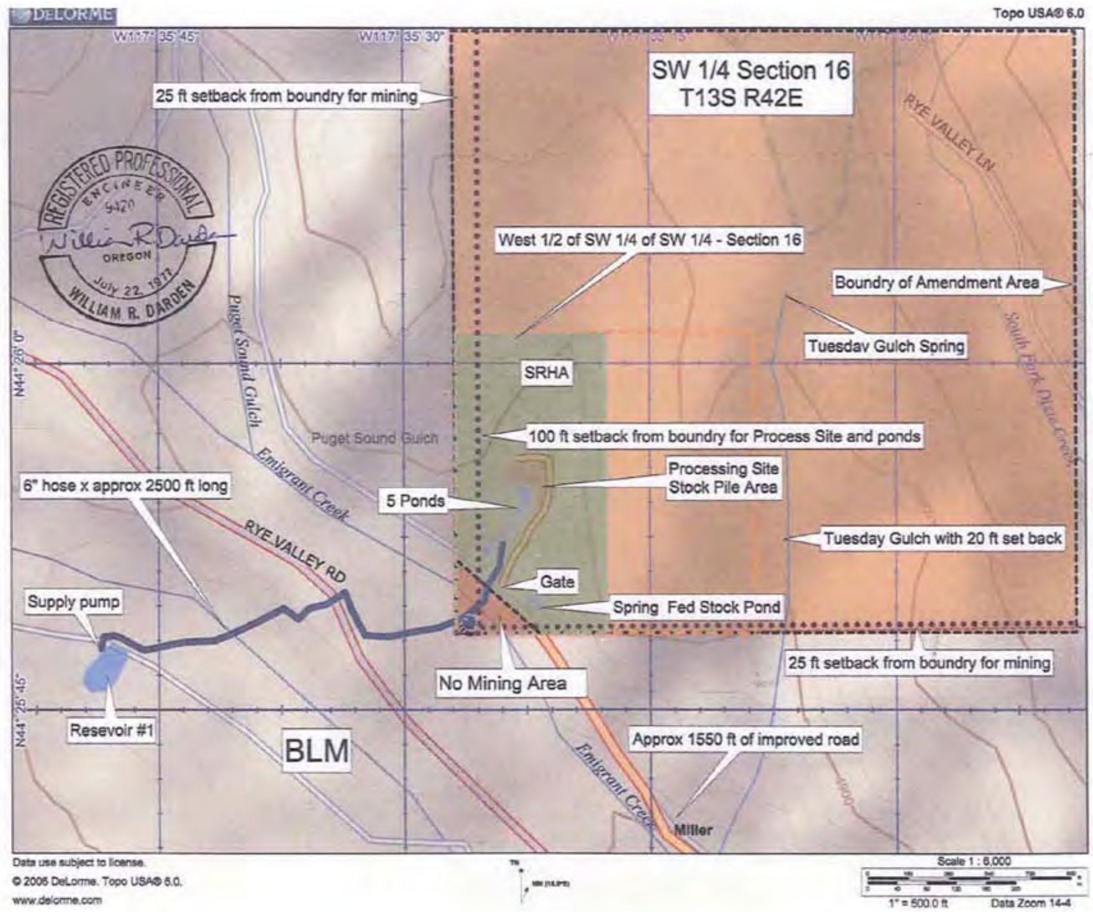
During phase II, approximately 10 ½ acres will be mined and reclaimed each year (5 acres in the north part and 5 1/2 acres in the south part). Mining will take place to a depth of from 12 to around 40 feet. (average of 26 feet). In areas where bedrock or the webfoot is less than 26' in depth, additional surface, up to 10 acres, may be impacted in one season. Mining of hillsides is also planned by benching the deposit. Several dry draws will be mined in 2-2 ½ acre increments. Reclamation will be ongoing with the mining, so that the surface impact of the mining area, plus any temporary access routes to or within the mining area, stockpiles and other mining related disturbances remains around five acres in size at a given time. Processing will be on private land until year 8, when a processing site at Reservoir #1 will be established.

The California Gulch pit is the only area where complete reclamation is not planned at the end of each season. This material is a gold bearing clay that does not lend itself to a volume operation. The access route to the mining area is included in the total of ½ acre that will be impacted in this area at a given time. The operation is designed so that reclamation of mined ground is concurrent with the stripping and excavation of new ground. In this way, the amount of ground disturbed by the mining operation is minimized, and reclaimed ground has an opportunity to vegetate as soon as mining and reclamation in that area has terminated.

Phase III activities include all phase II activities, with the addition of a separate processing site established on the unpatented claims on BLM at Reservoir #1. The anticipation is that all processing facilities will stay on private land or processing facilities will be located within the mining pit at least through year 8.

Mining Methods and Equipment

Mining-Phase 1 This test program for areas in Mormon Basin where values are not yet established will be addressed in a separate POO amendment.


DELORME
Topo USA® 6.0
W117° 35' 45"
W117° 35' 30"
SW 1/4 Section 16
T13S R42E
25 ft setback from boundry for mining
RYE VALLEY LN
REGISTERED PROFESSIONAL ENGINEER
OREGON
July 22, 1977
WILLIAM R. DARDEN
West 1/2 of SW 1/4 of SW 1/4 - Section 16
Boundry of Amendment Area
Tuesdav Gulch Spring
N44° 26' 0"
SRHA
Puget Sound Gulch
South Fork Dixie Creek
Puget Sound Gulch
100 ft setback from boundry for Process Site and ponds
Processing Site
Stock Pile Area
6" hose x approx 2500 ft long
5 Ponds
Emigrant Creek
RYE VALLEY RD
Tuesday Gulch with 20 ft set back
Gate
Supply pump
Spring Fed Stock Pond
25 ft setback from boundry for mining
No Mining Area
N44° 25' 45"
Resevoir #1
BLM
Approx 1550 ft of improved road
Emigrant Creek
Miller
Data use subject to license.
© 2006 DeLorme. Topo USA® 6.0.
www.delorme.com
Scale 1 : 6,000
1" = 500.0 ft
Data Zoom 14-4

Mining- Phase II

Site #1 (private land),Site #1A, Site #2, Site #3 (Public Land): During Phase II, mining will be confined to work on private land in areas with known values in gold until the Plan of Operation for Public Lands is approved for the aras on BLM where known values in gold occur. Phase II entails mining operations that will begin west of the Glengerry wetlands, where the valley widens, and will proceed from southeast to northwest,with mining taking place in conjunction with private land mining. Mining will also occur north of the private land, and this mininig will also be conducted in conjuction with private land mining. Additional mining areas are both west and north of there. The Emigrant deposit runs north to the claim boundary. This pay gravel will be processed at the French Gulch private land processing site.

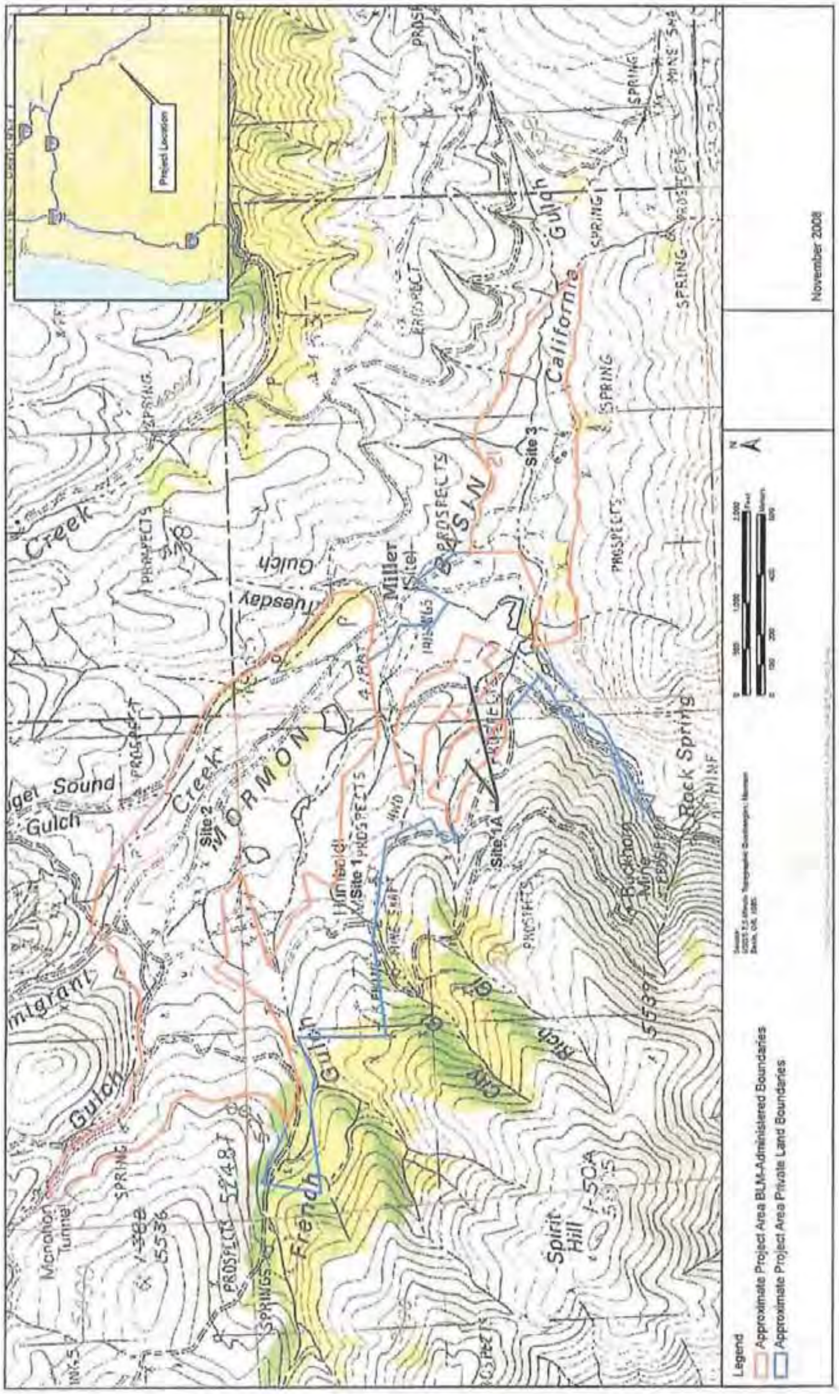
Concurrent with the mining and processing at the French Gulch processing site, will be the mining of pay gravel from the Rich Gulch area, along Basin Creek and in California Gulch, where processing will take place at the California Gulch private land processing site. The processing site on private land in Section 16 will provide a third private land site for processing, if needed.

All designated wetlands and perennial stream segments will be avoided during the mining operation. The private land boundary is flagged, and clearly marked along the boundary with a cat trail on the private land side of the line. An unmined riparian buffer of at least 20 feet will be left on either side of the streams and around ponds, springs and designated wetlands, unless a wider buffer is necessary to protect these resource values. Mining will begin as early in the spring as the Basin is accessible, since groundwater in excavations outside the wetlands is expected to be minimal. In the wide valley floor area, the land will be mined along Glengerry in strips, approximately 100-200'wide and up to 300' long, paralleling the streams, from the southeast to the northwest, avoiding the areas where wetlands are located. Overburden material, primarily clay, will be stockpiled on the side of the excavation away from the stream and upslope of the excavation, when possible. Once the first part of the area is mined out, the excavation will be refilled, beginning at the southeast end, the stockpiles will be pushed over the surface, and the area will be reclaimed to normal land contours as the excavation is expanded to the northwest. As the new area is excavated, overburden will be stockpiled upslope of the excavation, and mining and reclamation will take place as described above.

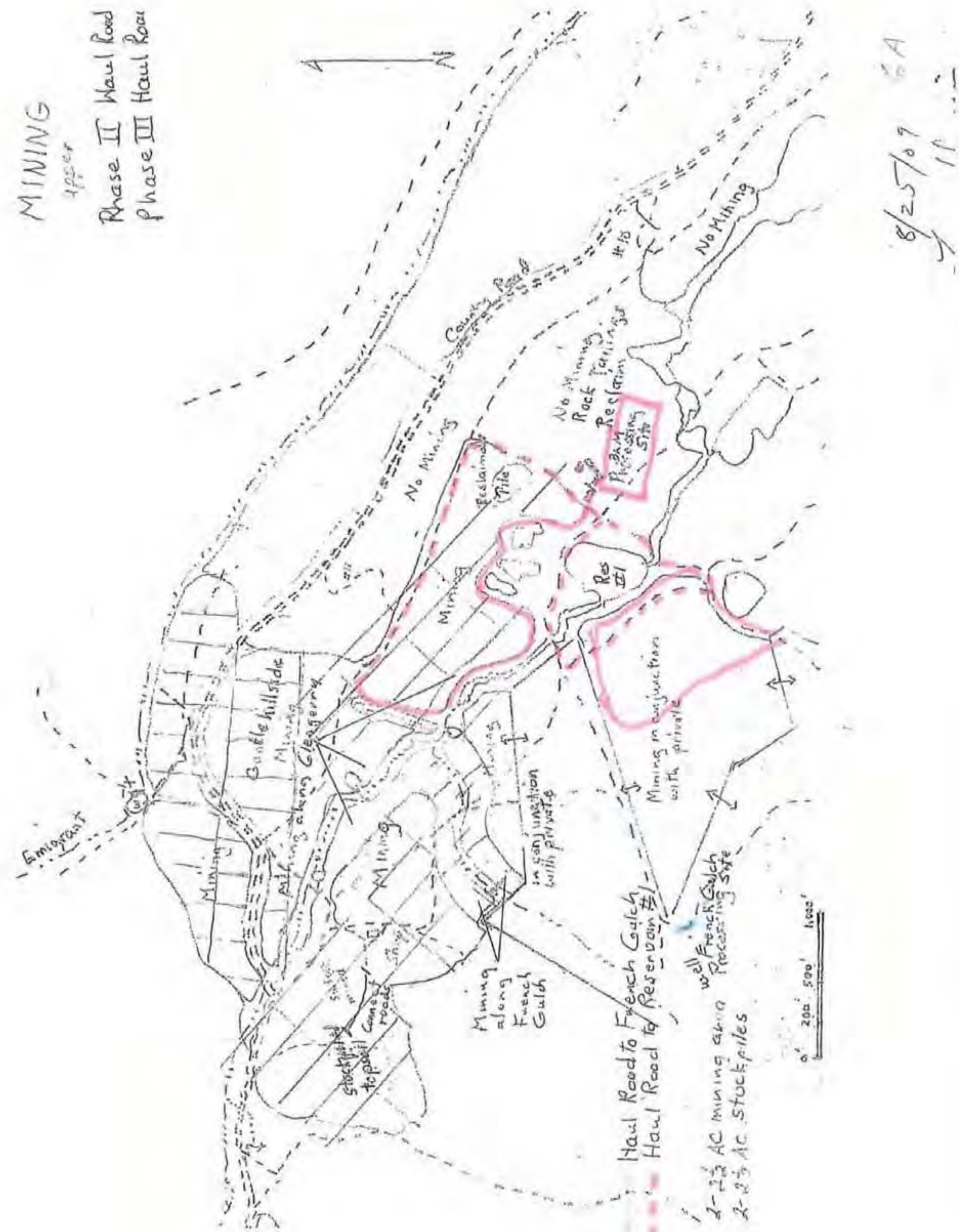
There is almost no topsoil left in many areas in Site #1A and #2. Thus, silt and sand from cleaning the settling ponds on private land and at Reservoir #1 during phase III will be used as topsoil as this material becomes available. In the few areas along the bottom with topsoil, and in the uplands, topsoil will be stockpiled beside the excavation, and used during reclamation to provide a soil cover for vegetation to establish.

All ponds, wetlands and perennial stream segments will be protected. Riparian vegetation around the ponds and along the perennial streams will provide stream shade, and will provide a seed source for willow and alders to grow in the reclaimed areas where the water table is high enough for the plants to establish. The expectation is that ground water will be encountered in excavations along the perennial stream segments, but ground water will not be in amounts that will effect the efficient excavation of gravels. As the topography rises away from the streams, groundwater is not expected to be encountered in any but minimal amounts.

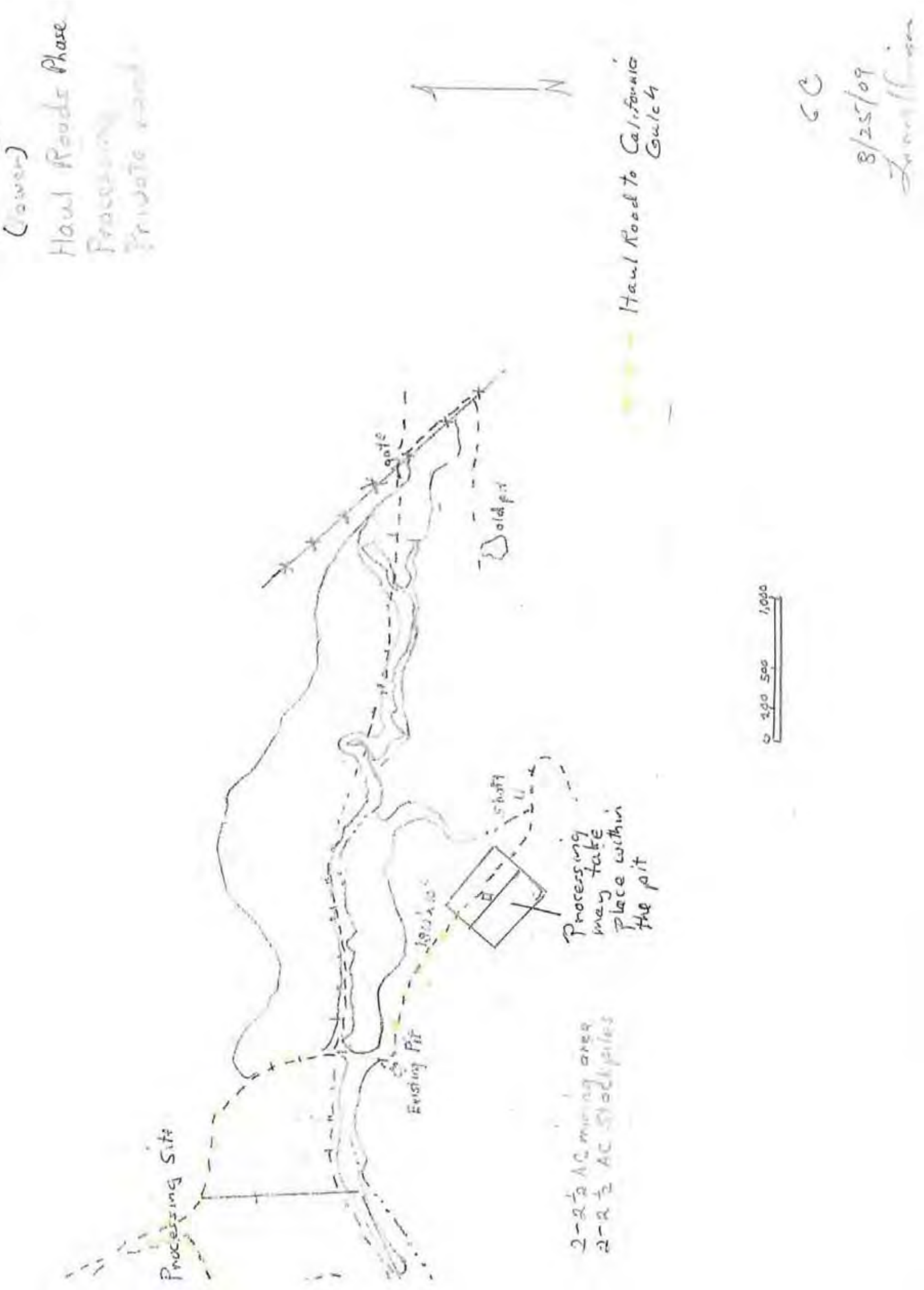
During preparation of the mining sites paralleling the perennial stream segments and/or wetlands, rocks and boulders on the surface will be pushed upslope of the area to be mined, then the excavator, loader and cat will be used to mine and remove the placer gravel from this long narrow area down to an average of 26 feet lower than ground level. Testing during 2007-2008 and mining in 2009 have shown that the consolidated gravels will stand vertically, even when small amounts of groundwater are encountered. A 1:1 or gentler slope will be maintained on the bank nearest the stream during the proposed operation. Because many of the perennial stream segments in the Basin run in ditches on a hardpan/clay layer, rather than in natural stream channels, no impact to surface flows is anticipated. However, in the unlikely event that the water level in a perennial stream segment begins to lower, the excavation will immediately be reclaimed, and a wider buffer employed thereafter. An excavator may need to step down to effectively mine the bottom of the pit. Placer gravel will be excavated, the material will be loaded into dump trucks and hauled to the plant.


Legend
Approximate Project Area BLM-Administered Boundaries
Approximate Project Area Private Land Boundaries
November 2008
Project Location
Site 1
Site 1A
Site 2
Site 3
Miller Site
Mormon Basin
California Gulch
Rock Spring
Spirit Hill
French Gulch
Emigrant Gulch
Puget Sound Gulch
Rich Gulch
Humboldt
Manahan Tunnel
Tuesday Gulch

5A


MINING
Phase II Haul Road
Phase III Haul Road
County Road
No Mining
Res #1
Mining in conjunction with private
Mining along French Gulch
Haul Road to French Gulch
Haul Road to Reservoir #1
French Gulch Processing Site
Emigrant
AC stockpiles


MINING (Middle)
stream goes subsurface
Phase II Haul Roads
No Mining
County Road
Cat Trail
French Gulch Processing Site
To California Gulch Processing Site
Haul Road to French Gulch
Haul Road to California Gulch
0 200 500 1,000
6B


MINING
Haul Roads Phase
Haul Road to California Gulch
8/25/09
gate
old pit
0 250 500 1,000
Processing may take place within the pit
Existing Pit
Processing Site
2-2½ AC mining area
2-2½ AC Stockpiles

As the southeast end of the pit is mined out, oversize will be pushed into the pit, and washed gravel will be returned to this end of the pit, and used to refill the excavation, and substrate and topsoil will be spread. By backfilling the pit in an ongoing manner, large quantities of processed material can be replaced and will be out of the way of the operation. This continual backfilling of the pit will also minimize the amount of ground disturbance at a given time. The mining operation is designed to mine both the paystreak and the ground adjacent that also has economic values in gold. As one end of the pit is reclaimed, the other end will be expanded another 1-2 acres to the northwest. Once the bottom along one side of the stream/wetlands has been mined and reclaimed, another strip adjacent to the first one, will be mined. Small wet areas disconncected from streams may be encountered in the areas to be mined. These areas will be reclaimed to the same size and type of vegetation, or reclaimed to a larger size, as directed by BLM. Once the area on the southwest side of Glengerry has been mined into the private land, the area north and northeast of Glengerry will be mined, in the same manner, mining first along the stream and or wetlands, outside the riparian buffer, then moving upslope and away from the stream. Processing will take place at the French Gulch private land or possibly the Section 16 private land site or during phase III at Reservoir #1 on BLM. The road north of Emigrant Creek and the adjacent wetlands mark the northeast boundary of the project area on Public Lands, but the mining and processing sites in Section 16 on private land will also be associated with this project.

Concurrent with this operation, will be mining and reclamation near Rich Gulch and California Gulch. Mining and reclamtaion will be conducted in a manner similar to what is described above. Processing will be at the California Gulch private land processing site.

The pumps located at the water sources will be powered by gasoline or diesel engines, or by generators. All precautions will be taken to preclude spillage while fueling motors located near the ponds and streams. BLM will be informed of the location of these facilities. A generator will be located at the shop and a diesel pump will be located at the west end of Reservoir #1 where a line will take water to the third processing site on private land north of Emigrant Creek in Section 16. This pump may also be utilized at the processing site during Phase III. Mining excavations are expected to be an average of 26 feet deep, and even though in places, gravels are deeper than this, mining of very deep, wet placer gravels is beyond the scope of this operation.

During phase II, approximately ten acres will be mined each season in two separate location in parcels 2-2.5 acres in size. Reclamation of each parcel before the next parcel is opened up will be the practice, with the goal of complete reclamation in the fall. Only the shallow (approximately 8 feet deep) California Gulch ¼ acre pit (¼ acre will be stockpiles) will remain open at the end of the season. Mining in other areas will be to a depth of an average of 26 feet (most of the mining to date has been in gravels around 12'-20' in depth, so 26 feet should represent a good average figure for depth). In areas where the pay gravel is less than 26 feet in depth, additional surface (up to 10 acres) may be impacted in one season. Installation of the second plant on private land at French Gulch, will mean that production will double from 500 cubic yards to 1,000 cubic yards. Mining of the gentle hillsides is also planned by benching the deposit. Mining will continue on the dry Rich Gulch draw on private land, and this mining will extend onto the BLM claims when the POO is approved. The dry stream channel will be reestablished to BLM specifications each fall by creating dips in the rock and gravel that covers the area, so sediment is removed from snow melt water in spring time. Reclamation will be ongoing with the mining, so that the surface impact of the pit or hillside, plus any temporary access routes to or within the mining area, remains around 5 acres or less at each of the sites at a given time, or a total of 10 1/2 acres on BLM, including the California Gulch pit.

Equipment-Phase II

One excavators on tracks, one D8 sized cat, two wheeled loaders with five yard buckets, one or two 30 ton dump trucks, will work in the north part of the project areas where gravel is processed at the French Gulch private land site. Eventually, an identical operation will be set up to mine and process gravel in the south part of the project area at the California Gulch private land processing site. A road grader and water truck will serve both operations. In addition, other equipment, such as pumps, welders, a generator at the shop, portable generators, a lowboy, a double axle equipment trailer, 4-wheel drive pick-ups will be used on public lands in support of the mining operation.

Equipment will be washed before it is taken into Mormon Basin to ensure noxious weeds are not spread from other areas onto the mining site. BLM will be kept informed when equipment changes are made.

Processing Sites Phase II
The processing sites will be located on private land during Phase II, and each will be one to 1 ½-2 acres in size. These sites will include sets of 3-5 settling ponds, room for piling silt cleaned from ponds, and room to park equipment. Water rights at processing sites provide 500 gpm of process water, or within one mile radius of the Humbolt shaft, 1 cfs (448gpm). Three 500 cubic yards per day washing plants will be located on private land, along with sluices, pipelines, pumps and associated equipment.

Mining Phase III
Mining activities include all phase II activities, with the addition of a separate processing site established on BLM. See discussion under **Processing Sites Phase III** below.

Equipment-Phase III
Equipment is the same equipment that is described under Phase II.

During Phases III, if necessary, a processing site may need to be established on BLM claims, at the hardened processing site at Reservoir #1. If this additional area of disturbance is needed (approximately 2 acres) BLM and DOGAMI will be informed and the reclamation bond will be increased as necessary.

Details of the Mining Operation

Phase I- Exploration
The exploration of areas where values are not yet verified will take place as time permits, under a separate POO amendment, while mining of areas with known values is taking place.

Phase II-Mining
Site #1: Mining at site #1 is on private land.

Phase II-Mining-Processing at the California Gulch Private Land Processing Site
Mining will take place in 2-2.5 acre increments, with reclamation ongoing with the mining. The first half of the 2-2.5 acre pit will be opened up, and another area about the same size will be needed for stockpiles. As the first mining area is reclaimed with the stockpiled material, a new area will be opened up, and a new stockpile area will be utilized. Each fall, the goal will be to reclaim the areas mined that season, and the area where the stockpile was removed will be prepared for mining the next spring (vegetation will be removed but no excavation will take place). In this way, there will be no adverse effects to ground birds as they will not choose to nest in the disturbed area. Additional area for accessways, stockpiles and other mining related disturbances may result in up to 5 acres of disturbance at a given time. The plan is to mine, process and reclaim five acres of gold bearing gravels per season in the south part of the project area.

Site #1A north on public lands is about 16 acres in size and contains the County road that parallels and crosses the lower portion of Rich Gulch which is dry. This road will not be mined, but it does mark the boundary between the "no mining area" where there are wetlands and old rock tailings, and the area to the west that will be mined. This mining will take place in conjunction with mining on private land.

Mining of the upper part of the dry gulch, site #1A south, which is about 20 acres, will take place where the surface was sluiced, and where rock tailings exist. This mining will entail stockpiling of overburden on the side hill, mining up to 200-300 feet of the gulch to a width of approximately 100-200 feet. Parcels to be mined will be about 2-2.5 acres each, and ongoing reclamation of mined parcels will take place. This mining will take place in conjunction with mining on private land.

A portion of Site #3, located near where California Gulch confluences with Basin Creek, is about 10 acres, and will be mined in conjunction with private land mining. Again, mining areas will be about 2-2.5 acres in size, with additional area needed for accessways, stockpiles and other mining related activity.

At all mining sites, at least a 20' unmined riparian buffer will be maintained along the perennial streams and around ponds and wetlands, to protect water quality and provide riparian species for a seed source.

The roads into the processing sites on private land will be closed to the public where these roads pass through into private land, however, range permittees will be allowed access as necessary. The public will still have access through the Basin via the main County roads and many of the roads that cross Public Lands. Following mining, the road system will be established to its current condition, unless BLM has other plans for these roads.

Phase II-Mining-Processing at the California Gulch Private Land Processing Site or Processing within the Pit

Another portion of Site #3 is a 5 acre parcel located where the clean-up shed is currently situated (shed is scheduled to be removed). Mining in this location will take place in ½ acre increments (¼ acre pit, ¼ acre stockpiles). This is a clay deposit containing fine gold, rather than a conventional placer deposit. Daily processing amounts are estimated to be about 20-50 cubic yards per day because of the slow process of recovering the gold.

Phase II-Mining-Processing at the French Gulch Private Land Processing Site

Mining and processing of portions of Site #2 will take place concurrently with mining and processing at site #1A and #3. As described above, mining will take place in 2-2.5 acre increments, with reclamation ongoing with the mining. Additional area for accessways, stockpiles and other mining related disturbances will result in up to 5 acres of disturbance at a given time. The plan is to mine, process and reclaim five acres of gold bearing gravels per season. French Gulch and City Gulch, both run west to east in the site #2 project area, and perennial segments of these streams and wetlands will be protected.

A portion of Site #2 (area to be mined first) is about 15 acres in size, and is located west of Reservoir #1 and is bordered by private land to the north, south and west. This area will be mined in conjunction with mining on the adjacent private land.

Another portion of Site #2 (area to be mined second) is about 15 acres, and is located north of the private land and north and south of French Gulch and west of Glengerry. This area too will be mined in conjunction with private land.

Another portion of Site #2 (area to be mined third) is about 20 acres, and is located west of the shop, and this area includes the ground that was stripped of topsoil in 1983 but never mined.

Another portion of Site #2 (area to be mined fourth) is about 10 acres and is located north of the county road and south of Emigrant Creek.

Another portion of Site #2 (area to be mined fifth) is about 20 acres, and is located south of the county road and north of Glengerry. This includes the Emigrant deposit.

At all mining sites, at least a 20' unmined riparian buffer will be maintained along the perennial streams and around ponds and wetlands, to protect water quality and provide riparian species for a seed source.

The County road is located within site #2 and the Ironside Road Department will be notified before any mining of the county road takes place. The public will be allowed access through the Basin at all times. Following mining, the road system will be reestablished to its current condition, unless BLM has other ideas for the Public Land roads.The road into the shop will be closed to the public during the mining operation. At some point in time, the shop building will be removed and the pay gravel beneath the structure will also be mined and processed.

Phase III-Mining-Processing at the Reservoir #1 Processing Site on BLM-
A portion of Site #2, about 15 acres, (area to be mined sixth) is located immediately northwest of the proposed processing site at Reservoir #1 and a portion of site #2 (area to be mined seventh) is about 10 acres and is located immediately southwest of the processing site. Mining of these two areas will take at least three seasons, and this will justify construction of the processing site, instead of hauling material to the private land French Gulch processing site. The processing site at Reservoir #1, will include the settling/recycling ponds, area for storage of dry, stockpiled slimes and area for parking support vehicles and will encompass about 1.5-2 acres in the rock tailings area.

Because of the location of the processing site at Reservoir #1, there will be at least a 100' unmined buffer (some of this has a narrow riparian area established) along the perennial streams and around ponds and wetlands. A pump will be located adjacent to the reservoir and water from the reservoir will be pumped to the trommel.

Staged Reclamation Bond (1^{st} paragraph clarified 12-27-09)

The reclamation bond amount will be based on the systematic, phased, operation designed to take place over a 10-12 year time-span. Bonding will include both ground disturbance and eventual removal of the shop structure, which is used in support of the mining operation. If mining areas are increased in size, and if two mining shifts are instigated, the life of this operation will be shortened. Mining is planned under this POO of areas where economic values in gold are verified. Exploration of areas where values are not yet confirmed, will take place as time allows, under a separate POO amendment, and the reclamation bond for that testing will be separate from the bond for the mining operation.

The reclamation bond for mining on 157 acres of private land has been posted with DOGAMI, based on five acres of disturbance at a given time. The bond for the additional 160 acres of private land in Baker County will be posted as soon as the amendment is approved. Reclamation of mined areas will be ongoing, and this includes three areas, each about two acres in size, without mineral values, on private land where excess materials will be used to reclaim the surface to productive range lands. There are similar areas on the BLM claims where no mining is planned, but where the surface could be enhanced under this POO to productive range lands.

As the mining operation moves onto Public Lands, additional bond will be posted to cover the part of the operation on BLM claims. The bond will be increased during phase III when processing sites are located on BLM. Staged bonding is an acceptable practice under the surface mining regulations at 43cfr3809.553 (a). "BLM may authorize you to provide a financial guarantee covering a part of your operation".

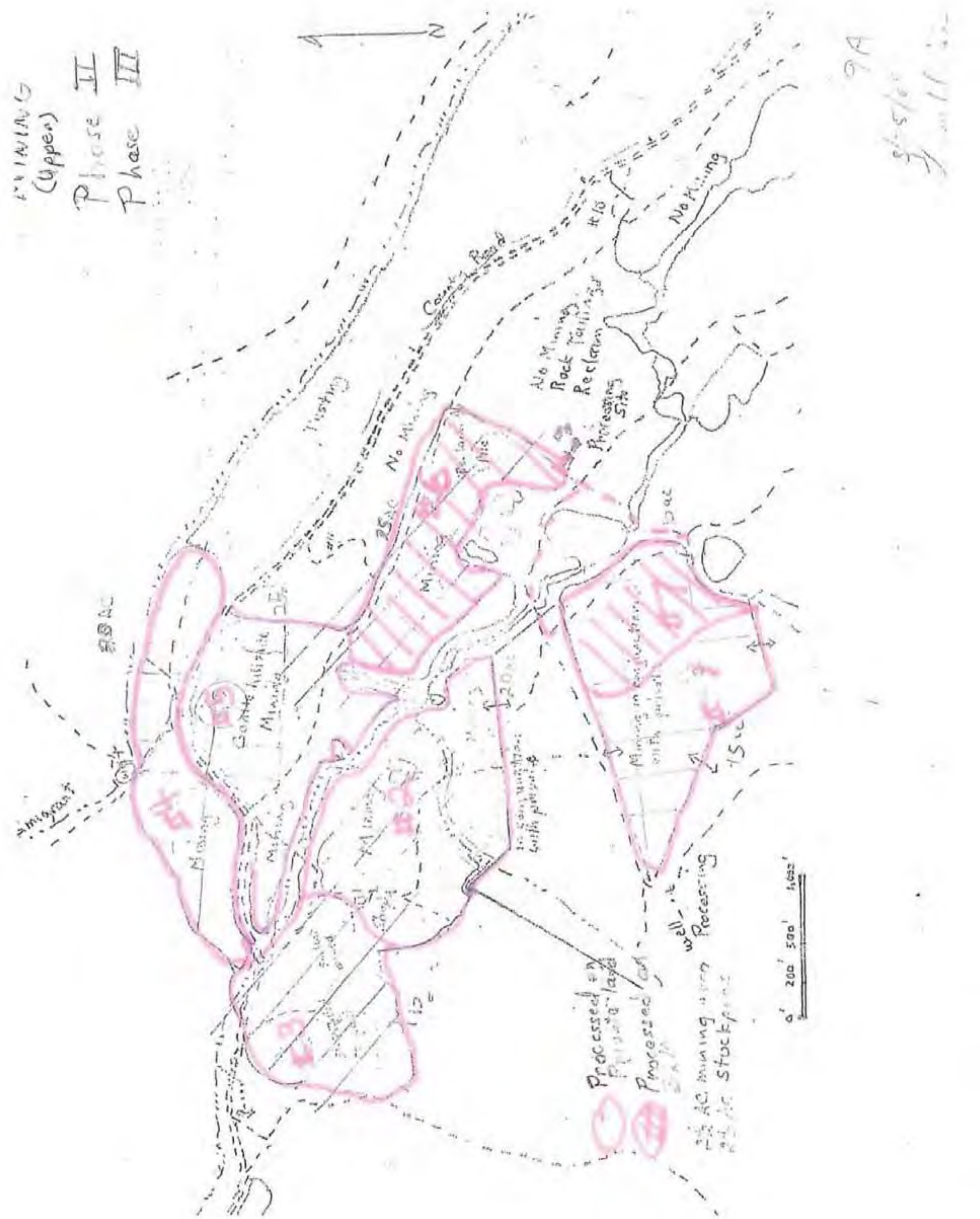
Schedule of Operations

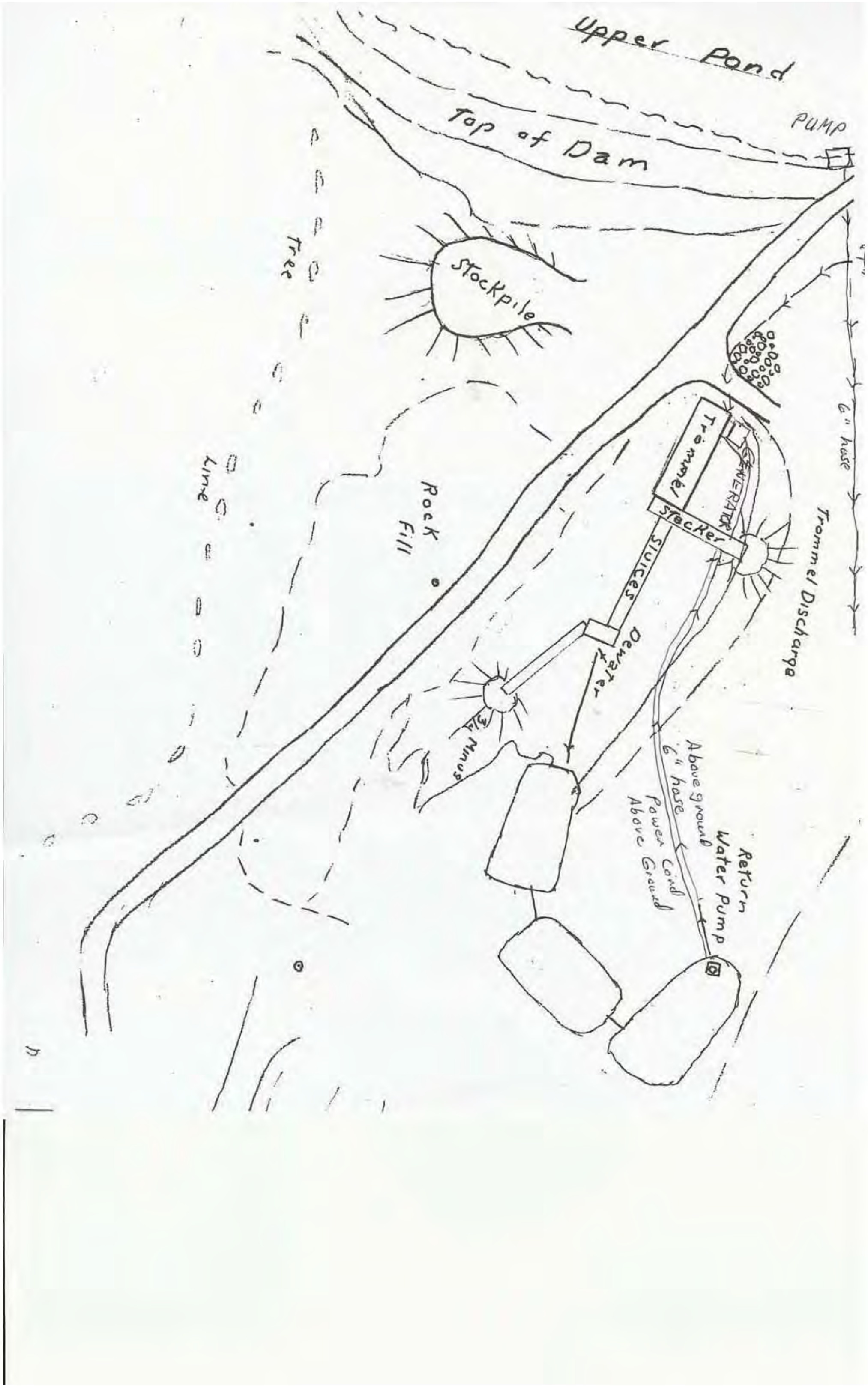
The operator reserves the right to change the order of mining, (phase II-III), as economic and on-the-ground condition determine. The times given below are approximations. BLM and DOGAMI will be kept informed if changes in the shcedule become necessary.

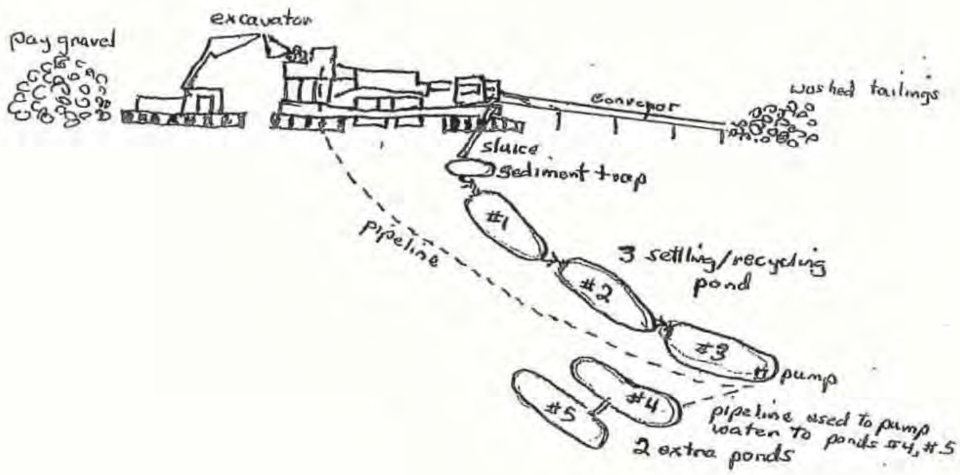
Phase I Testing of areas in the Basin where mineral values are not yet established will take place as time permits under the terms of a separate POO.

Phase II: 80 acres processed at French Gulch
site #2, area mined first,15 acres years 1-2
site #2, area mined second, 15 acres, years 2-3
site #2, area mined third, 20 acres, years 3-6
site #2, area mined fourth, 10 acres, years 6-7
site #2, area mined fifth, 20 acres, years 8-10

Phase II: 51 acres processed at California Gulch (error in acres corrected 12-27-09)
site #3 near Basin Creek 8-10 acres year 1--2
site #1A North and South 36 acres years 2-7
**Site #3 near clean-up shed 5 acres years 1-6*


Phase II
Phase III
County Road
No Mining
Processing Site
Mining
Processing


Upper Pond
PUMP
Top of Dam
Stockpile
Tree Line
Rock Fill
6" hose
Trommel
GENERATOR
Stacker
Trommel Discharge
Sluices
Dewater
Minus
Above ground 6" hose
Power Cord Above Ground
Return Water Pump



Mining Process Ponds

A three pond settling/recycling system will be used in the operation. When slimes make recycling impractical, the muddy process water will be pumped into ponds #4 and #5, and the three settling ponds will be refilled with clean water.

15

Phase III: 25 acres processed at Reservoir #1 on BLM

site #2, area mined sixth, 15 acres, years 8-9
site #2, area mined seventh, 10 acres year 10

Phase IV (years 10-11)

During this phase, no later than the fall of year 10, or during year 11, final reclamation and equipment and structure removal will take place.

Phase VI (years 10-13)

During this phase, monitoring and reseeding, if necessary, will take place. Because of the practice of ongoing reclamation, only the preceding two seasons of reclamation should be involved with monitoring. The rest of the reclaimed areas will be vegetated to productive grazing lands. If BLM requires additional monitoring, the operator is receptive to additional monitoring requirements.

Interim Management Plan

Phase II-III

Ongoing Reclamation Sites #1A, #2, #3

During the mining operation, interim reclamation will take place each fall. All mined areas will be stabilized prior to seasonal shutdowns or extended equipment maintenance and before equipment removal. This will involve reclaiming mining excavations that are still open, but are mined out, by refilling with rock and gravel, replacing substrate and topsoil, recontouring and reshaping, and seeding in an ongoing manner with a BLM approved seed mix. All pits and other disturbances where mining is not complete will be stabilized and left in a safe condition, with fill slopes of 2.5:1, and cutslopes of 2:1.

Approximately 2 acres will be in a partial state of reclamation (refilled and recontoured, but topsoil not yet placed) when a new 2-2.5 acre area is disturbed. At fall shutdown, a temporary fence will be constructed across the top of any gravel face that constitutes a safety concern for cattle and humans. Stationary processing sites will be stable, with ponds left dry or at the normal water table. By minimizing the amount of ground disturbance, and by employing ongoing reclamation, the intent is that the reclamation bond can be moved from one mined and reclaimed area to the next, as the pit is expanded. Within sites #1A and #2 are non-riparian, ephemeral snow melt channels and ditches, which are dry during the mining season. These dry channels will be mined after snowmelt, and will be returned to their original configuration the same year they are mined. Channels will be filled with washed rock, and dips will be left in the channels to slow run-off water to prevent silty water from reaching the perennial streams. Reclaimed areas that will not be disturbed again, will be vegetated in an ongoing manner. At mining site #2, mining and reclamation will take place initially along the perennial streams so that vegetation can establish in these areas while the areas further from the streams are being mined.

Access roads will have waterbars in place at fall shut-down, according to engineering protocol, and equipment access routes will be checked for erosion potential and waterbarred if necessary. Down wood, where available, will be placed over the reclaimed mining areas to help hold the soil. A seed mix approved by BLM, and DOGAMI, that is free of noxious weeds, will be used to vegetate reclaimed areas. Any areas where the seeding has failed after two years, (site-specific successful revegetation standards will be developed and made a part of this plan) will be reseeded at the direction of BLM and DOGAMI. The washing plants will be located on private land during phase II, and most equipment, other than the flexible hose from Reservoir #1 to private land, will be moved off the BLM claims during winter closure, for security. Under Phase III, the washing plant, and associated pipelines and other infrastructure will be left on the claims at Reservoir #1. BLM will be informed on an annual basis, if any equipment is to be left on the BLM claims over the winter, so the bond amount can be adjusted, if necessary. Petroleum products, parts, small equipment and maintenance supplies will be stored over the winter in the shop building and/or on private land.

If unplanned periods of closure become necessary, BLM will be informed of the pending closure. All necessary interim reclamation measures will be in place.

When BLM and DOGAMI concur that the mined areas have been reclaimed and vegetation has established to the criteria in this Plan of Operation, an appropriate portion of bond will be freed up and made available to apply to the next mining area.

Schedule for Redistribution sites #1-#3 phase II-III

Each day up to 500 cubic yards of washed tailings will be generated at each of the three private land processing sites. There will also be stockpiles of silt and sand that are cleaned periodically from the ponds. The washed gravel will be hauled back to the mining site when one end is mined out, and will be used to fill the excavation after first replacing the oversize. During phase III, the stockpiles will be located at the processing site on BLM. After the pit is refilled to normal land contours, the clay and topsoil stockpiled along the edge of the pit will be pushed onto the pit and the surface leveled to match the surrounding ground. The access routes will be obliterated. Where hillsides have been mined in benches, the benches will be insloped to retain moisture, growth medium will be placed on the benches, and the hillslope between benches will be left at 2:1. At the close of each mining season, topsoil or growth medium will be placed over the reclaimed portion of the excavations in a process of ongoing reclamation, and the areas will be seeded.

Enhancement

Some of the rock tailings areas will be left with hummocks and low places to be used by wildlife as habitat. Silt cleaned from the settling ponds will also be used to enhance productivity of the areas without topsoil, following mining. Headcuts and gullies on dry gulches that are mined can be repaired, additional ponds can be constructed for amphibians. This enhancement work will be accomplished under the terms of the Plan of Operation.

Surface Disturbance

Areas that will Not be Mined Within the Project Area

Within the private land boundary, where processing sites will be located during Phase I-II, there are three, 2 acre parcels of land that are devoid of minerals. These areas will be used to store excess overburden and substrate, and these materials will be used, where needed, in reclamation. The camp site, fuel storage area and areas on private land and on BLM claims without placer values will also not be mined during this project, nor will perennial streams and wetlands.

Several areas on the BLM claims are designated "no mining" on the enclosed maps. These areas are primarily rock tailings where no excavation is planned, however, if BLM concurs, these areas will have silt and sand from the settling ponds applied as "growth medium" and these areas will be vegetated using an appropriate seed mixture.

Phase II Mining: Ground disturbance under phase II will be maintained at about five acres at each location. If additional area is needed adjacent to the pit to stockpile overburden and substrate, BLM will be informed.

Phase II Reclamation of Mining Sites

Overburden: soil average of 6" over 2.5 acres (many areas do not have topsoil) 2,000 cubic yards stockpiled beside the excavation.

Cobble: 2' of rock cobble/dirt 8,000 cubic yards in 2.5 acres stockpiled upslope pf the excavation

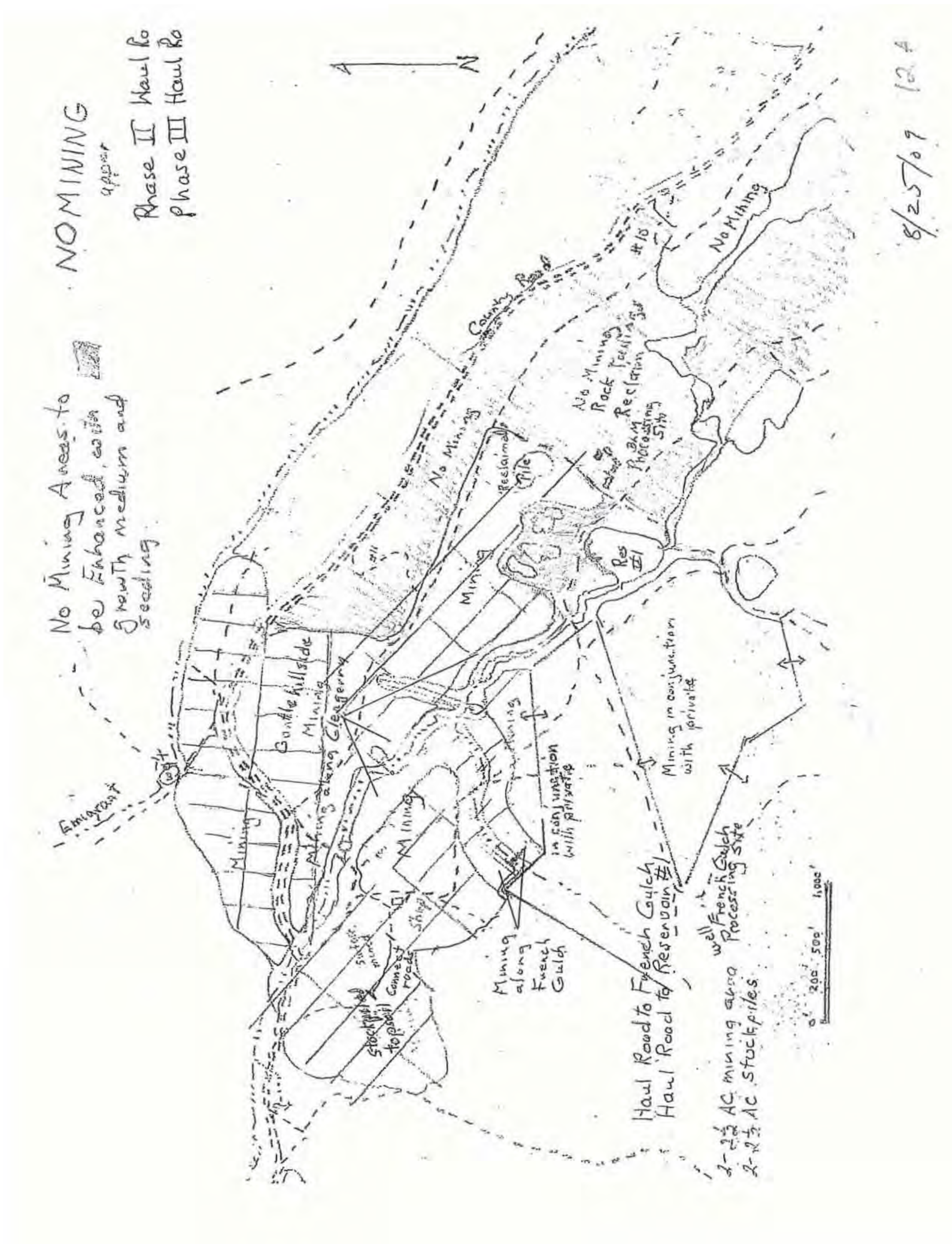
Substrate: 5' of clay, approximately 20,000 cubic yards from the 2.5 acre pit area, hauled to waste disposal site or stockpiled adjacent to the excavation.

Gravel:26 feet (or less if pit is shallow) Half the pit is mined out, then that half is reclaimed: 52,400 cubic yards/1.25 Ac up to 500 cubic yards will be processed daily, it will take 208 days to process ore from 2.5 acre (*In many areas the deposit is only 12' deep, and thus, mining will take half the time, or 104 days)

Phase III Mining

See above

Phase III Processing on BLM: In the event that a separate processing site is necessary on BLM claims, this will take up an additional 1.5-2 acres of BLM, including area for ponds, roads, tailings stockpiles, and equipment parking. The location will be at Reservoir #1.


NO MINING
Phase II Haul Ro
Phase III Haul Ro
No Mining Areas to be Enhanced with growth medium and seeding
N
8/25/09
County Road
No Mining
No Mining Rock Tailings Reclamation
BLM Processing Site
Reclaimed Pile
Res #1
Mining in conjunction with private
Gentle hillside Mining
Emigrant
Mining
in conjunction with private
Mining along French Gulch
Haul Road to French Gulch
Haul Road to Reservoir #1
well
French Gulch Processing Site
2-2½ AC mining area
2-2½ AC stockpiles
stockpile topsoil
connect roads
0 200 500 1,000


NO MINING (Middle)
stream goes subsurface
Phase II Haul Roads
No Mining
County Road
wet land
Dry Gulch
Mining
No Mining
To California Gulch
Cat trail
Haul Road to French Gulch
Haul Road to California Gulch
0 200 500 1,000

Phase III Reclamation of BLM Processing Site
Refilling ponds, approximately 667 cubic yards per pond, replacing topsoil, recontouring the surface Scarification of 1.5-2 acres. Adjacent rock tailings will be enhanced by recontouring and as growth medium becomes available, this material will be spread and these areas will be revegetated.

Monitoring-Phase IV
Monitoring of stream channel stability and health, monitoring of reclaimed snowmelt channels and ditches, and monitoring of vegetation growth, both on private lands and Public Lands, will take place each spring when the Basin becomes accessible. Monitoring to ensure that noxious weeds do not become established is an important part of monitoring, and will take place when the plants are in bloom or otherwise identifiable. Use of herbicides will take place on private lands in the spring and in the fall. BLM procedures for noxious weed control will be followed on public lands. Monitoring of reclaimed sites will take place immediately after reclamation, and during the two seasons following reclamation. BLM will monitor the seeding for a minimum of two years to establish if reseeding is necessary.

III ENVIRONMENTAL PROTECTION MEASURES

Air Quality
There should be no adverse effects on air quality. Roads will be rocked or wet down where dust is a problem. If brush and limbs or other woody material must be burned, a permit will be obtained from BLM.

Water Quality/Water Management.
During Phase II-III, settling ponds will be sized at approximately 30'X60'X10' each, and during phase II, all process ponds will be on private land. There will be three active settling recycling ponds at each site, and an additional two ponds where muddy process water, which cannot be recycled any more, will be pumped so that the active ponds can be refilled with clean water. Where a hydrocyclone or other dewatering devise is used, fewer ponds will be necessary. Water for processing is supplied by the four existing storage ponds under Water Right 18635 (500 gpm), which are filled under an 1896 water right out of Basin, Glengerry and French Creeks, and from the Humbolt shaft 1 cfs, from the perennial streams, and from a well. At each processing site, water from the settling ponds is pumped through the trommel into the series of settling ponds, then recycled back through the trommel. The processing facilities will be located over 50 feet from the active stream channels of Glengerry, French, Emigrant, Basin and California Creeks. The large stationary washing plant, which may be used on private land in the future, uses approximately 1000 gpm of recycled water, the smaller mobile plants use about 350-600 gpm of water.

The current processing site is located at the existing set of ponds on private land near Reservoir #3 (California Gulch Processing Site). This may be a stationary plant, or it may be a mobile plant that will be moved as the mining operation moves through the private land. A second processing site will be located near the well or the Humbolt shaft (French Gulch Processing Site). A third private land processing site will be located in Section 16, just north of Emigrant Creek. Additional processing sites on private land may become necessary during the course of the operation. The processing site at Reservoir #1 on BLM claims will be utilized during Phase III of the operation.

Clay soils tend to seal the settling pond bottoms, precluding much seepage from the settling ponds, and the water in the ponds slowly evaporates during the fall so that there is little water in the ponds at fall shut-down. The tailings will be flattened between ponds so that machinery can be brought in to clean the ponds. Silt and sand from cleaning the ponds will be stockpiled in an area adjacent to the ponds, and this material will eventually provide a medium for plant growth when the settling ponds and mining sites are reclaimed. The tailings drying area at each processing site will be ½ to one acre in size. Less than 1,000 cubic yards will be stockpiled to dry at two locations, before the material is spread over adjacnet rock tailings areas, or moved to a temporary storage site on private land. Two seasons of testing and one season of mining have shown there is only minimal groundwater in excavations. Thus, no dewatering of mining pits will be necessary.

The settling ponds used in this operation will all be pit type ponds and there will be no discharge of process water. During an 8 hour day, up to 480,000 gallons of recycled water are pumped and repumped through the processing plant. The three ponds contain approximately 1.2 acre feet of water. When 1,000 cubic yards are processed at one location, or two 500 cubic yard plants at separate locations are used, most of this rock and gravel is deposited in a pile beside the washing plant by using a conveyor belt system, and silt and sand is deposited in a sediment trap pond. This sediment trap is usually cleaned out daily and this material is stockpiled to dry. The settling/recycling ponds contain the muddy water but do not get much solid material deposited. When the water becomes too thick to recycle, the process water will be pumped or gravity fed into the two extra ponds, and clean water will be pumped into the 3 process ponds. If a dewatering devise, such as a hydrocyclone is used, the two additional ponds may not be necessary. The amount of make-up water needed from the storage ponds, streams, the Humbolt shaft, or from the well depends upon seepage and evaporation in the ponds, and how often the process water must be changed. Seepage is less when the ponds have sediment in them, evaporation is less when the weather is cool or rainy. The water rights are used in accordance with State law.

Groundwater Quality

No impacts to surface water quality are expected from ground water in excavations, since clay soils in French, Rich and Basin Creek areas, and tightly consolidated gravels in virgin ground along Glengerry preclude much seepage. In addition, vegetated riparian buffers are preserved between mining excavations and streams, wetlands and ponds. No impacts are expected to ground water from contamination since no toxic chemicals are used in the operation. Muddy process water will be contained in 3 off-channel settling/recycling ponds. There will be no discharge, and water is disposed of by evaporation and seepage. Perennial streams will be monitored visually during the time mining and processing are taking place to ensure that sediment is not seeping into the water. The channels will be checked in the morning and again in the afternoon to be sure sediment is not entering the channels.

Erosion Control

Tailings from the ponds are dried in locations where water will drain back into the ponds, rather than toward the creek channels. Areas of bare soil will be seeded with a BLM (Public Lands) or DOGAMI (private lands) approved seed mix. The mine access roads and equipment access ways will be waterbarred and rocked where dictated by on the ground site specific conditions and engineering protocol. Where the dry gulches are mined, they will have reclamation completed in the same season, the channels will be filled with washed rock, and dips will be left in the channel bottoms to slow water and ensure that any water that reaches the perennial portions of streams is clean water.

During the mining operation, surface water from rainy weather will be routed around the processing plant or allowed to seep into the rock tailings so that this run-off does not mix with process water to the point of overtopping the ponds. Small quantities of water from a garden hose (less than 4gpm) will be used to run the wheels at the camp site to separate gold from black sands. This water will be allowed to soak into the rock tailings or small catchment ponds will be constructed.

Solid Wastes/Rock Characterization and Handling Plans

Phase II- III involve placer mining operations. Quantities of washed rock tailings will be generated under phase II and phase III operations. Rock tailings will be conveyed away from the trommel into a stockpile for ease of returning these rocks to the mining excavations. Oversize, which is separated at the pit, will be returned to the excavation and then these tailings, or like material, will be used to refill the mining excavations to normal land contours and will also be used to rock the roads. Silt and sand (slimes) will be removed from the sediment trap ponds on a daily basis. When dry, this material will be spread over rock tailings areas as growth medium, or will be moved to private land for temporary storage or for reclaiming rock tailings there. Daily stockpiles of washed rock and silt will be around 1000 cubic yards. The Baker and Malheur Road Departments will be checking the washed rock to ensure it is appropriate for use on the County roads.

Scenic Values.

The camping, mining area and processing sites will be maintained in a neat and orderly fashion. Wherever possible, mining and processing sites will be screened from public view using mounds of washed rock tailings, or the processing facilities will be placed to take advantage of the existing topography to screen the site from view. Reclamation will be ongoing with the mining. Garbage will be removed regularly from the BLM on a weekly basis or whenever needed.

Fish and Wildlife.

There are no fish in the Mormon Basin streams, except for goldfish found in ponds between California Gulch and Emigrant Creek. No greater sage grouse or other T&E or sensitive wildlife species are present in the Basin, other than Columbia spotted frogs (Rana Inteiventris, which inhabit the wetalnd ponds and habitat along streams. This species is a candidate for listing under the Endangered Species Act. Pump intakes are screened to protect tad poles. Drawdown will be limited on Reservoir #1, and if necessary, water from the domestic well will be used to maintain the water level. Big game species are present during the summer months, and water fowl and beavers use the ponds and wetlands. The ponds and adjacent wetland habitat will be avoided during the mining operation, no chemicals are used, and there may be opportunities to create additional ponds within the Basin if BLM concurs. No sensitive plant species are known to occur in the vicinity of Mormon Basin. Bare tailings areas will be enhanced through placement of topsoil and seeding. No work will take place in the winter. The operator will avoid and/or protect any newly discovered threatened and endangered plant or habitat of threatened and endangered animal species. The area is constantly monitored for noxious weeds and these will be controlled on private lands, and also controlled on BLM according to BLM policy, using licensed applicators.

Cultural Resources.

There are historic cabin remains, can dumps, apple trees and other exotic plant species, an old hydraulic pit, rock mine tailings, prospects and collapsed portals, all associated with a long history of mining in the Basin. Any discovered sites will be protected until surveys are completed and sites are mitigated. Pursuant to 3809.420(b)(8)(i) operators shall not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archaeological site, structure, building, or object on Federal Lands.

Hazardous Substances.

There will be no deleterious materials used which could be toxic or acid-forming. No hazardous substances or chemicals will be used other than petroleum products. 2,000 gallons of diesel and 500 gallons of gas will be stored on site in above-ground tanks located on private land. Lined containment vaults beneath the tanks will be of sufficient quantity to hold the entire tank contents should a leak occur. Oil and hydraulic fluid will be hauled in, utilizing the bed of the pick-up. These will be stored in the shop buildings located on BLM. Small quantities of these products will be available at the mining site and will be stored in a pick-up bed or service truck, rather than on the ground. Waste petroleum products will be removed in original containers and disposed of at an appropriate dump site off the BLM. All applicable Federal and State regulations will be adhered to for the disposal of contaminated soil and other material.

Diesel and gas will be hauled to equipment using 75-100 gallon tanks in a pick-up or service truck. 2,000 gallons of diesel and 500 gallons of gas will be delivered to the site twice monthly over the Countiy roads. Fuel is stored on private land. Hydraulic fluid, oil and other petroleum products will be delivered to the site twice monthly, or as needed. Hydraulic fluid, stored in 5 gallon containers, cases of grease cartridges and motor oil will be stored in the locked building with cement floor. Grease cartridges and motor oil needed for the day are stored in the service truck. The amounts stored will depend upon how many pieces of equipment are in use during mining. BLM will be kept informed as to the type and amount of petroleum products being stored. MSDS are avaialble at the mine office and at the shop.

Funnels will be used to minimize spills when fueling pumps near the ponds or streams. Absorbent material will be kept on site in case of small leaks or spills of petroleum products. Contaminated soil will be removed from the BLM or private land to an authorized disposal site. All equipment is checked for fluid leaks before the equipment is operated and normal maintenance (oil changes, etc) take place at the shop buildings located on BLM, over 100 feet from any streams. No fueling of equipment (other than pumps) or routine maintenance takes place near streams, ponds, wetlands or springs (at least 50 feet).

With the release of a small quantity spill, cleanup operations will be conducted by mine employees. Should a significant spill occur, and if the operator is unable to complete clean-up of the spill, an outside contractor, who is bonded and licensed in hazardous materials clean-up, (such as Steve Rich Environmental) will be called to assist with the effort.

Spill containment and cleanup equipment available on site include the following:

- Spill kit
- Absorbent materials
- The fuel storage containment structure has a capacity of 3,000 gallons which is sufficient to contain the entire volume of both storage tanks plus ten percent.
- Backhoe and cat within ¼ mile

For spills on gravel or soil, it may be possible to absorb free liquid with absorbent materials prior to excavating and removing the contaminated material. Spills occurring on solid surfaces may be collected with the use of absorbent materials and then cleaned thoroughly with a non-hazardous solvent. Sufficient quantities of absorbent materials and other cleanup equipment will be maintained on site.

If small quantities of water exist with the spilled petroleum, the fluid may be absorbed in sawdust or sand and disposed of per DEQ regulations. The fluid may also be absorbed with the use of commercial products such as mats, socks or booms. If the spill is of significant size and/or duration, special cleanup efforts, such as those provided by environmental contractors, may be deemed necessary.

When cleaning up diesel or lubricating oil, all spent cleanup material such as rags, absorbents, etc., must be disposed of in accordance with approved procedures. Only approved locations or practices will be used to dispose of cleanup materials.

A reportable spill is defined as any noticeable amount of material released outside of containment. All reportable spills will be reported to BLM and DEQ. Records and reports of reportable spills shall be maintained for a period of five years by the owner, and will be made available for inspection upon request by EPA or State agency personnel.

See also attached Spill Prevention, Containment, and Countermeasures Plan.

IV. FINAL RECLAMATION (PHASE V)

Final Reclamation

Mining Sites: 43CFR3809.5 states "Reclamation means taking measures to meet applicable performance standards and achieve conditions required by BLM at the conclusion of operations". For the Mormon Basin operation, these measures include rehabilitation of headcutting dry channels, enhancing wildlife habitat, placement of growth medium, control of weeds, and establishment of self-sustaining vegetation. All areas disturbed or modified under this operating plan will be reclaimed in accordance with 43cfr3809.420.

The valley floor adjacent to the wetlands, much of which is rock tailings, will be reshaped to blend in with the existing topography, before placement of growth medium. The areas will then be vegetated to BLM/DOGAMI standards. Some areas will be left with hummocks to provide wildlife habitat. The highbars and hillsides will be left in a stable, safe, benched condition and the hillsides will be shaped so that they blend in with the existing topography.

Junipers and other timber that is removed from the uplands will be placed on reclaimed areas to help hold the soil, or in the headcuts from pond outlets or the channels of reclaimed dry draws or ditches to help slow flows during snow melt, and ensure sediment does not enter the perennial segments of the streams and gulches. The channels of dry gulches will be rocked and left with dips in the bottom to reduce erosion. Trees will be replanted as required by BLM.

Topsoil or other growth medium will be stockpiled separately from the substrate and gravels. These stockpiles will be evenly spread back over disturbed areas on completion of the operation and/or in an ongoing restoration program. The topsoil or growth medium will be applied during the fall that the excavation is backfilled. This method will result in a prepared seedbed, where seed can penetrate into the soil. If the seedbed becomes hardened, the reclaimed surface will be lightly scarified before seeding. Noxious weeds will be treated with herbicides in the spring and in the fall as needed on private land, however, BLM policy for weed control will be followed on Public Land. No steep hillsides or open holes will be left that could entrap or harm wildlife, cattle or humans. Riparian buffer areas will provide seed for willow and alder to grow. Grass, brush and trees will be planted with the intent that the current plant densities be achieved over time.

Access: Any temporary routes that are used will be obliterated, and will be reclaimed when the surrounding land is reclaimed to normal land contours. Any damage to the existing roads or widening and improvement of the access roads caused by the operators shall be reclaimed at the conclusion of operations, or in an ongoing manner. Standard engineering practices and site specific ground conditions will dictate where water bars are constructed. Equipment access ways will be waterbarred and/or scarified to reduce soil compaction, where needed. All reclaimed areas will be seeded with a BLM approved seed mix on Public Lands, and DOGAMI approved seed mix on private lands. The road system in the project area on BLM will be returned to the pre-mining condition unless BLM directs otherwise.

Processing Sites: During final reclamation, the dry settling ponds at Reservoir #1, that will not be used again, will be refilled with the rock cobble, and the settling ponds will be reshaped to the contour of the land that existed before this mining entry took place. Stockpiles of silt and sand stockpiled beside the ponds will be placed over the top of the rocks to provide a medium for plant growth. Storage Reservoirs #1 and #2 will be left in place. The stationary plant will remain set up on private land to support future mining and processing. Equipment and crew quarters needed for the mining operation will remain on the private land year round during the mining operation.

Shop: When no longer needed in support of the mining operation, the building will be removed, the cement foundation will be broken up and buried, soil will be placed, the parking area will be ripped to reduce compaction and the surface will be vegetated.

The intent of the reclamation plan is to establish a self-sustaining cover of perennial species (dry land pasture mix on private land, BLM approved reclamation seed mix for Public Lands). The operators, BLM and DOGAMI will inspect the seeding over a minimum of two years or more time for evidence of successful establishment, before reseeding is required. The operator will provide BLM evidence of seed purchase and will take pictures and give these to BLM within 60 days of seeding. All equipment, trailers, structures and associated materials will be removed from the BLM at the conclusion of the operation.

IV. MONITORING (PHASE V)

Monitoring During the Operation

Each 5 acre area that is disturbed and then reclaimed can be monitored visually by the operator and by BLM for seeding success, slope stability, erosion, excessive cattle and wildlife use, and noxious weed infestations. The operators will monitor the reclaimed areas monthly during the time that mining is occurring on the claims. In addition, throughout the operation, twice daily, the operators will monitor gulches during periods of flow (visual monitoring) to ensure water quality is maintained, once during the day at start-up and once later in the day to ensure there are no problems occurring. If sediment is visible in the water, and it is coming from the operation, the operators will shut down until the cause of the problem is identified and corrected.

By the time the last parcel of ground is reclaimed, all other areas of mining disturbance will be recontoured, topsoil or growth medium will be placed, these areas will be stable, and vegetative cover will have established. The area has been photographed, and this practice will be continued throughout the life of the operation. Before and after photographs are helpful in determining when vegetation approaches the pre-mining density, and what the prior condition of the site was. If BLM has additional monitoring requirements, these will be implemented. No monitoring is planned for the winter closure period. Spring monitoring will occur in April or May each season, or as soon as the area is accessible.

Post Closure Monitoring

The site will be left in a safe, stable, vegetated condition. Because reclamation and monitoring will be conducted throughout the life of the operation, at mine closure, most of the reclaimed areas will have vegetation established. No post monitoring of the area by the operators will be necessary, other than annual checks for two years following the last seeding to be sure the vegetation is established, and noxious weeds are under control. The results of the annual check of the site will be provided to BLM.

Occupancy

Mining under the terms of the DOGAMI permit and the submitted Plan of Operation has begun on private land. Residential occupancy during mining and mining related activity will take place on private lands. Sanitary facilities will be used at the camp site on private land and at mining sites on BLM, as needed. Use of the shop building south of Glengerry Gulch is planned in support of mining on private land and in support of the mining operation on BLM claims. Use of these facilities is reasonably incident to, and essential for, the mining operation.

Sanitary Facilities: A chemical toilet will be situated near each processing site when that site is active, as well as at the active mining sites. Initially these chemical toilets will be on private land, but they may be moved onto the BLM mining sites (and processing site if phase III takes place). These units will be serviced regularly, and will be removed to private land each fall.

Camp/Process Site: Travel trailers and motor homes will be located at the camp areas on private land. Fuel storage will be located on private land in above ground tanks. Initially, the diesel fuel will be stored in a 2,000 gallon tank, and gas will be stored in a 500 gallon tank. Processing equipment will be located on private land during phase II.

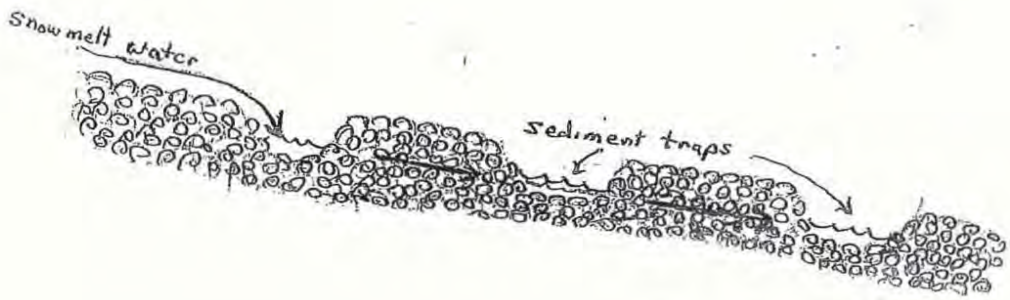
Structures:

Use of the equipment maintenance shop is necessary for the operation. No additional structures, other than chemical toilets, will be used or constructed on Public Lands. Signs will be posted warning the public that machinery may be operating on the roads.

Shop Building

The shop building, located in Section 17, is on unpatented claim Mormon Basin #2. This structure is located south of Glengerry Gulch. This structure will be used during the mining operation, which will take place on both private land and BLM claims.

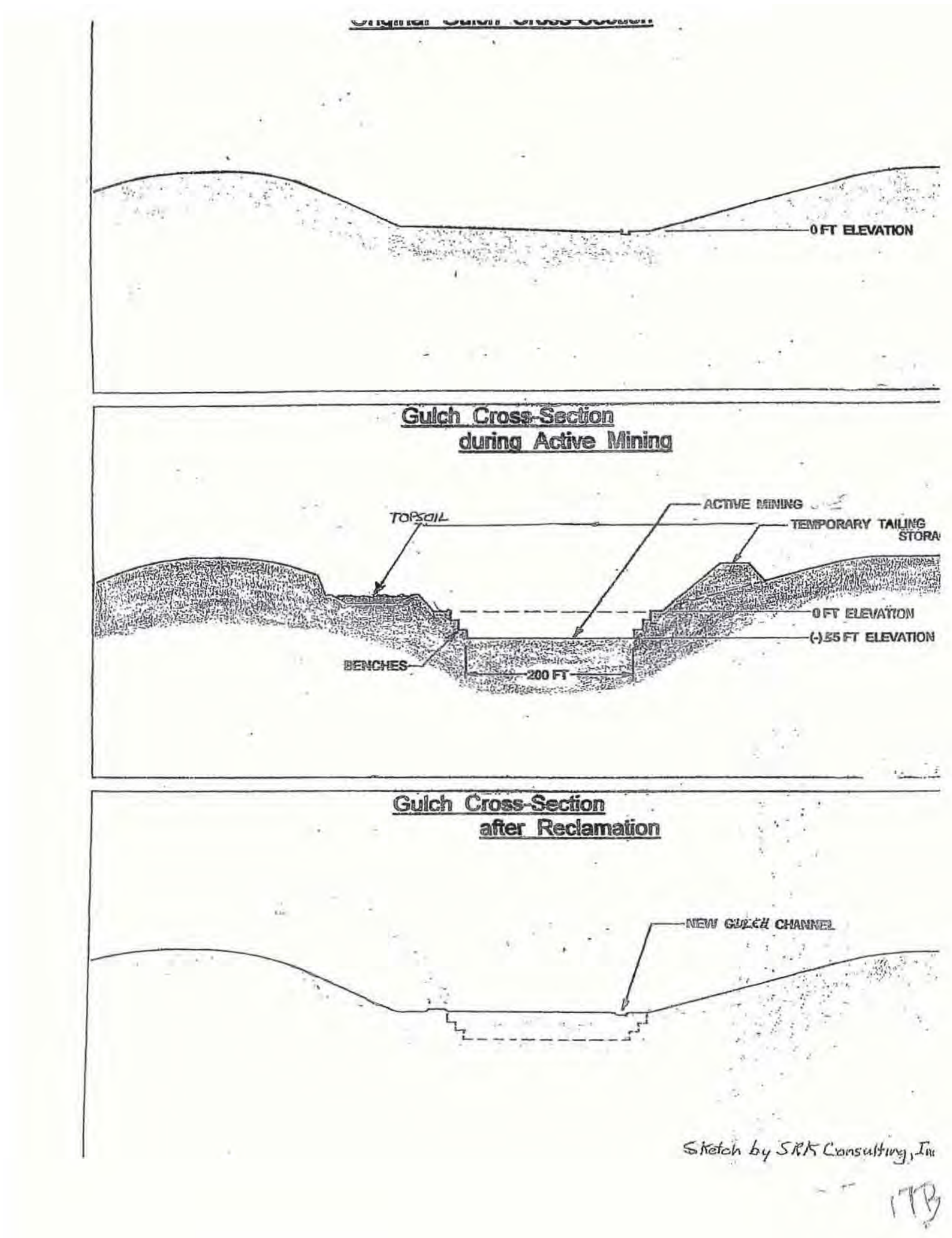
The shop building will be used for storage of mining equipment and supplies, petroleum products, parts, pumps, belts, motors, tools and other materials needed in the mining operation. In this remote location, a day of mining is lost every time there is a breakdown and a trip to Baker, Ontario or LaGrande is necessary. Mineral Valley has a mechanic hired to service, repair and maintain the equipment. When a mechanic from town must do the repairs, a shop building with cement floor and a hoist makes working conditions more condusive to completing repairs in a timely fashion. Equipment, such as the two cats, two excavators, two front end loaders, dump trucks, large pumps, generators and various support equipment are used in the operation. There is no way these large pieces of equipment can be hauled to a shop in town every time repairs are needed. The maintenance shop and the immediate accessibility to parts and petroleum products are essential to the operation. Routine oil changes and machinery maintenance conducted within the shop building, where petroleum products are contained, and there is no possibility that water quality off site could be impacted, is preferable to conducting this work in the open. BMPs required by BLM require the use of absorbent materials and other measures to capture diminimus spills



Mining and Reclamation of Dry Draws

Dry channels will be mined after snowmelt, and will be returned to their original configuration following mining, the same season that they are mined. These channels will be refilled with washed rock and gravel, and dips will be left in the channels to slow run-off water and prevent silty snow melt water from reaching the perennial streams.

17A


0 FT ELEVATION
Gulch Cross-Section
during Active Mining
TOPSOIL
ACTIVE MINING
TEMPORARY TAILING
STORA
0 FT ELEVATION
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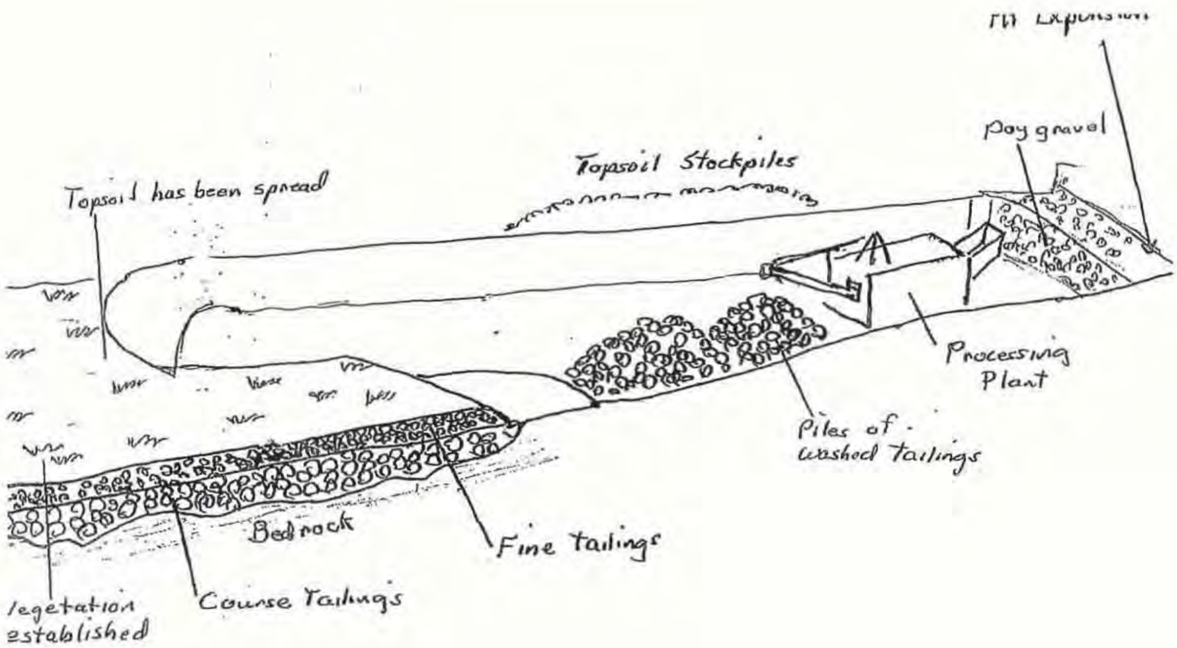
BENCHES
200 FT
Gulch Cross-Section
after Reclamation
NEW GULCH CHANNEL
Sketch by SRK Consulting, In
17B



Ongoing Reclamation

As the southeast end of the pit is mined out, washed gravel will be returned to this end of the pit, and used to refill the excavation. By backfilling the pit in an ongoing manner, large quantities of processed material can be replaced and will be out of the way of the operation. This continual backfilling of the pit will also minimize the amount of ground disturbance at a given time. As one end of the pit is reclaimed, the pit will be expanded another 1-2 acres to the north. If the processing facilities are located in the pit, these will be moved to the north.

17C

(see Spill Containment Plan).

The use and maintenance of the shop structure is reasonably incident to the planned mining activities on the claims and on private land. The maintenance shop in Section 17 directly supports work on machinery associated with all sites. There are first aid supplies in this building, fire fighting equipment, and copies of MSDS for all products in use. This building is not used for recreational purposes or for sleeping quarters. All activity associated with this building is conducted in support of the operation. The structure is maintained in a neat and workmanlike manner.

The Law

The General Mining Law gives miners the right to occupy their claims while engaged in mining activity. The basis of the occupancy issue is found in the 1872 Act which states "*That all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners, in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.*"

43CFR 3715

The shop building is used while conducting exploration, equipment maintenance, mining, processing and reclamation. The shop building will be used year-round for storage of equipment and supplies.

Crews normally will work 8-10 hour shifts per day, and work will take place five days or more per week. A second shift may be added as the operation progresses.

The mining phases are designed to produce gold and other valuable minerals. Due to the remoteness of the site, the road condition in wet weather, the need to work on equipment out of the weather, and due to the need to have parts available, use of the shop structure is essential to the operation.

Although mining will not take place during the winter months, the equipment maintenance shop in Section 17, has a concrete foundation, can be secured from vandels, and is necessary to store mining equipment, parts and supplies for the next season. The mobile mining equipment will be moved to private land during the winter, however, the shop building is affixed to the ground and cannot be moved. The area around the building will be maintained in a safe and workmanlike condition. The public will not be allowed to enter the buildings or the immediate area of the buildings because of concerns for public safety, and liability issues.

The Mormon Basin site is remote, being about two hours drive from Baker. As stated previously, in this remote location, a day or more of mining is lost every time there is a breakdown and a trip to town becomes necessary. Also, as stated previously, mining personnel perform maintenance and repair work, and the shop building is necessary for servicing and repairing equipment on site. It would not be reasonable to haul heavy equipment to town for maintenance and repair, nor would it be reasonable to pay to have a mechanic come out from town, only to find the repair job cannot be done because of adverse weather conditions. It would also not be reasonable to require the construction of a new shop on private land, when this facility already exists, and use of this shop in support of the mining operation on Public and private land is a legal use under the regulations.

The plan is to utilize the building while mining is taking place, and to remove it, along with any associated materials, when the operation is completed, or when the placer deposit beneath the shop is mined. The area where the structure is now located will be returned to normal contours, scarified and seeded according to the terms of the Plan of Operation.

Permitting
Water for processing is supplied by water from Basin, California, Glengerry, French Gulches under a 1896 Oregon State Certificate of water right #1574, and an 1863 right #1552. Storage ponds exist, both on BLM and on private land and stoarge and use of this water is under Certificate #69224. The Humbolt shaft also has a water right, under permit #18635. Settling ponds are covered under a State WPCF permit111747 GEN0600. This permit will be amended to reflect the increased yardage as the mining operation progresses

A Conditional Use Permit was issued by Malheur County for the private land mining operation, and a conditional use application has been filed for the Baker County private lands. A DOGAMI permit has been issued, 23-0267, and the reclamation bond posted for the current mining operation on private land. Two reclamation bonds have been posted for exploration on BLM claims. All necessary Federal and State permits will be applied for, copies of all permits will be provided to BLM prior to initiating mining activities..

Mormon Basin Mining Plan of Operation Submitted by:

Spill Prevention, Containment and Countermeasures: Mormon Basin Placers

Primary Contact: Larry Dinger, P.O. Box 188, Haines, OR 97833, 856-3403
Location of Facility: Mormon Basin patented land, T13S R42E Sec 20, W.M.
Access: From Bridgeport drive east to the junction of the Burnt River road and Clarks Creek road. Turn south and stay on the Baker County road to the ridge, continue down hill to Malheur County and Mormon Basin. Drive past the shop, through a gate and onto private land.

Material on Site:

Unleaded gasoline: 500 gallons or less stored in an above ground tank.
LS Diesel: 2,000 gallons or less stored in an above ground tank.

MSDSs are available on site for all the above products. All tanks are labeled as is required by Federal and State law.

Sumpter Gold Dredge employees will be responsible for supervising initial containment action for releases and subsequent clean-up.

This plan identifies potential sources of spills, establishes measures of prevention, and defines control, cleanup and reporting procedures including instructions on what to do in the case of a spill.

Preparation of the SPCC plan is pursuant to 40CFR 112, Oil Pollutant Prevention, which "establishes procedures, methods, and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable water of the United States or adjoining shorelines" (40CFRpart 112.3(e)).

Oil is considered the generic term for hydrocarbons and includes oil of any kind in any form, including, but not limited to petroleum, fuel, oil, sludge, oil refuse and oil mixed with water other than dredged soil (40CFR part 112.2).

A reportable spill includes but is not limited to, any spilling, leaking, pumping, pouring, emitting, or dumping, but excludes discharges in compliance with a permit under 402 of the Clean Water Act.

Prevention measures, containment and drainage control design, inspection procedures and disposal methods are defined in 40CFR 112, part 112.7. Prevention measures at the Moemon Basin Site include proper equipment and containment designs, periodic inspections, tank loading and unloading procedures and maintenance procedures.

Tanks in the fuel storage area are located within an earthen containment structure (berms). The fuel storage containment structure has a capacity of 3,000 gallons which is sufficient to contain the entire volume of both storage tanks plus ten percent. The fuel storage area is designed so that no spilled material can leave the facility. The fuel storage area is compacted earth over clay with loose gravel over the top.

Fuel vendor personnel will be required to remain with the transport vehicle and observe tank filling at all times, and remain attentive to tank level indicators to prevent tank overfills. Personnel engaged in fuel unloading and dispensing activities are required to remain with the

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vehicle until completion. Personnel are responsible for ensuring that these activities are conducted in a safe and environmentally sound manner. Minor spills that occur will be cleaned up with oil absorbent material. If a major spill occurs, a sump pump will be used to evacuate spilled material into a holding tank or back into secondary containment.

Tanks will be visually inspected weekly. Visual inspections are conducted with respect to the following:

1. Tank fill vales are to be in the closed position when not in use.

2. All values will be inspected for signs of leakage or deterioration.

3. Inlet and outlet piping, as well as tank flanges are to be checked for leakage and to insure that adequate support is provided.

4. Level indicators and discharge control equipment will be checked to see that all are operating properly.

5. The tank shell surfaces are to be visually inspected for areas of rust or other signs of deterioration. Particular attention should be paid to areas with peeling paint (or other coating), welds, and seams.

6. The ground surface in the loading area is to be checked for obvious signs of leakage or spills, specifically stained or visibly damp areas.

Annual inspections will include inspection of the tank shell, welds, rivets and bolts, foundations, and supports. Aboveground valves and pipelines will be examined for the general conditions of flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports and condition of metal surfaces.

Sumpter Gold Dredge employees are trained in the elements of this SPCC plan to minimize the number of human errors that can cause spills.

Oil spill prevention measures are designed to minimize spills from occurring; however, occasional releases may occur. Small leaks and spills, confined to small areas, will be cleaned up as part of the ordinary operating procedure. In situations where a large leak occurs and remains confined to the secondary containment area, cleanup will proceed according to the direct countermeasures outlined below.

These countermeasures have been designed to mitigate the possibility of oil reaching a waterway. Employees will undertake these countermeasures immediately when there is any danger of oil entering any waterway and/or in the case of any large oil release.

In the case of a small spill, direct countermeasures include stopping the material release by plugging the leak source and/or closing the valve. Employees will make sure the spill is totally confined.

Should a spill of significant size occur, direct countermeasures include taking the necessary action to terminate the source of the flow of petroleum product. A trench will be dug or earthen berm constructed around the spill, whatever is necessary to contain the area of the spill or to stop it from entering a waterway or leaving the fuel storage area. Water will never be applied, instead appropriate oil absorbing material will be applied to prevent petroleum products from flowing into watercourses or off the site. Oil absorbent materials may include floor sweep, absorbent mats, socks, booms or any other appropriate cleanup materials. Any other actions, such as placing absorbent materials around the spill to minimize environmental damage will also be taken.

When direct countermeasures described above have been implemented, notification and reporting procedures will be followed. Cleanup must be initiated immediately following containment of the spill.

It is extremely important that any oil be prevented from reaching streams, drainages, ditches, septic systems, property boundaries or any other place where water is or could potentially flow. Project personnel will exercise every available option to stop and confine the spill. Additionally, personnel are trained to anticipate and prevent water from flowing into a spill area. Water can be diverted around the spill area by constructing berms and/or ditches.

With the release of a small quantity spill, cleanup operations will be conducted by Sumpter Gold Dredge employees. Should a significant spill occur, and if the owner is unable to complete clean-up of the spill, an outside contractor, who is bonded and licensed in hazardous materials clean-up, (such as Steve Rich or Sumpter) will be called to assist with the effort.

Spill containment and cleanup equipment available on site include the following:

Spill kit
Absorbent materials
The fuel storage containment structure has a capacity of 3,000 gallons which is sufficient to contain the entire volume of both storage tanks plus ten percent.
Backhoe within ¼ mile

For spills on gravel or soil, it may be possible to absorb free liquid with absorbent materials prior to excavating and removing the contaminated material. Spills occurring on solid surfaces may be collected with the use of absorbent materials and then cleaned thoroughly with a non-hazardous solvent. Sufficient quantities of absorbent materials and other cleanup equipment will be maintained on site.

If small quantities of water exist with the spilled petroleum, the fluid may be absorbed in sawdust or sand and disposed of per DEQ regulations. The fluid may also be absorbed with the use of commercial products such as mats, socks or booms. If the spill is of significant size and/or duration, special cleanup efforts such as those provided by environmental contractors may be deemed necessary.

When cleaning up diesel or lubricating oil, all spent cleanup material such as rags, absorbents, etc., must be disposed of in accordance with approved procedures. Only approved locations or practices will be used to dispose of cleanup materials.

A reportable spill is defined as any noticeable amount of material released outside of containment. Records and reports of reportable spills shall be maintained for a period of five years by the owner, and will be made available for inspection upon request by EPA or State agency personnel.

STATE OF OREGON
COUNTY OF Marion

CERTIFICATE OF WATER RIGHT (HB - 2153)

THIS CERTIFICATE ISSUED TO

JILES DINGER
SUMPTER GOLD DREDGE INC.
1820 BALM ST
BAKER CITY, OR 97814

confirms the right to store the waters of
EMIGRANT CREEK AND BASIN CREEK, TRIBUTARIES OF MALHEUR RIVER IN FOUR RESERVOIRS
for MINING AND WILDLIFE.

The right to store and use these waters was perfected under Reservoir Application R-74498. The date of priority is January 1, 1993. The amount of water entitled to be stored and used each year under this right is not more than 35.0 ACRE-FEET, BEING 20.0 AF IN RESERVOIR 1, 4.0 AF IN RESERVOIR 2, 8.0 AF IN RESERVOIR 3, 3.0 AF IN RESERVOIR 4

Located as follows:
1 NE 1/4 NW 1/4 SECTION 20, TOWNSHIP 13 SOUTH, RANGE 42 EAST WM.
2 NE 1/4 NE 1/4 SECTION 20, TOWNSHIP 13 SOUTH, RANGE 42 EAST WM.
3 NW 1/4 SW 1/4 SECTION 21, TOWNSHIP 13 SOUTH, RANGE 42 EAST WM.
4 NW 1/4 SW 1/4 SECTION 21, TOWNSHIP 13 SOUTH, RANGE 42 EAST WM.

The storage of water allowed herein is subject to the installation and maintenance of an outlet pipe, with a minimum diameter of 8", or the provision of other means to evacuate water when determined necessary for public safety or to satisfy prior downstream rights as determined by the Water Resources Director.

The right to store and use the water for the above purpose is restricted to beneficial use at the place of use listed above.

WITNESS the signature of the Water Resources Director, affixed FEBRUARY 27, 1996.

Martha O. Pagel

Martha O. Pagel

Recorded in State Record of Water Right Certificates numbered 69224

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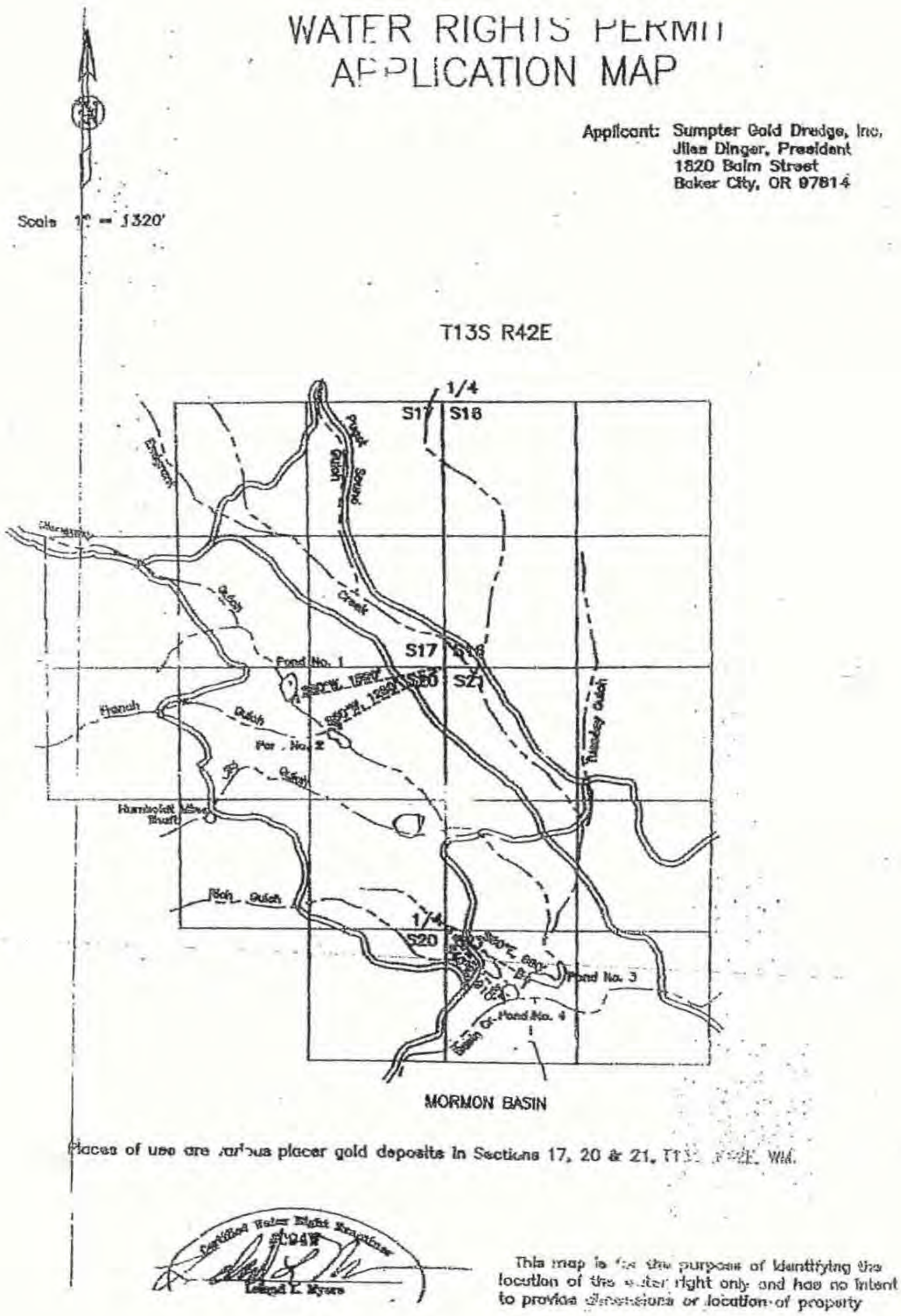
WATER RIGHTS PERMIT
APPLICATION MAP
Applicant: Sumpter Gold Dredge, Inc.
Jiles Dinger, President
1820 Balm Street
Baker City, OR 97814
Scale 1" = 1320'
T13S R42E
1/4
S17
S16
S17
S16
S20
S21
Pond No. 1
Pond No. 3
Pond No. 4
Humboldt Mine Shaft
Rich Gulch
MORMON BASIN
This map is for the purpose of identifying the location of the water right only and has no intent to provide dimensions or location of property

BP Gold but just says Basin Creek not site specific

1896

#1574

STATE OF OREGON

WATER DIVISION NO. 2 COUNTY OF MALHEUR

CERTIFICATE OF WATER RIGHT

(For Rights which have been confirmed by the Courts)

This is to Certify, That ANDREW HANSEN of Rye Valley State of Oregon has a right to the use of the waters of Morman Basin, Glengary and French Gulch, tributary of Willow Creek,

for the purpose of mining

and that said right has been confirmed by decree of the Circuit Court of the State of Oregon for Malheur County, and the said decree entered of record at Salem, in the Order Record of the STATE WATER BOARD [redacted] of the State of Oregon, in Volume 2 at page 289; that the priority of the right hereby confirmed dates from the year 1896 for 1.25 sec. ft. and 1909 for 1.25 sec. ft.

that the amount of water to which such right is entitled and hereby confirmed for the purpose aforesaid, is limited to an amount actually beneficially used for said purpose, and shall not exceed 2.50 second feet.

A description of the lands irrigated under such right, and to which the water hereby confirmed is appurtenant, or, if for other purposes, the place where such water is put to beneficial use, is as follows: Placer mining along Morman Basin and Glengary Creeks and French Gulch in Malheur County, Oregon.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described.

WITNESS the seal and signature of the State [redacted] Water Board [redacted] affixed this 11th day of June 19 17.

STATE WATER BOARD

[redacted]

(SEAL OF STATE WATER BOARD)

By JOHN H. LEWIS
State Engineer, President

Attest:
M. F. MERS
Secretary

Recorded in State Record of Water Right Certificates, Volume 2 page 1574

DOGAMI Enclos
Certy. 1552

STATE OF OREGON

WATER DIVISION NO. 2 COUNTY OF MALHEUR

CERTIFICATE OF WATER RIGHT

(For Rights which have been confirmed by the Courts)

This is to Certify, That RANSOM BEERS

of Malheur City State of Oregon has a right to the use of the waters of Willow Creek, a tributary of Malheur River, Crow Creek and Lost Watch Creek and Mormon Basin Creek, tributary to Willow Creek,

for the purpose of the irrigation of 86 acres of land, domestic, stock and mining

and that said right has been confirmed by decree of the Circuit Court of the State of Oregon for Malheur County, and the said decree entered of record at Salem, in the Order Record of the STATE WATER BOARD [redacted] of the State of Oregon, in Volume 1, at page 258 ; that the priority of the right hereby confirmed dates from the year 1879 for the irrigation of 86 acres from Willow Creek; 1863 for 2.00 sec. ft. for mining from Mormon Basin Creek and 1865 for 1.00 sec. ft. for mining from Crow Creek and Lost Watch Creek,

that the amount of water to which such right is entitled and hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes ; and shall not exceed 3 sec. ft. for mining and a rate of flow for irrigation of 2.15 sec. ft. from April 1st to May 1st and 1.08 sec. ft. from May 1st to September 1st of each year, or the equivalent in case of rotation; the total quantity diverted during each irrigation season not to exceed 258 acre feet.

A description of the lands irrigated under such right, and to which the water hereby confirmed is appurtenant, or, if for other purposes, the place where such water is put to beneficial use, is as follows: 18.5 acres in SW$\frac{1}{4}$NW$\frac{1}{4}$; 30 acres in NW$\frac{1}{4}$SW$\frac{1}{4}$; 5 acres in SW$\frac{1}{4}$SW$\frac{1}{4}$ of Section 13, 10.5 acres in NE$\frac{1}{4}$NE$\frac{1}{4}$; 2 acres in NW$\frac{1}{4}$NE$\frac{1}{4}$; 20 acres in SE$\frac{1}{4}$NE$\frac{1}{4}$ of Section 14, Tp. 14 S. R. 41 E. W. M., in Malheur County, Oregon.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described.

WITNESS the seal and signature of the State [redacted] Water Board [redacted] affixed this 11th day of June 1917.

STATE WATER BOARD
[redacted]

(SEAL OF STATE WATER BOARD)

By JOHN H. LEWIS
State Engineer, President

Attest:
M. F. WEBB
Secretary

Recorded in State Record of Water Right Certificates, Volume 2, page 1552.

Permit A—3N—1-7F SP*30001-890

Humbolt Shaft to [illegible] the Basin

STATE OF OREGON

COUNTY OF MALHEUR

CERTIFICATE OF WATER RIGHT

This Is to Certify, *That* SUMPTER GOLD DREDGE, INC. C/O LLOYD E. DINGER

of P.O. Box 410, Baker *, State of* Oregon, 97814 *, has made proof to the satisfaction of the Water Resources Director, of a right to the use of the waters of* Humboldt Mine Shaft

a tributary of Basin Creek *for the purpose of* mining

under Permit No. 18635 *and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from* September 28, 1948

that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1.0 cubic foot per second

or its equivalent in case of rotation, measured at the point of diversion from the stream. The point of diversion is located in the SW¼ NE¼, Section 20, T. 13 S., R. 42 E., W. M., South 55 degrees West 2500 feet from the NE Corner, Section 20

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to ------------ *of one cubic foot per second per acre,*

and shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use under the right hereby confirmed, and to which such right is appurtenant, is as follows:

SE¼ SW¼
SW¼ SE¼
SE¼ SE¼
Section 17
NE¼ NE¼
NW¼ NE¼
SW¼ NE¼
SE¼ NE¼
NE¼ NW¼
NW¼ NW¼
SE¼ NW¼
NE¼ SE¼

SE¼ SE¼
Section 20
SW¼ NE¼
NW¼ NW¼
SW¼ NW¼
SE¼ NW¼
NE¼ SW¼
NE¼ SE¼
NW¼ SE¼
NW¼ SW¼
Section 21
T. 13 S., R. 42 E., W. M.

The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described and is subject to the existing minimum flow policies established by the Water Policy Review Board.

WITNESS the signature of the Water Resources Director, affixed this date. April 30, 1979.

James E. Sexton
Water Resources Director

Recorded in State Record of Water Right Certificates, Volume 41 *, page* 47931

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APPENDIX B
ALTERNATIVE 3 TABLES

Table 1a. Fords of Streams by Roads – within Project Area

Ford ID	Ford Name	Ponds Water (Yes/No)	Stream Flow (Perennial/ Intermittent)	Comments
F-02	Glengarry Creek Ford 2	No	Perennial	Malheur County Road
F-03	Glengarry Creek Ford 3	No	Perennial	South of county road
F-04	Glengarry Creek Ford 4	Yes	Perennial	Below Reservoir R-02
F-05	Glengarry Creek Ford 5	Yes	Perennial	Below Reservoir R-03
F-06	Glengarry Tributary 1 Ford	No	Perennial	Malheur County Road
F-07	Glengarry Tributary 2 Ford	No	Perennial	Malheur County Road
F-08	Glengarry Tributary 3 Ford	No	Intermittent	Malheur County Road
F-09	French Gulch Ford	Yes	Perennial	Rocked since inventory
F-17	Intermittent Stream Ford 1	No	Intermittent	Water flows from 2 gullies above shed
F-19	Intermittent Stream Ford 2	Yes	Intermittent	Water seeping from depression below R-08 flows across road to R-13

Table 1b.Fords of Streams by Roads – outside of the Project Area but within the Upper Basin Creek Drainage Area (above Reservoir R-14)

Ford ID	Ford Name	Ponds Water (Yes/No)	Stream Flow (Perennial/ Intermittent)	Comments
F-01	Glengarry Creek Ford 1	Yes	Perennial	East of county road
F-10	Sunday Hill Creek Ford	No	Intermittent	Creek runs down road
F-11	Puget Sound Gulch Creek Ford	No	Perennial	Crossing east of Sunday Hill Mine
F-14	Emigrant Creek Ford	No	Intermittent	Road to processing site

Table 2a.Culverts – within the Project Area

Culvert ID	Site ID	Culvert Name	Culvert Type &Diameter (inches)	Inlet Status	Outlet Status	Land Ownership (BLM/ Private)	Location
C-04	3	Emigrant Creek Culvert 1	PVC 6	100% plug	open	BLM	Road/dam/ top
C-05	3	Emigrant Creek Culvert 2	Metal 7.5	100% plug	open	BLM	Road/dam/ bottom
C-07	5	Rich Gulch Culvert	Metal12	85% plug	95% plug	BLM	County road
C-08	6	California Gulch Culvert 1	Metal6	50% plug	open	BLM	Road
C-09	6	California Gulch Culvert 2	Metal6	50% plug	open	BLM	Road
C-10	7	California Gulch Culvert 3	8	100% plug	100% plug	BLM	Road/dam/ bottom
C-11	7	California Gulch Culvert 4	8	open	open	BLM	Road/dam/ middle
C-12	7	California Gulch Culvert 5	8	100% plug	100% plug	BLM	Road/dam/ top

Table 2b.Culverts – Outside of the Project Area But Within the Upper Basin Creek drainage area (above Reservoir R-14)

Culvert ID	Site ID	Culvert Name	Culvert Type &Diameter(inches)	Inlet Status	Outlet Status	Land Ownership (BLM/ Private)	Location
C-03	2	Glengarry Creek Culvert 3	Metal24	70% plug	open	Private	County road/ dam
C-06	4	Emigrant Creek Culvert 3	Metal12	50% plug	85% plug	BLM	County road

Table 3a.Roadway Segments That Can Function as Ephemeral Stream Channels – within the Project Area

Road Segment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	Land Ownership (BLM/ Private)	Road Maintenance Agency
W-01	250	Off-road ruts above county road	Glengarry Creek Spring #3 stream ford on county road	BLM	BLM & Malheur County
W-02	400	Glengarry Creek Spring #3 stream ford on county road	Glengarry Creek Ford #2	BLM	Malheur County
W-03	900	About 50 feet south of Glengarry Creek Ford #2	French Gulch Creek Ford	BLM	BLM
W-04	400	South of metal building SW of Glengarry Creek Ford #3	W-03	BLM	BLM
W-05	450	Below junction with W-07	To junction with road from French Gulch ford	BLM&Private	BLM & Private
W-06	500	250 feet SE of French Gulch Creek Ford	Downstream face of Reservoir R-01 dam over Glengarry Creek	BLM&Private	BLM & Private
W-08	300	Flat east of Reservoir R-02	Glengarry Creek Ford #4	BLM	BLM
W-09	400	Beginning of gully in old mining road above highwall west of Reservoir R-04	To road beside Reservoir R-04 (possibly into reservoir when flow is high) then into basin south of road	BLM	BLM
W-10	1100	Junction with county road	Mined land 300 feet north of Reservoir R-02	BLM	BLM

Table 3a (continued).Roadway Segments That Can Function as Ephemeral Stream Channels – within the Project Area

Road Segment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	Land Ownership (BLM/ Private)	Road Maintenance Agency
W-11	1500	North of Reservoir R-04	1200 feet to Pond P-11 (private), then 300 feet to county road (on private land), then 200 feet to wetland south of County Road (private)	BLM&Private	BLM & Private
W-12	250	Ridge north of Rich Gulch	Ephemeral draw north of Rich Gulch;no stream channel connection	BLM	BLM
W-15	550	Junction with W-14	Emigrant Creek/ Reservoir R-18	BLM	BLM
W-19	500	County road crossing over Rich Gulch	Down county road, then down side road to Rich Gulchcrossing near Reservoir R-14	BLM &Private	Malheur County&Private
W-20	350	Top of road	County road	BLM &Private	BLM &Private
W-22	900	Junction with Humboldt Mine Road	Slope above Rich Gulch; potential stream channel connection	BLM &Private	BLM &Private
W-23	500	Spur ridge north of California Gulch	California Gulch Road/dam of R-16	BLM	BLM
W-24	800	Below sheds in California Gulch	South of R-16; potential hydrologic connection	BLM	BLM
W-25	500	Below stream crossing	North of R-16; potential hydrologic connection; well vegetated road with 2 ruts	BLM	BLM
W-26	150	Below sand flat	Ephemeral draw connected to California Gulch	BLM	BLM

Table 3a (continued).Roadway Segments That Can Function as Ephemeral Stream Channels – within the Project Area

Road Segment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	Land Ownership (BLM/ Private)	Road Maintenance Agency
W-28	750	Ridge	Low spot in road; no potential connection to streams at this time	BLM	BLM
W-29	200	100 feet up road from culvert C-08	Near culvert C-09; road surface is rutted, runs water from spring in road, hasriparian vegetation	BLM	BLM

Table 3b.Roadway Segments That Can Function as Ephemeral Stream Channels – outside of the Project Area but within the Upper Basin Creek Drainage (above Reservoir R-14)

Road Segment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	Land Ownership (BLM/ Private)	Road Maintenance Agency
W-07	850	East of original French Gulch drainage	W-05	Private	Private
W-13	300	North of W-12	To small basin near county road; no stream channel connection	Private	Private
W-14	400	Below switchback west of Sunday Hill Mine mill site	Junction with road to Puget Sound Gulch	BLM	BLM
W-16	700+	Unknown	To Sunday Hill Mineroad crossing over Puget Sound Creek	BLM	BLM
W-17	1100	First minor summit of county road above Emigrant Creek	Emigrant Creek	BLM	Malheur County
W-18	600+	County road north of crossing of 2 county roads	Emigrant Creek	BLM	Malheur County and BLM
W-21	1900	Minor watershed divide on Humboldt Mine Road east of Rich Gulch	From BLM through private land to Rich Gulch crossing near Reservoir R-14; same crossing as W-17	BLM &Private	BLM &Private
W-27	700	Where road gets steep	Potential connection with W-23	Private	Private

APPENDIX C
THREATENED AND ENDANGERED SPECIES PLANT AND ANIMAL CLEARANCE SURVEY

Final Report

Threatened, Endangered and Sensitive Plant and Animal Clearance Survey

310 Acre Mormon Basin Placer Gold Mining Project Malheur County, OR

Submitted to:
B. P. Gold
PO Box 91
Baker City, OR 97814

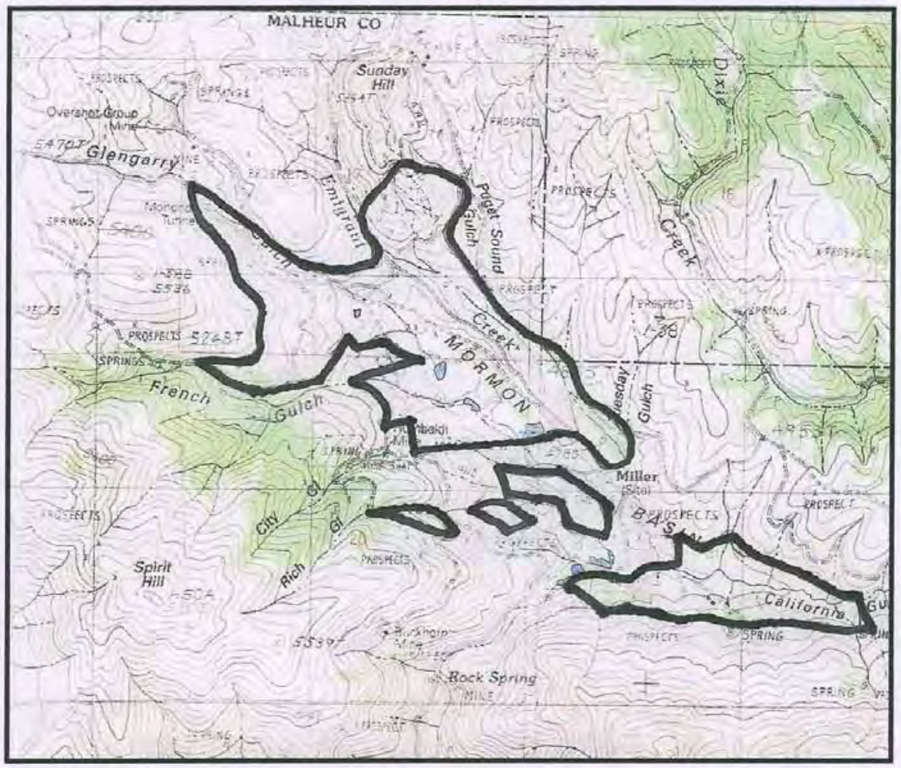
Submitted by:
Vision Air Research, Inc.
904 East Washington Street, Boise, Idaho 83712
(208) 841-9566
Susan Bernatas, President

July 16, 2008

Mormon Basin TES Clearance Survey, Malheur County, OR

Vision Air Research, Inc. was retained to conduct a threatened, endangered and sensitive plant and animal survey of 310 acres of the proposed boundaries of the Mormon Basin placer gold mining expansion located on public lands located in Malheur County, OR. The survey includes portions of BLM lands within Township 13 South, Range 42 East, sections 17, 20 and 21 W. M (Figure 1). The survey areas are adjacent to an existing mine area and private lands.

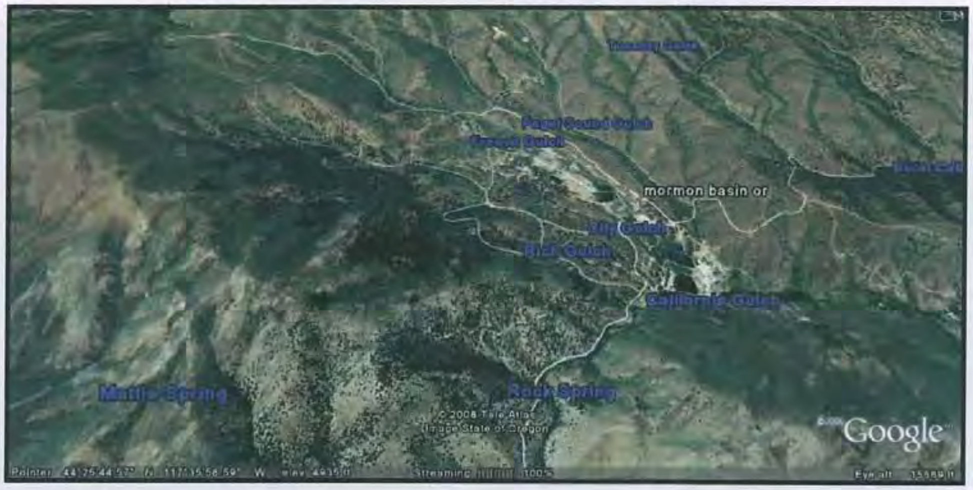
Figure 1. Mormon Basin proposed placer gold mine expansion in Malheur Country, OR.



Mormon Basin includes Emigrant Creek, Glengarry Gulch, French Gulch, California Gulch and Tuesday Gulch. Elevations range from approximately 4,800 to 5,200 ft. There are several reservoirs in the upper portion of the project area. There is a muddy pool on the upstream side of the road crossing through California Gulch.

Vegetation cover types within the project area are fairly diverse and intermingled (Figure 2). Wet meadows are found in California Gulch and around the reservoirs. Emigrant Creek has a stringer of willow (*Salix ssp*) and aspen (*Populus tremuloides*). South and west facing slopes are dominated by sagebrush (*Artemesia tridentata wyominensis*) steppe with scattered western juniper (*Juniperus occidentalis*). The north and east facing slopes have Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Psuedotsuga menziesii*) forests. Attachment A includes map of the project area with photo descriptions of some of the vegetation cover types.

Figure 2. Vegetation cover types of the Mormon Basin, OR project area.
Source: Tele Atlas Image State of Oregon, Google 2008.



Methods

Locations of known TES species within a ten mile radius of the project site were obtained from a data request from the Oregon Natural Heritage Program. Five species were found within the search area (Table 1). Locations of these known occurrences are considered sensitive, and not for general release, however, results were provided to Jan Alexander, B.P. Gold, Baker City, OR, mining consultant and Susan Bernatas, Ecologist, Vision Air Research, Boise, Idaho. In addition, Jean Findley, Botanist and Melissa Yzquierdo, Botanist/Wildlife Biologist for the Bureau of Land Management were consulted for potential sensitive species in the area, and for known locations to assist in developing a search image. Jean Findley, Vale District, BLM identified Snake River goldenweed (*Pyrrocoma radiata*), as possibly occurring within the area. Snake River goldenweed was formerly known as *Haplopappus radiatus.* No other plant species were identified as being of concern for the area. Melissa Yzquierdo requested any information on Columbia spotted frogs as well as the watch list species, horney toad and rattlesnakes since this area would be on the edge of their range.

Table 1. Oregon Natural Heritage Program results of Sensitive species found within a 10 – mile square of the Mormon Basin Project center as of June 16, 2008.

Common name Scientific Name	Federal Status	State Status	GRANK	SRANK	NHP List	NHP Track
Columbia spotted frog *Rana luteiventris*	C	SU	G4	S2S3	2	Y
Northern Goshawk *Accipiter gentillis*	SOC	SC	G5	S3	4	N
Greater sage grouse *Centrocerus urophasianus*	SOC	SV	G4	S3	2	Y
Country paintbrush *Castilleja flava* var. *rustica*	–	–	G4G3 T3T4	S1	2	Y
Snake River Goldenweed *Pyrrocoma raditata*	SOC	LE	G3	S3	1	Y

Federal Status: US Fish and Wildlife Service. SOC = Species of concern, C = Candidate for listing with enough information for listing.

State Status: for animals – Oregon Department of Fish and Wildlife Status. SU = Sensitive undetermined. SV = Sensitive vulnerable. SC = Sensitive Critical. For Plants – Oregon Department of Agriculture status. LE = Listed endangered.

GRANK/SRANK: Please see Box 1 for the definitions and descriptions.

Box 1. Global and State Rank Definitions and Description. Source: ONHP 2008.

ORNHIC participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is now maintained by NatureServe in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, in 4 Canadian provinces, and in 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. In this book, the ranks occupy two lines. The top line is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this line indicates the taxon has taxonomic questions. The second line is the State Rank and begins with the letter "S". The ranks are summarized as follows: 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences; 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences; 3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences; 4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences; 5 = Demonstrably widespread, abundant, and secure; H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered; X = Presumed extirpated or extinct; U = Unknown rank; ? = Not yet ranked, or assigned rank is uncertain.

NHP List: All rare species in Oregon are assigned a list number of 1, 2, 3, or 4, where 1 = threatened or endangered throughout the range, 2 = threatened or endangered in Oregon but more common elsewhere, 3 = Review List (more information is needed), 4 = Watch List (currently stable).

NHP Track: The Oregon NHP obtains and computerizes location information on only those elements which are marked with Y (yes). Those noted with N (no) have incomplete data because the ONHP doesn't actively track this species.

The project area was visited three times for a reconnaissance survey, botanical survey, and a spotted frog survey. The reconnaissance survey was conducted on June 12, 2008 with B.P. Gold representatives to identify the project area boundaries. Vegetation cover type and habitat type descriptions were recorded.

Botanical Survey – The botanical clearance survey was conducted June 19th. The focus of the botanical survey was Snake River goldenweed (Figure 3). This was the only identified TES plant species with potential to be found within the vegetation communities present on the project location. Generally, Snake River goldenweed is located on steep rocky hillsides with loam soils in big sagebrush, bluebunch wheatgrass (*Pseudoroegnaria spicata*), arrowleaf balsamroot (*Balsamorhiza sagittata)* and Idaho fescue (*Festuca idahoensis*) communities.

On June 19th, a known population of Snake River goldenweed in the vicinity of Huntington, OR, in the general vicinity of the project location, was visited by the botanists to determine the phenology of the plant and develop a search image. Although the Snake River goldenweed was not in bloom yet at the known site, the habitat and morphologic features were easily identifiable (Figure 4). This location was also visited on July 3rd to confirm identification. Potential for locating this species during the survey was limited, due to the lack of proper habitat within the project area.

Figure 3. Known population of Snake River goldenweed in the vicinity of Huntington, OR.

Figure 4. Snake River goldenweed habitat near Henderson, OR.

No site visit was conducted for rustic paintbrush, as the single previously know location for the species is ill defined. However, potential for this species occurring in the survey area is limited due to the lack of dry sagebrush habitat within the project area.

To conduct the botanical clearance survey, the areas were broken down into sections based on habitat type and access. Meandering transects were walked through the project area. Survey sections and transects were completed in California Gulch, Emigrant Greek, Glengarry Gulch and along French Gulch. Species lists were compiled as transects were completed. All habitat types and areas within the site area were surveyed. However, transects were concentrated more heavily on any potential habitat for the Snake River goldenweed.

No rustic paintbrush or Snake River goldenweed were located on site and potential habitat for these species was limited. No additional federal or state sensitive species were located. Existing flora is primarily comprised of native species, with few non-native species present. General vegetation types included moist meadows, ponderosa pine and Douglas fir open forests, sagebrush, Carey's balsamroot (*Balsamorhiza cayeyana*) and bunchgrass communities. Several of the hills were covered with Carey's balsamroot, bunchgrasses and silky lupine (*Lupine sericeus)*. While the wet meadows had large numbers of wild iris (*Iris missouriensis)*, Oregon checkerbloom (*Sidalcea oregano*) rushes (*Juncus*), sedges (*Carex*) and false hellebore (*Veratrum califonicum*). Attachment B lists identified plant species and their relative frequency, as noted during the survey.

Several areas had seen disturbance from prior mining activates, and included large stands of bulbus bluegrass (*Poa bulbosa*), an introduced early seral or disturbance species. In addition, there were several large patches of whitetop (*Cardaria draba*) and Canada thistle (*Cirsium arvense*) found. Both are considered noxious weeds by the State of Oregon. Many of these weed sites were generally accessible by road, and it would be recommended to spray these before they provide a seed source and continue expanding their range.

Fauna Survey – The fauna survey was conducted on July 3rd. The fauna survey concentrated on spotted frogs, which were identified by the Oregon Natural Heritage Program data as previously occurring within the project area. The spotted frog survey encompassed all reservoirs and creeks within the project area. Animal species on site, in addition to the spotted frogs, were identified during the fauna, botanical and reconnaissance surveys and via discussions with Jan Alexander. Table 2 lists the animal species identified within the project area. This list is not comprehensive. Only those species actually observed during the 3 site visits, or specifically noted by Jan Alexander are listed. Other B.P. Gold representatives indicated they were concerned about black bears (*Ursus americanus*) and western rattlesnakes (*Crotalus viridis*) within the area, although no specific sightings were indicated.

Table 2. Animal species observed within the Mormon Basin Project area.

Amphibians / Reptiles	***Scientific Name***
Columbia spotted frog	*Rana luteiventris*
Pacific Chorus (tree) Frog	*Pseudacris regilla*
Gopher snake	*Pituophis melanoleucus*
Common garter snake	*Thamnophis sirtalis*
Rubber boa	*Charina bottae*
Birds	
Killdeer	*Charadrius vociferus*
House Wren	*Troglodytes aedon*
Red Naped Sapsucker (pair and nest)	*Sphyrapicus nuchalis*
Turkey Vulture	*Coragypus atratus*
Robin	*Turdus migratorius*
Mourning Dove	*Zenaida macroura*
Whip poor will	*Caprimulgus vociferus*
Barn Swallow	*Riparia riparia*
Flicker	*Colaptes auratus*
Lesser Scaup	*Aythya affinis*
Red tailed Hawk	*Buteo jamaicensis*
Night Hawk	*Chordeiles minor*
Black Chinned Humming Bird	*Archilochus alexandri*
Redwing Blackbird	*Agelaius phoeniceus*
Turkey	*Meleagris gallpavo*
Great Horned Owl	*Bubo virginianus*
Cinnamon Teal	*Anas cyanoptera*

Mammals	
Mule deer	*Odocoileus hemionus*
Columbian ground squirrel	*Spermophilus columbianus*

The Columbia spotted frog was located as follows: Both adult frogs and tadpoles were observed within all reservoirs, with the exception of the upper reservoir. The upper reservoir has steep banks and little aquatic vegetation. It was too deep to wade and likely provides little habitat for this frog. The largest reservoir in the project location had numerous tadpoles, however only one adult frog was observed and positive identification wasn't made since it was only briefly viewed.

Frogs were also located within California Gulch creek and Glengarry Gulch creek. Two spotted frogs (no tadpoles) were found in the large (6 m by 6 m) pool upstream of the 2-track road crossing. The pool is used by cows, as evidenced by hoof prints and cow pies around and within the water. This muddy bottom pool had some aquatic blister buttercup and was ringed by sedges/rushes. The two frogs located within this pool may be immature, since they were fairly small and the spots were not well developed (Figure 5). No additional frog habitat was found up stream of this pool. The streambed became sharply incised, about 10 inches across and 12 inches deep with grasses, sedges, rushes and forbs along the wet meadow edges. There is a stringer of willow and alder along parts of this creek. Some segments are sharply down cut to an erosion gully (Figure 6).

Figure 5. Columbia spotted frog found in California Gulch, July 3, 2008.

Figure 6. Down cutting of the creek near California Gulch.

The upper portion of Glengarry Gulch has a two-track road crossing that creates a shallow mud puddle where the tracks cross the creek. Within this pool, and just above the road under a tree, least 8 adults (no tadpoles) were seen (Figure 7). This was the only location where spotted frogs were located along this creek.

Figure 7. Spotted frog location along upper road in the Glengarry Gulch.

Other species of interest included the Northern Goshawk and the sage grouse. The scattered conifer forests found in the project area and vicinity area provide little habitat for the Northern Goshawk, which inhabits deep conifer dominated mixed woodlands. These raptors prey on birds and small mammals. The historic nest site reported by the Oregon Natural Heritage Program is located north and east of the project area. The survey showed little habitat with potential to support sage grouse leks which typically use open areas within sage brush. No sage grouse or grouse pellets were found within the project area.

Other common species seen around and in the reservoirs during the suvey included common garter snakes, gopher snakes abundant insect activity and ducks (Figure 8). A rubber boa (Figure 9) was located on the road near the top of the survey area along Glengarry Gulch. It had apparently been run over earlier that day.

Figure 8. At least four dragon/damselflies were found near the reservoirs. This Libellula pulchella (male) was located at the lower reservoir in the upper project parcel.

Figure 9. Rubber boa found along the road up Glengarry Gulch which had been run over.

Reference

ONHP (Oregon Natural Heritage Program) 2005. Rare, Threatened, and Endangered plants and animals of Oregon. Oregon Natural Heritage Program. Portland, Oregon.

Attachment A

Mormon Basin TES Clearance Survey 310 Acre Project Area
Malheur County, OR photo descriptions of vegetation cover types.

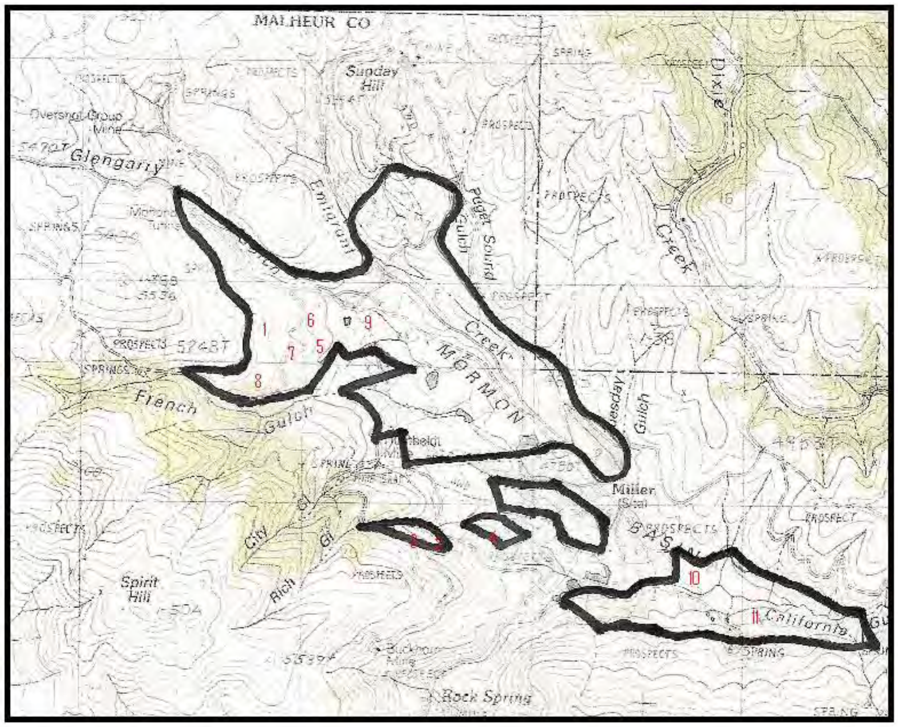


Figure 1. Sagebrush – grassland with tall forb component - looking east.

Figure 2. Ponderosa pine and Douglas – fir forests – looking southwest.

Figure 3. Douglas – fir forest - looking west.

Figure 4. Ponderosa pine forest in previous mined area.

Figure 5. Tall forb and shrubs – looking west.

Figure 6. Western juniper sagebrush grassland with tall forbs – looking east.

Figure 7. Carey's balsamroot and western juniper – looking west.

Figure 8. Cheatgrass, bulbus bluegrass with sagebrush – looking north.

Figure 9. Old truck and lilac – looking south east.

Figure 10. Sagebrush – grassland and western juniper – looking east.

Figure 11. Wet meadow adjacent to willow next to reservoir – looking east.

APPENDIX D
WATER RESOURCES/HYDROLOGY TECHNICAL REPORTS

Mormon Basin Placer Mine
Watershed Existing Condition Report

Prepared by Timothy Bliss, Bliss Enterprises LLC
August 14, 2008

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ANALYSIS AREAS

There are two analysis areas for this report.

Project Area – The Project Area (PA) includes about 300 acres of public lands in Mormon Basin administered by the United States Department of the Interior, Bureau of Land Management (BLM). It includes four tracts of land shown on maps in the B.P. Gold Plan of Operation for Mormon Basin and on Maps 1, 2, and 3 (Appendix).

Cumulative Watershed Effects Analysis Area - The Cumulative Watershed Effects Analysis Area (CWEAA) includes all lands of Basin Creek Subwatershed upstream of the lowest downstream point of Basin Creek that would be affected by potential runoff from the Project Area. The CWEA Point is the dam of Reservoir R-14, as shown on Map 2 and in Table 5a. This is the reservoir which receives water from Rich Gulch Creek from the west, California Gulch Creek from the east, and Basin Creek from the north. In this report, the CWEAA is also referred to as Upper Basin Creek HUC7 or drainage as shown in Table 1.

HYDROLOGY

HYDROLOGIC UNITS

Methodology – Information about hydrologic unit names and codes was obtained from the internet and BLM. Hydrologic unit delineation criteria (**Legleiter 2002**) are posted on the internet. A list of 1st to 4th level hydrlogic units is posted at the Oregon USGS website (**USGS 2008**). Fifth and sixth level information is not currently available on the internet, and was provided by the BLM. This author delineated a 7th field drainage.

Results – The hydrologic unit divisions, names and codes for Basin Creek are shown in **Table 1** below:

Table 1. Hydrologic Unit Names and Codes

Level	Division	HUC Name	Code	Square Miles
1	Region	Pacific Northwest	17	
2	Subregion	Middle Snake	1705	36,700
3	Basin	Middle Snake - Boise	170501	32,600
4	Subbasin	Willow	17050119	773
5	Watershed	Middle Willow Creek	1705011904	?
6	Subwatershed	Basin Creek	170501190401	?
7	Drainage	Upper Basin Creek	17050119040101	?

Discussion – The project is located in the headwaters of Basin Creek Subwatershed. Basin Creek has not been officially divided into 7th field drainages. If it were, Basin Creek above the Reservoir R-14 dam (which is just below the California Gulch/Rich Gulch inflows) would be a logical and appropriate 7th field drainage, because both streams drain into the reservoir. Subwatersheds are sometimes referred to as HUC6, 6th field, or 12 digit watersheds. Basins are also referred to as Accounting Units and Subbasins are also referred to as Cataloging Units.

STREAM ORDERS

Methodology – Stream order (**Easterbrook 1969a**) for perennial and intermittent stream channels was determined from maps, aerial photos and stream channel investigations.

Results – The order for each stream is shown in **Table 2**, below.

Table 2. Stream Order

Stream Name	Stream Reach	Stream Order
Glengarry Creek (upper)	Above French Gulch	1
French Gulch Creek		1 or 2
Glengarry Creek (lower)	Below French Gulch	2
City Gulch Creek		1
Emigrant Creek (upper)	Above Puget Sound Gulch	1 or 2
Puget Sound Gulch Creek		1
Emigrant Creek (lower)	Below Puget Sound Gulch	2
Emigrant Cr trib east of Puget Sound Gulch		1
Tuesday Gulch		1
Basin Creek	Below Glengarry/Emigrant confluence	3
Rich Gulch Creek		2
California Gulch Creek (upper)	Above springhouse creek	2
California Gulch springhouse creek		1
California Gulch trib north of springhouse cr		1
California Gulch Creek (lower)	Below springhouse creek	2
Basin Creek	Below California and Rich Gulches	3

DRAINAGE PATTERNS

Methodology – Drainage patterns (**Easterbrook 1969b**) were determined from maps and aerial photos.

Discussion – Two drainage patterns were observed in Mormon Basin: dendritic and parallel. The dendritic drainage pattern is dominant; it is characterized by irregular branching of streams. The parallel drainage pattern is also present; for example, lower Glengarry Creek and Emigrant Creek are parallel to each other, and tributary draws on the north side of California Gulch are parallel.

STREAM FLOW PERSISTENCE

Methodology – Streams in Mormon Basin were classified into three flow persistence types: perennial, intermittent and ephemeral. These stream flow persistence types are listed in **BLM 1993**, as follows, based on **Meinzer 1923**:

> **Perennial –** A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.
> **Intermittent –** A stream that flows only at certain times of the year, when it receives water from springs or from some surface source such as melting snow in mountain areas.
> **Ephemeral –** A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table. Ephemeral streams flow continuously for less than 30 days.

Results – Stream flow persistence types for Mormon Basin are shown in **Table 3** below:

Table 3. Stream Flow Types

Stream Name	P = Perennial I = Intermittent E = Ephemeral	Comments
Glengarry Creek	P, I, P	Perennial above French Gulch. Intermittent reaches below R-03 and R-04 in June. Stream could be intermittent below French Gulch or R-02 in late summer.
French Gulch Creek	P, I	Intermittent above confluence with Glengarry Creek in late summer.
City Gulch Creek	E, I	Ephemeral to wetland, then intermittent to R-03
Emigrant Creek	I, P, I	Many springs with short perennial reaches
creek on Sunday Hill Mine hill	P, I	Perennial in placer hole above the pond, then intermittent down road.
Puget Sound Gulch Creek	P, I	Perennial reaches below springs
unnamed Emigrant Cr gulch east of Puget Sound Gulch	I	Intermittent at road below small pond
Tuesday Gulch	I	Intermittent at road crossing
Rich Gulch Creek	I, P, I	Perennial reaches below springs
California Gulch	P, I, P	Becomes intermittent in reaches between springhouse trib and below R-17 dam.

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California Gulch springhouse trib	P, I	Intermittent in meadow above confluence with Emigrant Cr
California Gulch trib north of springhouse trib	I	Riparian intermittent springs and channel above meadow.
Basin Creek (begins at the Glengarry Cr / Emigrant Cr confluence in R-11)	P, ?I	Perennial below California Gulch; is reported to have been intermittent above R-14 in 2007 with no spillway outflow from R-12

Discussion – The information presented in Table 3 shows that all streams in the Project Area and CWE Analysis Area have intermittent reaches at some time of the year or in drought years. The beginning point and terminus of stream surface flow changes from spring snowmelt to late summer as local water tables drop below stream channels. The best time of year to observe and determine whether a stream reach is perennial or intermittent is the month of September, before the first hard frost shuts down evapo-transpiration of shrubs and trees in riparian areas. Intermittent streams can become seasonally perennial after the onset of cold weather. The timing of this project did not allow for accurate mapping of perennial flow reaches.

STREAM CROSS-SECTIONS

Methodology – Stream cross-sections were made on all major streams in the project area to document bankfull width, maximum bankfull water depth, width/depth ratio, floodprone width (50-100 year floodplain), entrenchment, sinuosity, gradient, particle size class, current water flow, and stream class. The methodology and terms are described in **Rosgen and Silvey 1996.**

Bankfull width was determined by observing and marking bankfull indicators, then laying a measuring stick horizontally between the banks.
Maximum bankfull water depth was measured from the bottom of the cross-section measuring stick.
Width/depth ratio is the ratio of bankfull width to average water depth; average water depth was not measured, but was estimated by using 67% of maximum bankfull water depth.
Floodprone width was measured by stretching a measuring stick horizontally above the bankfull site at 2 times maximum bankfull water depth.
Entrenchment ratio was determined by dividing floodprone width by bankfull width.
Sinuosity is the ratio of channel thalweg length along a reference reach to straight-line distance between the end points. Sinuosity was estimated after the first few measurements.
Gradient of the stream in percent was measured with a hand-held level.
Particle size class was determined from ocular evaluation of cobble, gravel, sand and silt bed materials to determine the dominant particle size class.
Stream class was determined using the above data.

Results – Stream cross-section information is summarized in **Tables 4a and 4b**. Cross-reference tables with Maps to see cross-section locations.

Table 4a. Stream Cross-sections – Within Project Area

Site ID	Cross Section Name and Location	Bankful Width (feet)	Bank -full Depth (feet)	W/D Ratio	Flood -plain Width (feet)	En-trench -ment (ratio)	Sinu-osity	Gra-dient (%)	Part-icle Size Class	June 08 Stream Flow (cfs)	Geo morphic Str Type	BLM or Priv Lnd
X-01	Glengarry Cr xSec1 abv county rd	2.4	0.3	<12	3.5	1.5	<1.4	5	4	0.096	A4	BLM
X-02	French Gulch Cr xSec abv road	1.6 (1.2-1.8)	0.3	8	3.3	2.1	1.1	4	4	0.041	A4B 4a	BLM
X-03	Glengarry Cr xSec2 below Res 2 outlet	3.3 (1.2-1.8)	0.4	12.2	6.6	2.0	1.1	3	4	0.074	B4	BLM
X-04	Glengarry Placer Cr xSec below Res 22	1.5	0.2	11					4	0.01	B4a	BLM
X-05	Glengarry Cr xSec3 (spr 1) NE of Res 3	1.5-2.0			4-6	2.5		2	4	0.071	B4	BLM
	(spr 2)								6	0.014	E6	BLM
X-06	City Gulch Cr xSec abv Res 3				3.0				4	none	B4	BLM
	Outlets of Res 4									0.098		BLM
X-09	Emigrant Cr xSec2 abv PS Gul	2.0	0.4	7	2.0	1.0	1.2	3	4,5, 6	none	G5	BLM
X-10	Emigrant Cr xSec3 below PS Gul	2.2	0.35	9	7.0	3.2	<1.4	2	4	none	E4b	BLM
X-14	Puget Sound Gulch Cr xSec2	1.8	0.3	9	3.3	1.8	<1.4	3	5/4	none	B5	BLM
X-17	Rich Gulch Cr xSec2	?	0.1		2.0			2	4	none	B4	BLM
X-19	Rich Gulch Cr xSec4 abv county rd	1 - 2	0.2	11	3 - 4	2.0	<1.2	2	6	0.007	B6	BLM
X-20	California Gulch Cr xSec1	1.4 (1.7-1.7)	0.40	5	8.0	5.7	1.3	2	4, 6	0.009	E4b	BLM
X-21	California Gulch Cr Trib xSec	1.0 (0.8-1.4)	0.13	11	2.2	2.2	<1.4	9	4	0.010	B4a	BLM

Table 4b. Stream Cross-sections – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Site ID	Cross Section Name and Location	Bankful Width (feet)	Bank -full Depth (feet)	W/D Ratio	Flood -plain Width (feet)	En-trench -ment (ratio)	Sinu-osity	Gra-dient (%)	Part-icle Size Class	June 08 Stream Flow (cfs)	Geo morp hic Str Type	BLM or Priv Lnd
X-07	Glengarry Cr xSec4 abv Res 8	2.4	0.35	10	3.5	1.5	<1.2 ditch	1	3,4	0.012 July 17	B3	Priv
X-08	Emigrant Cr xSec1 spr abv rd	2.7	0.35	11	4.6	1.7	<1.4	3	4	0.017	B4	BLM
X-11	Emigrant Cr Spr xSec on spr ditch	1.5	0.2	11	2.9	1.9	<1.2	1	4	none	B4c	BLM
X-12	Emigrant Cr xSec4 below co rd	2.0	0.2	15	3.7	1.9	<1.2	1	4	none	B4c	BLM
X-13	Puget Sound Gulch Cr xSec1 below road	1.5	0.2	11	3.0	2.0	<1.4	3	4,6	0.005	B4	BLM
X-15	Tuesday Gulch xSec	1.0						>4	6	none	A6	BLM
X-16	Rich Gulch Cr xSec1	?	0.1		1.4			>4	4	none	A4	BLM
X-17	Rich Gulch Cr xSec2	?	0.1		2.0			2	4	none	B4	BLM
X-18	Rich Gulch Cr xSec3	1.3	0.2	10	4.0	3.1	<1.4	3	6	0.004	E6b	Priv
X-22	California Gulch Cr xSec2	2.0	0.30	10	2.5	1.25	1.2	2	4	0.035	G4	Priv
X-23	Basin Cr xSec	4.9	0.5	14	10.0	2.0	>1.4	2	4	0.177	B4	Priv

Discussion – Based on the transect data in **Tables 4a and 4b**, streams in Mormon Basin can be generally described as follows:

<u>Bankfull width</u> of streams ranges from 1 to 3 feet, except for Basin Creek below Reservoir R-15 which is 5 feet.
<u>Maximum bankfull water depth</u> of streams ranges from 0.1 to 0.5 feet.
<u>Width/depth ratio</u> of streams ranges from about 5 to 15.
<u>Floodprone width</u> of streams ranges from 1.5 feet to 5.0 feet.
<u>Entrenchment ratio</u> of streams ranges from 1.5 to 5.7.
<u>Sinuosity</u> of streams is low, ranging from 1.0 in ditched reaches to about 1.4.
<u>Gradient</u> of streams ranges from 1 to 9 percent.
<u>Particle size class</u> of streams is dominantly gravel (class 4) and silt (class 6) but cobble (class 3) and sand (class 5) are present.

Geomorphic stream types – see separate section below.
Stream flows – see separate section below.

Transect X-23 is located below the CWE point, but is necessary to establish channel morphology and stream flow below the California Gulch Cr inflow. The only other potential cross-section point is the short channel reach above the headcut below Reservoir R-14. This was not chosen because X-23 captures flow from seepage below R-14 that enters R-15.

GEOMORPHIC STREAM TYPES

Methodology – Perennial and intermittent streams in Mormon Basin were classified into geomorphic types using the methodology described in **Rosgen and Silvey 1996.** Geomorphic stream type was determined using data collected from stream cross-sections listed in **Tables 4a and 4b**, above, plus information from stream cross-section photos, and observations of variability above and below the cross-section locations.

Results – See the geomorphic stream type column in **Tables 4a and 4b**, above.

Discussion – Major geomorphic stream types in Mormon Basin are A, B, E and G, with F in a few recently gullied areas. A's are common from the headwaters of streams to steeper alluvial deposits in the valleys. B's are common on lower alluvial fans and in steeper gradient valley bottoms; many B's are steeper gradient, transitional to A's. G's are older gullied reaches of streams. Most G's were observed in entrenched reaches of Emigrant Creek and California Gulch Creek, but they exist below headcuts in other streams. E's occur on flatter gradient sites where streams are well-connected to their floodplains; E's in the project area are of low sinuosity, transitional to B's.

The most common channel material is gravel (class 4) and silt (6), but cobble (class 3) and sand (class 5) are also present. Cobble channels occur at some steep-gradient sites, such as below the Glengarry Creek/French Gulch Creek confluence and below the Reservoir R-02 ford. Sandy channels were observed at the Emigrant Creek – Puget Sound Gulch Creek confluence. Silt channels (E6b, G6) occur where small streams are cutting through silt deposits or are depositing silts below a silty headcut or gully; examples are Rich Gulch Creek below the adit spring and above the county road, and California Gulch from Reservoir R-16 to the springhouse creek inflow.

The most common geomorphic stream types in Mormon Basin are A4, B4, G4, G6, E4b, and E6b. G6 and E6b are common in California Gulch and Rich Gulch.

STREAM DISCHARGE

Methodology – Stream discharge was measured or estimated for flowing reaches of streams in Mormon Basin from June 16-26, 2008. Discharge was measured using containers of known volume (5 gallons, 1 quart) for pipe outflows from Reservoir R-04. All other discharges were determine by constructing a rectangular channel with uniform water depth, channel width, and water velocity, then measuring water depth in inches, measuring width of flowing water in inches, and measuring water flow through the constructed reach by timing the velocity of floating debris in inches per second using a watch.

Results – See **Tables 4a and 4b**, above.

Discussion – Peak snowmelt discharge from Mormon Basin is estimated to occur in April of each year. South-facing streams (like Puget Sound Gulch Creek) peak earlier than north-facing streams (like French Gulch Creek).
Bankfull discharge for Basin Creek was estimated to be about 2 cfs at cross-section X-23. All streams in the basin were well below bankfull at the time of discharge measurements.
June 2008 discharges ranged from 0.18 cfs in Basin Creek at cross-section X-23 to less than 0.01 cfs in several smaller streams. This data indicates that late June 2008 stream discharge from Basin Creek below California Gulch inflow was about 10% of April 2008 bankfull discharge. Peak discharge for 2008 was not estimated.

FLOODPLAINS

Methodology – Floodplains were identified as follows:
First, floodprone width, approximating the 50-100 year floodplain (**Rosgen and Silvey 1996**), was estimated at stream cross-sections by measuring floodplain width at 2 times maximum depth at bankfull.
Second, most wetlands were identified as floodplains.
Third, flatter alluvial bottoms were identified as Holocene floodplains (Qal) (**Gilluly, Reed and Mitchell 1933),** which developed over the past several thousand years as streams moved across valley bottoms.

Results – Floodplain width for stream cross-sections is shown in **Tables 4a and 4b**. Wetland-floodplain areas were mapped by SWCA.

Discussion – Floodplain widths measured at stream cross-sections using the Rosgen & Silvey methodology ranged from 1.4 feet wide in upper Rich Gulch (an ephemeral reach) to 10 feet wide in Basin Creek below Reservoir R-15. Rosgen indicates these floodplain widths are equivalent to the floodprone area a 50-year to 100-year return interval storm would produce.

Most wetlands were identified as being within the 100-year return interval floodplain because a shallow layer of water usually flows over or is ponded on their surface at some time of the year, either from the stream overflowing it's banks, or from water emerging from the groundwater table above wetlands along the stream valley, or from backwaters of reservoirs. Floodprone wetlands in Mormon Basin range from about 5 feet wide along small, steep streams to about 600 feet wide in the backwaters of valley-wide reservoirs.

The alluvial bottoms of streams in and tributary to Mormon basin range in width from about 20 feet to about 700 feet. Over time, the streams have occupied most of the width of the alluvial bottoms. A tree falling across a floodplain can quickly move an active floodplain from one side of a valley to the other. A beaver dam across a valley can inundate the whole valley. For these reasons, it is appropriate to identify the entire flatter portion of the alluvial bottom as floodplain.

RESERVOIRS AND DAMS

Methodology – Reservoirs that currently affect or have potential to affect the stream network were noted on maps and some of them were photographed. Dam dimensions were paced and estimated; dam height at the downstream face was measured with a level. Depth and capacity were estimated from site observations, paced data and aerial photos.

Results – Mapped reservoirs are listed in **Tables 5a and 5b**. Cross-reference Tables with **Map** __ to see locations. Twenty-six (26) reservoirs were mapped. Other small off-channel ephemeral and intermittent reservoirs exist in and near the project area, mostly on private land.

Table 5a. Reservoirs and Dams – Within the Project Area

Res ID	Reservoir Name	Est'd Water Surface Area (acres)	Est'd Max Water Depth (feet)	Est'd Volume (ac-ft)	Dam Length (feet)	Dam Top Width (feet)	Down stream Dam Height (feet)	Spillway over or around dam	Recent Beaver Dam on Res	BLM or Private Land
R-01	Glengarry Creek Reservoir 1	0.04	4	0.08	20	12	5	Over	No	BLM
R-02	Glengarry Creek Reservoir 2	1.10	10-12	6-8	370?	12-25	11	Over	Old dam	BLM
R-03	Glengarry Creek Reservoir 3	1.00	10-12	4-6	400?	10-15	18	Around	No	BLM
R-04	Glengarry Creek Reservoir 4	2.50	5-6	7-10	500	15-20	15	Over	Old dam	BLM
R-08	Glengarry Creek Reservoir 8	0.80	5	3.0	700	10-15	17	Around	Yes	BLM & Private
R-14	Basin Creek Reservoir 4	0.50	6	2.5	220	8-25	7	Over	Yes	BLM & Private
R-16	California Gulch Creek Res 1	0.06	1.5	0.06	45	15	5	Over	No	BLM
R-17	California Gulch Creek Res 2	0.20	dry (0); 2-3 if dammed	0	160	10-25	11	Over (breached)	Old dam	BLM & Private
R-18	Emigrant Creek Reservoir 1	0.10	dry (0)	0	130	12	7	Over	No	BLM
R-22	Glengarry Placer Reservoir 1	0.02	2	0.01	10	10	5	Over	No	BLM
R-23	Glengarry Placer Reservoir 2	0.13	1	0.10	80	5-10	3-8	Over	No	BLM

R-24	Glengarry Placer Reservoir 3	0.25	2.5	0.40	200	20	10	none	No	BLM
R-29	Humbolt Reservoir 2	0.10	always dry (5)	0	210	3-10	5-10	over	No	BLM & Private
R-30	City Gulch Reservoir 2	0.03	2	0.04	90	3-10	6	over	No	BLM
R-34	California Gulch Reservoir 3	0.005	2	0.01	80	3	3-5	over	No	BLM

Table 5b. Reservoirs and Dams – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Res ID	Reservoir Name	Est'd Water Surface Area (acres)	Est'd Max Water Depth (feet)	Est'd Volume (ac-ft)	Dam Length (feet)	Dam Top Width (feet)	Down stream Dam Height (feet)	Spillway over or around dam	Recent Beaver Dam on Res	BLM or Private Land
R-05	Glengarry Creek Reservoir 5	0.50	3	0.75	400	12	7	Over	?	Private
R-06	Glengarry Creek Reservoir 6	0	dry (0)	0	350	10-15	5	Over (breached)	Old dam	Private
R-07	Glengarry Creek Reservoir 7	0.65	3	1.0	500	12	9	Around	No	Private
R-09	Glengarry Creek Reservoir 9	0.65	6-8	2.2	600	15	17	Around	No?	Private
R-10	Glengarry Creek Reservoir 10	0.95	6	3.8	500	15-20	2	Over	Yes	Private
R-11	Basin Creek Reservoir 1	3.30	6-8	12.0	430	12-15	14	Over	Yes	Private
R-12	Basin Creek Reservoir 2	2.80	8-10	14.5	840	3-40	17	Over	Yes	Private
R-13	Basin Creek Reservoir 3	0.30	6	1.0	40	10	10	Over	No	Private
R-15	Basin Creek Reservoir 5	0.05	0.4	0.02	40	6	6	Over (breached)	No	Private
R-19	Sunday Hill Mine Reservoir 1	0.01 0.07	2.0 7.5full	0.01 0.35full	145	10	10	none	No	BLM
R-20	Sunday Hill Mine Reservoir 2	0.06	3.5	0.12	270	10	13	Over (breached)	No	BLM
R-21	Unnamed Gulch Reservoir 1 in lwr Emig. Cr	0.02	4	0.03	50	10-12	6	Around	No	BLM
R-25	City Gulch Reservoir 1	0.04	3	0.06	40	20	10	none	No	BLM & Private
R-26	Humbolt Reservoir 1	0.05	2	0.05	250	5-10	6	none	No	Private
R-27	County Road Reservoir 1	0.02	3	0.03	80	12	4	none	No	Private
R-28	Hilltop Reservoir	0.02	2	0.03	100	3	3-5	over	No	BLM & Private
R-31	Dry Reservoir	0.03	dry (2)	0	45	3-10	3	over	No	Private
R-32	County Road Reservoir 2	0.01	2	0.01	30	12	4	over	No	Private
R-33	Rich Gulch Reservoir 2	0.005	3	0.01	40	12	3	over	No	Private

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R-35	Rich Gulch Reservoir 1	0.02	always dry (2)	0	50	5-10	3	around	No	BLM & Private

Discussion – Of the 35 reservoirs mapped, 25 were located on streams and 10 were located on dry hillsides.

Reservoirs in Mormon Basin have an estimated maximum surface water area of 16 acres in the springtime, to an estimated minimum water surface area of 7 acres in the fall. Evaporation loss from these reservoirs is estimated to be no less than 2.5 acre-feet per acre of water surface per year based on evaporation pan data for the Oregon State University Agricultural Experiment Station at Union, Oregon (**NOAA 1974-1999**) and observations of water level fluctuations of rockpit ponds on the Wallowa-Whitman National Forest by the author. This data suggests total evaporation losses from reservoir surfaces in Mormon Basin are more than 17.5 acre-feet per year (7 acres times 2.5 acre-feet/year), most likely near 25 acre-feet per year.

Maximum spring-time storage capacity of reservoirs in Mormon Basin is estimated to be about 60 to 70 acre-feet, as shown in the above tables. Minimum autumn-time storage capacity is estimated to be about 15 to 30 acre-feet. Maximum water depth ranges from about 1 to 10 feet.

Reservoirs located on streams eventually will fill with sediment. Several reservoirs in Mormon Basin are full or mostly full of sediment at this time; two examples are R-15 and R-17. Without dam maintenance, most streams will cut a notch through reservoir dams at the spillway or another low spot in the dam, especially as they reestablish their natural meander pattern and gradient in stored sediments; some examples in Mormon Basin include R-06, R-11, R-15, and R-17. In Mormon Basin, the natural breaching of reservoir dams by streams is countered by beaver, which have built mud-and-willow dams in the outlets of Reservoirs 8, 10, 11, 12 and 14, causing overtopping or near overtopping at several locations among the dams of these reservoirs, all of which is a natural outcome of beaver activity. Beaver have increased the water surface elevation of the above reservoirs by 2 to 3 feet.

Beaver appear to have excavated several feet into some dams in Mormon Basin, presumably to create dens. These sites are evident by collapsed borings. Beaver have also excavated tunnels through narrow shared dams; a site was found on the north end of the dam shared by R-09 and R-11. There is an old beaver lodge on the west end of R-04; there may be an old collapsed beaver lodge north of the City Gulch Creek inflow to R-03.

Dam length ranges from 10 to 700 feet. Dam height (downstream face) ranges from 3 to 18 feet. Dam top width ranges from 3 to 40 feet. Most spillways are over the dams.

The most common dam height measurement taken was the maximum height of the downstream face. The height of the downstream face of a dam may be more or less than water depth behind the dam, but is presumed to be more for most dams in Mormon Basin, based on measurements of both faces at dry reservoirs. Actual dam height (the average of maximum potential water depth and maximum adjacent dam height) was not estimated.

Reservoir 13 is currently being used as a clean water source for the mining operation. Reservoir 4 is the only one with an outlet works.

PONDS

Methodology – Ponds are bodies of water that have no dams, and were excavated to below maximum or minimum water table to provide water for mining purposes. Ponds were mapped on aerial photos and some of them were photographed.

Results – The mapped ponds are listed in **Tables 6a and 6b**. Cross-reference the tables with the maps to see pond locations.

Table 6a. Ponds – Within the Project Area

Pond ID	Pond Name	Estimated Water Surface Area (acres)	Estimated Maximum Water Depth (feet)	Estimated Volume (ac-ft)	Perennial or Intermittent	BLM or Private Land
P-01	Glengarry Creek Pond 1	0.01	2	0.01	Perennial	BLM
P-02	Glengarry Creek Pond 2	0.08	4	0.15	Perennial	BLM
P-04	City Gulch Pond	0.01	2	0.01	Intermittent	BLM
P-06	Emigrant Creek Pond 1	0.005	6	0.03	Perennial	BLM
P-07	Emigrant Creek Pond 2	0.02	3	0.01	Intermittent	BLM
P-08	Emigrant Creek Pond 3	0.005	3	0.005	Intermittent	BLM
P-09	California Gulch Pond	0.01	3	0.01	Perennial	BLM
P-10	Glengarry Creek Pond 3	0.07	2	0.07	Intermittent	BLM
P-11	Glengarry Creek Pond 4	0.005	3	0.01	Perennial	BLM

Table 6b. Ponds - Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Pond ID	Pond Name	Estimated Water Surface Area (acres)	Estimated Maximum Water Depth (feet)	Estimated Volume (ac-ft)	Perennial or Intermittent	BLM or Private Land
P-03	French Gulch Pond	< 0.07	< 5	? 0.20	Intermittent	Private
P-05	Sunday Hill Pond	0.01	5	0.04	Perennial	BLM

Discussion – Eleven (11) ponds were found and mapped. All mapped ponds had well developed riparian areas around them, indicating they were constructed many years in the past. Total maximum water surface area of these ponds is about 0.30 acre, with about 0.60 acre-feet of storage. Other ponds may exist in the project area and CWE analysis area. Ponds are perennial or intermittent depending on status of the local water table. All ponds appear to be related to past gold mining activity.

DITCHES

Methodology – Ditches that currently affect or have potential to affect the stream network were noted on maps and some of them were photographed.

Results – The mapped ditches are listed in **Tables 7a and 7b**. Cross-reference tables with the maps to see segment locations.

Table 7a. Ditches – Within the Project Area

Ditch ID	Ditch Name	Perennial Intermittent Ephemeral	Ditch Length (feet)	Ditch Depth (feet)	BLM or Private Land	Notes
D-01	Glengarry Creek Ditch	Perennial Intermittent	1500	1-8	BLM	Diverts flow around Glengarry Creek bottom from below French Gulch Cr inflow to 200 feet below Reservoir 3
D-02b	French Gulch Ditch Segment 2	Perennial	250	2-5	BLM	Excavated channel above French Gulch Ford
D-06	Emigrant Creek Spring Ditch	Perennial Intermittent	800	2-4	BLM	Diverts water to county road ditch

Table 7b. Ditches – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Ditch ID	Ditch Name	Perennial Intermittent Ephemeral	Ditch Length (feet)	Ditch Depth (feet)	Public or Private Land	Notes
D-02a	French Gulch Ditch Segment 1	Perennial	400	2-5	Private	Diverts water around placer hole
D-03	City Gulch Ditch 1	Ephemeral	300	2-5	Private	Abandoned ditch that functions as stream channel
D-04	City Gulch Ditch 2	Ephemeral	600	2	Private	Abandoned ditch that functions as stream channel
D-05	Puget Sound Gulch Ditch	Intermittent	300	2-3	BLM	Diverts water to Reservoir R-20
D-07	Rich Gulch Spring Ditch	Perennial Intermittent	600	1	Private	Diverts water around placer mined area

Discussion – Seven ditches were found in Mormon Basin. Most ditches (except D-03 and D-04) have permanent stream diversions. Ditches can be sources of sediment, but the ones listed in the tables appear to have relatively stable bottoms. Ditches divert perennial and intermittent streams to reservoirs, and to or around previously mined areas. Some ditches collect water or have potential to collect water from hillslopes, so they act as an extension of the drainage network.

WETLANDS

Methodology – Jurisdictional wetlands were mapped by SWCA wetland specialists. However, presence, general type and boundaries of wetland vegetation were identified, as needed, during the mapping of several hydrologic features in Mormon Basin, based on experience of this author mapping jurisdictional wetlands on the WWNF.

Discussion – It was necessary to identify and observe wetland boundaries and conditions while mapping stream flow types, stream channels, reservoirs, ponds, and floodplains, and at stream cross-sections and road fords. See the floodplains section for discussion of wetland-floodplain interactions.

GROUNDWATER HYDROLOGY

Methodology – Depth to groundwater was observed in reservoirs, ponds, streams, gullies, and mined areas.

Discussion – Depth to the groundwater table in Mormon Basin is as follows:
(1) Within 0 to 1 foot of the soil surface at perennial springs and streams.
(2) Seasonally within 0 to 5 feet of the soil surface at intermittent springs, streams and ponds.
(3) More than 5 feet below the soil surface on dry hill slopes and ridges. Observations of groundwater presence/absence were made at ten sites within or near the west side of the project area which have cutslopes ranging in height from 10 to 30 feet. Eight of the ten sites had a seasonal or permanent ground water table at a depth of 10 to 30 feet below the original soil surface.

The ground water table near perennial springs and streams and near intermittent springs during seasonal flow is usually parabolic-upward. This is evidenced by wetlands and water seepage on banks above the point of water emergence and above the stream channel. Losing reaches of perennial streams (where the stream flow decreases as it loses water to groundwater) and dry intermittent springs and streams usually have parabolic-downward water tables.

The steep excavated slope southeast of Reservoir R-03, south of the road, provides a glimpse of a deep groundwater table, and the variability of seasonal water depth. The top of riparian vegetation is the spring-time water table; the rest of the year the water table is below the bottom of the cutbank.

AREAS WITH NO SURFACE WATER OUTFLOW

Methodology – Several areas with no surface water outflow were observed in Mormon Basin and areas larger than 1 acre were mapped on aerial photos.

Results – See Maps 1 and 2.

Table 18. Areas with No Surface Water Outflow Potential

Area ID	Location	Acreage Estimate	BLM or Private Land; Inside the Project Area, or Outside the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Res R-1)
B-01	North of Glengarry Creek Ditch from above county road on the west to a valley-wide tailings dam north of R-03 on the east	30	BLM - Inside the Project Area
B-02	Old French Gulch Valley downstream from French Gulch Ditch Segment 1 to a primitive road/dam across the tailings below the Humbolt Mine Road	12	BLM - Inside the Project Area; Private - Outside the Project Area But Within the Watershed Cumulative Effects Point for the Project Area
B-03	Lower old French Gulch valley and adjacent areas below B-02 that drain into or from irregular rocky tailings	6	BLM - Inside the Project Area; Private - Outside the Project Area But Within the Watershed Cumulative Effects Point for the Project Area

Discussion – Three large areas with no surface water outflow potential were created by past placer mining of valley bottoms along Glengarry Creek and French Gulch Creek. The ground surface of these mined areas is very uneven, ranging from about 3 to 15 feet from the bottoms of small basins to the tops of piles of rock and soil, which creates dozens of “miniature basins” within placer mined areas with no surface water outflow potential under current conditions. Although the three “large basins” include unmined uplands that have potential for water runoff, and in some places do have short ephemeral runoff channels, all such surface water runoff flows into the mined land basins where it percolates into ground water. In most parts of these “basins” the ground water table is deeper than 5 feet. Where the ground water table is at or near the surface, there is no potential for surface water to rise above the mine spoils. Small wetlands exist in some of the miniature basins.

Small irregular areas (less than 1 acre) with no surface water outflow potential were not mapped. These areas were observed in Rich Gulch, south of R-03, and in parts of Emigrant Creek; there are old ditches and runoff channels through these areas.

GULLIES AND HEADCUTS

Methodology – Gullies and headcuts were observed and noted where encountered; a complete inventory of these conditions was not made. Several sites were photographed.

Results – Some sites with gullies and headcuts are noted on photos and maps in the Appendix, and in **Tables 19a and 19b** below. In the column labeled "Level of Concern," a Low rating suggests low priority for further evaluation or stabilization, and a Moderate rating suggests moderate priority for further evaluation or stabilization.

Table 19a. Some Sites with Gullies and Headcuts – Within the Project Area

Gully or Head cut ID	Photo ID	Notes	Level of Concern	BLM or Private Land
G-01	G-01	Short steep gully in gravelly to cobbly soils of Glengarry Creek below French Gulch Creek inflow where it enters a placer hole at beginning of Glengarry Creek Ditch	Low	BLM
G-02	G-02	Short steep gully in gravelly to cobbly mine spoils of Glengarry Creek below Reservoir R-03 at the end of the Glengarry Creek Ditch	Low	BLM
G-03	G-03	City Gulch Creek Gully above wetland	Moderate	BLM and pvt
G-06	G-06	Gullied channel of Emigrant Cr through sand deposit near confluence with Puget Sound Gulch above and below cross-section X-09	Low	BLM
G-07	G-07	Gully along California Gulch Creek through old sand-filled reservoir and dam	Moderate	BLM
G-09	-----	Gullied intermittent tributary of California Gulch	Low	BLM
G-10	-----	Gully on steep headwall of mined area; several smaller rills and gullies along the face	Moderate	BLM
G-11	G-11	A gully above the shed north of French Gulch is delivering water and sediment to the work area and down the hydrologically connected roads. The storage tanks shown in photos have been removed.	Moderate	BLM
G-12	G-12	Entrenched reach of California Gulch Cr – Eb6 type	Low	BLM
G-13	G-13	Entrenched reach of California Gulch Cr – Eb6 type	Low	BLM
G-14	G-14	Entrenched reach of California Gulch Cr – Eb6 type	Low	BLM
G-15	G-15	Gully through old sand-filled reservoir and dam	Moderate	BLM
H-02	H-02	3 foot high headcut in upper California Gulch Creek about 100 yards below cross-section X-20	Moderate	BLM
H-06	H-06	Headcut through old California Gulch dam; see G-15	Moderate	BLM
H-10	-----	2 foot headcut in French Gulch Creek about 300 feet above the ford – stable – ditched below	Low	BLM

Table 19b. Some Sites with Gullies and Headcuts – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Gully or Head cut ID	Photo ID	Notes	Level of Concern	BLM or Private Land
G-04	G-04	Gravel deposit below converging gullies in upper Emigrant Creek	Low	BLM
G-05	G-05	Entrenched channel of Emigrant Creek above 1st spring upstream from road to Sunday Hill Mine	Low	BLM

G-08	G-08	Vegetated gully below H-04 is stable	Very Low	pvt
H-01	H-01	Headcut in R-21 dam on Emigrant Creek tributary	Low	BLM
H-03	H-03	Headcut in siltstone below R-12;	Low	BLM
H-04	H-04	3 foot high headcut in Basin Creek about 100 feet below R-14	Moderate	BLM
H-05	-----	Headcut of Puget Sound Gulch Creek upstream from inflow from R-20	Low	BLM

Discussion – Several gullied streams and headcuts are present within the project area (**Table 19a**) and elsewhere above the CWEA point (**Table 19b**). Gullies and headcuts that were given a moderate level of concern are recommended for further evaluation of stabilization needs, including G-03, 07, 10, 11, and 15, and H-02, 04, and 06. Sites on public land would be appropriate for inclusion in a restoration alternative. Concern about these sites is only moderate because headcut/gully progression upstream is slow and recovery of the channels and riparian areas below the headcuts has been relatively rapid in most areas due to the presence of sedges and rushes along the streambanks. The major concern for the future is wildfire, because there has not been one for a long time and continued watershed stability depends on the absence of large wildfires.

ALTERED HYDROLOGY AND HYDROGRAPHY

Methodology – Areas of altered hydrology and hydrography were mapped on the ground and from aerial photos.

Results – Areas of altered hydrology and hydrography are shown on **maps** and **photos**, and are discussed below.

Discussion – The hydrography of Mormon Basin has been altered by roads, stream diversions, ditches, reservoirs, dams, placer mining spoils, sediment deposits, and adits. Changes include:

(1) <u>Large areas with no surface water outflow potential</u> were created by placer mining of uplands and valley bottoms. Uneven piles of soil and rock prevent runoff and formation of rills, gullies or stream channels. An example is the valley bottom north of the Glengarry Creek Ditch/Reservoirs R-01, 02, 03. See **Table 18** and area B-01 on Map 1.

(2) <u>Reservoirs and associated dams</u> which provide more open water surface and higher evaporation rates than under natural conditions, which store more water in the basin than under natural conditions with the assistance of beaver, which also reduce snowmelt and storm-generated peak flows from the basin but may increase summer base flows. Reservoirs along Glengarry and Basin Creeks are estimated to provide about 15 acres more open water surface than pre-mining conditions where beaver built small dams/reservoirs on narrow stream channels. <u>Evaporation losses</u> are about 20 acre-feet per year, which equals an annual flow rate of 0.03 cfs, which is about 20% of the June 2008 flow of Basin Creek below California Gulch.

(3) <u>Ditches and associated dams</u> which divert streams onto hillslopes into different drainages, or to reservoirs, or around placer mined bottoms. An example is the

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French Gulch Ditch (segment 1) which diverts water into a different drainage around a placer mined bottom.

(4) Roads and old water conveyance ditches that potentially extend the drainage network. An example is the three roads that periodically deliver water and sediment to French Gulch Creek Ford.

(5) Adits which bring ground water to the soil surface. An example is the collapsed adit southeast of Reservoir R-17; there is a small rust-stained riparian area on the mine dump.

(6) Sediment deposits in floodplains from mining activities have raised the soil surface farther above the water table and have created convex deposits in some areas that now have gullied channels though them. Two examples are the confluence of Puget Sound Gulch with Emigrant Creek, and California Gulch at the east boundary of the project area.

(7) Loss of hardened or sealed channel bottoms in mined stream channels. It is likely that pre-mined Glengarry Creek/Basin Creek had perennial flow through Mormon Basin to California Gulch. Today there are two intermittent reaches in placer gravels between Reservoirs R-03 and R-04. Other intermittent reaches exist and will be easy to find in September before cold weather stops riparian area evapo-transpiration.

(8) Gullies and headcuts in many areas are natural hydrologic responses to past mining activities.

ROADS ANALYSIS

FORDS

Methodology – Road fords of perennial and intermittent streams were noted on maps and most of them were photographed.

Results – The mapped roadway fords are listed in **Tables 8a and 8b**. Cross-reference tables with **maps** to see segment locations. Fifteen fords were mapped within and near the project area. Six of the fifteen fords are located on perennial streams and two are located below springs that appear to be perennial.

Table 8a. Fords of Streams by Roads – Within Project Area

Ford ID	Ford Name	Ponds Water? Yes/No	Perennial or Intermittent Stream Flow	BLM or Private Land	Comments
F-02	Glengarry Cr Ford 2	No	Perennial	BLM	Malheur County Rd
F-03	Glengarry Cr Ford 3	No	Perennial	BLM	S of county rd
F-04	Glengarry Cr Ford 4	Yes	Perennial	BLM	Below Res R-02
F-05	Glengarry Cr Ford 5	Yes	Perennial	BLM	Below Res R-03
F-06	Glengarry Trib 1 Ford	No	Perennial	BLM	Malheur County Rd
F-07	Glengarry Trib 2 Ford	No	Perennial	BLM	Malheur County Rd
F-08	Glengarry Trib 3 Ford	No	Intermittent	BLM	Malheur County Rd

F-09	French Gulch Ford	Yes	Perennial	BLM	Rocked since inventory
F-17	Intermittent stream ford 1	No	Intermittent	BLM	Water flows from 2 gullies above shed
F-19	Intermittent stream ford 2	Yes	Intermittent?	BLM	Water seeping from depression below R-08 flows across rd to R-13

Table 8b. Fords of Streams by Roads – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Ford ID	Ford Name	Ponds Water? Yes/No	Perennial or Intermittent Stream Flow	BLM or Private Land	Comments
F-01	Glengarry Cr Ford 1	Yes	Perennial	BLM	E of county rd
F-10	Sunday Hill Cr Ford	No	Intermittent	BLM	creek runs down rd
F-11	Puget Sound Gulch Cr Ford	No	Perennial	BLM	x-ing E of Sunday Hill Mine
F-12	Unnamed Emigrant Cr Trib Ford	No	Intermittent	BLM	N side of Emigrant Cr
F-13	Tuesday Gulch Ford	No	Intermittent	BLM	N side of Emigrant Cr
F-14	Emigrant Cr Ford	No	Intermittent	BLM	Road to processing site
F-15	Rich Gulch Ford 1	No	Intermittent	BLM	ok
F-16	Rich Gulch Ford 2	No	Intermittent	Private	by Res R-14
F-18	Rich Gulch Ford 3	No	Intermittent	Private	By Res R-33

Discussion – Nineteen fords were mapped. Fords are sources of sediment for streams. They widen and deepen over time as wheels sink into fine sediments as vehicles pass through the fords; the wheels also generate wakes of water that wash fine sediments from the stream banks of the ford. Fine sediment from streams settles into deepened/widened fords, which function as miniature ponds, such as the one at French Gulch (F-08)(see photos) before it was rocked. Wheel-caused wakes stir fine sediment from the ford bottom and sides which the stream then delivers downstream. An example of sediment delivery from a ford is seen the photograph of French Gulch Creek above the confluence with Glengarry Creek. Glengarry Creek Fords 1, 4 and 5 (F-01, F-04, F-05) and French Gulch Ford (F-08) are the widest and deepest ones in the project area. F-08 was rocked in July 2008 after it was inventoried. There are other fords on BLM and private land above the CWE point that were not inventoried; the most significant ones were inventoried.

CULVERTS

Methodology – Culverts were mapped on aerial photos and all were photographed. Diameter and percent plugging of both ends was noted. Composition was usually noted.

Results – The mapped culverts are listed in **Table 9a and 9b**. Cross-reference tables with **Maps** to see locations.

Table 9a. Culverts – Within the Project Area

Culvert ID	Site ID	Culvert Name	Culvert Diameter (inches)	Inlet Status	Outlet Status	BLM or Private Land	Location
C-01	1	Glengarry Cr Culvert 1	Metal 15	part plug	open	BLM	Dam/east/headgate
C-02	1	Glengarry Cr Culvert 2	Metal 15	100% plug	open	BLM	Dam/middle
C-04	3	Emigrant Cr Culvert 1	Pvc 6	100% plug	open	BLM	Rd/dam/top
C-05	3	Emigrant Cr Culvert 2	Metal 7.5	100% plug	open	BLM	Rd/dam/bottom
C-07	5	Rich Gulch Culvert	Metal 12	85% plug	95% plug	Private	**County Road**
C-08	6	California Gul Culvert 1	Metal 6	50% plug	open	BLM	Road
C-09	6	California Gul Culvert 2	Metal 6	50% plug	open	BLM	Road
C-10	7	California Gul Culvert 3	8	100% plug	100% plug	BLM	Rd/dam/bottom
C-11	7	California Gul Culvert 4	8	open	open	BLM	Rd/dam/middle
C-12	7	California Gul Culvert 5	8	100% plug	100% plug	BLM	Rd/dam/top

Table 9b. Culverts – Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Culvert ID	Site ID	Culvert Name	Culvert Diameter (inches)	Inlet Status	Outlet Status	BLM or Private Land	Location
C-03	2	Glengarry Cr Culvert 3	Metal 24	70% plug	open	Private	**County Rd/** dam
C-06	4	Emigrant Cr Culvert 3	Metal 12	50% plug	85% plug	Private	**County Road**
C-13	8	Sunday Hill Culvert	Metal 8.5	50% plug	open	BLM	P-5 Sunday Hill Pd

Discussion – Thirteen culverts were found at eight sites in or near the project area. Four potential culverts were found south of C-03 on the country road; two had an entrance, but appeared to have no exit; the other 2 had an exit but appeared to have no entrance; they may be part of an old mining water distribution system and were not included in the inventory.

Culverts were found under roads and through dams. Most culverts were partly to completely plugged. All culverts were undersized for potential peak stream flow. In some locations, undersized/plugged culverts caused overtopping of roads or dams with subsequent erosion. All culverts need maintenance. The top of C-06 (Emigrant Cr Culvert 3) is at the bottom of the stream channel. Percent plugging of C-01 was not determined because it was in the pond; it was partly plugged by cattail and willow debris.

RECENT ROAD CONSTRUCTION / RECONSTRUCTION

Methodology – The location of some recent road construction / reconstruction was generally observed as other field work was being done, but no detailed mapping of this work was done.

Results – See **Map 2** for approximate locations of some recent primitive road construction/reconstruction. The locations are marked by parallel dashed lines.

Discussion – Three areas of recent road construction/reconstruction were noted which affect or may affect portions of Project Area units 1a and 2, as shown on **Map 2**. Some of this work is reported to be related to a requirement by DOGAMI that the private property owner clearly mark the private land boundary.

Unit 1a south – boundary road: One of the new 4-wheel drive boundary roads begins at the Humbolt Mine Road and progresses down Rich Gulch Creek drainage to the east, crossing Rich Gulch in 3 or 4 locations before entering an old mining road through rocky tailings on the south side of Rich Gulch. All of the 1,300-foot long 4-wheel drive road appears to be on private land.

Unit 2 – boundary road: One of the new 4-wheel drive boundary roads begins at the Humbolt Mine Road and progresses eastward across old French Gulch and City Gulch, up City Gulch, east through R-29, along the ridge, then down into a drainage near R-31. All of the 3300-foot long 4-wheel drive road appears to be on private land. The author drove the west end of this road from corner 21 to corner 19.

The surface of the above two boundary roads is rough or undulating. Cuts are as high as 5 feet in some locations. There are no water bars. Ground cover is low, about 5-10%, except in areas of tailings and where the dozer blade was not in full contact with the ground surface. More than ninety percent (90%) of road length has silt loam to clay loam roadbed material which will be easily rutted and slick when wet.

Unit 2 – Humbolt Mine Road: The Humbolt Mine Road from the Humbolt well to the Glengarry Creek Road has been reconstructed to accommodate mining equipment. The road surface is smooth and silty and will rut when wet.

ROADWAY EXTENTION OF DRAINAGE NETWORK

Methodology – Rutted roads and bermed roads, which have potential to collect and deliver water and sediment to streams, reservoirs, floodplains and wetlands during storms, were mapped on aerial photos. A few of these roads were photographed.

Results – The mapped road segments are listed in **Table 10as and 10b**. Cross-reference the tables with **Maps** to see segment locations. Table 10b is a partial list of such roads outside of the project area.

Table 10a. Roadway Segments That Can Function as Ephemeral Stream Channels – Within the Project Area

Road Seg-Ment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	BLM or pvt Land	Road Maintenance Agency
W-01	250	Off-road ruts above County Rd	Glengarry Cr Spr #3 stream ford on County Rd	BLM	BLM & Malheur Co.
W-02	400	Glengarry Cr Spr #3 stream ford on County Rd	Glengarry Cr Ford #2	BLM	Malheur Co.

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W-03	900	about 50 ft south of Glengarry Cr Ford #2	French Gulch Cr Ford	BLM	BLM
W-04	400	south of metal building SW of Glengarry Cr Ford #3	W-03	BLM	BLM
W-05	450	below jct with W-07	To Jct with rd from French Gulch ford	BLM pvt	BLM and Private
W-06	500	250 feet SE of French Gulch Cr Ford	Downstream face of reservoir R-01 dam over Glengarry Creek	BLM pvt	BLM and Private
W-08	300	Flat east of Reservoir R-02	Glengarry Creek Ford #4	BLM	BLM
W-09	400	Beginning of gully in old mining road above highwall west of reservoir R-04	To road beside reservoir R-04 (possibly into reservoir when flow is high) then into basin south of road	BLM	BLM
W-10	1100	Junction with county road	Mined land 300 feet north of reservoir R-02	BLM	BLM
W-11	1500	North of reservoir R-04	1200 ft to Pond P-11 (pvt), then 300 ft to County Rd (on pvt land), then 200 ft to wetland south of Co Rd (pvt)	BLM pvt	BLM and Private
W-12	250	Ridge north of Rich Gulch	Ephemeral draw N of Rich Gul; no stream channel connection	BLM	BLM
W-15	550	Junction with W-14	Emigrant Creek / Res R-18	BLM	BLM
W-19	500	County Rd crossing over Rich Gulch	Down County Rd, then down side road to Rich Gulch crossing near reservoir R-14	BLM & pvt	Malheur Co and pvt
W-20	350	Top of road	County Road	BLM & pvt	BLM and pvt
W-22	900	Jct with Humbolt Mine Rd	Slope above Rich Gulch; potential stream channel connection	BLM & pvt	BLM and pvt
W-23	500	Spur ridge north of California Gulch	California Gulch Road /Dam of R-16	BLM	BLM
W-24	800	Below sheds in California Gulch	South of R-16; potential hydrologic connection	BLM	BLM
W-25	500	Below stream crossing	North of R-16; potential hydrologic connection, well vegetated road with 2 ruts	BLM	BLM
W-26	150	Below sand flat	Ephemeral draw connected to California Gulch	BLM	BLM
W-28	750	ridge	Low spot in road; no potential connection to streams at this time	BLM	BLM
W-29	200	100 ft up road from culvert C-08	Near culvert C-09; road surface is rutted, runs water from spring in road, has riparian vegetation	BLM	BLM

Table 10b. Roadway Segments That Can Function as Ephemeral Stream Channels - Outside of the Project Area But Within the Watershed Cumulative Effects Point for the Project Area (Reservoir R-14)

Road Seg-ment ID	Road Segment Length (feet)	Road Segment Beginning Point	Road Segment End Point	BLM or pvt Land	Road Maintenance Agency
W-07	850	East of original French Gulch drainage	W-05	pvt	Private
W-13	300	North of W-12	To small basin near County Rd; no stream channel connection	pvt	Private
W-14	400	Below switchback west of Sunday Hill Mine mill site	Junction with road to Puget Sound Gulch	BLM	BLM
W-16	700+	unknown	To Sunday Hill Mind Rd crossing over Puget Sound Cr	BLM	BLM
W-17	1100	1st minor summit of County Rd above Emigrant Cr	Emigrant Creek	BLM	Malheur Co
W-18	600+	Co Rd north of crossing of 2 county roads	Emigrant Creek	BLM	Malheur Co and BLM
W-21	1900	minor watershed divide on Humbolt Mine Road east of Rich Gulch	From BLM through private land to Rich Gulch crossing near reservoir R-14; same crossing as W-17	BLM & pvt	BLM and pvt
W-27	700	Where road gets steep	Potential connection with W-23	pvt	pvt

Discussion – Roads listed in **Tables 10a and 10b** have features that concentrate runoff water during periods of rapid snow melt and heavy rainfall. These features include road construction at a steep gradient along hillslopes and up/down hillslopes, excavation of a road surface below the land surface (entrenched), and road surface features such as berms and parallel ruts. These road segments range in length from 300 to 1500 feet. They function as ephemeral drainages that do or can extend the current drainage network during intense snowmelt and heavy rainfall. There are few rolling dips and water bars on these roads in Mormon Basin. Maps also show some road segments that collect water and deliver it to slopes without connecting to streams; an example is the road west of W-01 and the ridge road on the north side of upper City Gulch.

WATER QUALITY

Methodology – BLM provided water quality data they collected in Basin Creek 2 miles downstream of Mormon Basin in 2000, 2001, 2002 and 2003 (**BLM 2003**) The BLM did not request any additional water quality data collection for this project. However, additional observations of turbidity and of sediment sources and deposits were made during stream inventory work. The Oregon Department of Environmental Quality's

(ODEQ) 303(d) list for Basin Creek (**ODEQ 2006**) was also used as a data source. **Bliss 2001** was used to estimate spring water temperatures for Mormon Basin.

Results – See the following tables in the Appendix:
Table 11a. BLM Water Temperature Data for Basin Creek
Table 11b. Other BLM Water Quality Data for Basin Creek
Table 11c. ODEQ 303(d) List for Basin Creek
Only data on water temperature, turbidity and sediment are reported and discussed below. There is no information for other water quality parameters for Mormon Basin.

WATER TEMPERATURE

Discussion – BLM collected water temperature data for Basin Creek 2 miles below Mormon Basin. Summer water temperatures at the measurement site are well above the ODEQ standard of 68 F, which is why Basin Creek is included on the 303(d) list for exceeding summer water temperature for redband trout. Conditions near the BLM measurement site that could affect water temperature may include naturally low summertime stream flows, north-south stream orientation which is highly susceptible to collecting solar radiation, high summertime air temperatures, and past mining of the channel which may contribute to low or subsurface flow.

It is unknown how much various conditions in Mormon Basin may affect water temperature readings at the BLM measurement site and at the CWE analysis point for the basin. One concern is the solar heating of several sequential reservoirs in Mormon Basin, including R-08 to R-14, which are immediately above the CWE point. However, it also must be noted that data from a water temperature study in the adjacent upper Burnt River Basin (**Duncan D. et al 2002**) in which this author participated as the US Forest Service representative, and studies by this author on the Wallowa-Whitman National Forest (WWNF) (**Bliss 2002**) suggest that water temperatures of low-elevation low-discharge streams in NE Oregon, like Basin Creek, naturally exceed ODEQ summer water temperature standards.

Water temperatures of source springs in Mormon Basin were not measured. However, they were predicted from a study done on the WWNF (**Bliss 2001**) to be about 41 F to 45 F for springs emerging between 5200 and 4800 feet elevation. Studies done by Bliss on the WWNF (**Bliss 2002**) also suggest water temperatures of in-and-out streams, like those in Mormon Basin, cool 10-25 F in the summer as they pass from perennial to intermittent to perennial reaches with emergent temperatures commonly in the mid-50's F to low-60's F.

TURBIDITY

Discussion – Reservoirs R-01 and R-02 (see photos) were observed to have very high turbidity from algae, but this condition did not exist in R-03 or R-04 (see photos). Turbidity in R-8, R-9, R-10, R-11, R-12 and R-14 (see photos for R-14), which appears to be related to beaver activity and includes suspended sediment and algae, is filtered out by R-14 and cattails in R-15. Water exiting the project area at cross-section X-23 below reservoir R-15 had low turbidity in late June 2008 (see Photo X-23). The above observations suggest that high reservoir turbidity in some Mormon Basin reservoirs has little or no effect on turbidity measurements two miles downstream at the BLM water quality measurement site.

SEDIMENT

Discussion – Sediment transport out of upper Basin Creek below Reservoir R-15 is very low compared to pre-mining conditions, because reservoirs, wetlands and floodplains are trapping all bedload and most suspended sediment. The lowest elevation streams in the project area, Rich Gulch Creek and California Gulch Creek, both empty into Reservoir R-14, and all other streams upstream of there empty into several other sequential reservoirs. Reservoir R-15 is nearly full of sediment, is covered by cattails, and will continue to filter out sediment.

Observation of sediment deposits at stream cross-sections for source streams for Mormon Basin indicates most current bedload transport into reservoirs in upper Basin Creek consists of gravel (up to 3-inch diameter), sand and silt. Cobble is a very small component of bedload transport, and is actively moving in only a few short reaches of a few streams.

Because of high sediment storage in upper Basin Creek, the Sediment Delivery Ratio to Basin Creek below Mormon Basin is very low, estimated to be below 1 percent. Current sediment transport out of Mormon Basin below R-15 consists primarily of silt that floodwaters can carry through R-14, plus small-diameter gravel, sand and silt the stream can flush from the eroding channel between R-14 and R-15 through the cattails in R-15. This information suggests that Basin Creek below the CWEA point is sediment starved compared with the pre-mining, pre-reservoir condition.

WATER DEVELOPMENTS, USES & RIGHTS

WATER DEVELOPMENTS

Water developments found in or near the project area in Mormon Basin include 1 spring development, at least 26 reservoirs (with dams) (**Tables 5a and 5b**), at least 10 ponds (no dams) (**Tables 6a and 6b**), several stream diversions into ditches (**Table 7a and 7b**), and one 800-foot deep well (shaft).

WATER USES

The State of Oregon has classified the waters of the Malheur River Basin (**OAR 2008**), which includes Basin Creek, for the following purposes: domestic, livestock, municipal, irrigation, power development, industrial, mining, recreation, wildlife, fish life, and pollution abatement. From the above list, current water uses in the Project Area include livestock, mining, and wildlife. From water rights listed in **Table 12**, water uses include mining and wildlife.

EXEMPTIONS FROM WATER RIGHTS

Methodology – Certain types of water sources, developments and uses are exempt from the need for a water right certificate. They are referred to as exempt springs, exempt reservoirs and exempt groundwater uses. Exempt springs include "a landowner's use of a spring which, under natural conditions, does not form a natural channel and flow off the property where it originates at any time of the year" (**OWRD 2001**). Exempt reservoirs are registrations under House Bill 2153. Exempt groundwater uses are listed in state administrative rules and include mining water use under the 5,000 gallons per day industrial use. The state electronic water rights database was searched for exempt registrations. The Malheur County watermaster office was not queried for information about exempt reservoirs and exempt wells that may be in their plat card database. Persons familiar with Mormon Basin were also asked about spring developments and wells.

Results – No information was found for exempt spring developments, exempt reservoirs, or exempt wells in the Project Area. No information was available for private lands.

WATER RIGHTS

Methodology – Water right information was provided by Jan Alexander and from a search of the Oregon Water Resources Department (OWRD) (**OWRD 2008**) electronic water rights data base.

Results – Three (3) water rights were found for the project area. Data from them is posted in **Table 12**, below.

TABLE 12. Water Rights of Record for Public and Private Lands in Mormon Basin

Ref. No. and Water Right Applic., Permit, and Cert. Number	Applicant Name	Priority Date	Point of Diversion: Source Name & Legal Description	Diversion Quantity, (Rate in cfs/ac) & (Duty in af/ac/mo or af/ac/yr)	Use	Place of Use	Acreage	Period of Use
WR-1 (no certificate number)	Andrew Hansen	(1)1896 (2)1905	Mormon Basin, Glengary Creek, French Gulch	(1) 1.25 cfs (2) 1.25 cfs total 2.50 cfs	Mining	along Mormon Basin, Glengary Creek, and French Gulch	not stated	Year long

WR-2 Applic S23450 Permit S18635 Cert 47931	Lloyd Dinger, Sumpter Gold Dredge Inc	09-28-1948	Humbolt Mine Shaft: SW NE Sec 20 T13S R42E (private land)	1.0 cfs	Mining	SE SW, SW SE, SE SE Sec 17; NE NE, NW NE, SW NE, SE NE, NE NW, NW NW, SE NW, NE SE, SE SE Sec 20; SW NE, NW NW, SW NW, SE NW, NE SW, NE SE, NW SE, NW SW Sec 21; T13S R42E	not stated	Year long
WR-03 Applic. R-74498 Certificate 69224	Jiles Dinger, Sumpter Gold Dredge Inc	01-01-1993	(1) NE NW Sec 20 (2) NE NE Sec 20 (3) NW SW Sec 21 (4) NW SW Sec 21 T13S R42E	(1) 20 ac-ft storage (2) 4 ac-ft storage (3) 8 af-ft storage (4) 3 ac-ft storage	Mining and Wildlife	(1) NE NW Sec 20 (2) NE NE Sec 20 (3) NW SW Sec 21 (4) NW SW Sec 21 T13S R42E	not stated	Year long

Discussion – Three water rights have place of use within the project area and CWEA area: all places of use shown for the 3 water rights include public land administered by the BLM. Two of the water rights (WR-1 & WR-3) have points of diversion within the project area. Reservoirs in the project area (**Table 5a**) and CWEA area (**Table 5b**) that are not included on WR-03, appear to have no water right registration with the State of Oregon.

WR-1 points of diversion and place of use include public land in the project area and private land in the CWEA area. The cumulative diversion rate of 2.5 cfs is equivalent to all bankfull stream flow leaving Mormon Basin below California Gulch based on the bankfull flow estimate for cross-section X-23 as shown in **Table 4b** and as discussed in the Stream Discharge section.

WR-2 point of diversion is located on private land in the CWEA area. Places of use include public land in the project area and private land in the CWEA area. The private land owner plans to pump from the well and pipe the water to wherever it is needed on place of use lands. The OWRD prefix in it's water rights data base for the WR-2 application and permit is incorrect; according to current OWRD policy, Humbolt Shaft should be coded G for groundwater, not S for surface water.

WR-3 reservoirs 1 and 2 are the same as reservoirs R-02 and R-03, respectively, in **Table 5a.** **WR-3** reservoirs 3 and 4 are the same as reservoirs R-12 and R-14, respectively, in **Table 5b**. Note that capacity estimates for R-02, R-03, R-12 and R-14 differ from capacities shown in **Table 12**. WR-3 reservoirs 1 and 2 are located on public land within the project area; WR-3 reservoirs 3 and 4 are located on private land outside the project area but within the CWEA area.

SOILS

SOIL SURVEY

Methodology – Topsoils, ground cover and exposed subsoils were observed in the project area as part of the hydrologic analysis.

Results – Observations of soil properties and conditions are provided in **Table 13**.

Table 13. Observations of Soil Properties and Conditions in the Project Area

Topic	Observation
Soil Age	Topsoil age ranges from less than 100 years (mine spoils) to many thousands of years. Subsoils of residual soils weathered from sedimentary rocks are of great age. Also see Volcanic Ash section.
Soil Texture	In mined areas, surface soils were found to range in texture from pure cobbles and gravels, to extremely cobbly sandy loams and loams, to fine sands and silt loams. On unmined hillslopes, topsoil textures were commonly gravelly loams to silt loams, and subsoils were often gravelly clay loams to clays.
Volcanic Ash	Soil mapping on the nearby Wallowa-Whitman National Forest suggests undisturbed soils in the project area include variable amounts of silt-sized particles of Mt Mazama volcanic ash which was deposited about 6,800 years ago. About 20 inches of volcanic ash was deposited in NE Oregon. Natural erosion processes removed much of the ash from the project area; the remainder has been mixed into soils primarily by rodents; recognizable ash layers are absent or uncommon be may exist on alluvial fans and in forested areas on the side side of the basin.
Soil Depth	Soil depth ranges from shallow (less than 10 inches) on convex hillslopes to very deep (greater than 5 feet) on concave slope positions and in valleys.
Topsoil Thickness	Topsoils in mined areas are non-existent to thin; they are thickest in floodplains where high organic silts and sands have been deposited in backwaters of reservoirs. Topsoils of upland soils range in thickness from 4 to 7 inches for shallow soils on convex slopes (ridges), to 10 to 20 inches for deep soils on concave slopes (swales).
Soil Biotic Crusts	Soil biotic crusts are uncommon in the project area. One site was found at the mouth of Puget Sound Gulch where about 70% of the ground surface is covered with a microbiotic crust; rodents destroy the crust with annual tunneling under the snow but the crust grows faster than the rodents can churn the soil surface. Another area with 70-80% moss cover was found in mined forestland in lower Emigrant Creek.
Water Table	Seasonal and permanent water tables vary across the landscape from standing

	water at the soil surface in wetlands to more than 5 feet from the soil surface on ridges.
Natural Soil Disturbance Mechanisms	The primary natural soil disturbance mechanism is rodent churning of the topsoil, which incorporates organic matter and creates bare soil. An example is the ridge NE of Reservoir R-03 where there is up to 50% bare ground due to rodents. The secondary natural soil disturbance mechanism is soil erosion/deposition by surface water runoff. An example is the ridge east of Reservoir R-04 where high sheet erosion has pedestaled grasses, and headcuts and associated gullies in streams.

Discussion - According to information posted by the USDA Natural Resource Conservation Service (NRCS) at http://www.or.nrcs.usda.gov/pnw_soil/or_data.html (**NRCS 2008**), the NRCS has not yet published a soils report for the project area. The adjacent Baker County soil survey can be used to identify potential soils and soil properties, but the taxonomy of many of those soils is inaccurate due to the previously unrecognized influence of volcanic ash on soils in NE Oregon.

GROUND COVER TRANSECTS

Methodology – Ground cover transects were done in several locations to demonstrate the range of ground cover in the project area. Ground cover was determined by pacing a predetermined distance at a site with characteristic vegetation and landform. Transects were mapped on aerial photos and photographs were taken of most areas. Rock, biotic crusts, plant basal area and organic litter greater than ¾ inch diameter was classified as ground cover; all other conditions were classified as bare ground. Canopy cover was measured for shrubs. The percent ground cover groups in Table 14a are based on **USFS 1999** (Pacific SW Region Methodology).

TABLE 14a. Ground Cover Condition Classes

GROUND COVER CLASSES	PERCENT GROUND COVER
Very Low	0 - 10 %
Low	11 - 30 %
Moderately Low	31 – 50 %
Moderately High	51 – 70 %
High	71 – 90 %
Very High	91 – 100 %

Results – Ground cover data are listed in **Table 14b**. All of these sites are located on public land within the Project Area. Cross-reference **Table 14b** with **Maps __** to see transect locations. GC-01, 02 and 03 were done in rangelands; they show a range of 59-84% ground cover and canopy cover of 23-50%. GC-04, 05 and 06 were done in poorly vegetated mined lands; they show a range of 20-95% ground cover and that ground cover at some sites is washed rock.

Table 14b. Ground Cover Transects – Summary of Percent Ground and Canopy Cover

Site ID	Location	Percent Type of Ground Cover					Percent Ground Cover*	Percent Canopy Cover
		Bare Ground	Rock*	Micro-biotic Crust*	Plant Basal Area*	Organic Litter*		
GC-01	California Gulch	41	2	1	17	39	59	23
GC-02	Glengarry Creek	16	2	0	28	54	84	50
GC-03	French Gulch	18	0	0	14	68	82	28
GC-04	Glengarry Reclaimed Site 1	80	16	0	0	4	20	0
GC-05	Glengarry Reclaimed Site 2	58	4	0	14	24	42	5-10
GC-06	Glengarry Reclaimed Site 3	5	95	0	0	0	95	0

* greater than ¾ inch diameter.

Table 14c. Ground Cover Transects – Site Descriptions

Site ID	Site Description
GC-01	California Gulch; north slope; 10-20% gradient; vegetation is western juniper, mountain big sagebrush, current, Idaho fescue, many herbaceous plants
GC-02	Glengarry Creek; north slope; 15-30% gradient; vegetation is western juniper, current, mountain snowberry, mountain big sagebrush, brome, many herbaceous plants; taller shrubs than GC-01
GC-03	French Gulch; north slope; 5-10 % gradient; vegetation is mountain big sagebrush, current, mountain snowberry, many herbaceous plants
GC-04	Bare mined area east of Res R-02; <5% gradient; scattered grass and herbaceous plants. 64% of Bare Ground is loose pea gravel pavement.
GC-05	Reclaimed site NW of Res R-22; 5% gradient; sagebrush, grass, herbaceous plants
GC-06	Bare reclaimed site E of Res R-24; gravel, cobble, stones, little bare ground

Discussion – Ground cover was observed in forestlands, rangelands, wetlands, and mined areas. Forestlands, rangelands, and wetlands were found to have potential or near potential ground cover. Ground cover in forestland is about 85-100 %. Ground cover in rangelands is about 60-85%, but some shallow soil sites have ground cover around 50%. Ground cover in wetlands is about 90-100%. The above observations track well with observations of ground cover potential by the author on the WWNF.

At some sites in the Emigrant Creek drainage, microbiotic crusts occupy more than 50% of the ground surface, indicating low disturbance of those sites over a long period of time. At other sites, high pocket gopher activity continually churns the soil surface, which maintains a high percent of bare soil and allows for little or no microbiotic crust development.

Forestland, rangeland and wetland vegetation is naturally reestablishing on mined areas in the Project Area with varying degrees of success, depending on soil texture, depth to water table, and time since last mining entry. Current ground cover on mined lands ranges from 20% to 100%. Wetlands on older mined areas have near optimal ground cover and willow canopy cover. Ground cover recovers most rapidly where the soil surface remains moist through much or all of the growing season due to a high water table.

EROSION HAZARD RATINGS

Current erosion hazard and bare soil erosion hazard can be estimated using a number of methodologies. The factors that most affect erosion hazard are described by what is referred to as the Revised Universal Soil Loss Equation (**MSU 2002**), A=RKLSCP, where:

A = estimated average soil loss in tons per acre per year,
R = rainfall-runoff erosivity factor,
K = soil erodibility factor,
L = slope length factor,
S = slope steepness factor,
C = cover-management factor,
P = support practice factor.

In Mormon Basin, R is a constant, K has a narrow range of variability for native loam to silt loam surface soils, L and S vary across the landscape, C varies across the landscape from low ground cover mined areas and roads to high ground cover wetlands, rangelands and forestlands but changes little from year to year, and P is a constant. Therefore, the greatest variables in the Basin affecting erosion hazard are soil erodibility, slope length, slope gradient and cover.

Methodology – The California Interagency Erosion Hazard Rating Model (**USFS 1999**) (**Figures 2** and **3**) incorporates RUSLE factors, and was used to develop current erosion hazard (vegetated) and inherent erosion hazard (bare soil) ratings for the project area. One must be aware of the following limitations of using this model.

> "The Erosion Hazard Rating (EHR) method is a highly developed checklist and is not a mathematically exact equation. It is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, or mass wasting. The purpose of EHR is to (1) help evaluate the likelihood that a specific soil disturbing activity would cause accelerated sheet and rill erosion, (2) to evaluate the relative risk for adverse consequences, and (3) identify approximate soil cover amounts needed to achieve and acceptable risk level" (**USFS 1999**).

Model inputs (from Figures 2 and 3 of the methodology) for **Table 15a** are:

Soil erodibility (I) = 2 to 4, where [texture (sandy loam = 2-3; loam = 3; silt loam = 4) + aggregate stability (0)]

Runoff production (II) = 5-15 / 3 = 1.7 to 5, where [climate (1) + water movement in soil (3-6) + runoff from adjacent land (0-2) + uniform slope length (1-6)].
Runoff energy (III) = 0.15 to 0.60, where [0-15, 15-30, 30-60 slope gradient].
Soil cover (IV) = 0 to 4, where [quality & quality (0-3) + distribution (0-1)].

Model outputs for **Tables 15a and 15b are** a rating for the product of soil erodibility (I), runoff production (II), runoff energy (III), and soil cover (IV) factors: (I x II x III x IV). Adjective ratings are Low (<4), Moderate (4-12), High (13-29), and Very High (>29).

Results (unadjusted) – Table 15a shows Current Erosion Hazard Ratings, and **Table 15b** shows Inherent Erosion Hazard Ratings using the California HER method.

TABLE 15a. Current Erosion Hazard for Forestland, Rangeland, and Roads - Unadjusted

FORESTLAND, RANGELAND, OR ROAD	PERCENT GROUND COVER	PERCENT CANOPY COVER (1)	EQUATION (2) (gradient)	CURRENT EROSION HAZARD RATING (3)
Forestland	>90%	71-90%	(3-4)(1.7-2.7)(.05-.60)(0) = 0	Low
Forestland	>90%	51-70%	(3-4)(1.7-2.7)(.05-.37)(1) = 0.3 – 4.0 (3-4)(1.7-2.7)(.37-.60)(1) = 4.1 – 6.5	Low Moderate
Forestland	71-90%	31-70%	(3-4)(1.7-2.7)(.05-.19)(2) = 0.5 – 4.0 (3-4)(1.7-2.7)(.19-.60)(2) = 4.1– 13.0	Low Moderate
Forestland	71-90%	0-30%	(3-4)(1.7-2.7)(.05-.13)(3) = 0.8 – 4.0 (3-4)(1.7-2.7)(.13-.37)(3) = 4.1 – 12.0 (3-4)(1.7-2.7)(.37-.60)(3) = 12.1 – 19.4	Low Moderate High
Rangeland	51-90%	0-30%	(2-3)(2.3-5.0)(.05-.09)(3) = 0.7 – 4.0 (2-3)(2.3-5.0)(.09-.27)(3) = 4.1 – 12.0 (2-3)(2.3-5.0)(.27-.60)(3) = 12.1 – 27.0	Low Moderate High
Cutbanks	11-30%	0-10%	(2-4)(1.7-3.3)(.40-.80)(4) = 5.4 – 10.9	Moderate
Roadbeds	0-10%	0%	(2-4)(4.3-6.0)(.01-.035)(5) = 0.4 – 4.0 (2-4)(4.3-6.0)(.035-.10)(5) = 4.1 – 12.0 (2-4)(4.3-6.0)(.10-.15)(5) = 12.1 – 18.0	Low Moderate High

(1) Canopy cover includes trees and shrubs; trees includes canopy of trees in all layers.
(2) Ranges in ratings were made by varying slope gradient (3rd paren from left).
(3) Low (<4), Moderate (4-12), High (13-29), and Very High (>29).
(4) Rangelands with the highest ground cover are located on north slopes, in swales, and in wetlands.

TABLE 15b. Inherent Erosion Hazard for Forestland and Rangeland - Unadjusted

	PERCENT GROUND COVER (1)	PERCENT CANOPY COVER (1)	EQUATION (1) (gradient)	CURRENT EROSION HAZARD RATING
Forestland	0-10%	0-10%	(3-4)(1.7-2.7)(.01-.07)(5) = 0.3– 4.0 (3-4)(1.7-2.7)(.07-.22)(5) = 4.1 – 12.0 (3-4)(1.7-2.7)(.22-.54)(5) = 12.1 – 29.0 (3-4)(1.7-2.7)(.54-.60)(5) = 29.1 – 32.4	Low Moderate High Very High
Rangeland (1)	0-10%	0-10%	(2-3)(2.3-5.0)(.01-.05)(5) = 0.2 – 4.0 (2-3)(2.3-5.0)(.05-.16)(5) = 4.1 – 12.0 (2-3)(2.3-5.0)(.16-.39)(5) = 12.1 – 29.0 (2-3)(2.3-5.0)(.39-.60)(5) = 29.1 – 45.0	Low Moderate High Very High

(1) Data inputs for bare soil conditions from Figures 2 and 3 (appendix).

Discussion – Keeping in mind that **Tables 15c and 15d** provide information that is qualitative, for internal comparison, and should be interpreted based on local site conditions, the data can be used to make the following conclusions about erosion hazard in Mormon Basin.

TABLE 15c. Current Erosion Hazard for Forestland, Rangeland, and Roads - Adjusted

FORESTLAND, RANGELAND, OR ROAD	PERCENT GROUND COVER (%)	PERCENT CANOPY COVER (%)(5)	SLOPE GRADIENT (%)	CURRENT EROSION HAZARD RATING (3)
Forestland	>90	71-90	5 – 60	Low
Forestland	>90	51-70	5 – 37 37 – 60	Low Moderate
Forestland	71-90	31-70	5 – 19 19 – 60	Low Moderate
Forestland (1)	71-90 71-80	15-30 0-15	5 – 13 13 – 37 37 – 60 5 – 13 13 – 37 37 – 60	Low Moderately Low Moderate Low Moderate High
Rangeland (2)	71-90 51-70	20-50 0-30	0 – 9 9 – 27 27 – 60 0 – 9 9 – 27 27 – 60	Low Moderately Low Moderate Low Moderate High
Cutbanks (3)	11-30	0-10	40 – 80	Moderate
Roadbeds (4)	0-10	0	0 – 3.5 3.6 – 10 10 – 15	Low Moderate High

(1) Open canopy forestlands in Mormon Basin have ground cover and canopy cover similar to higher ground cover and canopy cover rangelands. Percent ground cover in forest land is usually at least 80%, and total canopy cover (trees + shrubs) is at least 20%, so the ratings are revised as shown.
(2) Observations of erosion in rangelands indicates ground cover should be split at about 70%, so that the high rating for steep slopes would apply only to lower ground cover rangelands. Canopy cover is at least 20% in higher ground cover areas. Rangeland canopy cover consists mainly of juniper, snowberry and sagebrush.
(3) 40-80% gradient cutbanks are rated only Moderate because slope distance is so short.
(4) High rating will be lower where ground cover (rock > 0.75 inch diameter) is more than about 50%.
(5) Forestland must have or be able to support at least 10% canopy cover.

TABLE 15d. Inherent Erosion Hazard for Forestland and Rangeland - Adjusted

FORESTLAND, RANGELAND, OR ROAD	PERCENT GROUND COVER (%)(1)	PERCENT CANOPY COVER (%) (1)	SLOPE GRADIENT (%)	CURRENT EROSION HAZARD RATING
Forestland (1)	0-10	0-10	1 – 7 7 – 22 22 – 54 54 – 60	Low Moderate High Very High

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Rangeland	0-10	0-10	1 – 5 5 – 16 16 – 39 39 – 60	Low Moderate High Very High

(1) Bare soil erosion hazard in forestland is lower than rangeland for the same slope gradient because forest topsoils have a higher infiltration rate because they are less dense and more porous.

Accelerated erosion in the project area occurs on roadways, at recent and historic mined areas where ground cover is below optimal, and at gullied reaches of streams including through dams. Current erosion hazard is low in wetlands and riparian areas, mostly low in forestlands, and low to moderate in dry rangelands. Roads have low to high current erosion hazard on roadways and low to moderate current erosion hazard on cutbanks. Inherent (bare soil) erosion hazard in the project area varies from low to very high, based mostly on increasing slope gradient. Inherent erosion hazard ratings for rangelands are higher than for forestlands for the same slope gradient because topsoils in rangelands are more dense, with lower infiltration rates.

SOIL QUALITY RATINGS

Methodology – Soil quality was observed throughout the project area using Protocol for Assessment and Management of Soil Quality Conditions (**WWNF 2004**). Soil quality was rated according to criteria listed in **Table 16a**. Soil quality evaluations include intensity and spacial components: measurable soil damage and percent area affected by this soil damage. The twenty percent (20%) break is based on **USFS 1998**. The other breaks (5%, 10%, 50%) are fifty percent of the next higher number. The soil quality criteria were applied to sites as well as to the proposed project area. The scale of final use of this methodology should be based on BLM preference.

The term "Detrimental Soil Conditions" as used in **Table 16a,** refers to soil alteration or soil damage severe enough to adversely affect long-term soil productivity, and includes detrimental compaction, puddling, displacement, burning, erosion and mass wasting as defined by Region 6 of the US Forest Service (**USFS 1998**). To make mapping of soil damage easier and quicker, **WWNF 2004** redefined detrimental soil conditions as follows. Detrimental compaction and puddling occur when the soil surface is compressed a minimum of 4 inches. Detrimental displacement and erosion occur when one-half of the topsoil is displaced or lost, usually at least 4 inches. These definitions apply to soils at least 20 inches deep, with topsoils at least 8 inches thick.

Table 16a. Soil Quality Criteria - Intensity

Percent Detrimental Soil Conditions	Percent of Area With Acceptable Soil Quality	Soil Quality Rating
0-5%	95-100%	Very High
5-10%	90-95%	High
10-20%	80-90%	Moderate
20-50%	50-80%	Low
50-100%	0-50%	Very Low

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Results – Detrimental soil conditions and soil quality ratings are reported in **Table 16b**. below. No formal detrimental soil condition transects were done, or needed at this time.

Table 16b. Soil Quality Ratings – Sample Sites Within the Project Area

Site Rated	Detrimental Soil Conditions	Percent Detrimental Soil Conditions	Percent of Site With Acceptable Soil Quality	Soil Quality Rating
Roads	Displacement (incl erosion), Compaction	70-100%	0-30%	Very Low
Mined areas - excavated	Displacement	100%	0%	Very Low
Mine spoils - cobble	Displacement of fines	100%	0%	Very Low
Mine spoils – mixed, some non riparian vegetation	Displacement	variable	variable	Moderate to Very Low
Mine spoils – mixed, high water table and riparian vegetation present	Displacement	variable	variable	Moderate
Slightly Disturbed Rangelands and Forestlands	Compaction, Displacement	0-5%	95-100%	Very High

Discussion - Soil quality at sites within the project area ranges from very low to low in mined areas and on roads where topsoil has been displaced or compacted, to very high in undisturbed forestlands, rangelands and wetlands.

The road up California Gulch was estimated to have 70% DSCs because it's a low volume 2-track road. In contrast, most roads in the project area are composed of compacted gravels or native soils, and many are excavated into hillsides or are entrenched up hillslopes.

Although most old mine spoils are in a detrimental condition (displacement, compaction) and have very low soil productivity compared with pre-mining condition, the sites with high water tables have a high rate of recovery, of plant growth, of carbon sequestration, of fine soil accumulation in floodplains.

LANDSLIDES

Discussion – No landslides (e.g. earth flows or slumps) were found in the project area during on-the-ground site review. Areas with highest landslide potential are steeper slopes around and below spring areas, especially where finer textured subsoils (silts or clays) are present or where underlying bedrock is mudstone/shale or has weathered to silts or clays.

WATERSHED CONDITION ASSESSMENT

RIPARIAN WETLAND PROPER FUNCTIONING CONDITION RATINGS

Methodology – All major riparian wetlands in Mormon Basin were evaluated for Proper Functioning Condition using **BLM 1994**; evaluation was ocular only. Riparian areas were given one of three **Proper Functioning Condition Ratings** (PFC, FAR or NF) based on the following definitions quoted form the BLM publication.

> Proper Functioning Condition (PFC): Adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. Riparian-wetland areas control erosion and maintain water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize stream banks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater diversity.
>
> Functioning-at-Risk (FAR): Riparian-wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
>
> Non-Functional (NF): Riparian-wetland areas clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc

Results – See **Table 17**, below.

Discussion – Riparian wetland evaluations are a small component of the watershed condition assessment, because most of the project area is non-riparian.

WATERSHED CONDITION RATINGS

Methodology – All named and a few unnamed drainages in Mormon Basin were evaluated for Watershed Condition using **USFS 2000**. Drainages were given one of three **Watershed Condition Ratings** (Class 1, 2 or 3) based on the following definitions quoted from **USFS 2000**.

> Class 1: Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Drainage network is generally stable. Physical, chemical, and biologic[al] conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.
>
> Class 2: Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biologic[al] conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.
>
> Class 3: Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biologic[al] conditions suggest that soil, aquatic, and riparian systems do not support beneficial uses.

Definitions for hydrologic function, soil function, geomorphic integrity, hydrologic integrity, and biotic integrity are available upon request.

Results – See **Table 17**, below.

Discussion – Stream channel, riparian area and upland conditions in the project area in June 2008 indicate riparian areas are mostly in proper functioning condition and drainages are mostly in Class 1 watershed condition.

Proper Functioning Condition rating for the project area is PFC-. Positive conditions include an abundance of willows, sedges/rushes, and beaver. Negatives include residual effects of mining activities, including stream diversions, ditches, instream headcuts, gullied reaches, large dams/ponds, and stream fords.

Watershed Condition Rating for the project area is Class 1-, close to 2+. Positive conditions include an abundance of willows, sedges/rushes, beaver/beaver dams, reservoir storage, and high ground cover in riparian areas, and some forest cover, good shrub canopy cover, and high ground cover in uplands (60-85% in rangelands; 80-100% in forestlands). It is estimated that post-mining riparian area acreage exceeds pre-mining acreage. Post-mining water storage exceeds pre-mining water storage. Negatives include substantial acreage of poorly vegetated mine tailings in lower Glengarry Creek, mixed soil profiles in mined areas, roads, fords, and other conditions listed under the Proper Functioning Condition discussion. Erosion rates are near natural levels (except from roads, low ground cover mine spoils, and recent small mining sites). Surface and ground water are stored in and slowly processed through the project area.

Table 17. Proper Functioning Condition and Watershed Condition Ratings by Drainage

Drainages within project area (upstream to downstream)	PFC Rating	Watershed Condition Rating	Basis for Rating –
Glengarry Creek	PFC-	Class 1-	Heavy willow cover along most of it's length below headwater springs. Channel below headwater springs stable except at a few sites. Near optimal ground cover in uplands. Diverted into Reservoirs 1, 2 & 3 on south side of valley below French Gulch inflow, then flows through Reservoirs 4, 5, 6, 7, 8, 9 & 10 in the valley bottom. Beaver are currently in Reservoirs 8, 9 and 10. Four fords. Road along creek above French Gulch. Three fords of small tributary spring streams upstream of French Gulch.
French Gulch	FAR+	Class 1-	Forest or sedge-rush cover along most of it's length; some willows. Diverted into ditch on private land and across low gradient slope below private land; still developing new channel; several headcuts. Good ground cover in uplands. One ford.
City Gulch	FAR+	Class 2	Two old ditches collect water below upper private land road, meet, then water flows down gully down old road to man-made wetland; constructed stable channel below there to Reservoir 3. New private land boundary road crosses channel above wetland. Upper private land road is dam for Res 25; no surface water passes road. Wetland and lower channel are in old French Gulch

			drainage; no surface water flows from placer mined part of French Gulch from diversion above upper road to City Gulch and there is no channel. Non-riparian except at and near created wetlands.
Unnamed Gulch east of City Gulch	PFC-	Class 1-	Old mining ditches can collect water in upper drainage below upper private land road. Surface water flow over the county road was not evident; channel disappears above county road. Surface flow would enter below Res 6. Non-riparian except near Glengarry Creek.
Emigrant Creek	PFC-	Class 1-	Channel is well vegetated with willows and sedges/rushes. Some headcuts and gullies. 3 culverts. Reservoir 18 is ephemeral and seldom overflows. Channel below rd to Sunday Hill Mine (Res 18) is highly altered and discontinuous/underground in many places. Deep, light-colored sand deposit at confluence with Puget Sound Gulch. Intermittent along most of length. Empties into Reservoir 10.
Unnamed Gulch near Sunday Hill Mine	FAR	Class 2	Perennial stream rises from 3 spring areas in deeply eroded gulch, flows into Pond 5, then down road into Reservoir 18. Channel reach in gulch is PFC; channel reach on road is NF. Lower part of original channel was severed by the road.
Puget Sound Gulch	PFC-	Class 1-	Channel is well vegetated with willows and sedges/rushes. Some headcuts and short gullies. One ford. One permanent stream diversion and ditch to Reservoir 20; reservoir is breached and stores little water. Reservoirs 19 and 20 are below the Sunday Hill Mine. Deep, light-colored sand deposit at confluence with Emigrant Creek.
Unnamed Gulch; drainage east of Puget Sound Gulch	PFC	Class 1	Channel is well vegetated with meadow species near county road. One ford; headcut and short gully below ford. Res 21 above road has 2 foot deep headcut in dam; advance is slow. Channel not investigated above Res 21.
Tuesday Gulch	PFC	Class 1	Channel is well vegetated with riparian species near county road. One ford. Channel not investigated above ford.
Ditched Emigrant Cr spr	FAR+	Class 1-	Off-channel spring in lower south side of Emigrant Creek drainage is ditched to county road, then flows east to original channel. Forested and sedges/rushes along channel. Remainder of old ditch to area above Res 10 breached by 2 roads.
Basin Creek	PFC-	Class 1-	Begins in Reservoir 11 where Glengarry Creek and Emigrant Creek join. Spillway below Res 12 is gullied to mudstone bedrock. Gullied channel and 3 foot headcut between Res 14 and Res 15. Beaver dams on Reservoirs 11, 12, 14. Channel well vegetated with sedges/rushes in meadow below breached Res 15.
Rich Gulch	PFC-	Class 1-	Above upper main private land road channel is forested and stable except for some headcuts. Recently dozed private land boundary road crosses channel in 3 locations. Channel below main springs is ditched to north around placer mined area but is well vegetated with sedges and rushes. Gullied channel above county rd has thick sedge/rush cover and is stable; channel below county rd also stable with riparian vegetation. 1 culvert; 5 fords. Intermittent where enters Reservoir 14.

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California Gulch (from fence downstream)	PFC-	Class 1-	Channel well vegetated with sedges/rushes along most of its length; areas of thick willows in lower part. Several headcuts 1 to 3 feet high; some entrenched reaches; short deep gully at east end of project area. Two reservoirs; lower one breached. One culvert. Perennial where enters Reservoir 14.
Unnamed Calif. Gulch drainage; lower north side	FAR+	Class 1-	Gullied above meadow, but healing. Intermittent riparian channel above project area. Well vegetated with riparian and moist meadow vegetation near California Gulch where channel disappears.
Unnamed Calif. Gulch drainage; perennial spring	PFC	Class 1	Channel well vegetated with sedges/rushes with some willows and aspen. Begins at perennial spring; intermittent near California Gulch. Two culverts. Spring diversion (inactive); one pit pond above springhouse.

DESIRED CONDITION

BLM will provide desired condition standards and guidelines from their Land Use Plan for the soil and water resources of the project area. This information will be provided in the watershed effects write-up for the project area.

LIST OF ACRONYMNS

BLM = USDI Bureau of Land Management
CWEAA = Cumulative Watershed Effects Analysis Area
DOGAMI = Oregon Department of Geology and Mineral Industries
DSC = Detrimental Soil Condition
EHR = Erosion Hazard Rating
FAR = Functioning At Risk
HUC = Hydrologic Unit Code
NF = Non-Functional
NRCS = USDA Natural Resource Conservation Service
ODEQ = Oregon Department of Environmental Quality
OWRD = Oregon Water Resources Department
PA = Project Area
PFC = Proper Functioning Condition
RUSLE = Revised Universal Soil Loss Equation
SWCA = SWCA Environmental Consultants
WWNF = Wallowa Whitman National Forest

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APPENDIX

TABLES – (below)

Table 11a. BLM Water Temperature Data for Basin Creek
Table 11b. Other BLM Water Quality Data for Basin Creek
Table 11c. ODEQ 303(d) List for Basin Creek

MAPS – attached hard copies

Map 1 – Area 2 – Glengarry and Emigrant Creeks
Map 2 – Area 1a (two units labeled the same) – Rich Gulch Area
Map 3 – Area 3 – California Gulch

PHOTOGRAPHS – electronic file (or CD)

212 photographs

CREDENTIALS

Education
BS Soil Science 1975 Oregon State University
MS Natural Resource Planning and Policy Analysis 1984 Michigan State University
Hydrology I 1987 USDA Graduate School

Experience
Soil Scientist Trainee, Boise National Forest, 1975-1978
Soil Scientist, Fishlake National Forest, 1978-1984
Hydrologist Trainee, Fishlake National Forest, 1985-1988
Hydrologist, Fishlake National Forest, 1988-89
Interdisciplinary Hydrologist/Soil Scientist, Wallowa-Whitman National Forest, 1989-2005

APPENDIX - Tables

Table 11a. BLM Water Temperature Data for Basin Creek

Site Name	Township Range	Section	Start Date	Stop Date	Seasonal Maximum Date	Max Value	Seasonal Minimum Date	Min Value	Seasonal Max ΔT Date	Value	7-Day averages Date	Max	Min	Δ T
Basin Creek 2000	13 S,42 E.	SE/NE 32	05/25/00	09/12/00	07/29/00	77.9	06/01/00	44.2	07/11/00	21.7	07/30/00	76.2	57.5	18.7
Basin Creek 2001			04/27/01	10/01/01	07/04/01	74.5	05/03/01	37.2	05/03/01	28.4	07/03/01	73.2	57.0	16.2
Basin Creek 2002			05/14/02	09/15/02	06/26/02	78.7	06/08/02	42.8	05/16/02	25.3	07/14/02	76.6	60.0	16.7
Basin Creek 2003			05/16/03	09/29/03	07/22/03	93.0	05/18/03	37.1	07/21/03	31.4	07/20/03	88.7	60.6	28.2

Site Name	Days > 55 F	Days > 64 F	Days > 70 F	Hours > 55 F	Hours > 64 F	Hours > 70 F	Warmest day of 7-day max Date	Max	Min	Agency
Basin Creek	111	93	63	1869.6	666.0	258.0	07/29/00	77.9	57.6	BLM
Basin Creek #1	154	114	27	2685.0	619.0	88.0	07/02/01	74.5	54.6	BLM
Basin#1	123	110	76	2238.5	790.5	305.0	07/12/02	78.4	60.5	BLM
Basin#1	137	131	119	2503.0	1239.5	745.5	07/22/03	93.0	62.2	BLM

State Water Temperature Standard for Basin Creek: 20 C = 68F

Table 11b. Other BLM Water Quality Data for Basin Creek

STREAM	DATE	DO	TURBIDITY	PH	Conductivity	H2O TEMP	SHADE TEMP	CFS	WIDTH	DEPTH	LOCATION
Basin#1	8/8/2000	6.85	1.15	8		67F@1055	85F@1055	0.35	2.5'	0.3'@hobo	within lowest BLM boundary
Basin#1	4/26/2001	6.65	3.11	8.5		61.1/1226	75@1226	na	5'	0.9'	within lowest BLM boundary
Basin#1	7/23/2001	12.78	0.17	8.32		61.4/1005	74.1/1005	na	5'	.9'	within lowest BLM boundary
Basin#1	7/23/2001										within lowest BLM boundary
Basin#1	10/2/2001	12.44	0.54	8.13		55.2/1952	69.7/0952	na	4'	.6'	within lowest BLM boundary
Basin#1	5/13/2002	7.24	7.05	8.88		62.5/1300	66.4/1300	FM= 797	6'	.8'	within lowest BLM boundary
Basin#1	7/1/2002	9.44	9.31	8.56		75.3/1400	76.2/1400	too low-1cfs est.	4'	.6'	within lowest BLM boundary-1cfs est.
Basin#1	9/16/2002	6.57	1.18	8		61.3/1030	70.1/1030	na	3.5	0.4	within lowest BLM boundary
Basin#1	5/15/2003	5.7	4.24	8.82		18.3/1400	19.8/1400	0.73	5.5'	1.1 'pool	within lowest BLM boundary
Basin#1	7/24/2003	7.08	29.3*	8.62	496	27.1/1435	24.5/1435	low flow	1'	0.2' pool	within lowest BLM boundary *capfull sampl
Basin#1	9/30/2003	9.25	1.67	8.24	354	11.9/0940	17.7/0940	low flow	2.5'	0.6 pool	within lowest BLM boundary, stream slightl audit

Table 11c. ODEQ 303(d) List for Basin Creek

Name LLID River Mile	Parameter	Season	Criteria	Beneficial Uses	Status	Assessment: Year Action	[Data Source] Supporting Data
Basin Creek 1178055443389 0 to 8.8	Temperature	Year Around (Non-spawning)	Redband or Lahontan cutthroat trout: 20.0 degrees Celsius 7-day-average maximum	Redband or Lahontan cutthroat trout	Cat 5: Water quality limited, 303(d) list, TMDL needed	2004 Added to database	2004 Data: [BLM - Vale] LASAR 27759 River Mile 4.3: From 5/29/2000 to 9/28/2001, 85 days with 7-day-average maximum > 20 degrees Celsius.

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Mormon Basin Placer Mine
Watershed Existing Condition Report 2

Prepared by Timothy Bliss, Bliss Enterprises LLC
September 16, 2008
November 18, 2008 update

HYDROLOGY

WETLAND MAPPING

Jurisdictional Wetlands – This author was asked to map jurisdictional wetlands on certain private lands in Mormon Basin, plus on certain public lands not mapped by SWCA, following development of a more accurate map of private land and project area boundaries. The author discussed jurisdictional wetlands with Eric Metz of the Oregon Department of State Lands (ODSL), with Jan Alexander, and read OAR 141-085 and 090. According to Mr. Metz and the OARs, jurisdictional wetlands include created wetlands larger than 1 acre, but there is no minimum size for natural wetlands. A decision was made along with Jan Alexander to not map created wetlands smaller than 1 acre unless they are associated with natural wetlands along streams that would otherwise be mapped as jurisdictional wetlands. Created wetlands exist in many locations on private and public lands and many of them are off-channel. Other wetlands along streams were mapped if a polygon could be shown on the 1 inch equal 200 feet scale base maps used for Report 1.

Methodology – Jurisdictional wetlands not mapped by SWCA were pencil-mapped on the 200-foot-per-inch hydrology report base maps during a September 6, 2008 site visit. The lines were inked on these maps, then transferred to a set of 400-foot-per-inch maps intended for DOGAMI.

Results – Jurisdictional wetland polygons are shown on Hydrology report #1 maps 1, 2, and 3 and SWCA wetland maps 4a, 4b and 4c, and are listed in Table 20, below.

Table 20. Jurisdictional Wetland Polygons, in addition to SWCA polygons.

Juris-dictional Wetland ID	Hydrology Report 1 Map No.	SWCA Wetland Map No.	Location of Polygon	Private Land Acres	BLM Acres
J-01	1	4a	French Gulch	0.60	-
J-02a J-02b	1	4a	2 small polygons connecting 3 small SWCA polygons around 3 Glengarry Creek Placer Ponds	-	0.06 0.15
J-03	1	4a	Emigrant Creek – west polygon	-	0.50
J-04	1, 2	4a, 4b	Emigrant Creek – middle polygon	-	1.50
J-05	2	4b	Emigrant Creek – east polygon	-	0.80
J-06	2	4b	Wetland in pond with no outflow	0.19	0.16

J-07	2	4b	Rich Gulch – west polygon	0.53	0.07
J-08	2	4b	Rich Gulch – east polygon	0.12	0.14
J-09	2, 3	4b, 4c	Large polygon that includes part of Glengarry Creek, California Gulch and Basin Creek	17.03	2.57
			TOTAL ACREAGE	18.47	5.95

Discussion – Ten (10) jurisdictional wetland polygons were added to SWCA maps. SWCA mapped 20.2 acres of wetlands on public land (BLM). Total wetland acres include 18.5 acres on private land and 26.2 acres on public land (BLM), for a grand total of 44.7 acres.

STREAM MAPPING

Methodology – See Report 1. Stream locations were found to be in error at 4 sites during jurisdictional wetland mapping. Correct locations were noted in pencil on field maps and inked in the office.

Results – The locations of streams were corrected at the following sites:
- Upper French Gulch intermittent stream (west part of J-01).
- Emigrant Creek at the east boundary of J-03 (below the recently mined area where the stream goes around the south side then north along the east face of an old dam).
- California Gulch inflow to Reservoir R-14,
- Basin Creek from R-12 to R-14.

LIST OF ACRONYMNS

DOGAMI = Department of Geology and Mineral Industries
ODSL = Oregon Department of State Lands

BIBLIOGRAPHY

Oregon Administrative Rules about jurisdictional wetlands, available at the following web addresses:

http://arcweb.sos.state.or.us/rules/OARS_100/OAR_141/141_085.html
http://arcweb.sos.state.or.us/rules/OARS_100/OAR_141/141_090.html

APPENDIX

MAPS – attached hard copies

SWCA field maps 1, 2 and 3 included in Hydrology Report 1: 1 inch = 200 feet
SWCA final wetland maps 4a, 4b, 4c: 1 inch = 400 feet

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Supplement to
Mormon Basin Placer Mine
Watershed Existing Condition Report dated August 14, 2008 and **Watershed Effects Report** dated November 25, 2008

Prepared by Timothy Bliss, Bliss Enterprises LLC
May 24, 2009 – version #1

Table of Contents

Introduction

This report was begun at the request of Jan Alexander on May 21, 2009 to respond to a letter (Appendix) sent to BP Gold by the BLM requesting additional information on groundwater hydrology of Mormon Basin.

Review

The following information on Groundwater Hydrology was included in the Existing Condition Report.

Methodology – Depth to groundwater was observed in reservoirs, ponds, streams, gullies, and mined areas.

Discussion – Depth to the groundwater table in Mormon Basin is as follows:
(1) Within 0 to 1 foot of the soil surface at perennial springs and streams.
(2) Seasonally within 0 to 5 feet of the soil surface at intermittent springs, streams and ponds.
(3) More than 5 feet below the soil surface on dry hill slopes and ridges. Observations of groundwater presence/absence were made at ten sites within or near the west side of the project area which have cutslopes ranging in height from 10 to 30 feet. Eight of the ten sites

had a seasonal or permanent ground water table at a depth of 10 to 30 feet below the original soil surface.

The ground water table near perennial springs and streams and near intermittent springs during seasonal flow is usually parabolic-upward. This is evidenced by wetlands and water seepage on banks above the point of water emergence and above the stream channel. Losing reaches of perennial streams (where the stream flow decreases as it loses water to groundwater) and dry intermittent springs and streams usually have parabolic-downward water tables.

The steep excavated slope southeast of Reservoir R-03, south of the road, provides a glimpse of a deep groundwater table, and the variability of seasonal water depth. The top of riparian vegetation is the spring-time water table; the rest of the year the water table is below the bottom of the cutbank.

BLM Request for Groundwater Hydrology Model

The BLM requested that BP Gold develop a hydrologic model for Mormon Basin. We note that this request was not made a year ago when appurtenant data could have been collected in 2008. The specific request is quoted below from the BLM letter (Appendix).

> You will need to develop a good characterization of the hydro geological conditions of the basin which should include, but are not limited to:
>
> - Topographic data, to include surface water elevations
> - Regional data, to include subsurface geology
> - Surface water bodies and measured stream discharge data
> - Geologic cross section from soil borings and well logs
> - Measured hydraulic head
> - Well construction diagrams and soil boring logs
> - Estimated hydraulic conductivity, from aquifer tests
> - Location and estimation of flow rate and groundwater sources or sinks
>
> These data must be presented in map, table or graph format in a report documenting the model development.
>
> Questions that should be answered by the model include, but are not limited to:
>
> - Are there adequate data describing the hydrogeology?
> - In how many directions is groundwater moving?
> - Can the groundwater flow or contaminant transport be defined as one, two or three dimensional?
> - Is there recharge to the aquifer by precipitation or leakage from a river, stream, drain, or infiltration system?
> - Is groundwater leaving the aquifer by seepage to surface water bodies, flow to a drain, extraction well, or mine shaft?
> - Does it seem that the aquifer's hydrogeological characteristics remain uniform or does the geologic data indicate considerable variation?
> - Have boundary conditions been defined around the modeling domain, and what is the basis?
> - Do groundwater flow or contaminant source conditions remain the same, or do they change with time?
> - Are there receptors located down-gradient of any potential contaminant plumes?

2

- Are there geochemical reactions taking place in onsite groundwater and are the processes understood?

Other questions related to site-specific conditions may be asked. This conceptualization step must be completed and described in the model documentation report.

If you have this data, please supply it.

Response to 8 Specific Data Requests

1. Topographic data, to include surface water elevations

Methodology & Results – Elevations of streams (**Table 3b**), reservoirs (**Table 5c**) and ponds (**Table 6c**) were estimated from the Mormon Basin topographic map (**USGS 1990**).

Table 3b. Elevations of Streams – Within the Project Area

Stream Name	Upper Elevation (ft)	Lower Elevation (ft)
Glengarry Creek	5150	4770
French Gulch Creek	4940	4890
City Gulch Creek	4890	4850
Emigrant Creek	4950	4760
creek on Sunday Hill Mine hill	4960	4940
Puget Sound Gulch Creek	4870	4860
unnamed Emigrant Cr gulch E of Puget Sound Gul	4830	4820
Rich Gulch Creek	4880	4760
California Gulch	4830	4720
California Gulch springhouse trib	4840	4770
California Gulch trib north of springhouse trib	4790	4760

Table 5c. Elevations of Reservoirs – Within the Project Area

Res ID	Reservoir Name	Water Surface Elevation (ft)	BLM or Private Land
R-01	Glengarry Creek Reservoir 1	4880	BLM
R-02	Glengarry Creek Reservoir 2	4870	BLM
R-03	Glengarry Creek Reservoir 3	4850	BLM
R-04	Glengarry Creek Reservoir 4	4810	BLM
R-08	Glengarry Creek Reservoir 8	4740	BLM & private
R-14	Basin Creek Reservoir 4	4700	BLM & private
R-16	California Gulch Creek Res 1	4750	BLM
R-17	California Gulch Creek Res 2	4720	BLM & private
R-18	Emigrant Creek Reservoir 1	4950	BLM
R-22	Glengarry Placer Reservoir 1	4860	BLM
R-23	Glengarry Placer Reservoir 2	4850	BLM
R-24	Glengarry Placer Reservoir 3	4850	BLM

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R-29	Humbolt Reservoir 2	4910	BLM & private
R-30	City Gulch Reservoir 2	4890	BLM
R-34	California Gulch Reservoir 3	4790	BLM

Table 6c. Elevations of Ponds – Within the Project Area

Pond ID	Pond Name	Water Surface Elevation (ft)	BLM or Private Land
P-01	Glengarry Creek Pond 1	4880	BLM
P-02	Glengarry Creek Pond 2	4880	BLM
P-04	City Gulch Pond	4880	BLM
P-06	Emigrant Creek Pond 1	4920	BLM
P-07	Emigrant Creek Pond 2	4890	BLM
P-08	Emigrant Creek Pond	4890	BLM
P-10	Glengarry Creek Pond 3	4780	BLM
P-11	Glengarry Creek Pond 4	4910	BLM

Discussion – Water surface elevations in the project area are between a high of 5150 feet at the spring stream in upper Glengarry Creek to a low of 4700 feet at Reservoir R-14 on Basin Creek. Where the project area boundary crosses Glengarry Creek the elevation is 5000 feet.

2. Regional data, to include subsurface geology

See the geology discussion in the EA and the Geologic Map of Mormon Basin (**USGS 1933**). The geology map indicates most of the project area consists of geology map units **Qal** (alluvium) and **Tgs** (gravel, sand and silt with some dacite flows) with small areas of **qms** (quartz-mica schist, slate, and quartzite) in California Gulch and small areas of **Ta** (andesite) in French Gulch and Glengarry Creek.

3. Surface water bodies and measured stream discharge data

For surface water body information, see the "Reservoir and Dams" and "Ponds" sections of the Existing Condition Report.
For stream discharge information, see the "Stream Cross-Sections" and "Stream Discharge" sections of the Existing Condition Report.

4. Geologic cross section from soil borings and well logs

There are no wells within the project area.

However, there is a well log for one well on private land south of the project area. Go to the Oregon Water Resources Department website: http://apps2.wrd.state.or.us/apps/gw/well_log/Default.aspx. Type in T13S, R42E. Information for well log MALH7 will appear. Some information from the well log is presented below.

Well Location:	NW1/4 NE1/4 Sec, 20, T13S, R42E (private land).
Completed Depth:	650 feet.
First Water:	160 feet.
Static Water Level:	48 feet.
Yield:	500 gpm.
Casing Diameter:	16 inches at top; 12 inches below casing
Casing Depth:	118 feet
Date Constructed:	08/13/1980
Company:	Sumper Gold Dredge Inc., c/o Lloyd Dinger, Box 410, Haines, OR 97833
Constructor:	Larry Burd / Larry Burd Well Drilling

Well Log

Material	From (feet)	To (feet)	SWL
Clay	0	49	
Clay & Gravel	49	110	
Basalt black	110	160	
Clay & Gravel	160	285	15gpm
White Rock	285	325	30gpm
Clay & Gravel	325	595	
Green Soapstone	595	49	
Brown Basalt/GR/SS	640	650	600gpm

According to Mark Ferns, (**Ferns 2009**), the well was drilled in the Tgs formation (**USGS 1933**) which early geologists described as consisting of "gravel, sand and silt with some dacite flows. Ferns said the well log indicates that the Tgs formation is 595 feet thick in this location, that the white rock layer is likely rhyolitic ash flow tuff (ignimbrite), and that water was perched on top of the white rock layer at 285 feet and on top of the basement rock at 595 feet.

According to Jan Alexander (**Alexander 2009**), the above well is located at an elevation of about 5000 feet near the new French Gulch Creek channel. Jan also reported the water level in the Humbolt Mine Shaft is 60 feet below the ground surface; the top of the shaft is at an elevation of about 4980 feet.

5. Measured hydraulic head

No information was collected by this author or is known to exist.

6. Well construction diagrams and soil boring logs.

No information was collected by this author or is known to exist.

7. Estimated hydraulic conductivity, from aquifer tests

No hydraulic conductivity data was collected by this author or is known to exist.

The National Soil Survey Handbook (**NSSH 2003**) lists 6 saturated hydraulic conductivity classes: <0.01; 0.1, 1.0, 10, 100, >100 micrometers/second. Comparing these classes to observations by this author of water flow from gravels in the enclosed basin north of Reservoirs R-01, R-02, R-03, that flows into R-22, through R-23, and back into the ground below R-23, then into the stream channel north off R-03, this author concludes the hydraulic conductivity of some of that area is much greater than100 micrometers/second due to the presence of well sorted gravels.

8. Location and estimation of [groundwater] flow rate and groundwater sources or sinks

For location and estimation of groundwater flow rates near springs, see the "Stream Cross-Sections" section of the Existing Condition Report.

For groundwater sources, see spring symbols on Maps 1, 2 and 3 of the Existing Condition Report and SWCA jurisdictional wetland maps (as amended by Bliss); most wetlands in the project area are groundwater source areas.

For groundwater sinks, see the "Areas with No Surface Water Outflow", "Stream Flow Persistence", "Reservoirs and Dams", and "Ponds" sections of the Existing Condition Report, and intermittent stream symbols on Maps 1, 2 and 3.

Response to 10 Specific Questions

1. Are there adequate data describing the hydrogeology?

This author believes there is enough information, coupled with professional judgment, to adequately describe the hydrogeology of the basin.

2. In how many directions is groundwater moving?

See discussion under item 3, below.

3. Can the groundwater flow or contaminant transport be defined as one, two or three dimensional?

Groundwater flow in Mormon Basin is three dimensional. There are 3 three-dimensional concepts. First, each aquifer has vertical, horizontal and longitudinal dimensions at any single site along the aquifer.

Second, as water flows down an aquifer, it also expands or contracts in the vertical and horizontal dimensions. Little data has been collected about the vertical and horizontal dimensions of aquifers in Mormon Basin; more is known about the longitudinal dimensions. Mormon Basin is the high-elevation

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headwater of Basin Creek. Most groundwater collected by Mormon Basin appears to rapidly flow from the basin in the spring time through streams and Quaternary alluvium (Qal) below them. It is unknown how much of the groundwater passing through the Quaternary alluvium percolates into deeper aquifers; it is presumed to be a small percent of total water production of the Mormon Basin watershed.

Third, aquifers have 3-dimensional landscape characteristics. For example, groundwater passing through shallow aquifers on hillsides flows at 2-dimensional acute angles into the 3rd dimension receiving stream channels.

There is no known site of artesian or geothermal-related upward movement of groundwater in Mormon Basin.

4. Is there recharge to the aquifer by precipitation or leakage from a river, stream, drain, or infiltration system?

The Quaternary alluvium aquifer (Qal) of Mormon Basin is recharged by precipitation, primarily by spring rains and snowmelt into upland residuum/colluvium and sedimentary and volcanic rocks.

5. Is groundwater leaving the aquifer by seepage to surface water bodies, flow to a drain, extraction well, or mine shaft?

Groundwater leaves or seeps from shallow aquifers in the project area as evidenced by many perennial and intermittent springs that deliver water to perennial and intermittent streams and constructed reservoirs and ponds.

6. Does it seem that the aquifer's hydrogeological characteristics remain uniform or does the geologic data indicate considerable variation?

The geologic data indicate variation in the hydrogeological characteristics of aquifer's in Mormon Basin. Aquifers of uplands outside of the project area occur primarily in metamorphosed sedimentary and volcanic rocks (**qms**) which are presumed to have low hydraulic conductivity. In contrast, aquifers project area occur in alluvium (**Qal**) and consolidated gravel, sand and silt with some dacite flows (**Tgs**) that has higher hydraulic conductivity. Between French Gulch and Emmigrant Creek, where the Qal and Tgs deposits have been placer mined and highly sorted, higher hydraulic conductivity is much higher.

Comparison of the locations of known springs (see Maps 1, 2, 3) with the geology map (**USGS 1933**) indicates that some springs occur near the contacts between units, especially in California Gulch. However, most springs rise within geology map units, Qal and Tgs, which suggests that unmapped silt layers in Qal and silt and ignimbrite layers in Tgs may be responsible for spring locations.

7. Have boundary conditions been defined around the modeling domain, and what is the basis?

Please explain what you mean by "boundary conditions."

8. Do groundwater flow or contaminant source conditions remain the same, or do they change with time?

Shallow groundwater flow changes over time. Shallow groundwater flow greatly increases as snow melts in the spring. Due to short travel distance of shallow groundwater to Quaternary alluvium and related stream channels, low annual precipitation and small watershed size, this flow greatly decreases by later summer. Stream channel cross-sections and stream flow measurements (see Existing Condition report) suggest shallow groundwater flow in Mormon Basin increases/decreases by at least ten times the based flow of Basin Creek below Reservoir 15.

9. Are there receptors located down-gradient of any potential contaminant plumes?

Please explain what you mean by "receptors."

10. Are there geochemical reactions taking place in onsite groundwater and are the processes understood?

The only site observed by this author in the project area has rusty effluent in water flowing about 30 feet from an adit onto its mine dump located in lower California Gulch southeast of Reservoir R17. See the spring symbol on Map 3. This site was not discussed in the Water Quality section of the Existing Condition Report because it does not discharge by stream channel into the waters of the state.

Groundwater Hydrology Model for Mormon Basin

Aquifers Types– There are at least four distinct types of groundwater aquifers in Mormon Basin.

Type 1. Perched shallow groundwater that flows through Quaternary alluvium (Qal) and through residuum/colluvium that covers other geologic map units (Tgs, qms, etc.). Evidence of this aquifer is perennial and intermittent streams, springs and wetlands in Quaternary alluvium.

Type 2. Groundwater that percolates in uplands to low-conductivity silt, clay and rock layers above the valley floors, exists as springs on hillslopes, and flows into higher elevation stream channels and wetlands above the Quaternary alluvium.

Type 3. Groundwater that percolates deeply in uplands to low-conductivity silt, clay and rock layers below the valley floors. An example is the rhyolitic ash flow tuff (ignimbrite) layer in the MALH7 well log located 285 feet below the land surface.

Type 4. Groundwater that percolates along basement rock. An example is the brown basalt layer in the MALH7 well log located 595 feet below the land surface.

Aquifer Interconnectivity – It is unknown if and to what extent there is any connectivity between surficial Type 1 and 2 aquifers and deep the Type 3 and 4 aquifers within the project area or elsewhere in Mormon Basin. Type 2 aquifers deliver water to Type 1 aquifers. Type 3 and 4 aquifers are not known to deliver water to Type 1 aquifers in Mormon Basin; they are too deep, as described in the Groundwater Elevations section below.

Aquifer Seepage – Groundwater seeps or flows from Type 2 aquifers via springs into streams that supply Type 1 aquifers. An example is the spring flowing from the old adit in upper Rich Gulch. Groundwater seeps or flows from Type 1 aquifers into stream channels and reservoirs, as evidenced by springs in Quaternary alluvium. An example is the springs in Quaternary alluvium lower Emmigrant Creek.

Aquifer Recharge – Precipitation of Mormon Basin ranges from about 15 to 20 inches per year, with a substantial portion of that precipitation coming as snow. There are potentially three or more peak streamflow events during each year: one in the spring time due to spring snowmelt runoff; one in the fall after frost stops the transpiration of plants in riparian areas; and other times of the year from spring to fall when the basin is visited by heavy short to long-duration rainfall. These peak streamflow events recharge Type 1 aquifers in the project area. Snowmelt and rainfall on uplands in and near the project area also recharges Type 2 aquifers. It is presumed that Type 3 and 4 aquifers are recharged mostly from outside the project area.

Aquifer Conductivity – There are 6 saturated hydraulic conductivity classes: <0.01; 0.1, 1.0, 10, 100, >100 micrometers/second (**NSSH 2003**). No hydraulic conductivity data was collected in or near the project area. Hydraulic conductivity of Type 1 aquifers (Qal map unit) is estimated to be moderate to high. The highest hydraulic conductivity in **Qal** is in the mined area between the Glengarry Creek-French Gulch Creek confluence and the county road near the old trommel. Hydraulic conductivity of the well sorted gravels north of Reservoirs R-01, R-02, R-03 appears to exceed 100 micrometers/second. The hydraulic conductivity of Type 2 aquifers, esp. in **Tgs** and **qms** formations, is estimated to be low to moderate. Hydraulic conductivity Type 3 and Type 4 aquifers is also estimated to be low to moderate.

Aquifer Hydrogeological Variability – Type 1 aquifers (Qal geology map unit) have high hydrogeological variability within the project area. For example: at the Emmigrant Creek-Puget Sound Gulch Creek confluence the aquifer is sandy; in California Gulch and Rich Gulch it is silty; in the mined section of Glengarry Creek north of Reservoir R-1, R-2 and R-3 it is extremely gravelly. Hydraulic conductivity is different at each site. It is assumed that the Type 2, 3 and 4 aquifers have much more uniform hydrogeological characteristics.

Another aspect of hydrogeological variability of Type 1 and Type 2 aquifers is the rising and sinking of groundwater as it flows down all stream channels in the project area and greater Mormon Basin area. This is represented by alternating perennial spring-stream reaches and dry intermittent stream reaches along the same named stream.

Comparison of the locations of known springs of Type 2 aquifers with the geology map (**USGS 1933**) indicates that some springs occur near the contacts between geology map units, especially in California Gulch. However, most springs from Type 2 aquifers rise within geology map units Tgs and qms, which suggests that unmapped interbedded silt and impervious rock layers in those formations may be responsible for spring locations.

Aquifer Dimensions - Groundwater flow in Mormon Basin is three dimensional. There are 3 three-dimensional concepts. First, each aquifer has vertical, horizontal and longitudinal dimensions at any single study site along the aquifer.

Second, as water flows down an aquifer, it also expands or contracts in the vertical and horizontal dimensions. Expansion in the vertical direction produces springs and streams. Little data has been collected about the vertical and horizontal dimensions of aquifers in Mormon Basin; more is known about the longitudinal dimensions. Most groundwater collected by Mormon Basin (the high elevation source for Basin Creek) appears to rapidly flow from the basin in the spring time through streams and Quaternary alluvium (Qal) below them. It is unknown how much of the groundwater passing through the Quaternary alluvium percolates into deeper aquifers; it is presumed to be a small percent of total water production from the Mormon Basin catchment.

Third, aquifers have 3-dimensional landscape characteristics. For example, groundwater passing through shallow aquifers on hillsides flows at 2-dimensional acute angles into the 3rd dimension receiving stream channels.

Groundwater Sinks – There are three types of groundwater sinks. First, any portion of the project area or Mormon Basin without a perennial water surface is a groundwater sink at least for Type 1 and Type 2 aquifers. Residuum, colluvium and alluvium collect and deliver water to underlying aquifers. Second, there are large areas in **Qal** and **Tgs** geology map units in and near Glengarry Creek that have no potential for surface water outflow; see the section of the Existing Condition Report entitled "Areas with No Surface Water Outflow." These areas have uneven surfaces and no surface water outflow; they were created by placer mining and dam construction. These sinks also supply groundwater to Type 1 and Type 2 aquifers. Third, groundwater could sink from Type 1 and Type 2 aquifers to Type 3 and Type 4 aquifers via cracks in bedrock that underlies aquifers. There is no data about the existence and location of such sites in Mormon Basin, except perhaps the Humbolt Shaft.

Groundwater Elevations – The upper elevations of Type 1 and Type 2 aquifers in the project area range from a high of 5150 feet in upper Glengarry Creek to 4700 feet near the mouth of

California Gulch. The project area boundary crosses Glengarry Creek as 5000 feet. At the well on private land (elevation 5000 feet), the Type 3 aquifer is at an elevation of 4700 feet and the Type 4 aquifer is at an elevation of 4400 feet; both of these elevations are lower than the project area.

Groundwater Flow Persistence – This term refers to whether the flow of water through an aquifer is perennial or intermittent. Type 3 and Type 4 aquifers in Mormon Basin are assumed to be perennial. Type 1 and Type 2 aquifers in Mormon Basin may be either perennial or intermittent, or may have both perennial and intermittent reaches and characteristics.
For example, Type 1 perennial and intermittent aquifers have high flows from spring snowmelt; they expand vertically above, horizontally across, and longitudinally down the restrictive layers of the aquifers. The aquifers that support intermittent streams may be either perennial or intermittent immediately above the restrictive layer; they are mostly intermittent in their vertical and horizontal dimensions.

Additional Mitigations to Consider

At sites where there is concern that the top of the aquifer for streams and on-stream reservoirs is convex, such that mining near them may cause groundwater to seep from them through porous gravels into the mining pit, which could reduce streamflow and increase stream water temperature, the following mitigations are offered as solutions.

Timing of Mining Mitigation for Perennial Stream Reaches: Mine during the spring months when the groundwater table is high and concave due to abundant snowmelt-related groundwater percolation from uplands.

Timing of Mining Mitigation for Intermittent Stream Reaches: Mine during the summer-fall months after streamflow goes subsurface.

General Mitigation for Mining Near Streams: Dig one or more small test holes with a backhoe to an appropriate depth at least 20 feet from the affected stream. Measure the depth from the original ground surface to the water table immediately after the hole is dug. Let the test hole(s) fill with water for 24 hours. Use a level and rod to measure the surface water level of the hole(s) and of the stream perpendicular to the hole(s), Record this information in a log book. Mark the test hole location(s) on a site map and put a site code on the map and in the log book. If the hole does not fill with water, or the original water level does not change, or the water level in the hole(s) is the same or higher than the stream... it's ok to mine.

Bibliography

Alexander 2009. Personal communication with Jan Alexander, BP Gold Rep.

Ferns 2009. Personal communication with Mark Ferns, Geologist, Baker City Office, Oregon Department of Geology and Mineral Industries on May 22, 2009.

NSSH 2003. National Soil Survey Handbook. Saturated Hydraulic Conductivity classes. See http://soils.usda.gov/technical/technotes/note6.html.

USGS 1933. Bulletin 846. Plate 2. Geological Map of Mormon Basin District, T13S, R43E, Oregon. Geology by James Gilluly, J. C. Reed, and H. G. Mitchell. Topography by C. F. Park, Jr.

USGS 1990. Mormon Basin Quadrangle, Oregon. 7.5 Minute Series (Topographic). United States Department of the Interior, Geological Survey.

Appendix – BLM Letter to BP Gold Inc

3809/3715 (035)
OR-64155

CERTIFIED MAIL - Return Receipt Requested – 7008 1300 0002 2874 4729

DECISION

Mr. Larry Dinger	:	43 CFR 3809
B.P. Gold, Inc.	:	Surface Management
P.O. Box 188	:	OR-64155
Haines, OR 97833		

Updated and Additional Information Required

On April 10, 2007, the Bureau of Land Management (BLM) issued a letter stating that your plan was complete and notifying you that an Environmental Assessment is required to process your plan. On July 2, 2008, BLM received an Amended Plan that included Mr. Bliss' Existing Condition and Wet Land Avoidance. On January 23, 2009, BLM received Amendment 2 to the Plan of Operations this included the Draft EA prepared by SWCA Environmental Consultants. On May 1, 2009, BLM received additional information in the form of the Plan of Operations dated January 23, 2009, that was updated with the corrected Mining Claim Serial Numbers and Maps.

The BLM is in the process of reviewing your Environmental Assessment (EA) and as part of this review, your Plan of Operations (OR-64155) is also being reviewed pursuant to 43 CFR 3809.115, §3809.411(a)(3)(ii) & §3809.431(b). Several questions have arisen regarding your Plan for which the BLM requests the following information in order to continue the review of your EA.

On page 2, Access, paragraph 1, line 4. "*During exploration (Phase I), temporary overland routes to the trench locations may be necessary if the trench cannot be assessed off an existing road. These routes will not be constructed access routes, except to the extent necessary to bring in equipment and run the dump truck. All temporary overland access routes will be approximately 200 feet in length.*"

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Provide a map showing the location of all trenches giving the dimensions, orientations and access routes. This may require several maps to include all the areas of proposed trenching. This map(s) must be at a scale appropriate for BLM to locate and delineate the individual trenches and access routes, label the map, and provide a north arrow, a scale that matches the map scale draw the roads and trenches at a scale that matches the map(s). Also, note that a 1:1 slope, 45°, is likely not safe, due to lack of material stability. If you have information on slope stability to support the walls at a 1:1 slope, please supply this information. The angle of repose for dry or wet sand and gravel is ~37.5° and at the depth you have indicated, 40 feet, it would possibly be saturated. The access ramp, at 10% to 16% slope, would require between 120' and 200' (length) to drop onto the 20' bench level of the trench. Provide information on stockpiles, overburden piles and tailings piles where they will be placed including the dimensions of each incorporating a swell factor and angle of repose for each. Show where the topsoil salvage piles will be located and the dimensions of each including the swell and angle of repose. These features and details need to be shown on a map of an appropriate scale. Also include a detailed statement on how you are going to handle excess ground water, i.e.: pumping to surface ponds, not working below the water table.

Page 2, Access, paragraph 3, line 1. *"Drainage features will be installed where needed."*

Provide information on a map(s), at an appropriate scale, to show where these features will be located, what type of feature will be installed, i.e. retention pond, ditch, culvert or low water crossings etc. with dimensions and engineering specifications for each crossing, label the map, and provide a north arrow, a scale that matches the map scale draw the roads and improvements at a scale that matches the map(s).

Page 2, Access, paragraph 3, line 2. *"The Baker and Ironside Road Department will be contacted if any County roads must be disturbed. The public will be provided access through Mormon Basin during the time that mining takes place. Where necessary alternate routes will be constructed around the mining areas."*

If any of these roads are RS2477 roads, you will need to contract the appropriate county road department well in advance of closure and mining of the road(s) and provide the required measures to ensure the safety of the public.

Will these roads be effected during phase 1 the exploration phase? If so provide a map at an appropriate scale to show where the location(s) of roads that may be mined through is/are located, on a map(s) provide the location(s) of alternate route(s) with dimensions i.e. length and width, cuts and fills, and any improvements that may be required for example culverts, water crossings and road cuts with engineering specifications and conceptual designs, label the map, and provide a north arrow, a scale that matches the map scale draw the roads and improvements at a scale that matches the map(s).

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Page 2, Access, paragraph 4, line 1. *"The roads within each mining area will be interconnected during the mining operation, with various access routes through the mining areas, constructed to the minimum width needed to bring in equipment, approximately 12 feet."*

Will this occur in phase 1 of the exploration phase? If so provide a separate map showing all locations of where existing roads will be altered, giving dimensions and improvements with engineering specifications, label the map, and provide a north arrow, a scale that matches the map scale draw the roads to conform to the map scale.

Page 4, Streams, paragraph 1, line 1. *"All perennial stream segments will be protected during the proposed mining operation, with unmined buffer strips on sufficient size to prevent impacts to water quality."*

How will you do this? Do you have any data on groundwater? Do you know if these streams are gaining or losing water? Do you have a hydrogeologic model for the basin to be able to determine what size of buffer you will need to impose? If you do, please supply this information; if you do not, you will need to collect this data to support this statement.

Page 4, Noxious Weeds, paragraph 1, line 1. *"Knapweed, Scotch thistle and whitetop (horey cress) are present in the Basin. These invasive species are being controlled on private land, but are expanding on Public Land, especially in the historically mined areas where ground cover is low."*

What are your plans to control these noxious weeds in your operation? Please provide this information.

Page 5, paragraph 1, line 5. *"Groundwater that is encountered in excavations will be pumped into excavations so no muddy water leaves the mining site."*

Provide separate a map at an appropriate scale to show the location of where these excavations will be located, label the map, and provide a north arrow, a scale that matches the map scale draw the excavation, pipeline, hoses, etc. at the scale that matches the map scale. Describe the process including flow patterns and equipment that will be used. Provide information on the quantity of water to be pumped and how this water be handled? Where will this water be stored? What excavations will be used to store groundwater? Describes their location, how they will be developed, dimensions, access, etc. This is unclear and needs clarification.

Page 5, paragraph 4, line 1. *"All storm water is contained on site. Surface water drainage will be accomplished by diverting storm water, isolating facility runoff and minimizing erosion."*

Please provide information on how this will be accomplished. Provide plans that include engineering diagrams. Provide map(s) that show the location of where these diversions and conveyance structures or equipment will be located and where the water will be stored, label the map, and provide a north arrow, a scale that matches the map scale draw the diversions and location of where the water will be stored at the appropriate scale.

Page 4

Page 7, Processing sites-Phase I, paragraph 1, line 1. *"Two to three 20'X30X8-10 feet deep ponds located on private land or on BLM claims will be used. A small mobile processing plan will be utilized on BLM claims, or the material will be hauled to one of the processing sites on private land.*

Provide a map of where the ponds will be located, label the map, and provide a north arrow, a scale that matches the map scale draw the ponds at the appropriate scale. You need to state if or if not the small mobile processing plant will be used on BLM lands.

Page 9, Details of the Mining Operation, Phase I-Exploration, paragraph 1, line 1. *"Up to 10 trenches at each site (1A, #2, #3) will be excavated yearly at each site, with surface disturbance of up to 100' long and 30' wide at each trench location. Stock piles of overburden and substrate will impact an additional area of the same dimensions. Riparian buffers of 20' along perennial segments of French, California, Glengerry and Emigrant, and at least 20' buffers around existing ponds and wetlands will be employed during this testing."*

Provide a map showing the location of all trenches giving the dimensions, orientations and access routes. This may require several maps to include all the areas of proposed trenching. This map(s) must be at a scale appropriate for BLM to locate and delineate the individual trenches and access routes, label the map, and provide a north arrow, a scale that matches the map scale. Also, note that a 1:1 slope, 45°, is likely not safe, due to lack of material stability. If you have information on slope stability to support the walls at a 1:1 slope, please supply this information. The angle of repose for dry or wet sand and gravel is ~37.5° and at the depth you have indicated, 40 feet, it would possibly be saturated. The access ramp, at 10% to 16% slope, would require between 120' and 200' (length) to drop onto the 20' bench level of the trench. Provide information on stockpiles, overburden piles and tailings piles where they will be placed including the dimensions (length, width & height) of each incorporating a swell factor and angle of repose for each. Show where the topsoil salvage piles will be located and the dimensions (length, width & height) of each including the swell and angle of repose. These features and details need to be shown on a map of an appropriate scale. Also include a detailed statement on how you are going to handle excess ground water, i.e.: pumping to surface ponds, not working below the water table.

Provide data that shows that a Riparian buffers are sufficient, including any hydrologic data. Also provide a hydrologic model for the Basin? You will need to develop a good characterization of the hydro geological conditions of the basin which should include, but are not limited to:

- Topographic data, to include surface water elevations
- Regional data, to include subsurface geology
- Surface water bodies and measured stream discharge data
- Geologic cross section from soil borings and well logs
- Measured hydraulic head
- Well construction diagrams and soil boring logs
- Estimated hydraulic conductivity, from aquifer tests
- Location and estimation of flow rate and groundwater sources or sinks

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These data must be presented in map, table or graph format in a report documenting the model development.

Questions that should be answered by the model include, but are not limited to:

- Are there adequate data describing the hydrogeology?
- In how many directions is groundwater moving?
- Can the groundwater flow or contaminant transport be defined as one, two or three dimensional?
- Is there recharge to the aquifer by precipitation or leakage from a river, stream, drain, or infiltration system?
- Is groundwater leaving the aquifer by seepage to surface water bodies, flow to a drain, extraction well, or mine shaft?
- Does it seem that the aquifer's hydrogeological characteristics remain uniform or does the geologic data indicate considerable variation?
- Have boundary conditions been defined around the modeling domain, and what is the basis?
- Do groundwater flow or contaminant source conditions remain the same, or do they change with time?
- Are there receptors located down-gradient of any potential contaminant plumes?
- Are there geochemical reactions taking place in onsite groundwater and are the processes understood?

Other questions related to site-specific conditions may be asked. This conceptualization step must be completed and described in the model documentation report.

If you have this data, please supply it.

Page 9, Details of the Mining Operation, Phase I-Exploration, paragraph 2, line 1. *"Samples will be trucked to private land for processing, then the washed tailing will be trucked back in an ongoing manner to reclaim that trench. As an alternative, a small portable washing plant will be located on BLM and this plant will move as the test work moves, similar to the work currently taking place."*

If you are going to process on BLM land, you need provide the size and type of equipment, the location, amount of material that will be handled at each location, method of disposal of tailings, water handling access and any other surface and subsurface disturbances related to each specific location. This information will be needed by the BLM in order to process your plan of operations.

Page 9, Details of the Mining Operation, Phase I-Exploration, paragraph 2, line 4. *"Up to 100 cubic yards will be processed in a day."*

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How will water be supplied to this(ese) processing site(s), where will settling ponds be constructed and what will their dimensions be? How will water be managed to ensure that no contamination of surface water and ground water quality occurs?

Page 11, Schedule of Operation, Phase I (years 1-2), paragraph 1, line 1. *"Continue exploration/bulk testing on BLM claims to determine depth of pay gravel that can be economically mined, with work taking place on all claims."*

From this statement it is clear that you need more information to determine if the site is economically feasible to mine, what areas may be excluded and what areas require more testing. If you already have this data, please supply it to BLM in a form that complies with the industry standards.

Page 14, Water Quality/Water Management, paragraph 1, line 1. *"During Phase I, 2-3 small pit ponds approximately 20'X30'X8' in size would be used for settling process water. These could be located either on private land or on BLM.*

Please provide a separate map of sufficient scale for BLM to locate these ponds, label the map, and provide a north arrow, at a scale that matches the map scale draw the ponds using the appropriate scale.

Page 15, Groundwater Quality, paragraph 1, line 1. *"No impacts to surface water quality are expected from groundwater in excavations. Since clay soils and tightly consolidated gravels preclude much seepage."*

Please supply the data to support this statement, for example perk tests, groundwater flow charts, subsurface geologic maps, etc. If you do not have this data, then you will need to collect it.

Page 15, Groundwater Quality, paragraph 1, line 4. *"If groundwater is used in processing, this water will remain in the layer from which it came."*

This statement is unclear. Are you saying that groundwater used in the operation will be returned to the same aquifer from which it came? How do you propose to do this? What studies have been done to be able to ensure that groundwater can be returned to the same aquifer? If you have this data, please supply it.

Page 15, Groundwater Quality, paragraph 1, line 5. *"Muddy process water will be contained in 3 off-channel settling/recycling ponds. There will be not discharge, and water is disposed of by evaporation and seepage."*

Where are these ponds located? Are these 3 ponds the same 2-3 ponds as on Page 7, Processing sites-Phase I, paragraph 1, line 1? Please provide a map of their locations, label the map, and provide a north arrow, a scale that matches the map scale, draw the ponds at the appropriate scale to match that of the map. Also describe and indicate on the map how and where materials from the construction of the ponds will be handled and stored and describe in the plan how the ponds will be stabilized and reclaimed.

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Page 16, Groundwater Quality, paragraph 1, line 1. *"There will be no discharge, and water is disposed of by evaporation and seepage."*

This statement is a direct contradiction of information provided on page 15, groundwater Quality, paragraph 1, line 1. *"No impacts to surface water quality are expected from groundwater in excavations. Since clay soils and tightly consolidated gravels preclude much seepage."* Please clarify these conflicting statements. Please provide hydrogeologic studies to support or refute this statement.

Page 16, Groundwater Quality, paragraph 1, line 2. *"Perennial streams will be monitored visually during the time mining and processing are taking place to ensure that sediment is not seeping into the water. The channels will be checked in the morning and again in the afternoon to be sure sediment is not entering the channels."*

Visual inspections are nice but clay sized particles are normally too small to be seen with the unaided eye. These particles can remain suspended in the water column for extend periods of time and can only be detected with special instrumentation. A hydrologic study would provide a baseline of the streams turbidity at various periods of the year.

Page 16, Solid Wastes/Rock Characterization and Handling Plans, paragraph 1, line 1. *"Only small quantities of rock tailings will be generated under phase 1 operations, and these tailings, or like material, will be used to refill the trenches to normal land contours."*

This statement is not realistic in the light of the volume that will be removed from a single "test" hole 30' x 100' x 40' ~ 7000 cy. Assuming at least 75% s +1" that would leave 5250 cy over size. This is not a small volume.

If these rock tailings are not used in reclamation, what will they be used for. Removing common variety mineral materials from federal lands may require a minerals material disposal contract pursuant to 43 CFR 3600 regulations. Please clarify this statement and make it perfectly clear how these tailings will be used.

Page 17, Hazardous Substances, paragraph 3, line 1. *"Should a significant spill occur, and if the owner is unable to complete clean-up of the spill, and outside contractor, who is bonded and licensed in hazardous materials clean-up, (such as Steve Rich) will be called to assist with the effort."*

All spills over 42 gallons must be reported to BLM and ODEQ, and any quantity of spill in waters of the State are reportable. You will need to include a spill prevention plan.

Page 20, Occupancy, The Law *"The General Mining Law gives miners the right to occupy their claims while engaged in mining activity. The basis of the Occupancy issue is found in the 1872 Act which states, "Except as otherwise provided, all valuable mineral deposits in lands belonging to the United States .....shall be free and open to exploration and purchase.... and the lands in which they are found to* ***occupation*** *and purchase" (30 U.S.C. 22)."*

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The actual law reads:

"That all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners, in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States."

This is a direct quote from the Act of May 10, 1872, otherwise known as The General Mining Law. The General Mining Law has been amended by 137 years of new laws and clarified and further defined by numerous judicial decisions. Provisions of the 1872 Mining Law were changed with the implementation of the 1976 Federal Land Policy Management Act (FLPMA) effective as of January 1981. Many of the provisions of FLPMA revised the surface uses allowed on mining claims under the 1872 mining law by halting or restricting unnecessary or undue degradation of the public lands. The regulation portion of the FLPMA is found at 43 CFR 3809. These regulations were updated and the final rules published in December 2001. These rules effectively replace many of the 1872 Mining Law provisions and require mining reclamation, financial guarantees for reclamation to the Federal government, mining claim occupation permits and detailed Mining Plans of Operations to be submitted to the governing agencies before disturbing the surface.

Page 20, Occupancy, 43 CFR 3715, page 21, paragraph 1, line 1. *"The shop building is used while conducting exploration, equipment maintenance, mining, processing and reclamation. The shop building will be used year-round for storage of equipment and supplies."*

In 43 CFR §3715-2, what activities do I have to be engaged in to allow me to occupy the public lands?

"In order to occupy the public lands under the mining laws for more than 14 calendar days in a 90 day period within a 25-mile radius of the initially occupied site, you must be engaged in certain activities. Those activities that are the reason for your occupancy must:

(a) Be reasonably incident;
(b) Constitute substantially regular work;
(c) Be reasonably calculated to lead to the extraction and beneficiation of minerals;
(d) Involve observable on-the-ground activity that BLM may verify under Sec 3715.7; and
(e) Use appropriate equipment that is presently operable, subject to the need for reasonable assembly, maintenance, repair or fabrication of replacement parts."

43 CFR §3715.2-1, what additional characteristic(s) must my occupancy have?

"In addition to the requirements specified in §3715.2, your occupancy must involve one or more of the following:

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(a) Protecting exposed, concentrated or otherwise accessible valuable minerals from theft or loss;
(b) Protecting from theft or loss appropriate, operable equipment which is regularly used, is not readily portable, and cannot be protected by means other than occupancy;
(c) Protecting the public from appropriate, operable equipment which is regularly used, is not readily portable, and if left unattended, creates a hazard to public safety;
(d) Protecting the public from surface uses, workings, or improvements which, if left unattended, create a hazard to public safety; or
(e) Being located in an area so isolated or lacking in physical access as to require the mining claimant, operator, or workers to remain on site in order to work a full shift of a usual and customary length. A full shift is ordinarily 8 hours and does not include travel time to the site from a community or area in which housing may be obtained."

According to your proposed Mining Plan, this is a phased project which may have a protracted life of mine and the BLM agrees with this premise. It appears that very little information as to site geology, ore grade, valuable mineral characteristics and general minability of the property, has been developed. The logical initial phase is the development of said information. If you do have this information, please supply it in order for BLM to evaluate the data and to ensure that no undue and unnecessary degradation will occur on the public lands from the approval of this plan.

The BLM will evaluate each phase of the project individually and based on its own merits. Decisions for each phase will be issued in a logical and sequential order as detailed information is developed and provided. BLM will not evaluate Phase II thru V until you have developed and we have received information supporting the logical and sequential development of the property in a miner-like manner and in accordance with accepted industry standards.

Before this occupancy can be allowed as part of your operation under the 1872 Mining Law as amended, it is your responsibility under 43 CFR 3715 to provide detailed information, conforming to standard engineering practice and industry standards, indicating that the value of the locatable minerals onsite is sufficient to justify the use of the metal shop building and sustain your proposed operation.

The SME Mining Engineering Handbook Vol. 1, 2nd edition, p. 344 (1992) states the following:

> "Ore reserve estimates are assessments of the quantity and tenor of a mineral that may be profitably and legally extracted from a mineral deposit through mining and/or mineral beneficiation. Estimation of ore reserves involves not only evaluation of the tonnage and grade of a deposit but also consideration of the technical and legal aspects of mining the deposit, of beneficiating the ores, and of selling the product."

Based on this definition, the BLM expects you to produce maps, sample and assay data, and operations and market information sufficient to delineate reserves for the mine life, in accordance with standard engineering practice and industry standards. Providing all the relevant information described in Table 6.2.1, entitled "Salient Factors Requiring Consideration in a Mining Project Feasibility Study," of the SME Mining Engineering Handbook referenced above, and would satisfy this requirement.

BLM looks forward to working with you in processing your plan and EA in compliance with the regulations and to ensure that no undue or unnecessary degradation occurs on the public lands. BLM requests that you submit all the additional information required herein within 90 days from the date of your receipt of this decision. Should you fail to do so, BLM will consider your Plan withdrawn.

Pursuant to 43 CFR 3809.800(a), you may ask the Oregon State Director to review this decision. If you request State Director review of this decision, your written request must be a single package that includes a brief written statement explaining why BLM should change its decision and any documents that support your written statement (See 43 CFR 3809.805(a)). This decision will remain in effect during the period of State Director review unless a stay is granted by the State Director (See 43 CFR 3809.808(a)). Requests for State Director Review must be sent to the Bureau of Land Management, State Director Review, c/o Baker Field Office, P.O. Box 947, 3285 11th Street, Baker City, OR 97814. When you submit your request for State Director review, you may also request a meeting with the State Director (See 43 CFR 3809.805(b)).

If you have requested a State Director review, you may terminate this review by filing an appeal with the Interior Board of Land Appeals (IBLA) during the 30 days immediately following the date of the original decision. If you have requested a State Director review and the State Director decides not to review the decision in your case, you may appeal to IBLA. An appeal to IBLA must be taken during the 30-day period following the date the State Director decides not to review the decision. If the State Director does not make a decision within 21 days of your request, you should consider your request for State Director review declined and you have 30 days following that 21-day period in which you may appeal the original decision to IBLA (See 43 CFR 3809.806). You may also appeal an unfavorable decision resulting from the State Director review. If appealing an unfavorable decision from a State Director's review, you have 30 days from the date of that decision to appeal to IBLA.

You may also file an appeal directly to IBLA and bypass completely the State Director review (See 43 CFR 3809.800(b)). If you wish to bypass State Director review and appeal directly to IBLA, your appeal must be filed within 30 days of the date of the original decision.

Any appeal taken with IBLA must be in accordance with 43 CFR 4.400 et seq. If you decide to appeal, your Notice of Appeal (NOA), must be filed in writing and in accordance with Form 1842-1 (enclosed) at the Bureau of Land Management, Baker Field Office, 3285 11th Street, Baker City, OR 97814, and with Office of the Regional Solicitor, 805 SW Broadway, Suite 600 Portland, OR 97205.

The required Statement of Reasons (SOR; see 43 CFR 4.412) may be filed with the NOA or, if not, it must be filed with the IBLA, Office of Hearings and Appeals, U.S. Department of the Interior, MS 300-QC, Arlington, VA 22203, within 30 days after the NOA was filed (See also required service at 43 CFR 4.413).

The decision, signed by the Field Office Manager, will remain in effect during the appeal unless a stay is granted. If you wish to file a petition pursuant to regulations 43 CFR 4.21 for a stay of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, or for a stay pursuant to 43 CFR 3809.808(b) during a State Director review, the petition for a stay must accompany your notice of appeal or with your package requesting State Director review. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted. Except as otherwise provided by law or other pertinent regulation, a petition for a stay of a decision shall show sufficient justification based on the following standards:

Standards for Obtaining a Stay

1. The relative harm to the parties if the stay is granted or denied,
2. The likelihood of the appellant's success on the merits,
3. The likelihood of immediate and irreparable harm if the stay is not granted, and
4. Whether the public interest favors granting the stay.

Please contact Lead Geologist, Eastern Zone, Kirk Rentmeister at 541-523-1287 with any questions regarding this decision.

Ted Davis
Acting Field Manager

1 Attachment
1 - Form 1842-1, Information on Taking Appeals to the Board of Land Appeals (2 pp.)

cc: Ed Baldwin
P.O. Box 91
Baker City, OR 97814

Ed Hardt
1695 Auburn #33
Baker City, OR 97814

Jan Alexander
P.O. Box 153
Unity, OR 97884

Supplement #3
to **Mormon Basin Placer Mine**
Watershed Existing Condition Report dated August 14, 2008 and **Watershed Effects Report** dated November 25, 2008

Prepared by Timothy Bliss, Bliss Enterprises LLC
September 9, 2010 Final

Table of Contents

Introduction

This report was begun at the request of Jan Alexander to respond to certain sections of the BLM's review of the draft EA regarding potential for excavations to affect stream flow. After completing the first analysis entitled, "Potential for Mining to Dewater Streams in Mormon Basin," which identifies hydrologically sensitive areas within "Unit 1 - Glengarry Creek-French Gulch Creek," I was asked to prepare a second analysis entitled, "Areas at Risk for Mining Activity to Substantially Affect Water Flow and Sediment Production From Stream-Associated Springs," which more specifically describes the boundaries and potential mining effects for 5 hydrologically sensitive areas within "Unit 1" - Glengarry Creek-French Gulch Creek" that will be excluded from mining at this time per Jan's instructions.

Map of Project Area – See Map 1 in Appendix.

This map was provided by Jan Alexander. It shows the 6 units of the current 150-acre project area located on public lands administered by the Bureau of Land Management. For reference in this analysis, the 6 Units are named as follows:
Unit 1 - Glengarry Creek-French Gulch Creek.
Unit 2 - Old French Gulch-City Gulch.

Unit 3 - Dry Gulch North.
Unit 4 - Dry Gulch South.
Unit 5 - Basin Creek-California Gulch.
Unit 6 - California Gulch.

Map of Areas at Risk – See Map 2 in Appendix.

Referring to the revised Project Area Map, this map shows 5 areas within Unit 1 (Glengarry Creek-French Gulch Creek) where there is substantial risk for mining activity to adversely affect water flow and sediment production at stream-associated springs.

Potential for Mining to Dewater Streams in Mormon Basin

Refer to the **Map of Project Area.**

The test in **General Mitigation for Mining Near Streams** would be used to show the effect of excavation on adjacent streams, springs and wetlands, and whether any further mitigation is needed, in addition to standard 20-foot buffers.

Area 1 (Glengarry Creek and French Gulch Creek) – For discussion purposes, this area will be divided into the following 6 subareas:
Area 1A – French Gulch Creek Floodplain from the Ford to Glengarry Creek.
Area 1B – Upper French Gulch Creek Valley.
Area 1C – Valley bottom west of Glengarry Creek and north of French Gulch valley.
Area 1D – Hillslope north of French Gulch valley and west of Glengarry Creek valley.
Area 1E – Valley bottom and ridge east of Glengarry Creek and north of Pond 2.
Area 1F – Valley bottom east of Glengarry Creek and south of Pond 2.

Area 1A (French Gulch Creek Floodplain and Riparian Area from the Ford to Glengarry Creek) – The portion of French Gulch Creek floodplain and riparian area, located downstream from the ford, formed under the influence of Glengarry Creek. Part of this area has received some sediment from French Gulch Creek after it was diverted in a ditch to this site during a past mining episode. The current channel is on the north side of the floodplain. There are a few older channels, including one along the north edge of the floodplain, one above the Pond 1 spring area, and one or two south of there above the enclosed basin spring area. The enclosed basin has a floodplain and riparian area that receive water and sediment from the enclosed basin spring area. Both spring areas occur along escarpments on the east end of the upper French Gulch floodplain; the escarpments are remnants of a past mining episode. Vegetation growing in the lower part of the French Gulch Creek channel above it's junction with Glengarry Creek indicates some surface water is being lost to groundwater before the confluence; this area is near Pond 1.

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Exposed subsoils at the Pond 1 and enclosed basin spring areas are loamy to sandy and very gravelly. On 27 July 2010, water flow from the Pond 1 spring area was slow to rapid, and water flow from the enclosed basin spring area was slow to moderate. Observed soil and waterflow conditions at these springs suggests subsoil horizons of the unmined upper floodplain west of the springs should also have slow to rapid hydraulic conductivity and large enough voids in portions of some horizons and areas to pass turbid water a substantial distance underground.

Due to the presence of the porous subsoils in the upper floodplain, and to exposure of the floodplain aquifer along an escarpment by past mining activity, future mining in the riparian floodplain 20+ feet above the springs (the standard buffer) has potential to cause a negligible (unmeasurable) to minor (measurable) short-term adverse increase in turbidity in spring water. Any turbid water entering the enclosed basin would have no effect on turbidity of the adjacent Glengarry Creek channel (and Glengarry Creek Reservoir 1 - Bliss Report) because the basin has a silty bottom that currently filters out all sediment. Any turbid water flowing from the Pond 1 spring area would drop most of it's sediment in Pond 1, then flow into Glengarry Creek, causing a short-term turbidity increase of Pond 1 and Glengarry Creek.

The presence of the porous subsoils in the upper floodplain, the exposure of the floodplain aquifer along the escarpment, and the subbing out of water in lower French Gulch Creek also suggest that future mining in the floodplain 20+ feet from the springs, streams and wetlands of French Gulch Creek (being about ¼ acre of mineable area) has potential to alter the flow of French Gulch Creek and the springs with the following consequences. There would be a negligible (unmeasurable) to minor (measurable) short-term adverse dewatering effect on the flow of French Gulch Creek, which could also cause a small increase in the water temperature of lower French Gulch Creek. This dewatering could occur because most of the pit would be located at a lower elevation than most of the creek channel, which curves to the northeast, and because water is believed to flow away from this channel segment to the enclosed basin and Pond 1 spring areas. In contrast, there would be a negligible (unmeasurable) to minor (measurable) beneficial enhanced-flow effect on enclosed basin and Pond 1 spring areas, assuming the soil layer supporting the spring area aquifers remains in tact. However, if mining activity were to puncture the aquifer-supporting soil layer for the springs, the water table could drop a few to several feet, resulting in a site-specific major (measurable) long-term adverse effect on water table elevation and on water flow from and wetlands at the current springs, with water likely emerging at a lower elevation along the escarpments. The rating for a drop in water table is major because it would be very difficult to mitigate.

Area 1B (Upper French Gulch Creek Valley) – This area includes the remainder of the French Gulch Creek valley not included in 1A, including the valley slopes north and south of the floodplain west of the ford, and all of the valley east of the ford. Exposed subsoils observed in this area are heavy loams to clays loams, which indicates they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from the stream and wetland, at the depth of the water table, would cause a negligible (unmeasurable) short-term adverse effect on streamflow and stream/wetland water table.

Area 1C (Valley bottom west of Glengarry Creek and north of French Gulch valley) – This area is upstream of the Glengarry Creek-French Gulch Creek confluence, which is just above Pond 1 springs and the south end of Pond 2 spring areas. The area includes the Glengarry Creek floodplain and valley on the west side of the creek.
Exposed subsoils at the Pond 1 and Pond 2 spring areas are loamy to sandy and very gravelly. Water flow from Pond 1 springs indicates slow to rapid hydraulic conductivity; water flow from Pond 2 springs indicates slow to moderate hydraulic conductivity. Soil and waterflow conditions at Ponds 1 and 2 are assumed to represent floodplain conditions upstream of the Glengarry Creek-French Gulch Creek confluence.

Excavations 20+ feet from stream-associated wetlands above the confluence with French Gulch likely would have a negligible (unmeasurable) to minor (measurable) short-term adverse dewatering effect on streams and wetlands, with range of risk related to local site conditions (such as depth to bedrock, subsurface soil textures, geometry of the aquifer, depth to aquifer and aquifer supporting layer, seasonal changes in the aquifer), to location, dimensions and orientation of excavations, and on texture of soils placed back into excavations compared with soil layers taken out.

Adverse effects of mining coarser, more porous, unsorted floodplain soils along Glengarry Creek are estimated to be no worse than minor with respect to stream dewatering because test holes and mining excavations will be progressively reclaimed as soon as possible after soil is removed, and will be located perpendicular to the stream channel (and not below the stream channel as in Area 1A), and will be located more than 20 feet from streams because the buffer is measured from stream-associated wetlands. Other factors are a large percentage of the coarser, more porous floodplain soils will be left unmined within the buffer, and usually the majority of the area of near-stream excavations will be in finer-textured soils outside of the current floodplain. All of these factors combine to reduce potential and risk for water movement away from the stream. Adverse effects on streamflow by excavation in clayier soils farther from the stream will be negligible due to slow hydraulic conductivity. Adverse effects are estimated to be short-term because the General Mitigation for Mining Near Streams provides a protocol for observing and measuring water levels of and hydrologic connection between a stream and adjacent test holes and mining excavations, which are anticipated to equilibrate within 24 hours based on past observation of near-stream pits; if corrective action is needed, it will occur shortly after calculations of hydraulic conductivity are made. In addition, data gathered pursuant to the General Mitigation for Mining Near Streams will provide a body of knowledge that the BLM and operator can use to refine mitigations, as needed, as testing and mining proceed.

The portion of the valley bottom nearer the hillslope (Area 1D) has more clayey, less porous soils, and is higher elevation so the water table is much deeper, and is farther from the stream channel; therefore, excavations in this area would have a negligible (unmeasurable) short-term adverse dewatering effect on nearby Glengarry Creek and wetlands.

Area 1D (Hillslope north of French Gulch valley and west of Glengarry Creek valley) – This area includes the metal shop. The mineable area on the northwest side is uphill from the county road. Exposed subsoils observed in previously mined sites and roads in this area are clay loams to clays, which indicate they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from Glengarry Creek, springs and wetlands, at the depth of their water tables, would cause a negligible (unmeasurable) short-term adverse effect on streamflows and stream/wetland water tables. Bedrock in most of this area is at a higher elevation than the water table adjacent to Glengarry Creek and French Gulch Creek, so there is no potential for most excavation to dewater either stream.

Area 1E (Valley bottom and ridge east of Glengarry Creek and north of Pond 2) – This area consists of Glengarry Creek floodplain deposits and valley highlands east of the creek, the toe of a ridge NW of the County Road-Glengarry Creek ford, and a ridge between Glengarry Creek and Emmigrant Creek. For the southeast portion of the Glengarry Creek floodplain near Pond 2, effects are as described for Area 1A. For the remainder of the Glengarry Creek floodplain upstream of there, effects are as described for Area 1C. For the Glengarry Creek valley east of the floodplain, effects are as described for Area 1B. For the ridge to the northeast and ridge toeslope to the northwest, effects are as described for area 1D.

Area 1F (Valley bottom east of Glengarry Creek and south of Pond 2) - On the west side of this area there is a trench that is located east of and 10-20 feet lower elevation than the current Glengarry Creek channel that was constructed sidehill around the west side of the valley bottom. The groundwater table dips steeply downward from Glengarry Creek to the northeast under the escarpment and bottom of the trench. No seepage was observed midslope along the escarpment, and no water flows in the bottom of or near the trench, except for springs that rise along Reservoirs 22, 23 and 24, north of Reservoir 1 (Glengarry Creek Reservoir 2 in Bliss Report) on the east end of this area. Reservoir 24 is about 20 feet lower than Reservoir 1. There is no surface water outflow from this area; all water and sediment flow into reservoir 24 and adjacent pits to the northeast, which have no surface water outflow to Glengarry Creek.

Exposed subsoils have loam to clay loam textures along the north side and sandy loam to loam textures along the south side of this area, which indicates they have moderate to slow hydraulic conductivity. Therefore, mining 20+ feet from Reservoirs 22, 23 and 24 streams and wetlands, at the depth of the water table, would have a negligible (unmeasurable) to minor (measurable) short-term adverse effect on streamflow and turbidity of the short Reservoir 22 to 24 stream, and no effect or negligible adverse effect on the Glengarry Creek channel 800 feet to the southeast below City Gulch Reservoir (Glengarry Creek Reservoir 3 in Bliss Report).

If mining occurs west of the trench above Reservoirs 23 and 24, there is potential for rocks and soil of the escarpment to roll into the Reservoirs and their wetlands and streams, which would be difficult to mitigate and would be a moderate to major (measurable) site-specific long-term adverse effect on streamflow because the rocks and soil could bury the streams, wetlands and reservoirs. If the steep slope adjacent to the east side of the reservoirs is not mined, there will be no effect.

If mining occurs west of the trench near the constructed Glengarry Creek channel and berm, there is potential to intercept the steeply dipping subsurface groundwater table between Glengarry Creek and the trench. It is unlikely that mining 20+ feet from the creek on the east side of the berm would remove a key stream-supporting soil layer; the stream-supporting soil layer should be in the unmined berm. However, there is potential to intercept/uncover the steeply dipping aquifer outside of and downslope from the stream-supporting soil layer. Uncovering of the steeply dipping aquifer several feet away from and below the stream supporting layer most likely would have a negligible (unmeasurable) site-specific short-term adverse effect on streamflow of Glengarry Creek and a minor (measurable) site-specific short-term adverse effect on the function and flow of the aquifer which would be covered following mining. In the unlikely event that mining would remove the stream-supporting layer, the effect would be at least moderate.

Mining in most of this area (northeast of the trench on the benches west of Reservoir 22, and northeast of Reservoirs 22, 23 and 24) will have no effect to a negligible (unmeasurable) short-term adverse effect on streamflows and stream/reservoir/wetland water tables.

Area 2 (Old French Gulch-City Gulch) – This area is located southwest of Glengarry Creek and Reservoir 1 (Glengarry Creek Reservoir 2 in Bliss Report) and northwest of City Gulch, and includes a portion of the old French Gulch valley. Landforms are mostly 5 to 15 feet higher than the margins of streams/wetlands. Exposed subsoils observed in previously mined sites in this area are heavy loams to clay loams, which indicate they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from Glengarry Creek, City Gulch Creek, and Reservoir 1 and associated wetlands, at the depth of their water tables, would cause a negligible (unmeasurable) short-term adverse effect on streamflows and stream/reservoir/wetland water tables.

Area 3 (Rich Gulch North) – This area includes a ridge between Rich Gulch and drainages to the north and east, and portions of valleys on the northwest and south ends including a small part of the Rich Gulch valley. The only portion near a stream channel is the south end, which includes the Rich Gulch Creek gully and wetlands. The 20-foot stream/wetland buffer boundary along Rich Gulch Creek is about 5-10 feet higher in elevation than the stream/wetland margin of Rich Gulch Creek. Exposed subsoils observed in this area are heavy loams to clay loams, which indicates they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from the stream and wetland, at the depth of the water table, would cause a negligible (unmeasurable) short-term adverse effect on streamflow and stream/wetland

water table. The valley on the north end of the unit is about 250 feet south of an intermittent stream channel; potential adverse effects on streamflow of an excavation here would be lower than for excavating near Rich Gulch Creek.
Bedrock in most of this mining area is at a higher elevation than the water table adjacent to Rich Gulch Creek, so there is no potential for excavation of most of the area to dewater Rich Gulch Creek or other streams.

Area 4 (Rich Gulch South) – This area includes a partially mined hillslope on the south side of Rich Gulch, some springs in mined areas on the west end, and an upper hillslope on the east end that faces Basin Creek. The only portions of the unit near the Rich Gulch Creek channel, springs and wetlands are the northwest and northeast boundaries. The 20-foot buffer boundary along Rich Gulch Creek, springs and wetlands is about 5-10 feet higher in elevation than the stream/spring/wetland margins. Exposed subsoils observed in this area are heavy loams to clay loams, which indicates they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from the stream and wetland, at the depth of the water table, would cause a negligible (unmeasurable) short-term adverse effect on streamflow and stream/wetland water table. Bedrock in most of this mining area is at a higher elevation than the water table adjacent to Rich Gulch Creek, so there is no potential for excavation of most of the area to dewater Rich Gulch Creek or other streams.

Area 5 (Basin Creek-California Gulch) – This area is located on a steep hillside south of Basin Creek and California Gulch Creek. The mineable area is uphill above the streams, wetlands and floodplains of Basin Creek and California Gulch Creek. Exposed subsoils observed in this area are heavy loams to clay loams, which indicates they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining 20+ feet from the streams and wetlands, at the depth of the Basin Creek and California Gulch Creek water tables, would cause a negligible (unmeasurable) short-term adverse effect on streamflow and stream/wetland water table. Bedrock in the higher elevation part of this mining area is at a higher elevation than the water table of Basin Creek and California Gulch Creek, so there is no potential for excavation in this part of the mining unit to dewater either stream.

Area 6 (California Gulch) - This area is located on a hillside about 400 hundred feet south of and about 60 feet higher than California Gulch Creek and wetlands and west of a metal building. Exposed subsoils observed in this area are heavy loams to clay loams, which indicates they would have slow hydraulic conductivity. Bedrock at this area is at a higher elevation than the water table adjacent to California Gulch Creek, so there is no potential for the excavation to dewater California Gulch Creek.

Areas at Risk for Mining Activity to Substantially Affect Water Flow and Sediment Production From Stream-Associated Springs

Five small areas within the 150-acre project area have substantial risk for mining activity to increase or decrease spring and stream flows and to deliver sediment to streams, springs and wetlands through stream, spring and wetland-associated groundwater aquifers. See Areas A, B, C, D and E boundaries on attached map; see Area descriptions below. All of these areas occur in coarser-textured floodplain sediments along or near Glengarry Creek where excavation escarpments from previous mining entry intercepted the groundwater table, creating new springs, streams and wetlands. The closer a new mining excavation would be to the escarpment springs of these 5 areas, the greater the risk would be to adversely affect spring/stream flow and turbidity.

<u>Area A</u> includes a portion of the floodplain of French Gulch Creek (east of the ford, south of the channel, and uphill of two spring areas along two human-made escarpments), the enclosed basin and springs that flow into it, and the berm along the west side of Glengarry Creek between the creek and the enclosed basin from Pond 1 to the road. The southern boundary of the French Gulch Creek floodplain is the edge of the riparian area. One spring area is in Pond 1, tributary to Glengarry Creek. The other spring area is south of Pond 1 in the enclosed basin.

<u>Area B</u> includes mine spoils west of Pond 2 and a portion of the floodplain of Glengarry Creek west of the mine spoils. Springs surface along a human-made escarpment along the west side of Pond 2. The southern part of the area is where Glengarry Creek is adjacent to the west side of the mine spoils; this area is too narrow to mine after imposing buffers on the wetlands on the east side of the creek and west side of the pond. The middle part of the area is north of Glengarry Creek where the old floodplain is adjacent to the old mine spoils. The northern part of the area is where mine spoils are piled on uplands.

<u>Area C</u> is a bench of previously mined land adjacent to the northeast side of Glengarry Creek channel and adjacent to Glengarry Creek Reservoirs 1 and 2. <u>Area D</u> is a steep 10 to 20 foot high escarpment adjacent to the northeast side of Area C and adjacent to the southwest side of Reservoirs 22, 23 and 24 and their associated springs and streams. The northeast boundary of Area D is the first toeslope in the trench. The Glengarry Creek groundwater table steeply dips to the northeast through Areas C and D to the riparian areas, springs, streams, wetlands, and reservoirs northeast of Area D. Excavation in Areas C and D could intercept the groundwater table and accelerate flow from Glengarry Creek toward the depression east of Area D and could creating new springs and wetlands. Excavation of Area D above Reservoirs 22, 23 and 24 could result in rocks and soil rolling into springs, streams and wetlands.

<u>Area E</u> includes the escarpment and a portion of the bench on the north side of Reservoir 22, and the area between Reservoirs 22/23 and Area D. There are springs and wetlands along the reservoirs. The location of the springs in Reservoir 22 suggests water is flowing from the northwest.

Mining in these five areas will require wider buffers than the standard 20 feet, in order to decrease the risk of intercepting steam associated groundwater and delivering sediment to streams, springs and wetlands. By increasing the buffers around the streams, springs and wetlands of concern, the result is that there is insufficient room for the mining excavation, stockpiles and access routes. Thus, all five of these areas will be excluded from mining at this time. The risk of sediment entering the waters, or stream dewatering will be eliminated.

The remainder of the Glengarry Creek floodplain west of French Gulch Creek and Pond 2 has soils similar to those of Areas A and B, which are loamy to sandy and very gravelly. The exact boundary of this coarser soil/floodplain deposit has not been mapped. Much of this floodplain will be excluded from mining by 20-foot buffers along streams, springs and wetlands; total width of this buffer along Glengarry Creek will be a minimum of about 50 feet, including the stream. Excavations 20+ feet from stream-associated wetlands in this area would have a negligible (unmeasurable) to minor (measurable) short-term adverse dewatering effect on streams and wetlands, depending on site conditions (such as depth to bedrock, subsurface soil textures, geometry of the aquifer, depth to aquifer and aquifer supporting layer, seasonal changes in the aquifer), on location, size and orientation of excavations, and on texture and location of soils placed back into excavations. The risk of sediment input is also negligible due to the 20-foot buffer. The following Mitigation will be used to insure that the potential for impacts to streams, springs and wetlands from mining of these courser floodplain soils is minimized.

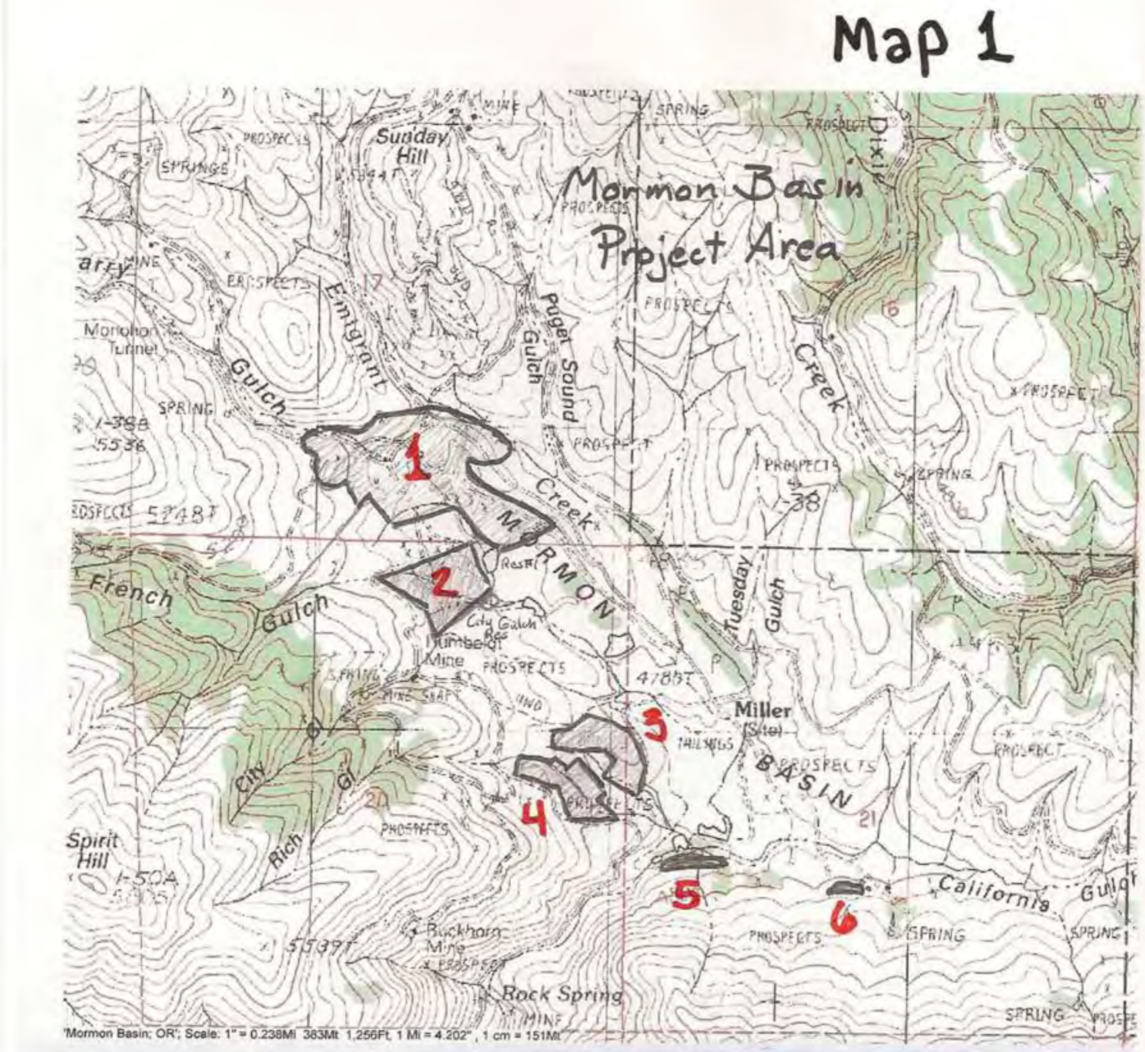
> **General Mitigation for Mining Near Streams:** Dig one or more small test holes with a backhoe to an appropriate depth beyond the minimum 20-foot stream/wetland buffer. Measure the depth from the original ground surface to the water table immediately after the hole is dug. Let the test hole(s) fill with water for 24 hours. Use a level and rod to measure the water surface elevation at the stream and adjacent hole, perpendicular to the stream, for each test hole test location. Record this information in a log book. Mark the test hole location(s) on a site map and put a site code on the map and in the log book. If the hole does not fill with water, or the original water level does not change, or the water level in the hole(s) is the same or higher than the stream, then mining may begin. After 24 hours, if the water level is lower than the stream, and water appears to be seeping out of the hole, and stream flow appears to be affected by this, the hole will be filled, and if stream water remains clear, 1 or more test holes will be dug another 10-20 feet away, with all procedures repeated, until a negligible effect is detected; then mining may proceed with the shortest footprint of the excavation along the stream and the longest side of the excavation away from the stream. Reclamation of these small areas will be ongoing using washed gravel mixed with dried silt and sand that is removed from the settling ponds.

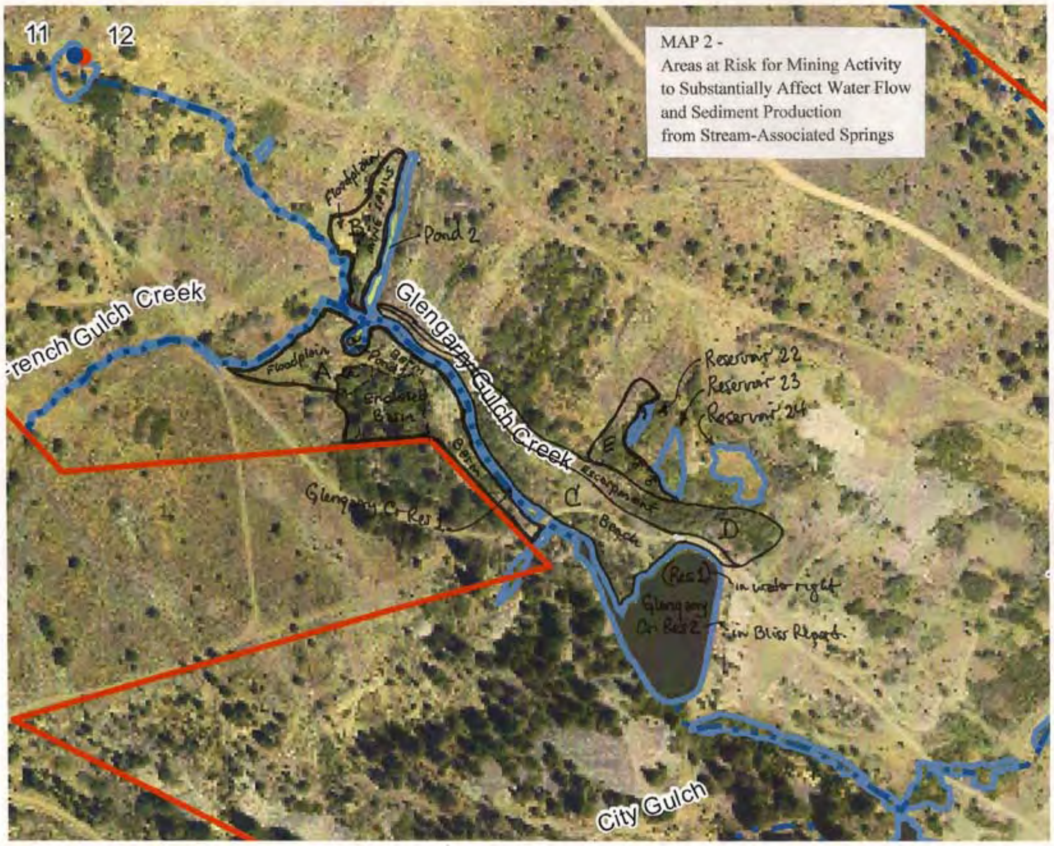
Non-floodplain areas (terraces, toeslopes, benches, uplands) to be mined along Glengarry Creek and French Gulch Creek have more clayey, less porous soils, or are at a higher elevation, so the water table is much deeper. Exposed subsoils observed in previously mined sites and roads are heavy loams to clays, which indicate they would have slow hydraulic conductivity. Hydraulic conductivity is so slow that mining at least 20 feet from Glengerry Creek and French Gulch Creek, springs and wetlands at the depth of their water tables, would cause no more than a negligible (unmeasurable) adverse short term effect on streamflows and stream/wetland water tables. Also, there would be a negligible (unmeasurable) adverse risk of sediment leaching through the soils into the streams. Bedrock in most of this area (estimated to be 15-20 feet) is at a higher elevation than the water table adjacent to Glengarry Creek and French Gulch Creek, so there is no potential for excavations to dewater either stream.

In the old French Gulch, City Gulch area, and along Rich Gulch, landforms are mostly 5 to 15 feet higher than the margins of streams/wetlands. Exposed subsoils observed in previously mined sites in this area are heavy loams to clay loams, which indicate they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining at least 20 feet from Glengarry Creek, City Gulch Creek, Rich Gulch and Reservoir 1 and associated wetlands, at the depth of their water tables, would cause a negligible (unmeasurable) adverse short-term effect on streamflows and stream/reservoir/wetland water tables. The risk of sediment input is also negligible.
The Basin Creek proposed mining area and the California Gulch pit area are both located upslope of the streams. Exposed subsoils observed in these areas are heavy loams to clay loams, which indicates they would have slow hydraulic conductivity. Hydraulic conductivity of these subsoils is so slow, mining at least 20 feet from the streams and wetlands, even at the depth of the Basin Creek and California Gulch Creek water tables, would cause a negligible (unmeasurable) adverse short-term effect on streamflow, sediment and stream/wetland water table.

Appendix

Map 1 - Map of Project Area (separate .pdf document)
Map 2 - Map of Areas at Risk (separate .pdf document)


Map 1
Mormon Basin Project Area
Sunday Hill
Emigrant
Gulch
Puget Sound Gulch
Creek
Mormon Creek
French Gulch
Tuesday Gulch
Miller (Site)
BASIN
City Rich Gl
Spirit Hill
Buckhorn Mine
Rock Spring
California Gulch
1
2
3
4
5
6
'Mormon Basin, OR'; Scale: 1" = 0.238Mi 383Mt 1,256Ft, 1 Mi = 4.202", 1 cm = 151Mt


MAP 2 -
Areas at Risk for Mining Activity
to Substantially Affect Water Flow
and Sediment Production
from Stream-Associated Springs
11
12
French Gulch Creek
Glengarry Gulch Creek
City Gulch
Floodplain
Pond 2
Reservoir 22
Reservoir 23
Reservoir 24
Escarpment
Breach
A
B
C
D
E
Res 1
in water right
in Bliss Report

APPENDIX E
WETLAND DELINEATION REPORT

Mormon Basin Placer Mine
Wetland and Water Determination Report
Malheur County, Oregon
T13S, R42E, Sections 16, 17, 20 and 21

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SWCA Project #14532

Table of Contents

Introduction

The Portland Office of SWCA Environmental Consultants (SWCA) was contracted by Assessment Associates, Inc., on behalf of B.P. Gold Inc., to conduct a wetland determination and delineation for a project located in the Mormon Basin approximately 27 miles southeast of Baker City in Malheur County, Oregon. B.P. Gold Inc. is planning placer mining operations on land administered by the Bureau of Land Management (BLM). The mining operation is designed to test ahead of actual mining, to ensure surface impacts are confined to areas with economic values in gold. No mining is planned to occur in wetlands, streams, springs or ponds.

A) Landscape Setting and Land Use: *OAR141-090-0035(7)(a)*

The site is located within the moderately sloped, sub-alpine area of the Mormon Basin in Malheur County, Oregon (Figure 1). A very small portion of the study area is located in Baker County. The study area is comprised of approximately 300 aces of BLM mining claims (Figure 2). Private lands are located adjacent to the BLM claims. The tax lot map available on the Oregon Map website is for tax assessment purposes only and was determined to be incorrect according to the client based on the field-located private property boundaries determined by a professional land surveyor.

Topography within the study area consists of steep, rugged higher elevational areas dominated by Ponderosa pine, steppe hillsides and valley bottomlands containing drainages and associated wetlands (Photo 1). Three main drainages flow within the study area at the bottom of the valleys: California Gulch Creek, Emigrant Gulch Creek and Glengarry Gulch Creek. The steppe region is dominated by bunchgrasses (e.g. bluebunch wheatgrass, Idaho fescue, Sandberg's bluegrass), sagebrushes (e.g. white and big sagebrush) and western juniper.

The site has a history of mining activities with documented mining operations as early as 1883 and most recently in 1980. Mining within the 300 acre study area on BLM lands is not active today. Current primary land use consists of cattle grazing. Active placer mining occurs on adjacent private lands under the terms of an Oregon Department of Geology and Mineral Industries (DOGAMI) permit and a conditional use permit from Malheur County. Several gravel and dirt roads are present throughout the study area that originally served historic mining activities. Roads and a few structures associated with historic mining operations still exist (locations shown on attached recent aerial Wetland Maps Figures 4a-4c: Appendix A). Old mine tailings and deposits are scattered throughout the site.

B) Site Alterations: *OAR141-090-0035 (7)(c)*

Site conditions have been altered by the historic construction of roads, drainage diversions and dams, land clearing, excavation activities and associated placement of placer mining spoils (rock and soil piles) associated with previous mining activities. Historic mining activities occurred within floodplains and streams; however, vegetation has recolonized the site and it is currently well-vegetated with a diverse assemblage of species. The historic mining activities described above also resulted in alterations to the historic soil profiles and hydrology that were present on the site.

Large confined depressions, referred to as reservoirs, are present in the study area (for example at the downstream end of Glengarry Gulch Creek). These reservoirs were originally excavated and bermed for use as a water source for mining activities. The historic Glengarry Gulch Creek and Emigrant Gulch Creek channels have been altered, and hydrology is constricted by downstream push up berms associated with the reservoirs. The downstream portions of Emigrant Gulch Creek and Glengarry Gulch Creek have been diverted and now flow through a series of off-site, bermed reservoirs located on private land. Most of the historic reservoirs displayed wetland conditions and were delineated in this study. A few dry excavated depressions located in the upslope edges of the reservoir complex were documented as upland (see upland determination plot 10).

In other areas, placement of sediment deposits during historic mining activities have raised the soil surface elevation in floodplains farther above the water table creating convex upland areas. Evidence of this was observed along Rich Gulch in Phase 1A and along downstream portions of Glengarry Gulch Creek and Emigrant Gulch Creek in Phase 2.

Site alterations have taken place greater than 5 years ago and wetland and water conditions observed within the study area during our July 2008 site visits were considered to be normal circumstances, as defined by Oregon Department of State Lands (DSL) under OAR 141-090-0020 (22).

C) Precipitation Data and Analysis: *OAR141-090-0035 (7)(f)*

The closest WETS Station to the project site is the Baker FAA AP, Oregon station located approximately 40 miles north of the project site (WETS is not an acronym, it is short for wetlands climate analysis; Personal Communication, Jim Marron, National Water & Climate Center, Natural Resources Conservation Service, jim.marron@usda.gov, with C. Mirth Walker, SWCA, September 18, 2007).

Precipitation data were obtained from the Baker, Oregon weather station via the Boise, Idaho National Weather Service (NWS) Forecast Office website. Average annual rainfall according to the WETS table for Baker FAA AP is 10.59 inches. Precipitation data are shown below and precipitation data tables are included in Appendix B.

Table 1. Precipitation Data and Analysis (Baker, Oregon Station)

Field Investigation Date	Observed Rainfall on the Field Investigation Date (in.)	Observed Rainfall Two Weeks Prior to the Field Investigation Date (in.)	Percent of Normal Rainfall for the Water Year to Date (From NOAA observed precipitation data and NOAA normals table)	Monthly Percent of Normal Precipitation for Each of the Three Months Preceding the Field Investigation (From WETS)
July 15, 2008	0	Trace	95%	[April 2008]: 64%, [May 2008]: 159%, [June 2008]: 77%
July 16, 2008	0	Trace	95%	
July 17, 2008	0	Trace	95%	
July 18, 2008	0	Trace	95%	
Data Sources: Observed precipitation data obtained from the Preliminary Climatology Data table for the NOAA/National Weather Service station at Baker, Oregon. Percent of normal data obtained from the NOAA/National Weather Service Baker, Oregon daily normals table and the Baker FAA AP station WETS table.				

According to the Baker, Oregon NWS station, monthly observed precipitation for April 2008 was 0.55 inches, which is below average but within the normal range; for May rainfall received was 2.14 inches which is above the WETS average; and for June rainfall received was 0.95 inches which is below average but within the normal range. In summary, precipitation received during the months prior to our July field work can be considered to have been within the normal range according to the WETS table.

D) Methods: *OAR141-090-0035 (7)(d-e), (g-h), (16)(a-b), (f), (d) or (g), (17), & (19-20)*

The methodology used for determining the presence of wetlands and waters and delineating wetland boundaries followed the routine wetland determination methodology and plant community approach of the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Arid West Interim Regional Supplement* to the 1987 USACE Wetland Delineation Manual, which became effective February 2007 (USACE, 2006). The site is located in the Columbia/Snake River Plateau Land Resource Region (LRR B) of the Arid West Interim Regional Supplement. The 1987 Corps Manual and the supplemental Arid West Manual are consistent with the Oregon Department of State Lands (DSL) wetland delineation requirements.

The study area for the wetland and water determination consisted of three separate phases (referred to as Phase 1A, 2, and 3) within the project site which consists of approximately 310 acres of BLM land. The field investigation focused on areas within the study area with USGS and NWI-mapped streams and wetlands and areas determined to have the potential to contain wetlands or waters based on a recent site aerial photograph (photo date August 9, 2007).

Field work was conducted on July 15, 16, 17, and 18, 2008 by SWCA Senior Wetland Scientist Mirth Walker, SWCA Senior Wetland Ecologist Stacy Benjamin, and SWCA Wetland Scientist Stacey Reed. Soils, vegetation, and indicators of hydrology were recorded at 18 sample plot locations to document representative wetland and upland site conditions. Wetland determination data forms are included in Appendix C, ground level photos are included in Appendix D and a list of vegetation observed onsite is included in Appendix E. Report references are in Appendix F. Soil texture class abbreviations used on the wetland determination data forms are included in Appendix G.

Portions of the wetland and water determination boundaries were GPS surveyed in the field, and the remaining boundaries were hand mapped in the field onto large scale aerial photo field maps (August 9, 2007 aerial photo; scale 1 inch = 200 feet). The locations of all wetland and upland sample plots were GPS surveyed. During the field investigation, we ground-truthed the wetland hydrology signatures and other signatures observed on the aerial photos (i.e. dark areas of inundation, light green algae covered ponds, dark green vegetation breaks, drainage patterns, depressions) and this information was used to assist with mapping of wetland boundaries in the field.

The approximate locations of the stream centerline of the potentially jurisdictional waters were mapped by hand onto the aerial photo field maps based on field observations and aerial photo signatures (Figures 4a-4c; Appendix A). The project does not propose to impact jurisdictional waters; therefore, the ordinary high water mark was not delineated in this study.

According to information posted by the USDA Natural Resource Conservation Service (NRCS) at http://www.or.nrcs.usda.gov/pnw_soil/or_data.html (NRCS 2008), the NRCS has not yet mapped or published a soils report for the project area.

E) Description of All Wetlands and Other Non-Wetland Waters: *OAR141-090-0035 (2), (7)(b), & (17)*

Potentially jurisdictional wetlands and waters totaling 20.2 acres were mapped within the study area. Floodplain wetlands delineated within the study area are hydrologically influenced by three main drainages that flow through the project area (Glengarry Gulch Creek, Emigrant Gulch Creek and California Gulch Creek). Hydrology of these drainages is mainly supported by seasonal groundwater springs and snowmelt from surrounding mountains, and the drainages are not perennial.

Ponds and reservoirs mapped as wetlands within the study area were determined to be potentially jurisdictional features and are remnants of mining features excavated below the groundwater table. Maximum water depth of the ponds and reservoirs was not determined in this investigation. The majority of these features appear to be shallow; however, it is possible that two of the apparently deeper reservoirs on Glengarry Gulch Creek would be considered waters, depending upon the maximum water depth.

Phase 1A (South)

Rich Gulch Creek originates from a ground water spring located to the west of the study area. Rich Gulch Creek extends into the north part of the study area (Wetland Map 4b) and flows northeast through a mosaic of depressional bermed wetlands located between old mine tailings (Photo 2). Plot 17 is located northeast of the study area but is representative of the emergent wetland conditions within the study area and provides relevant information used in determining wetland boundaries in the study area (Photo 3). Common redoximorphic features were observed within the entire 18 inch deep soil profile. Soils were saturated at 18 inches below ground surface during the July 18, 2008 site visit. Shallow ponding was observed near the plot in small depressional areas of the swale. This area was determined to be wetland based on having a hydrophytic dominated vegetation community along with hydric soil and wetland hydrology indicators. The wetland boundary was well defined by a significant increase in topography to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland (soft rush) to non-hydrophytic in upland (Ponderosa pine, sagebrush, western juniper, tall ragwort; as documented at upland plot 18). The swale and Rich Gulch Creek extend off-site to the east, west and south of the study area.

Due to the narrow width of the channel (approximately 2 to 3 feet wide; Photo 4) Rich Gulch Creek likely has intermittent stream flow. Shallow flow (average of 2 inches deep) was observed within on-site portions of the channel during our July 2008 site visits.

Phase 1A (North)

Wetland Plot 15 documents the conditions of a spring fed depressional wetland observed in the southeast part of the Phase 1A north study area. The concave emergent wetland slopes downward to the south and extends off-site (Photo 5). The wetland was dominated by soft rush and small spikerush. Soils were saturated at the surface during the July 17, 2008 site visit. The wetland boundary was defined by a topographic increase to the adjacent mine tailing mounds. A non-hydrophytic dominated vegetation community was growing on the mounds (white and big sagebrush, Idaho fescue, bottlebrush squireltail, common yarrow; as documented at paired upland plot 16).

An approximately 5 foot tall upland berm is present along the northeastern perimeter of the wetland which separates it from a larger reservoir to the northeast. The reservoir is mainly located off-site to the north with only a portion extending on-site. The reservoir contained a large area of open water with a narrowleaf willow and Pacific willow scrub-shrub community dominant along the perimeter (Photo 6). Soft rush and cattails were also present along the perimeter of the reservoir. The on-site wetland boundary associated with the reservoir was well-defined by the push-up berm and a transition from hydrophytic dominated vegetation community in wetland (willow) to non-hydrophytic vegetation community in upland (Ponderosa pine, sagebrush).

Phase 2

Several ponds, three large reservoirs, spring fed wetlands and palustrine scrub-shrub and emergent fringe wetlands associated with Glengarry Gulch Creek, French Gulch Creek, and Emigrant Gulch Creek were determined to be present within the Phase 2 study area (Wetland maps 4a and 4b). Several of the ponds and reservoirs are mapped on the National Wetland Inventory (NWI) map.

A spring fed wetland that originates from the hillslope in the north portion of the study area flows northeast off-site into Glengarry Gulch Creek. The wetland is a concave sloped spring-fed wetland and is mapped on the NWI map. The wetland was dominated by Pacific willow, cottonwood, mountain alder, hooded ladies-tresses, California false hellebore and soft rush. Shallow ponding was observed throughout the wetland and due to the predominance of hydrophytic vegetation, a soil test pit was not examined. Surface water flows from the downslope edge of the wetland (Photo 7) across the adjacent road before flowing into Glengarry Gulch Creek off-site to the north. The wetland boundary was defined by a topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland to non-hydrophytic in upland (Douglas-fir, snowberry, black cottonwood, western juniper and red columbine).

Another small emergent spring seeps across the road downslope of the larger NWI mapped wetland. It too discharges along the adjacent road before joining Glengarry Gulch Creek off-site to the north. All observed seep areas were mapped within the wetland.

Glengarry Gulch Creek enters the study area from the north and flows in a southeasterly direction within a defined channel through the site. A willow and cottonwood dominated riparian corridor is present along the defined channel. The channel is approximately 2 feet wide and appears to be intermittent. Approximately 4 inch deep flow was present within Glengarry Gulch Creek during our July 2008 field investigations.

Paired plots 11 and 12 document representative wetland and upland conditions associated with a palustrine emergent fringe wetland adjacent to Glengarry Gulch Creek in the north part of the study area. Plot 11 documents the representative emergent conditions dominated by soft rush, redtop and areas of California false hellebore (Photo 8). The surface 10 inches of the soil profile were a low chroma clay loam containing common, prominent redoximorphic features. Surface soil cracks were observed at plot 11. Plot 11 was determined to be wetland based on a hydrophytic vegetation community along with the presence of hydric soils and wetland hydrology indicators. The wetland boundary was defined by a change in the vegetation community from hydrophytic in wetland (soft rush, redtop, California false hellebore) to non-hydrophytic in upland (choke cherry, snowberry, slender cinquefoil, tall ragwort).

The downstream portion of Glengarry Gulch Creek lacks a defined channel and flows through a series of ponds and two permanently flooded reservoirs. Outflow at the downslope end of each reservoir is constricted by man-made dams associated with historic mining operations. However, surface water seasonally spills over, around and/or under the berms, hydrologically connecting the reservoirs. A narrow fringe of soft rush and/or willow is present along the perimeter of the reservoirs (Photo 9). Aquatic vegetation was also present. Therefore, the reservoirs were determined to be wetland based on having wetland hydrology and a hydrophytic vegetation community. The wetland boundary associated with the reservoirs was well defined by the topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland (willow and soft rush) to non-hydrophytic in upland (Ponderosa pine, sagebrush, California brome, common yarrow and tall ragwort).

Plot 8 documents the scrub-shrub wetland community near the outer wetland edge of one of the larger downstream reservoirs. The outer fringe of the reservoir was dominated by a large community of willow (Pacific willow, narrowleaf willow and rigid willow) and soft rush. The lower elevational areas of the reservoir were inundated (Photo 10). Surface soils were layers of sandy loams and sands underlain by silty clay. Soils met the redox dark surface hydric soil indicator due to having a surface 4 inch layer of chroma of 2 with common, prominent concentrations occurring in the matrix. The water table was observed at approximately 18 inches below ground surface (and rising) during the July 16, 2008 site visit. A clay pan restrictive layer was observed at approximately 27 inches below ground surface. Therefore these areas were determined to be wetland based on having a hydrophytic dominated vegetation community along with the presence of hydric soil and wetland hydrology indicators. The wetland boundary was mostly defined by a change in the vegetation community from hydrophytic in wetland (willow) to non-hydrophytic in upland (sagebrush, rose, gray spineless horsebrush, bottlebrush squirreltail, California brome) as documented at upland plot 9.

Several additional smaller excavated ponds are present upslope of the Glengarry Gulch Creek main stem within the associated valley floodplain. Ponds were inundated during the July 2008 site visits. Three of the ponds did not appear to have a direct surface water connection to Glengarry Gulch Creek. Ponds were dominated by soft rush and cattails with a willow dominated fringe (Photo 11). The wetland boundary associated with the ponds was well defined by a topographic increase to the adjacent upland along with a change in the vegetation community from willow and cattails to sagebrush.

French Gulch Creek is an intermittent spring-fed stream that enters the site from the southwest and flows on-site into Glengarry Gulch Creek. Willow dominated riparian fringe wetland communities are present along on-site portions of French Gulch Creek. Very shallow flow (average approximately 1 inch deep) was observed within on-site portions of French Gulch Creek during the July 2008 site visits. Average bankful width was approximately 2 feet.

City Gulch Creek enters the site from the southwest, south of French Gulch Creek. The stream flows in a northerly direction through a depressional wetland before flowing into one of the on-site reservoirs. The average bankful width was approximately 1 foot, and this stream is likely intermittent.

Emigrant Gulch Creek is intermittent and flows southeast along the northern study area boundary of Phase 2. Hydrology is supported by upslope off-site groundwater springs. Flow was absent within Emigrant Gulch Creek during the July 2008 site visits. A large mosaic of scrub-shrub and emergent depressional wetlands located between old mine tailings was delineated within the downstream floodplain of Emigrant Gulch Creek. Wetlands extend outside the study area to the southeast. The convex ridges associated with the mine tailings support non-hydrophytic vegetation species. Less than 50% of the upland mine tailings were delineated within the wetland mosaic. Wetland plot 13 documents the scrub-shrub wetland conditions associated with the on-site downstream end of Emigrant Gulch Creek. Plot 13 was dominated by narrowleaf willow, small spikerush and redtop (Photo 12). Emergent depressions associated with Emigrant Gulch Creek located downslope of plot 13 were dominated by soft rush and redtop. Surface soils at plot 13 met the redox dark surface hydric soil indicator. Dried algal mats were observed on the soil surface in the plot vicinity. Therefore, this area was determined to be wetland based on having a dominant hydrophytic vegetation community along with hydric soils and wetland hydrology indicators. The wetland boundary associated with on-site floodplain of Emigrant Gulch Creek was defined by a natural topographic rise to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland (primarily willow) to non-hydrophytic in upland (Ponderosa pine, Idaho fescue and silky lupine; as documented at upland plot 14; Photo 13).

Phase 3

California Gulch Creek enters the Phase 3 study area (wetland map 4c) from the east and flows west through the study area within a defined channel. Willow dominated scrub-shrub wetlands and soft rush, slender cinquefoil and redtop dominated emergent floodplain wetlands (Photo 14) were mapped along California Gulch Creek. Floodplain wetlands associated with California Gulch Creek extend outside the study area to the east and to the west. Wetland Plot 7 documents the wetland conditions of emergent floodplain wetlands associated with California Gulch Creek. Although Plot 7 is outside the study area, it is representative of wetland conditions in the eastern portion of the study area and provides relevant information used in determining wetland boundaries in the study area. Soils within the surface 12 inches at Plot 7 were a low value with a low chroma matrix with many distinct redoximorphic features, which met the redox dark surface hydric soil indicator. Dark hydrology signatures are present on the 2007 aerial photo in the vicinity of Plot 7. Vegetation documented at Plot 7 met the FAC-neutral test. Therefore, these areas were determined to be wetland based on having a hydrophytic dominated vegetation community along with hydric soil and two secondary wetland hydrology indicators. The wetland boundary was defined by a natural topographic increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland (soft rush, slender cinquefoil and redtop) to non-hydrophytic in upland (basin wildrye, California brome, Canada thistle; as documented at upland plot 6).

A groundwater spring discharges from the hillslope south of the Phase 3 study area. Discharge flows north downslope through a narrow well defined channel (tributary to California Gulch Creek) within the study area (Photo 15). The tributary outfalls into a small concave depression located slightly upslope from the California Gulch Creek main stem. The depressional wetland was dominated by soft rush, meadow foxtail and slender cinquefoil (as documented at wetland plot 4). Shallow flow approximately ½-inch deep was present within the tributary and lower elevational areas of the emergent wetland during the July 16, 2008 site visit. Drainage patterns consisting of flattened down vegetation were visible within the upslope edge of the wetland. Hydric redoximorphic soil indicators were observed within low chroma (chroma of 2 or less) surface soils. This area was therefore determined to be wetland based on having met the hydrophytic vegetation, hydric soil and wetland hydrology parameters. The wetland boundary was defined by a distinct topographic rise to the adjacent upland to the south and to the west along with a change in the vegetation community from soft rush and meadow foxtail to big sagebrush, slender cinquefoil and northern bedstraw in upland (as documented at paired upland plot 5). The depression extends into emergent floodplain wetland associated with California Gulch Creek to the northeast.

The downstream portion of California Gulch Creek flows through a small depressional emergent wetland located immediately upstream of a dirt road crossing and is mapped on the NWI map (Photo 16; Plots 1 and 2). The wetland was dominated by pond weed, soft rush, Oregon checkermallow and western blue flag. Approximately 4 inch deep ponding was observed in lower elevational areas of the wetland with surface soil cracking along the perimeter during the July 15, 2008 site visit. Approximately 7 inches within the surface 12 inches of the soil pit contained low chroma silt loam displaying many, distinct redox concentrations. The wetland boundary was defined by an elevational increase to the adjacent upland along with a change in the vegetation community from hydrophytic in wetland (soft rush) to non-hydrophytic in upland (Ponderosa pine, sagebrush, western juniper, silky lupine, northern bedstraw; as documented at paired upland plot 3).

Shallow flow (average approximately 2 inches deep) was observed within California Gulch Creek within the study area during our July 2008 site visits. California Gulch Creek is an intermittent stream. It flows off-site to the southwest into Basin Creek.

F) Deviation from LWI or NWI: *OAR141-090-0035 (16)(e)*

The following streams and wetlands are mapped within each study area phase according to the Bridgeport NE, Oregon National Wetland Inventory map. The NWI map is included as Figure 3 in Appendix A. The study area is not included in a Local Wetland Inventory (LWI). Wetlands mapped in this investigation generally agree with the locations of the NWI mapped wetlands; however, we identified several additional wetlands that are not shown on the NWI map.

Phase 1A

A portion of palustrine unconsolidated shore excavated wetland with a temporary water regime (PUSAx) extends into the northeast part of the northern Phase 1A study area.

Phase 2

Upstream portions of Glengarry Gulch Creek are mapped as palustrine scrub-shrub with a seasonally flooded water regime (PSSC). The lower on-site reach is mapped as an intermittent riverine excavated stream bed with a seasonally flooded water regime (R4SBCx). A palustrine scrub-shrub wetland with a saturated water regime (PSSB) is mapped in the northern part of the study area. Ponds and reservoirs mapped on the NWI associated with Glengarry Gulch Creek include: palustrine, diked/impounded, unconsolidated bottom with a semipermanently flooded water regime (PUBFh), palustrine emergent with a saturated water regime (PEMB), palustrine unconsolidated bottom excavated with a permanently flooded water regime (PUBHx), palustrine excavated unconsolidated bottom seasonally flooded water regime (PUBCx), palustrine excavated unconsolidated shore seasonally flooded water regime (PUSCx) and palustrine excavated unconsolidated shore with a temporarily flooded water regime (PUSAx). A palustrine unconsolidated bottom excavated wetland with a semipermanently flooded water regime (PUBFx) is mapped associated with City Gulch within the study area. French Gulch is mapped as an intermittent riverine stream bed with a seasonally flooded water regime (R4SBC).

Emigrant Gulch Creek is mapped as palustrine scrub-shrub with a temporarily flooded water regime (PSSA) and the downstream portion is mapped as riverine intermittent stream bed with a seasonally flooded water regime (R4SBC).

Phase 3
California Gulch Creek is mapped as palustrine emergent with a seasonally flooded water regime (PEMC). Seasonally flooded palustrine scrub-shrub wetlands (PSSC) are mapped near the western boundary in the downstream portion of California Gulch Creek.

G) Mapping Method: *OAR141-090-0035 (7)(f), (11), (12), (13), (18), & (22)*

SWCA's study area boundary was digitized into a Geographic Information System (GIS) based on hard copy maps of the project area boundary overlayed on a USGS map base that were provided by the client. The study area was located in the field using a GPS unit with submeter accuracy. Sample plot locations, partial wetland boundaries, and photo location points were GPS surveyed by SWCA using a GeoExplorer XT Mapping Grade GPS unit, capable of accuracy of one meter or less with wide-area augmentation system activated. The remaining resource boundaries were hand drawn on large aerial photo field maps and digitized in the office by SWCA GIS staff. The accuracy of the hand mapped boundaries is +/- 10 feet. Mapping and cartography was completed in ArcGIS 9.1. The wetland overview map is shown in Figure 4, and the detail maps are shown in Figures 4a through 4c. Maps were prepared according to the DSL map requirements.

H) Additional Information: *OAR141-090-0035 (6)(c), (16)(c), & (21)*

Wetlands and waters mapped within the study area are likely to be considered jurisdictional by the Oregon Department of State Lands (DSL). Many of the ponds and reservoirs observed on-site were created during or as a result of historic mining operations. Four of the reservoirs have mining water rights which are used annually in support of mining operations. At several of the other reservoirs, activities have ceased for over 5 years and the abandoned reservoirs have reclaimed natural wetland conditions and are therefore likely to be determined jurisdictional by DSL.

All drainages in the study area are intermittent. A few perennial segments are present, particularly below springs, but all drainages are intermittent at the confluence with other streams. These waters will likely be determined to be jurisdictional by DSL. Drainages determined not to provide spawning, rearing or food-producing areas for food and game fish or which lack a free and open connection to waters of the state may not be determined to be jurisdictional by DSL.

Wetlands and waters present in the study area may or may not be considered jurisdictional by the U.S. Army Corps of Engineers, depending on their analysis of adjacency and surface water connection to traditional navigable waters. All drainages present within the study area appear to flow to Basin Creek, which is a tributary to Willow Creek. However, the downstream connection of on-site waters to other waters or traditional navigable waters was not documented in this investigation.

I) Results and Conclusions: *OAR141-090-0035 (7)(j)*

Approximately 20.2 acres of potentially jurisdictional wetlands and waters were mapped within the study area.

J) Disclaimer: *OAR141-009-0035 (7)(k)*

This report documents the investigation, best professional judgment and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

K) List of Preparers

Stacey Reed

Stacey Reed
Wetland Scientist
Field Work and Report Preparation

C Mirth Walker

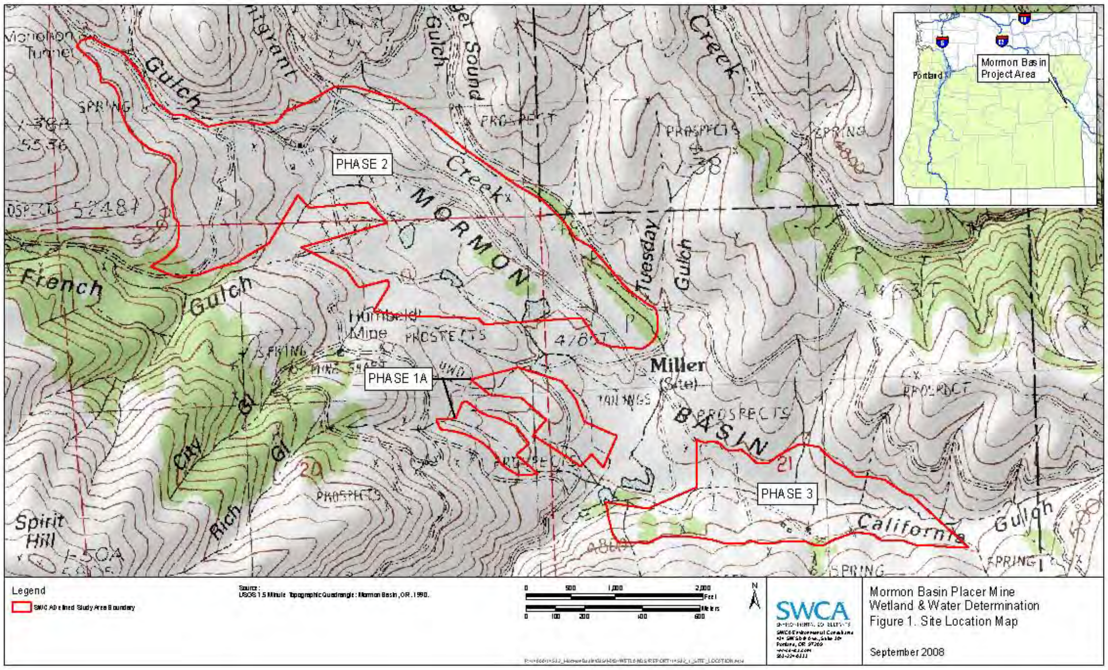
C. Mirth Walker, PWS, CWD
Senior Wetland Scientist
Field Work and Data Sheet Review

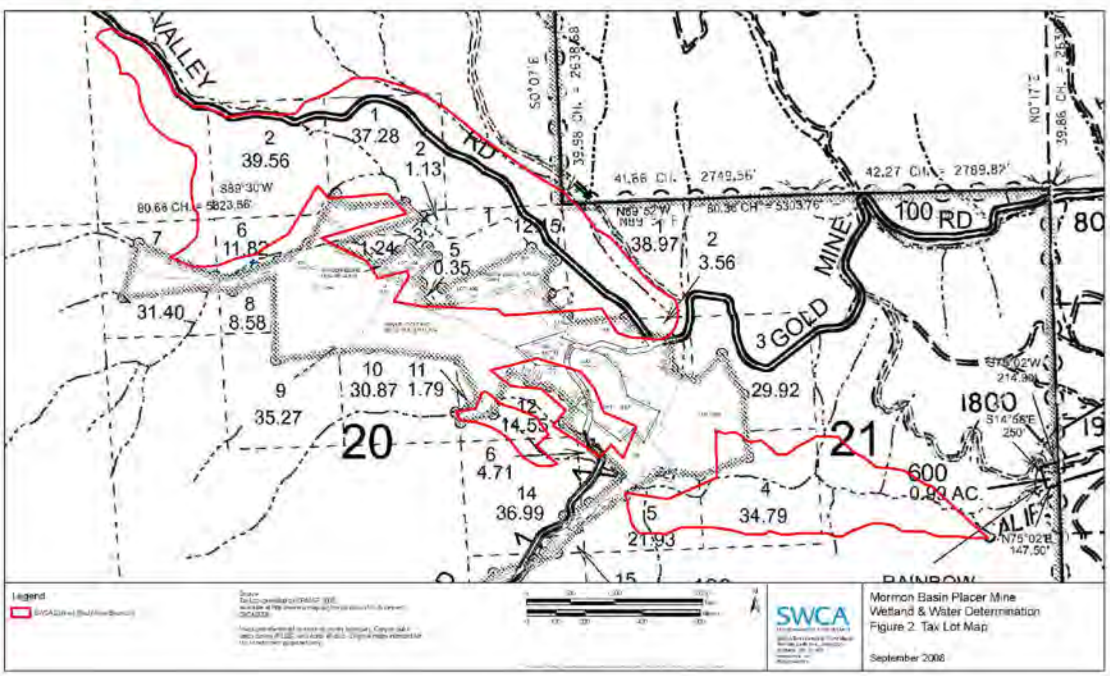
Stacy Benjamin

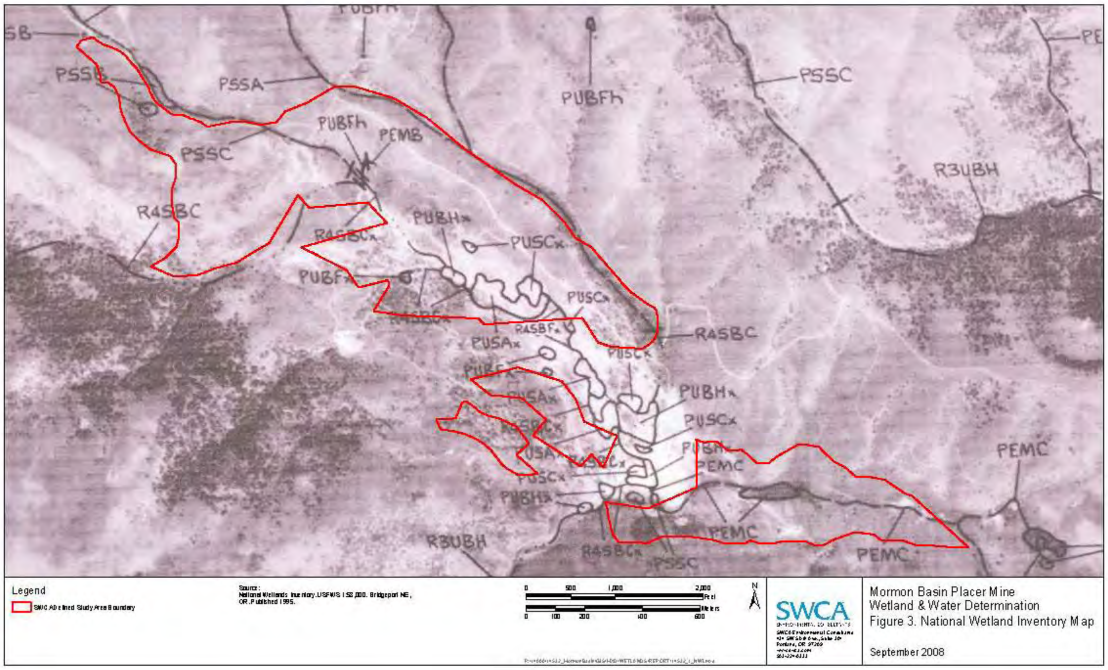
Stacy Benjamin
Senior Wetland Ecologist
Field Work and Report Review

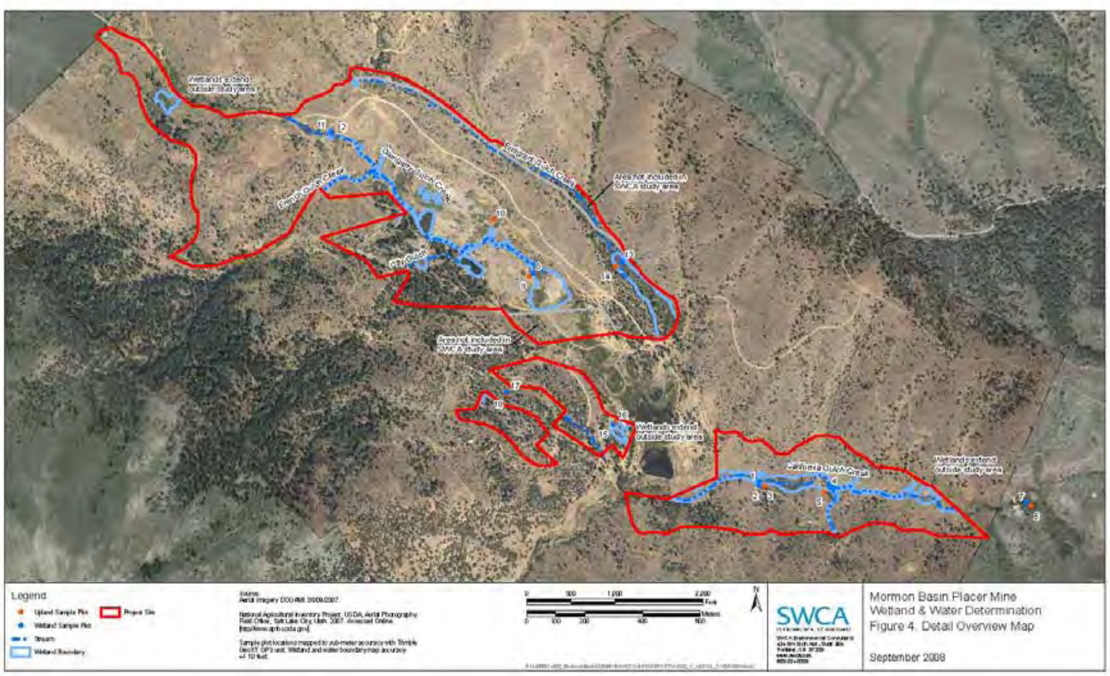
Appendices

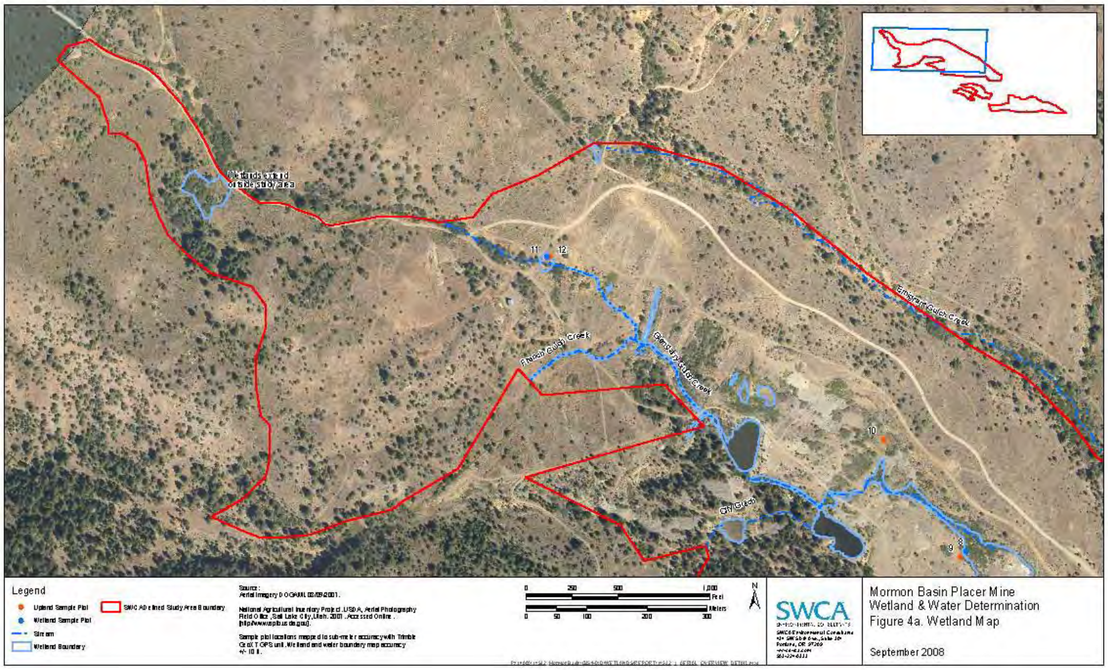
Appendix A: Maps

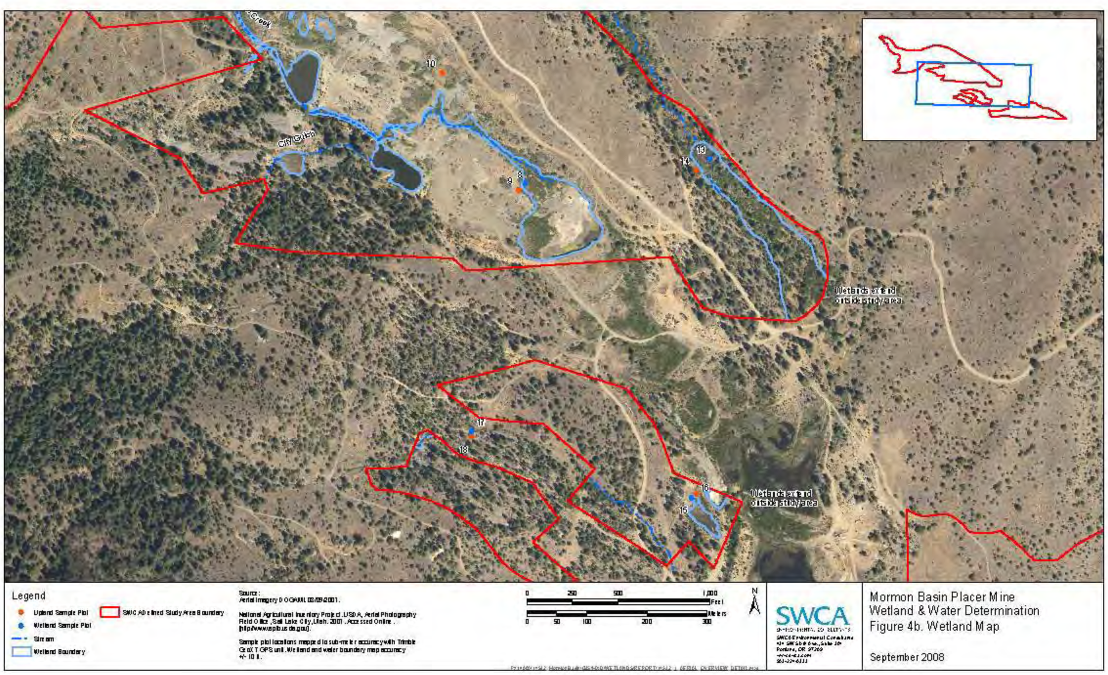

Mormon Basin Project Area
Portland
PHASE 2
PHASE 1A
PHASE 3
French
Gulch
Mormon
Creek
Basin
Miller (Site)
Humboldt Mine
Tuesday Gulch
California Gulch
Spirit Hill
Rich Gl
City Gl
PROSPECTS
SPRING
Legend
Source:
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 1. Site Location Map
September 2008

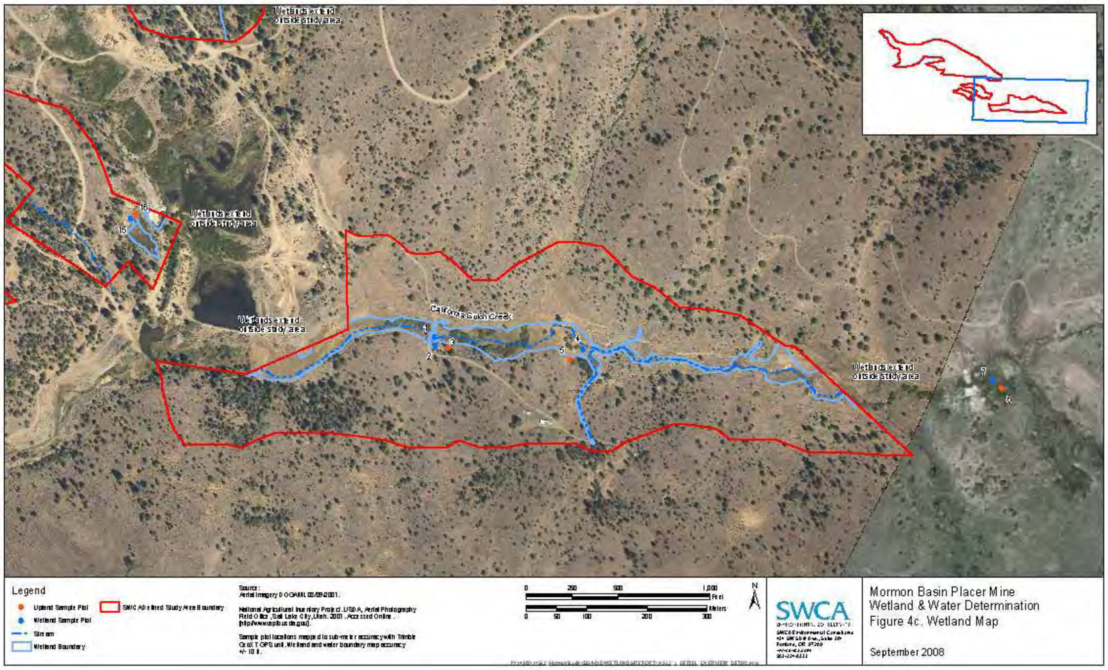

VALLEY RD
100 RD
3 GOLD MINE
20
21
39.56
37.28
1.13
11.82
31.40
8.58
35.27
30.87
1.79
14.55
4.71
36.99
38.97
3.56
29.92
34.79
21.93
600
0.99 AC.
1800
Legend
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 2. Tax Lot Map
September 2008


PSSA
PSSC
PUBFh
PEMB
R4SBC
PUBHx
PUSCx
PUBFx
R4SBFx
PUSAx
R3UBH
PEMC
R3UBH
Legend
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 3. National Wetland Inventory Map
September 2008
SWCA


Legend
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary
Project Site
California Gulch Creek
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4. Detail Overview Map
September 2008
SWCA


Emigrant Gulch Creek
City Creek
Legend
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary
SWCA Defined Study Area Boundary
Source:
Aerial Imagery DOQ/AIML 08/09/2001.
National Agricultural Inventory Project, USDA, Aerial Photography Field Office, Salt Lake City, Utah. 2001. Accessed Online. (http://www.apfo.usda.gov).
Sample plot locations mapped to sub-meter accuracy with Trimble GeoXT GPS unit. Wetland and water boundary map accuracy +/- 10 ft.
0 250 500 1,000 Feet
0 50 100 200 300 Meters
N
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4a. Wetland Map
September 2008


City Creek
Legend
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary
SWCA Defined Study Area Boundary
Source:
Aerial Imagery DOQ/AIML 08/09/2001.
National Agricultural Inventory Project, USDA, Aerial Photography Field Office, Salt Lake City, Utah. 2001. Accessed Online. (http://www.apfo.usda.gov).
Sample plot locations mapped to sub-meter accuracy with Trimble GeoXT GPS unit. Wetland and water boundary map accuracy +/- 10 ft.
0 250 500 1,000 Feet
0 50 100 200 300 Meters
N
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4b. Wetland Map
September 2008


California Gulch Creek
Legend
Upland Sample Plot
Wetland Sample Plot
Stream
Wetland Boundary
SWCA Defined Study Area Boundary
Feet
Meters
N
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Figure 4c. Wetland Map
September 2008

Appendix B: Precipitation Data

WETS Station : BAKER FAA AP, OR0412 Creation Date: 09/09/2002
Latitude: 4450 Longitude: 11749 Elevation: 03370
State FIPS/County(FIPS): 41001 County Name: Baker
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	34.2	17.1	25.7	0.91	0.62	1.09	2	6.5
February	41.3	22.1	31.7	0.62	0.40	0.75	2	4.0
March	50.9	27.2	39.1	0.83	0.57	0.99	2	2.8
April	59.3	31.4	45.4	0.86	0.51	1.04	2	1.1
May	67.2	38.3	52.8	1.35	0.83	1.64	4	0.4
June	75.4	44.4	59.9	1.24	0.76	1.50	3	0.0
July	84.5	48.4	66.5	0.68	0.27	0.84	1	0.0
August	84.8	47.5	66.2	0.87	0.29	1.04	2	0.0
September	75.3	39.0	57.1	0.73	0.21	0.91	1	0.0
October	62.5	30.4	46.5	0.57	0.32	0.71	1	0.2
November	44.8	24.6	34.7	0.97	0.62	1.16	3	4.0
December	35.2	17.5	26.3	0.95	0.46	1.17	3	7.3
Annual	-----	-----	-----	------	9.32	11.60	--	----
Average	59.6	32.3	46.0	------	------	------	--	----
Total	-----	-----	-----	10.59	------	------	26	26.3

GROWING SEASON DATES

Probability	Temperature 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	4/22 to 10/ 5 166 days	5/11 to 9/24 137 days	6/ 2 to 9/12 102 days
70 percent *	4/17 to 10/ 9 175 days	5/ 6 to 9/29 146 days	5/28 to 9/17 112 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : OR0412, BAKER FAA AP

[Explanation of the Preliminary Climate Data (F6) Product](#)

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

000
CXUS56 KBOI 011002
CF6BKE
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: BAKER
MONTH: APRIL
YEAR: 2008
LATITUDE: 44 50 N
LONGITUDE: 117 49 W

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
										AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	44	18	31	-11	34	0	T	M	M	3.2	10	310	M	M	4	1	14	310
2	49	17	33	-10	32	0	0.00	M	M	7.4	21	340	M	M	1		26	340
3	57	16	37	-6	28	0	0.00	M	M	3.6	15	40	M	M	0		21	130
4	55	23	39	-4	26	0	T	M	M	7.6	29	310	M	M	1		35	310
5	47	23	35	-8	30	0	T	M	M	5.1	20	170	M	M	9		24	170
6	47	28	38	-5	27	0	0.06	M	M	4.8	15	260	M	M	7	1	20	40
7	47	24	36	-7	29	0	0.03	M	M	4.5	21	320	M	M	7	18	23	320
8	47	22	35	-9	30	0	0.04	M	M	6.0	30	320	M	M	8	12	44	330
9	45	25	35	-9	30	0	0.11	M	M	7.6	18	310	M	M	7	1	25	310
10	49	24	37	-7	28	0	0.04	M	M	7.8	25	310	M	M	7	18	32	310
11	60	18	39	-5	26	0	0.00	M	M	1.5	10	80	M	M	0		14	100
12	70	25	48	4	17	0	0.00	M	M	4.8	15	90	M	M	0	1	21	80
13	72	28	50	5	15	0	0.00	M	M	9.2	23	100	M	M	0		35	120
14	48	33	41	-4	24	0	T	M	M	15.0	28	330	M	M	5		35	330
15	45	26	36	-9	29	0	0.00	M	M	16.2	33	300	M	M	5	8	40	300
16	51	23	37	-8	28	0	0.00	M	M	4.8	13	350	M	M	5		17	350
17	64	19	42	-4	23	0	0.00	M	M	6.0	20	80	M	M	0		26	80
18	57	28	43	-3	22	0	0.00	M	M	10.3	25	330	M	M	0		30	320
19	42	20	31	-15	34	0	0.00	M	M	11.9	25	310	M	M	6		30	310
20	38	18	28	-18	37	0	T	M	M	8.0	21	190	M	M	4	1	24	190
21	44	21	33	-13	32	0	T	M	M	4.0	23	190	M	M	6	128	28	170
22	56	29	43	-4	22	0	0.06	M	M	8.1	23	130	M	M	8	1	28	120
23	51	30	41	-6	24	0	0.11	M	M	6.4	22	340	M	M	6	12	29	330
24	47	28	38	-9	27	0	0.00	M	M	3.8	15	350	M	M	8		22	310
25	49	22	36	-11	29	0	T	M	M	6.2	17	330	M	M	4		23	350
26	62	14	38	-10	27	0	0.00	M	M	3.1	13	60	M	M	0		17	50
27	66	21	44	-4	21	0	0.00	M	M	7.0	21	90	M	M	0		28	110
28	75	33	54	6	11	0	0.00	M	M	6.3	22	290	M	M	2	18	33	160
29	47	33	40	-8	25	0	0.09	M	M	11.0	24	300	M	M	7	13	32	300
30	44	24	34	-15	31	0	0.01	M	M	13.0	32	330	M	M	5	18	39	340

```
================================================================================
SM 1575  713       798   0  0.55    M    214.2          M      122
================================================================================
AV 52.5 23.8                              7.1 FASTST  PSBL  %   4    MAX(MPH)
                               MISC ---->  # 33 300                 # 44  330
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                          STATION:  BAKER
                                          MONTH:    APRIL
                                          YEAR:     2008
                                          LATITUDE:   44 50 N
                                          LONGITUDE: 117 49 W

[TEMPERATURE DATA]       [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 38.1    TOTAL FOR MONTH:    0.55    1 = FOG OR MIST
DPTR FM NORMAL:  -7.2    DPTR FM NORMAL:    -0.31    2 = FOG REDUCING VISIBILITY
HIGHEST:     75 ON 28    GRTST 24HR  0.17 ON 22-23       TO 1/4 MILE OR LESS
LOWEST:      14 ON 26                                3 = THUNDER
                         SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                         TOTAL MONTH:      M         5 = HAIL
                         GRTST 24HR    M  ON   M     6 = FREEZING RAIN OR DRIZZLE
                         GRTST DEPTH:  M  ON   M     7 = DUSTSTORM OR SANDSTORM:
                                                         VSBY 1/2 MILE OR LESS
                                                     8 = SMOKE OR HAZE
[NO. OF DAYS WITH]       [WEATHER - DAYS WITH]       9 = BLOWING SNOW
                                                     X = TORNADO
MAX 32 OR BELOW:   0     0.01 INCH OR MORE:   9
MAX 90 OR ABOVE:   0     0.10 INCH OR MORE:   2
MIN 32 OR BELOW:  27     0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0     1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    798    CLEAR  (SCALE 0-3)  11
DPTR FM NORMAL    205    PTCLDY (SCALE 4-7)  16
TOTAL FM JUL 1   7426    CLOUDY (SCALE 8-10)  3
DPTR FM NORMAL    808

[CDD (BASE 65) ]
TOTAL THIS MO.      0
DPTR FM NORMAL      0    [PRESSURE DATA]
TOTAL FM JAN 1      0    HIGHEST SLP 30.54 ON 26
DPTR FM NORMAL      0    LOWEST  SLP 29.66 ON 29

[REMARKS]
#FINAL-04-08#
```

Explanation of the Preliminary Climate Data (F6) Product

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WFO Monthly/Daily Climate Data

000
CXUS56 KBOI 011002
CF6BKE
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: BAKER
MONTH: MAY
YEAR: 2008
LATITUDE: 44 50 N
LONGITUDE: 117 49 W

TEMPERATURE IN F: :PCPN: SNOW: WIND :SUNSHINE: SKY :PK WND

1 DY	2 MAX	3 MIN	4 AVG	5 DEP	6A HDD	6B CDD	7 WTR	8 SNW	9 DPTH	10 AVG SPD	11 MX SPD	12 2MIN DIR	13 MIN	14 PSBL	15 S-S	16 WX	17 SPD	18 DR
1	53	23	38	-11	27	0	0.00	M	M	4.4	13	320	M	M	3	1	15	300
2	63	18	41	-8	24	0	0.00	M	M	3.8	14	100	M	M	2		17	100
3	63	32	48	-1	17	0	0.01	M	M	5.4	18	280	M	M	7		24	310
4	67	33	50	0	15	0	0.00	M	M	6.4	15	310	M	M	2		20	310
5	74	30	52	2	13	0	0.00	M	M	5.7	21	330	M	M	0	18	26	320
6	65	40	53	3	12	0	0.00	M	M	9.3	21	330	M	M	3		29	340
7	60	38	49	-2	16	0	0.00	M	M	13.0	29	310	M	M	1		39	320
8	58	32	45	-6	20	0	0.00	M	M	10.0	23	330	M	M	1		29	330
9	58	31	45	-6	20	0	0.00	M	M	9.3	21	330	M	M	1		25	340
10	69	26	48	-3	17	0	0.00	M	M	9.0	22	150	M	M	3		39	130
11	55	37	46	-6	19	0	T	M	M	13.0	29	330	M	M	3		36	330
12	56	30	43	-9	22	0	0.00	M	M	9.8	21	320	M	M	4		28	320
13	65	27	46	-6	19	0	0.02	M	M	2.8	14	340	M	M	5		25	250
14	69	48	59	7	6	0	0.00	M	M	10.7	26	340	M	M	7		32	330
15	78	47	63	10	2	0	0.00	M	M	11.2	18	310	M	M	1		24	320
16	86	38	62	9	3	0	0.00	M	M	2.6	9	250	M	M	0	1	12	280
17	91	41	66	13	0	1	0.00	M	M	2.6	12	340	M	M	0	1	15	310
18	86	48	67	14	0	2	0.00	M	M	7.3	20	340	M	M	0		24	350
19	84	42	63	10	2	0	0.00	M	M	2.3	8	260	M	M	0		9	80
20	67	39	53	-1	12	0	0.16	M	M	11.0	31	330	M	M	5	13	38	320
21	51	38	45	-9	20	0	0.10	M	M	15.4	31	320	M	M	9	1	38	330
22	52	38	45	-9	20	0	0.01	M	M	21.4	32	330	M	M	6		41	330
23	62	44	53	-1	12	0	0.03	M	M	6.2	20	300	M	M	5		23	300
24	64	38	51	-4	14	0	0.01	M	M	5.5	18	330	M	M	2	3	22	330
25	67	37	52	-3	13	0	0.00	M	M	8.3	21	310	M	M	1	1	25	320
26	67	34	51	-4	14	0	0.00	M	M	6.6	22	310	M	M	2	12	26	310
27	65	43	54	-1	11	0	0.17	M	M	4.1	16	330	M	M	8	13	21	330
28	60	48	54	-2	11	0	1.26	M	M	4.7	15	260	M	M	9	1	20	270
29	58	49	54	-2	11	0	0.30	M	M	2.5	15	330	M	M	9	1	17	230
30	66	45	56	0	9	0	0.01	M	M	2.4	10	270	M	M	6		13	280

```
31  69  41  55  -1  10   0 0.06    M    M  3.9 36 160   M    M   2 13     47 160
================================================================================
SM 2048 1155       411   3  2.14    M    230.6          M      107
================================================================================
AV 66.1 37.3                              7.4 FASTST  PSBL  %   3    MAX(MPH)
                                  MISC ---->  # 36 160                # 47  160
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                         STATION:   BAKER
                                         MONTH:     MAY
                                         YEAR:      2008
                                         LATITUDE:    44 50 N
                                         LONGITUDE: 117 49 W

[TEMPERATURE DATA]       [PRECIPITATION DATA]        SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 51.7    TOTAL FOR MONTH:    2.14    1 = FOG OR MIST
DPTR FM NORMAL:  -1.0    DPTR FM NORMAL:     0.79    2 = FOG REDUCING VISIBILITY
HIGHEST:    91 ON 17     GRTST 24HR  1.35 ON 27-28       TO 1/4 MILE OR LESS
LOWEST:     18 ON  2                                 3 = THUNDER
                         SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                         TOTAL MONTH:     M          5 = HAIL
                         GRTST 24HR    M  ON    M    6 = FREEZING RAIN OR DRIZZLE
                         GRTST DEPTH:  M  ON    M    7 = DUSTSTORM OR SANDSTORM:
                                                         VSBY 1/2 MILE OR LESS
                                                     8 = SMOKE OR HAZE
[NO. OF DAYS WITH]       [WEATHER - DAYS WITH]       9 = BLOWING SNOW
                                                     X = TORNADO
MAX 32 OR BELOW:    0    0.01 INCH OR MORE:  12
MAX 90 OR ABOVE:    1    0.10 INCH OR MORE:   5
MIN 32 OR BELOW:    9    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:    0    1.00 INCH OR MORE:   1

[HDD (BASE 65) ]
TOTAL THIS MO.    411    CLEAR  (SCALE 0-3)  18
DPTR FM NORMAL     27    PTCLDY (SCALE 4-7)  10
TOTAL FM JUL 1   7837    CLOUDY (SCALE 8-10)  3
DPTR FM NORMAL    835

[CDD (BASE 65) ]
TOTAL THIS MO.      3
DPTR FM NORMAL      2    [PRESSURE DATA]
TOTAL FM JAN 1      3    HIGHEST SLP 30.39 ON 15
DPTR FM NORMAL      2    LOWEST  SLP 29.42 ON 23

[REMARKS]
#FINAL-05-08#
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Explanation of the Preliminary Climate Data (F6) Product

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WFO Monthly/Daily Climate Data

000
CXUS56 KBOI 011002
CF6BKE
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: BAKER
MONTH: JUNE
YEAR: 2008
LATITUDE: 44 50 N
LONGITUDE: 117 49 W

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
										AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	67	43	55	-1	10	0	0.17	M	M	5.3	22	210	M	M	4	3	29	210
2	64	43	54	-3	11	0	0.00	M	M	5.5	14	300	M	M	4	18	18	300
3	59	43	51	-6	14	0	0.12	M	M	7.0	25	330	M	M	8	1	32	330
4	56	39	48	-9	17	0	0.00	M	M	15.7	29	330	M	M	1		36	310
5	64	34	49	-8	16	0	0.01	M	M	4.2	18	200	M	M	4		23	180
6	53	35	44	-14	21	0	0.01	M	M	8.1	22	310	M	M	6		28	310
7	57	37	47	-11	18	0	0.00	M	M	6.0	16	330	M	M	8		23	350
8	68	31	50	-8	15	0	0.00	M	M	2.4	9	310	M	M	1		12	310
9	67	40	54	-4	11	0	T	M	M	5.2	16	210	M	M	4		20	250
10	52	31	42	-16	23	0	0.37	M	M	9.9	33	300	M	M	8	1	41	300
11	58	34	46	-13	19	0	0.01	M	M	6.0	16	330	M	M	8		24	340
12	69	32	51	-8	14	0	0.00	M	M	4.7	13	310	M	M	0		20	350
13	78	37	58	-1	7	0	0.01	M	M	3.5	15	330	M	M	0	1	23	240
14	73	39	56	-3	9	0	0.00	M	M	5.7	17	320	M	M	0		21	310
15	75	35	55	-5	10	0	0.00	M	M	5.0	15	310	M	M	0		18	310
16	80	40	60	0	5	0	0.00	M	M	5.5	14	300	M	M	0		17	330
17	74	44	59	-1	6	0	0.00	M	M	9.9	24	330	M	M	0		29	330
18	73	36	55	-5	10	0	0.00	M	M	6.4	18	320	M	M	0		23	330
19	79	36	58	-3	7	0	0.00	M	M	3.5	12	290	M	M	0		15	280
20	87	41	64	3	1	0	0.00	M	M	3.2	13	130	M	M	0		17	120
21	84	43	64	3	1	0	0.11	M	M	5.8	28	210	M	M	0	3	36	210
22	76	45	61	0	4	0	0.00	M	M	5.9	20	310	M	M	0	1	24	310
23	78	39	59	-3	6	0	0.00	M	M	7.2	24	320	M	M	1		31	320
24	75	40	58	-4	7	0	0.00	M	M	6.8	14	310	M	M	0		22	330
25	80	39	60	-2	5	0	0.00	M	M	5.9	16	320	M	M	0		21	320
26	75	48	62	0	3	0	0.00	M	M	8.4	22	340	M	M	0		29	340
27	83	45	64	1	1	0	0.00	M	M	6.3	15	320	M	M	0		21	330
28	89	48	69	6	0	4	0.00	M	M	3.9	9	270	M	M	0		13	250
29	95	46	71	8	0	6	0.00	M	M	3.5	14	290	M	M	0		17	280
30	95	55	75	12	0	10	0.14	M	M	5.3	24	360	M	M	1	3	31	260

```
================================================================================
SM 2183 1198       271  20  0.95    M    181.7          M       58
--------------------------------------------------------------------------------
AV 72.8 39.9                             6.1 FASTST  PSBL  %   2    MAX(MPH)
                                 MISC ---->  # 33 300              # 41  300
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                          STATION:  BAKER
                                          MONTH:    JUNE
                                          YEAR:     2008
                                          LATITUDE:   44 50 N
                                          LONGITUDE: 117 49 W

[TEMPERATURE DATA]        [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 56.4    TOTAL FOR MONTH:    0.95    1 = FOG OR MIST
DPTR FM NORMAL:  -3.4    DPTR FM NORMAL:    -0.29    2 = FOG REDUCING VISIBILITY
HIGHEST:    95 ON 30,29 GRTST 24HR  0.37 ON 10-10        TO 1/4 MILE OR LESS
LOWEST:     31 ON 10, 8                              3 = THUNDER
                         SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                         TOTAL MONTH:     M          5 = HAIL
                         GRTST 24HR    M  ON   M     6 = FREEZING RAIN OR DRIZZLE
                         GRTST DEPTH:  M  ON   M     7 = DUSTSTORM OR SANDSTORM:
                                                         VSBY 1/2 MILE OR LESS
                                                     8 = SMOKE OR HAZE
[NO. OF DAYS WITH]        [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                     X = TORNADO
MAX 32 OR BELOW:    0    0.01 INCH OR MORE:   9
MAX 90 OR ABOVE:    2    0.10 INCH OR MORE:   5
MIN 32 OR BELOW:    3    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:    0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    271    CLEAR  (SCALE 0-3)  21
DPTR FM NORMAL     87    PTCLDY (SCALE 4-7)   9
TOTAL FM JUL 1  8108    CLOUDY (SCALE 8-10)  0
DPTR FM NORMAL    922

[CDD (BASE 65) ]
TOTAL THIS MO.     20
DPTR FM NORMAL     -6    [PRESSURE DATA]
TOTAL FM JAN 1     23    HIGHEST SLP 30.21 ON 13
DPTR FM NORMAL     -4    LOWEST  SLP 29.65 ON 10

[REMARKS]
#FINAL-06-08#
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Explanation of the Preliminary Climate Data (F6) Product

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WFO Monthly/Daily Climate Data

000
CXUS56 KBOI 011002
CF6BKE
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: BAKER
MONTH: JULY
YEAR: 2008
LATITUDE: 44 50 N
LONGITUDE: 117 49 W

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
										AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	87	52	70	6	0	5	0.00	M	M	3.7	21	280	M	M	0	3	26	290
2	91	48	70	6	0	5	0.00	M	M	2.5	10	270	M	M	0	1	13	280
3	96	50	73	9	0	8	0.00	M	M	4.8	18	310	M	M	0		24	310
4	78	56	67	3	0	2	T	M	M	7.0	22	310	M	M	0	3	33	330
5	79	52	66	1	0	1	0.00	M	M	4.8	13	310	M	M	2		16	310
6	80	54	67	2	0	2	0.00	M	M	9.3	23	330	M	M	2		28	330
7	83	40	62	-3	3	0	0.00	M	M	7.2	23	340	M	M	0		30	340
8	85	43	64	-1	1	0	0.00	M	M	9.3	21	320	M	M	0		26	330
9	88	42	65	-1	0	0	0.00	M	M	4.8	14	320	M	M	0		17	310
10	84	49	67	1	0	2	0.00	M	M	8.4	31	320	M	M	0		40	320
11	77	43	60	-6	5	0	0.00	M	M	9.8	21	330	M	M	0		25	330
12	85	34	60	-6	5	0	0.00	M	M	4.9	13	320	M	M	0		16	320
13	89	36	63	-3	2	0	0.00	M	M	5.2	16	340	M	M	0		21	330
14	88	43	66	-1	0	1	0.00	M	M	4.2	13	340	M	M	0		16	300
15	86	56	71	4	0	6	0.00	M	M	8.1	20	320	M	M	0		24	320
16	84	46	65	-2	0	0	0.00	M	M	7.7	21	330	M	M	0		28	350
17	86	41	64	-3	1	0	0.00	M	M	4.6	17	320	M	M	1		22	320
18	81	44	63	-4	2	0	0.00	M	M	6.4	15	330	M	M	0		18	340
19	86	34	60	-7	5	0	0.00	M	M	2.6	12	40	M	M	0		16	40
20	90	48	69	2	0	4	0.00	M	M	4.6	12	300	M	M	0		15	320
21	85	48	67	0	0	2	T	M	M	3.2	9	260	M	M	0	8	12	260
22	72	51	62	-6	3	0	0.15	M	M	4.2	13	210	M	M	2	13	15	210
23	80	46	63	-5	2	0	0.00	M	M	7.7	22	320	M	M	1		28	320
24	82	37	60	-8	5	0	0.00	M	M	4.3	12	270	M	M	0		14	260
25	90	41	66	-2	0	1	0.00	M	M	4.6	20	320	M	M	0		25	320
26	85	50	68	0	0	3	0.00	M	M	6.2	15	310	M	M	0		22	330
27	84	47	66	-2	0	1	0.00	M	M	6.9	22	320	M	M	0		29	320
28	84	46	65	-3	0	0	0.00	M	M	4.4	9	310	M	M	0		13	320
29	83	47	65	-3	0	0	0.00	M	M	5.5	23	330	M	M	0		30	340
30	79	46	63	-5	2	0	0.00	M	M	5.6	12	310	M	M	0		18	310

```
31  90  39  65  -3   0   0 0.00   M    M  3.7 16 330   M    M   0        22 330
================================================================================
SM 2617 1409       36  43  0.15   M    176.2          M        8
================================================================================
AV 84.4 45.5                             5.7 FASTST   M    M   0    MAX(MPH)
                                 MISC ---->  # 31 320               # 40  320
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                         STATION:   BAKER
                                         MONTH:     JULY
                                         YEAR:      2008
                                         LATITUDE:    44 50 N
                                         LONGITUDE: 117 49 W

[TEMPERATURE DATA]        [PRECIPITATION DATA]        SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 64.9   TOTAL FOR MONTH:    0.15    1 = FOG OR MIST
DPTR FM NORMAL:  -1.6   DPTR FM NORMAL:    -0.54    2 = FOG REDUCING VISIBILITY
HIGHEST:     96 ON  3   GRTST 24HR  0.16 ON 22-23       TO 1/4 MILE OR LESS
LOWEST:      34 ON 19,12                            3 = THUNDER
                        SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                        TOTAL MONTH:      M         5 = HAIL
                        GRTST 24HR     M  ON    M   6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   M  ON    M   7 = DUSTSTORM OR SANDSTORM:
                                                        VSBY 1/2 MILE OR LESS
                                                    8 = SMOKE OR HAZE
[NO. OF DAYS WITH]        [WEATHER - DAYS WITH]     9 = BLOWING SNOW
                                                    X = TORNADO
MAX 32 OR BELOW:    0     0.01 INCH OR MORE:    1
MAX 90 OR ABOVE:    5     0.10 INCH OR MORE:    1
MIN 32 OR BELOW:    0     0.50 INCH OR MORE:    0
MIN  0 OR BELOW:    0     1.00 INCH OR MORE:    0

[HDD (BASE 65) ]
TOTAL THIS MO.     36     CLEAR  (SCALE 0-3)   31
DPTR FM NORMAL    -35     PTCLDY (SCALE 4-7)    0
TOTAL FM JUL 1     36     CLOUDY (SCALE 8-10)   0
DPTR FM NORMAL    -35

[CDD (BASE 65) ]
TOTAL THIS MO.     43
DPTR FM NORMAL    -73     [PRESSURE DATA]
TOTAL FM JAN 1     66     HIGHEST SLP 30.22 ON 12
DPTR FM NORMAL    -77     LOWEST  SLP 29.73 ON  4

[REMARKS]
#FINAL-07-08#
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Appendix C: Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S of Baker City / Malheur Sampling Date: 7/15/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 1
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E
Landform (hillslope, terrace, etc.): Gulch Local relief (concave, convex, none): Concave Slope (%): 3-5
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.421400 Long: -117.582700 Datum: WGS84
Soil Map Unit Name: N/A NWI classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:
Northwest part of the Phase 3 study area.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	40%	Yes	FACW
2. *Alopecurus aequalis*	20%	Yes	OBL
3. *Hordeum brachyantherum*	10%	No	FACW*
4. *Alopecurus pratensis*	10%	No	FACW
5. *Eleocharis palustris*	10%	No	OBL
6. *Agrostis alba*	5%	No	FAC*
7. See Remarks	4%	No	FACW*
8. *Rumex crispus*	1%	No	FAC
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	64	x 2 =	128
FAC species	6	x 3 =	18
FACU species	0	x 4 =	
UPL species	0	x 5 =	
Column Totals:	100 (A)		176 (B)

Prevalence Index = B/A = 1.76

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Herb stratum #7 includes 2% *Geum macrophyllum* and 2% *Iris missouriensis*.

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SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100	7.5YR 3/4	2	C	PL	sil	Very rooty
4-12	10YR 2/1	100	7.5YR 4/6	10	C	M	sil	Platy
12-17	10YR 5/1	100	10YR 4/6	20	C	M	cl	
			7.5YR 3/4	5	C	PL		
17-29	10YR 2/1	100	None	N/A	N/A	N/A	sic	5% organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Probed below 16 inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>29
Saturation Present? (includes capillary fringe)		X	>29

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Slightly moist starting at 12" bgs

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S of Baker City / Malheur Sampling Date: 7/15/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 2

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Floodplain Terrace Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.421130 Long: -117.582632 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____		
Hydric Soil Present? Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Wetland Hydrology Present? Yes X No ____		

Remarks:
Northwest part of the Phase 3 study area. Approximately 50 feet south of Plot 1 and approximately 2 feet higher in elevation.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	70%	Yes	FACW
2. *Sidalcea oregana*	5%	No	FACW
3. *Iris missouriensis*	5%	No	FACW
4. *Poa sandbergii [secunda]*	5%	No	FAC*
5. *Potentilla gracilis*	5%	No	FAC
6. *Achillea millefolium*	5%	No	FACU
7. *Bromus carinatus*	4%	No	NOL
8. *Agropyron spicatum*	1%	No	UPL
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	80	x 2 =	160
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	5	x 5 =	25
Column Totals:	100 (A)		235 (B)

Prevalence Index = B/A = 2.35

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

Poa sandbergii is a problematic species with synonomies to FAC*(*P. nevadensis*) and to FACU (*P. gracillima* and *P. juncifolia*). We are treating the species as FAC* throughout our determinations, for consistency.

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SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100	None	N/A	N/A	N/A	sil	Very rooty
5-12	10YR 3/2	100	7.5YR 3/4	5	C	M	sil	
12+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
_X_ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Indurated Soils (Cemented layer)

Depth (inches): 12

Hydric Soil Present? Yes _X_ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
_X_ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
_X_ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No _X_	Depth (inches):	N/A
Water Table Present?	Yes ___	No _X_	Depth (inches):	>12
Saturation Present? (includes capillary fringe)	Yes ___	No _X_	Depth (inches):	>12

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S of Baker City / Malheur Sampling Date: 7/15/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 3

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 20

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.421102 Long: -117.582383 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No	
Hydrophytic Vegetation Present?		X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?		X	
Wetland Hydrology Present?		X	

Remarks:
Northwest part of Phase 3 study area. Approximately 50-60 feet east of Plot 2 and approximately 5-6 feet upslope of wetland boundary.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus ponderosa*	10%	Yes	FACU
2.			
3.			
4.			
Total Cover:	10%		
Sapling/Shrub Stratum			
1. *Artemisia tridentata*	5%	Yes	NOL
2. *Ribes cereum*	5%	Yes	FAC*
3. *Juniperus occidentalis*	2%	No	NOL
4. *Pinus ponderosa*	1%	No	FACU
5.			
Total Cover:	13%		
Herb Stratum			
1. *Lupinus sericeus*	20%	Yes	NOL
2. *Galium boreale*	20%	Yes	FACU
3. *Antennaria microphylla*	20%	Yes	NOL
4. *Festuca idahoensis*	10%	No	FACU*
5. See Remarks	17%	No	UPL
6. *Achillea millefolium*	5%	No	FACU
7. *Sitanion hystrix*	2%	No	FACU
8. *Iris missouriensis*	1%	No	FACW
Total Cover:	95%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 17% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 =
FACW species	1	x 2 = 2
FAC species	5	x 3 = 15
FACU species	48	x 4 = 192
UPL species	64	x 5 = 320
Column Totals:	118 (A)	529 (B)

Prevalence Index = B/A = 4.48

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Herb stratum #5 includes 5% *Clematis hirsutissima*, 5% *Erigeron species*, 5% *Agropyron spicatum*, and 2% *Koeleria cristata*.

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SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100	None	N/A	N/A	N/A	sil	Gravelly
16+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes ___	No X	Depth (inches): >16
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): >16

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 4

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Gulch Floodplain Local relief (concave, convex, none) Concave Slope (%): <3

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.421001 Long: -117.579570 Datum: WSG84

Soil Map Unit Name: N/A NWI classification: PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
Northwest part of Phase 3 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	40%	Yes	FACW
2. *Alopecurus pratensis*	25%	Yes	FACW
3. *Potentilla gracilis*	20%	Yes	FAC
4. *Hordeum brachyantherum*	5%	No	FACW*
5. *Poa sandbergii [secunda]*	5%	No	FAC
6. *Agrostis alba*	5%	No	FAC*
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	70	x 2 =	140
FAC species	30	x 3 =	90
FACU species	0	x 4 =	
UPL species	0	x 5 =	
Column Totals:	100 (A)		230 (B)

Prevalence Index = B/A = 2.30

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

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SOIL

Sampling Point 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/2	100	None	N/A	N/A	N/A	sil	Fine sands
7-14	10YR 2/1	100	7.5YR 4/6	10	C	M	sic	Trace organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes X No __

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
X Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
X Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>14
Saturation Present? (includes capillary fringe)		X	>14

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Entered by: SAR QC by: CMW

Flow patterns visible on bent forbs within wetland.

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 5

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none) None Slope (%): 7

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.420858 Long: -117.579828 Datum: WSG84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X
Is the Sampled Area within a Wetland?		X

Remarks:
Northwest part of Phase 3 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Artemisia tridentata*	10%	Yes	NOL
2.			
3.			
4.			
5.			
Total Cover:	10%		
Herb Stratum			
1. *Potentilla gracilis*	20%	Yes	FAC
2. *Galium boreale*	20%	Yes	FACU
3. *Carex filifolia*	10%	Yes	NOL
4. *Juncus effusus*	10%	Yes	FACW
5. *Eriogonum heracleoides*	10%	Yes	NOL
6. *Clematis hirsutissima*	10%	Yes	NOL
7. *Geum triflorum*	10%	Yes	FACU
8. *Sitanion hystrix*	5%	No	FACU
Total Cover:	101%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	10	x 2 =	20
FAC species	20	x 3 =	60
FACU species	35	x 4 =	140
UPL species	46	x 5 =	230
Column Totals:	111 (A)		450 (B)

Prevalence Index = B/A = 4.05

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

Herb stratum also5% *Erigeron species*, and 1% *Lupinus sericeus* (all NOL).

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SOIL Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 3/2	100	None	N/A	N/A	N/A	sil	Gravels
13+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes ___	No X	Depth (inches): >13
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): >13

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 6
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none) None Slope (%): 7
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.420197 Long: -117.570863 Datum: WSG84
Soil Map Unit Name: N/A NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland?	Yes ___ No X
Hydric Soil Present?	Yes ___ No X		
Wetland Hydrology Present?	Yes ___ No X		

Remarks:
Northeast part of Phase 3 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Elymus cinereus*	40%	Yes	FAC
2. *Bromus carinatus*	20%	Yes	NOL
3. *Cirsium arvense*	20%	Yes	FACU
4. *Iris missouriensis*	5%	No	FACW
5. *Penstemon procerus*	5%	No	FAC*
6. *Achillea millefolium*	5%	No	FACU
7. *Thlaspi arvense*	5%	No	FACU?
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	5	x 2 =	10
FAC species	45	x 3 =	135
FACU species	30	x 4 =	120
UPL species	20	x 5 =	100
Column Totals:	100 (A)		365 (B)

Prevalence Index = B/A = 3.65

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Penstemon procerus and *Thlaspi arvense* are listed as NI in Region 9; the National Indicator and Regional Indicators for 0 and 8 are the same (FAC*); the Natio Indicator for *Thaspi arvense* was used (FACU?) since it is also listed as NI in Regions 0 and 8.

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SOIL Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-17	10YR 3/2	100	None	N/A	N/A	N/A	sil	
17-18	10YR 4/2	100	None	N/A	N/A	N/A	cl	
18+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) **(LRR C)**
__ 1 cm Muck (A9) **(LRR D)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) **(LRR C)**
__ 2 cm Muck (A10) **(LRR B)**
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: None
Depth (inches): ____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) **(Nonriverine)**
__ Sediment Deposits (B2) **(Nonriverine)**
__ Drift Deposits (B3) **(Nonriverine)**
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) **(Riverine)**
__ Sediment Deposits (B2) **(Riverine)**
__ Drift Deposits (B3) **(Riverine)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches):	N/A
Water Table Present?	Yes ____	No X	Depth (inches):	>18
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	>18

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 7

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Terrace / footslope Local relief (concave, convex, none) Concave Slope (%): 4

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.420317 Long: -117.571044 Datum: WSG84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
Northeast part of Phase 3 study area. Approximately 60 feet south of Plot 6 and approximately 2 feet lower in elevation.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	30%	Yes	FACW
2. *Potentilla gracilis*	30%	Yes	FAC
3. *Agrostis alba*	20%	Yes	FAC*
4. *Poa sandbergii [secunda]*	10%	No	FAC*
5. *Iris missouriensis*	5%	No	FACW
6. *Cirsium arvense*	3%	No	FACU
7. *Achillea millefolium*	1%	No	FACU
8. *Sidalcea oregana*	1%	No	FACW
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	36	x 2 =	72
FAC species	60	x 3 =	180
FACU species	4	x 4 =	16
UPL species	0	x 5 =	
Column Totals:	100 (A)		268 (B)

Prevalence Index = B/A = 2.68

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100	None	N/A	N/A	N/A	sil	Few cobbles
6-8	10YR 6/1	100	10YR 5/6	20	C	M	sic	
8-17	10YR 2/1	100	7.5YR 4/6	10	C	M	sic	Mica

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

_ Histosol (A1)
_ Histic Epipedon (A2)
_ Black Histic (A3)
_ Hydrogen Sulfide (A4)
_ Stratified Layers (A5) **(LRR C)**
_ 1 cm Muck (A9) **(LRR D)**
_ Depleted Below Dark Surface (A11)
_ Thick Dark Surface (A12)
_ Sandy Mucky Mineral (S1)
_ Sandy Gleyed Matrix (S4)
_ Sandy Redox (S5)
_ Stripped Matrix (S6)
_ Loamy Mucky Mineral (F1)
_ Loamy Gleyed Matrix (F2)
_ Depleted Matrix (F3)
X Redox Dark Surface (F6)
_ Depleted Dark Surface (F7)
_ Redox Depressions (F8)
_ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

_ 1 cm muck (A9) **(LRR C)**
_ 2 cm Muck (A10) **(LRR B)**
_ Reduced Vertic (F18)
_ Red Parent Material (TF2)
_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? Yes X No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

_ Surface Water (A1)
_ High Water Table (A2)
_ Saturation (A3)
_ Water Marks (B1) **(Nonriverine)**
_ Sediment Deposits (B2) **(Nonriverine)**
_ Drift Deposits (B3) **(Nonriverine)**
_ Surface Soil Cracks (B6)
_ Inundation Visible on Aerial Imagery (B7)
_ Water-Stained Leaves (B9)
_ Salt Crust (B11)
_ Biotic Crust (B12)
_ Aquatic Invertebrates (B13)
_ Hydrogen Sulfide Odor (C1)
_ Oxidized Rhizospheres along Living Roots (C3)
_ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
_ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

_ Water Marks (B1) **(Riverine)**
_ Sediment Deposits (B2) **(Riverine)**
_ Drift Deposits (B3) **(Riverine)**
_ Drainage Patterns (B10)
_ Dry-Season Water Table (C2)
_ Thin Muck Surface (C7)
_ Crayfish Burrows (C8)
X Saturation Visible on Aerial Imagery (C9)
_ Shallow Aquitard (D3)
X FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>17
Saturation Present? (includes capillary fringe)		X	>17

Wetland Hydrology Present? Yes X No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 8
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E
Landform (hillslope, terrace, etc.): Floodplain / Valley Bottom Local relief (concave, convex, none) Concave Slope (%): <3
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.428000 Long: -117.592147 Datum: WSG84
Soil Map Unit Name: N/A NWI classification: PUSAx
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
Southeast part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Salix lasiandra [lucida var. lasiandra]*	40%	Yes	FACW
2. *Salix exigua*	20%	Yes	OBL
3. *Salix rigida [lutea]*	20%	Yes	OBL
4.			
5.			
Total Cover:	80%		
Herb Stratum			
1. *Juncus effusus*	70%	Yes	FACW
2. *Lotus corniculatus*	10%	No	FAC
3. *Trifolium repens*	10%	No	FAC*
4. *Agrostis alba*	10%	No	FAC*
5.			
6.			
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	110	x 2 =	220
FAC species	30	x 3 =	90
FACU species	0	x 4 =	
UPL species	0	x 5 =	
Column Totals:	180 (A)		350 (B)

Prevalence Index = B/A = 1.94

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100	7.5YR 3/4	5	C	M	sl	
4-6	10YR 3/2	80	None	N/A	N/A	N/A	cos	
	10YR 6/2	10	None	N/A	N/A	N/A		
	10YR 5/4	10	None	N/A	N/A	N/A		
6-9	10YR 4/2	100	7.5YR 4/6	20	C	M & RC	sic	Trace fine sand
9-10	10YR 3/2	60	None	N/A	N/A	N/A	cos	
10-27	2.5Y 3/1	100	7.5YR 4/6	10	C	M	c	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Clay pan

Depth (inches): 27

Hydric Soil Present? Yes X No ___

Remarks:
Probed below 17" bgs.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes X	No ___	Depth (inches): 18 (rising)
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 10

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 9

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E

Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none) None Slope (%): 3

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.427911 Long: -117.592282 Datum: WSG84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:
Southeast part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Rosa species*	5%	Yes	FAC
2. *Artemisia tridentata*	5%	Yes	NOL
3. *Tetradymia canescens*	5%	Yes	NOL
4. *Artemisia ludoviciana*	2%	No	FACU*
5.			
Total Cover:	17%		
Herb Stratum			
1. *Sitanion hystrix*	5%	Yes	FACU
2. *Bromus carinatus*	5%	Yes	NOL
3. *Poa sandbergii [secunda]*	5%	Yes	FAC*
4. *Poa bulbosa*	5%	Yes	NOL
5. *Achillea millefolium*	3%	No	FACU
6. *Potentilla gracilis*	2%	No	FAC
7. *Senecio serra*	1%	No	FACU*
8. *Elymus cinereus*	1%	No	FAC
Total Cover:	27%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		
% Bare Ground in Herb Stratum 73%		% Cover of Biotic Crust	0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 29% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	0	x 2 =	
FAC species	13	x 3 =	39
FACU species	11	x 4 =	44
UPL species	20	x 5 =	100
Column Totals:	44 (A)		183 (B)

Prevalence Index = B/A = 4.16

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: *identifies indicator status is tentative
Rosa species indicator status assumed to be FAC.

Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100	N/A	N/A	N/A	N/A	ls	Gravelly
16+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:
Tailings (mining sediment deposits)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>16
Saturation Present? (includes capillary fringe)		X	>16

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/16/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 10
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 21, T13S, R42E
Landform (hillslope, terrace, etc.): Former Settling Pond Local relief (concave, convex, none) Concave Slope (%): 0
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.429708 Long: -117.593784 Datum: WSG84
Soil Map Unit Name: N/A NWI classification: PUSCx
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes ___ No X	

Remarks:
Southeast part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Artemisia ludoviciana*	5%	Yes	FACU*
2. *Salix exigua*	3%	Yes	OBL
3.			
4.			
5.			
Total Cover:	8%		
Herb Stratum			
1. *Bromus carinatus*	20%	Yes	NOL
2. *Achillea millefolium*	20%	Yes	FACU
3. *Juncus effusus*	20%	Yes	FACW
4. *Poa sandbergii [secunda]*	15%	No	FAC*
5. *Madia species*	10%	No	FACU
6. *Solidago canadensis*	5%	No	FACU
7. *Agrostis alba*	5%	No	FAC*
8. See Remarks	9%	No	UPL
Total Cover:	104%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		
% Bare Ground in Herb Stratum 0%	% Cover of Biotic Crust 0%		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	3	x 1 = 3
FACW species	20	x 2 = 40
FAC species	20	x 3 = 60
FACU species	40	x 4 = 160
UPL species	29	x 5 = 145
Column Totals:	112 (A)	408 (B)

Prevalence Index = B/A = 3.64

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index is≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Herb stratum #8 includes 5% *Tragopogon dubius*, 2% *Agropyron spicatum*, 1% *Lathyrus pauciflora*, and 1% *Balsamorhiza species* (UPL). Also 1% *Festuca idahoensis* (FACU).

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SOIL

Sampling Point 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 3/2	100	None	N/A	N/A	N/A	sl	
6-23	10YR 4/2	100	None	N/A	N/A	N/A	cl	Trace fine sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:
Probed below 15" bgs.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes ___	No X	Depth (inches): >23
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): >23

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 11

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.432623 Long: -117.600683 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:
Northwest part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Veratrum californicum*	40%	Yes	FACW
2. *Juncus effusus*	30%	Yes	FACW
3. *Agrostis alba*	20%	Yes	FAC*
4. *Potentilla gracilis*	5%	No	FAC
5. *Iris missouriensis*	5%	No	FACW
6. *Festuca idahoensis*	3%	No	FACU*
7.			
8.			
Total Cover:	103%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	75	x 2 =	150
FAC species	25	x 3 =	75
FACU species	3	x 4 =	12
UPL species	0	x 5 =	
Column Totals:	103 (A)		237 (B)

Prevalence Index = B/A = 2.30

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

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SOIL

Sampling Point 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100	7.5YR 3/4	5	C	PL	cl	Few cobbles
10-16	10YR 2/1	100	None	N/A	N/A	N/A	sicl	
16-18	10YR 3/2	100	None	N/A	N/A	N/A	sic	Trace fine sand
18+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)
Depth (inches): N/A

Hydric Soil Present? Yes X No __

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>18
Saturation Present? (includes capillary fringe)		X	>18

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 12
Investigator(s): Mirth Walker and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E
Landform (hillslope, terrace, etc.): Valley Bottom Local relief (concave, convex, none) None Slope (%): 5
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.432617 Long: -117.600618 Datum: WGS84
Soil Map Unit Name: N/A NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland?	Yes ____ No X
Hydric Soil Present?	Yes ____ No X		
Wetland Hydrology Present?	Yes ____ No X		

Remarks:
Northwest part of Phase 2 study area. Approximately 20 feet south of Plot 11.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Prunus virginiana*	5%	Yes	FACU
2. *Symphoricarpos albus*	5%	Yes	FACU
3.			
4.			
5.			
Total Cover:	10%		
Herb Stratum			
1. *Potentilla gracilis*	30%	Yes	FAC
2. *Senecio serra*	10%	Yes	FACU*
3. *Achillea millefolium*	10%	Yes	FACU
4. *Solidago canadensis*	10%	Yes	FACU
5. *Sidalcea oregana*	10%	Yes	FACW
6. *Juncus species*	10%	Yes	FAC
7. See Remarks	8%	No	NOL
8. See Remarks	10%	No	FACU
Total Cover:	98%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		
% Bare Ground in Herb Stratum 2%	% Cover of Biotic Crust 0%		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 8 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 38% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 =
FACW species	10	x 2 = 20
FAC species	40	x 3 = 120
FACU species	50	x 4 = 200
UPL species	8	x 5 = 40
Column Totals:	108 (A)	380 (B)

Prevalence Index = B/A = 3.52

Hydrophytic Vegetation Indicators:
____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Herb stratum #7 includes 5% *Tragopogon dubius* and 3% *Bromus carinatus*. Herb stratum #8 includes 5% *Delphinium* species and 5% *Cirsium arvense*. *Delphinium* species indicator status is assumed to be FACU. *Juncus* species indicator status is assumed to be FAC.

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SOIL Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100	None	N/A	N/A	N/A	sil	
6-12	10YR 2/1	100	None	N/A	N/A	N/A	sil+	Gravelly
12+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)

Depth (inches): N/A

Hydric Soil Present? Yes __ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes __	No X	Depth (inches): N/A
Water Table Present?	Yes __	No X	Depth (inches): >12
Saturation Present? (includes capillary fringe)	Yes __	No X	Depth (inches): >12

Wetland Hydrology Present? Yes __ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 13
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E
Landform (hillslope, terrace, etc.): Gulch Floodplain Local relief (concave, convex, none) Concave Slope (%): <5
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.428268 Long: -117.588266 Datum: WGS84
Soil Map Unit Name: N/A NWI classification: R4SBC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
Southeast part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Salix exigua*	60%	Yes	OBL
2.			
3.			
4.			
5.			
Total Cover:	60%		
Herb Stratum			
1. *Eleocharis palustris*	60%	Yes	OBL
2. *Agrostis alba*	30%	Yes	FAC*
3. *Geum macrophyllum*	5%	No	FACW*
4. *Sisyrinchium species*	3%	No	FAC
5. *Mentha piperita [citrata] or [x p.]*	2%	No	FACW
6.			
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	120	x 1 =	120
FACW species	7	x 2 =	14
FAC species	33	x 3 =	99
FACU species	0	x 4 =	
UPL species	0	x 5 =	
Column Totals:	160 (A)		233 (B)

Prevalence Index = B/A = 1.46

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative
Sisyrinchium species indicator status assumed to be FAC
Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100	7.5YR 4/6	10	C	M	cl	Sand coatings / mica
8-11	10YR 2/1	100	None	N/A	N/A	N/A	sl	Many pebbles
11-16	10YR 3/3	60	None	N/A	N/A	N/A	sl	Gravels and pebbles
	10YR 4/6	40	None	N/A	N/A	N/A		
16+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) **(LRR C)**
__ 1 cm Muck (A9) **(LRR D)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) **(LRR C)**
__ 2 cm Muck (A10) **(LRR B)**
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)
Depth (inches): N/A

Hydric Soil Present? Yes X No __

Remarks:
Slight hydrogen sulfide odor 8" below ground surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) **(Nonriverine)**
__ Sediment Deposits (B2) **(Nonriverine)**
__ Drift Deposits (B3) **(Nonriverine)**
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
X Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) **(Riverine)**
__ Sediment Deposits (B2) **(Riverine)**
__ Drift Deposits (B3) **(Riverine)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>16
Saturation Present? (includes capillary fringe)		X	>16

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Dried algal matting at surface. Very moist at depth.

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 14

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none) Convex Slope (%): 5

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.428109 Long: -117.588557 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland?	Yes ____ No X
Hydric Soil Present?	Yes ____ No X		
Wetland Hydrology Present?	Yes ____ No X		

Remarks:
Southeast part of Phase 2 study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus ponderosa*	60%	Yes	FACU
2.			
3.			
4.			
Total Cover:	60%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Festuca idahoensis*	30%	Yes	FACU*
2. *Lupinus sericeus*	20%	Yes	NOL
3. *Antennaria microphylla*	10%	No	NOL
4. *Taraxacum officinale*	10%	No	FACU
5. *Achillea millefolium*	5%	No	FACU
6. *Crepis species*	5%	No	FACU
7. *Iris missouriensis*	5%	No	FACW
8. *Poa bulbosa*	5%	No	NOL
Total Cover:	90%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 10% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	5	x 2 =	10
FAC species	0	x 3 =	
FACU species	110	x 4 =	440
UPL species	35	x 5 =	175
Column Totals:	150 (A)		625 (B)

Prevalence Index = B/A = 4.17

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: *identifies indicator status is tentative
Crepis species indicator status assumed to be FACU.

Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9+	10YR 3/2	100	None	N/A	N/A	N/A	ls	Pebbles and Gravels

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes ___	No X	Depth (inches): >9
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): >9

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 15
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none) Concave Slope (%): 4
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.423201 Long: -117.588899 Datum: WGS84
Soil Map Unit Name: N/A NWI classification: PUSAx
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:
Southeast part of Phase 1A study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	60%	Yes	FACW
2. *Eleocharis parvula*	30%	Yes	OBL
3. *Juncus acuminatus*	5%	No	OBL
4. *Agrostis alba*	5%	No	FAC*
5. *Erigeron pumilus*	1%	No	NOL
6.			
7.			
8.			
Total Cover:	101%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	60	x 2 =	120
FAC species	5	x 3 =	15
FACU species	0	x 4 =	
UPL species	1	x 5 =	5
Column Totals:	101 (A)		175 (B)

Prevalence Index = B/A = 1.73

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW

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SOIL

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100	None	N/A	N/A	N/A	sc	
4-9	10YR 4/1	100	10YR 4/4	5	C	M	sc	
9+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented pan

Depth (inches): 9

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes X	No ___	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mine City/County: 1.5 hrs S Baker City / Malheur Sampling Date: 7/17/2008
Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 16
Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 17, R13S, R42E
Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none) None Slope (%): 3
Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.423257 Long: -117.588812 Datum: WGS84
Soil Map Unit Name: N/A NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Southeast part of Phase 1A study area. Approximately 20 feet north of Plot 15 and approximately 2 feet higher in elevation.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Artemisia ludoviciana*	20%	Yes	FACU*
2. *Artemisia tridentata*	5%	No	NOL
3. *Salix exigua*	4%	No	OBL
4. *Juniperus occidentalis*	1%	No	NOL
5.			
Total Cover:	30%		
Herb Stratum			
1. *Festuca idahoensis*	20%	Yes	FACU*
2. *Sitanion hystrix*	20%	Yes	FACU
3. *Achillea millefolium*	20%	Yes	FACU
4. *Bromus carinatus*	5%	No	NOL
5. *Madia species*	5%	No	FACU
6. *Solidago canadensis*	5%	No	FACU
7. *Lotus corniculatus*	5%	No	FAC
8. *See Remarks*	3%	No	UPL
Total Cover:	83%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		
% Bare Ground in Herb Stratum 17%	% Cover of Biotic Crust 0%		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	4	x 1 =	4
FACW species	0	x 2 =	
FAC species	5	x 3 =	15
FACU species	90	x 4 =	360
UPL species	14	x 5 =	70
Column Totals:	113 (A)		449 (B)

Prevalence Index = B/A = 3.97

Hydrophytic Vegetation Indicators:
____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: CMW
Herb stratum #8 includes 1% each *Erigeron pumilus* and 1% *Penstemon eatonii* and 1% *Arabis* species (FAC to UPL). *Madia* species indicator status assumed to be FACU.

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100	None	N/A	N/A	N/A	sl	Gravelly
5-7	2.5Y 7/2	100	None	N/A	N/A	N/A	si	
7-16	10YR 4/2	100	None	N/A	N/A	N/A	sic	
16-20	10YR 3/2	100	10YR 4/4	5	C	M	sc	Mica
20-24	10YR 4/2	100	None	N/A	N/A	N/A	sic	Mica
24-26	10YR 4/2	100	None	N/A	N/A	N/A	sl	Mica

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (**LRR C**)
- 1 cm Muck (A9) (**LRR D**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- 1 cm muck (A9) (**LRR C**)
- 2 cm Muck (A10) (**LRR B**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes ____ No X

Remarks:
Probed below 16 inches bgs.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Plowed Soils (C6)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)
- Drift Deposits (B3) (**Riverine**)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Thin Muck Surface (C7)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?	X		25
Saturation Present? (includes capillary fringe)	X		24

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: CMW

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mining City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/18/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 17

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 20, T13S, R42E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.424316 Long: -117.593451 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:
Northwest part of Phase 1A study area. Approximately 2 feet south of drainage (Rich Gulch).

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. *Juncus effusus*	85%	Yes	FACW
2. *Agrostis alba*	10%	No	FAC*
3. *Trifolium repens*	3%	No	FAC*
4. *Lotus corniculatus*	2%	No	FAC
5.			
6.			
7.			
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	85	x 2 =	170
FAC species	15	x 3 =	45
FACU species	0	x 4 =	
UPL species	0	x 5 =	
Column Totals:	100 (A)		215 (B)

Prevalence Index = B/A = 2.15

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: SNB

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SOIL

Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100	7.5YR 3/4	5	C	PL	sc	Very rooty
6-9	10G 3/1	100	10YR 3/4	5	C	M	sl	
			10YR 4/3	5	C	M		
9-12	10YR 4/2	100	10YR 4/6	15	C	M	sic	Mica
12-16	10YR 3/1	100	7.5YR 3/4	10	C	M & PL	sl	Mica
16-18	10YR 4/2	100	10YR 4/6	10	C	M	sc	Mica
18+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) **(LRR C)**
__ 1 cm Muck (A9) **(LRR D)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
X Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm muck (A9) **(LRR C)**
__ 2 cm Muck (A10) **(LRR B)**
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to rock fragment)
Depth (inches): N/A

Hydric Soil Present? Yes X No __

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) **(Nonriverine)**
__ Sediment Deposits (B2) **(Nonriverine)**
__ Drift Deposits (B3) **(Nonriverine)**
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) **(Riverine)**
__ Sediment Deposits (B2) **(Riverine)**
__ Drift Deposits (B3) **(Riverine)**
__ Drainage Patterns (B10)
X Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
X FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	N/A
Water Table Present?		X	>18
Saturation Present? (includes capillary fringe)	X		18

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Scattered 2 inch deep inundation near plot.

Entered by: SAR QC by: SNB

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Mormon Basin Placer Mining City/County: 1.5hrs S of Baker City / Malheur Sampling Date: 7/18/2008

Applicant/Owner: B.P. Gold Inc. State: Oregon Sampling Point: 18

Investigator(s): Mirth Walker, Stacy Benjamin and Stacey Reed Section, Township, Range: Sec 20, T13S, R42E

Landform (hillslope, terrace, etc.): Tailings Mound Local relief (concave, convex, none) Convex Slope (%): 2

Subregion (LRR): B-Columbia/Snake River Plateau Lat: 44.424252 Long: -117.593455 Datum: WGS84

Soil Map Unit Name: N/A NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Northwest part of Phase 1A study area

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1. *Artemisia ludoviciana*	20%	Yes	FACU*
2. *Juniperus occidentalis*	10%	Yes	NOL
3. *Pinus ponderosa*	5%	No	FACU
4. *Ribes cereum*	2%	No	FAC*
5. *Prunus virginiana*	1%	No	FACU
Total Cover:	**39%		
Herb Stratum			
1. *Sitanion hystrix*	30%	Yes	FACU
2. *Elymus cinereus*	10%	Yes	FAC
3. *Penstemon procerus*	5%	No	FAC*
4. *Senecio serra*	5%	No	FACU*
5. *Poa bulbosa*	5%	No	UPL
6. See Remarks	7%	No	FACU
7. See Remarks	5%	No	UPL
8. See Remarks	2%	No	FACW
Total Cover:	69%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 31% % Cover of Biotic Crust 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	2	x 2 =	4
FAC species	18	x 3 =	54
FACU species	68	x 4 =	272
UPL species	20	x 5 =	100
Column Totals:	108 (A)		430 (B)

Prevalence Index = B/A = 3.98

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: *identifies indicator status is tentative Entered by: SAR QC by: SNB

Herb stratum #6 includes 5% *Geranium viscosissimum*, 1% *Phacelia heterophylla*, and 1% *Achillea millefolium* Herb stratum #7 includes 1% *Tragopogon dubius*, 3% *Stipa occidentalis*, and 1% *Antennaria microphylla*. Herb stratum #8 includes 1% *Iris missouriensis* and 1% *Sidalcea oregana*. **Also 1% *Rosa* species (FAC) in shrub stratum.

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SOIL

Sampling Point: 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/3	100	None	N/A	N/A	N/A	sil	Gravelly
7+								Refusal

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: None (Refusal due to gravels)
Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): N/A
Water Table Present?	Yes ___	No X	Depth (inches): >7
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): >7

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Entered by: SAR QC by: SNB

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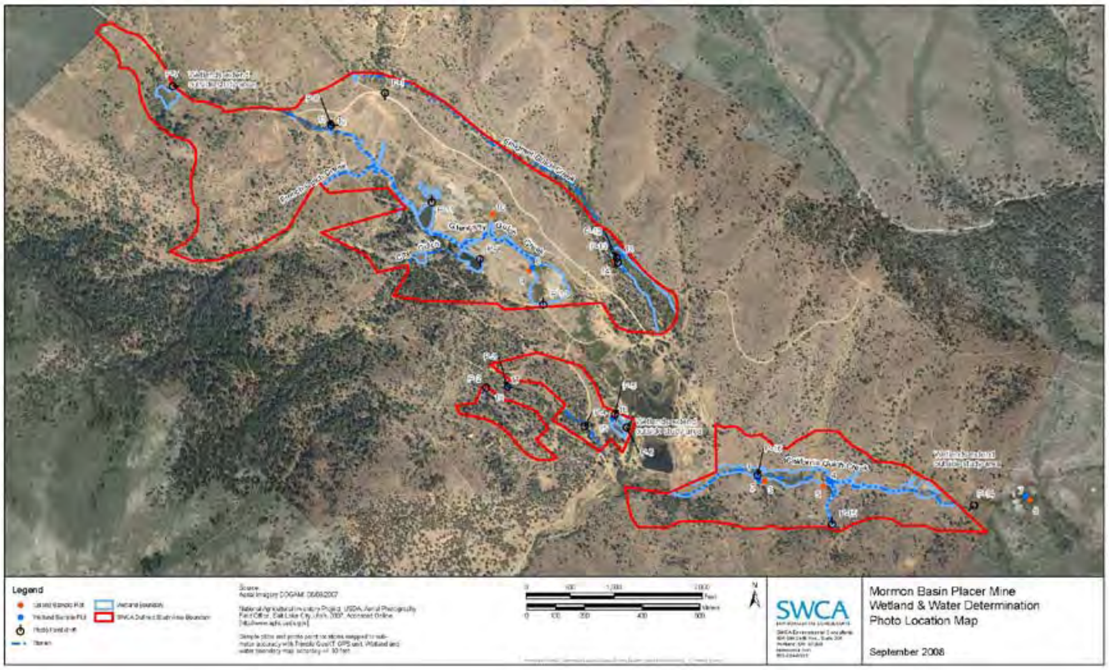
Appendix D: Ground Level Site Photographs


Legend
SWCA
Mormon Basin Placer Mine
Wetland & Water Determination
Photo Location Map
September 2008

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 1. View looking south across the Phase 2 study area.

Photo 2. View looking southwest of bermed emergent wetlands associated with Rich Gulch Creek mapped in the Phase 1A South study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 3. View looking southeast of emergent swale in vicinity of Phase 1A South study area.

Photo 4. View looking southeast of Rich Gulch Creek in the Phase 1A North study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 5. View looking southeast of spring fed emergent wetland in background and upland berm in foreground.

Photo 6. View looking northeast of willow dominated portion of large abandoned mining reservoir.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 7. View looking east of road ford which passes flow associated with spring fed wetland in the Phase 2 study area into Glengarry Gulch Creek.

Photo 8. View looking east of California false hellebore dominated emergent wetland associated with Glengarry Gulch Creek in the Phase 2 study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 9. View looking south of permanently ponded reservoir in the Phase 2 study area.

Photo 10. View looking north of large reservoir in Phase 2 associated with downstream portions of Glengarry Gulch Creek.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 11. View looking north of pond mapped in the Phase 2 study area.

Photo 12. View looking northwest of narrowleaf willow, small spikerush and redtop wetland community documented by wetland plot 13 associated with downstream portions of Emigrant Gulch Creek in the Phase 2 study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 13. View looking southwest of upland (in vicinity of plot 14) adjacent to wetlands in downstream portions of Emigrant Gulch Creek in Phase 2 study area.

Photo 14. View looking southwest of emergent wetlands associated with California Gulch Creek in Phase 3 study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Mormon Basin Placer Mine
Wetland and Water Determination

Photo 15. View looking north of tributary to California Gulch Creek in the Phase 3 study area.

Photo 16. View looking northeast of emergent wetland associated with California Gulch Creek located upstream of road crossing in the Phase 3 study area.

SWCA Environmental Consultants Project #14532 Photos by CMW, July 15-18, 08

Appendix E: Vegetation Table

Mormon Basin
List of Vegetation
July 15-18, 2008

Common Name	Scientific Name	Wetland Indicator Status	In Wetland (W) or Upland (U)
common yarrow	*Achillea millefolium*	FACU	W / U
nettleleaf horsemint	*Agastache urticifolia*	NOL	U
bluebunch wheatgrass	*Agropyron spicatum*	UPL	W / U
redtop	*Agrostis alba*	FAC*	W / U
mountain alder	*Alnus incana*	FACW	W
shortawn foxtail	*Alopecurus aequalis*	OBL	W
meadow foxtail	*Alopecurus pratensis*	FACW	W
rosy pussytoes	*Antennaria microphylla*	NOL	U
red columbine	*Aquilegia formosa*	FAC	U
rockcress	*Arabis* species	FAC to NOL	U
white sagebrush	*Artemisia ludoviciana*	FACU*	U
big sagebrush	*Artemisia tridentata*	UPL	U
balsamroot	*Balsamorhiza* species	UPL	U
creeping Oregongrape	*Berberis repens*	NOL	U
California brome	*Bromus carinatus*	NOL	W / U
sagebrush mariposa	*Calochortus macrocarpus*	UPL	U
dense sedge	*Carex densa*	OBL	W
threadleaf sedge	*Carex filifolia*	NOL	U
sawbeak sedge	*Carex stipata*	OBL	W
sedge	*Carex* species	OBL to NOL	W / U
paintbrush	*Castilleja species*	OBL to NOL	U
tumble knapweed	*Centaurea diffusa*	NOL	U
curl-leaf mountain mahogany	*Cercocarpus ledifolius*	NOL	U
hoary false-yarrow	*Chaenactis douglasii*	NOL	U
Canada thistle	*Cirsium arvense*	FACU	U
hairy clematis	*Clematis hirsutissima*	NOL	U
blue-eyed Mary	*Collinsia* species	NOL	U
black hawthorn	*Crataegus douglasii*	FAC	W
hawksbeard	*Crepis* species	FACU/UPL	U
larkspur	*Delphinium* species	FACW to NOL	W / U
creeping spikerush	*Eleocharis palustris*	OBL	W
small spikerush	*Eleocharis parvula*	OBL	W
basin wildrye	*Elymus cinereus*	FAC	U
small-flowered willow-herb	*Epilobium minutum*	NOL	W
common horsetail	*Equisetum arvense*	FAC	W
fleabane	*Erigeron* species	NOL	U
shaggy fleabane	*Erigeron pumilus*	NOL	W / U
tall buckwheat, rush buckwheat	*Eriogonum elatum*	NOL	U
parsnipflowered buckwheat	*Eriogonum heracleoides*	NOL	U
cushion buckwheat	*Eriogonum ovalifolium*	NOL	U
barren (brome) fescue	*Festuca [Vulpia] bromoides*	NI (Natl. Ind. UPL,FACW, Region 8 NO, Region 0 FACW)	U
Idaho fescue	*Festuca idahoensis*	FACU*	W / U

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Common Name	Scientific Name	Wetland Indicator Status	In Wetland (W) or Upland (U)
small fescue	*Festuca [Vulpia] microstachys*	NOL	U
northern bedstraw	*Galium boreale*	FACU	U
sweetscented bedstraw	*Galium triflorum*	FACU	U
sticky crane's-bill	*Geranium viscosissimum*	FACU	U
Oregon avens	*Geum macrophyllum*	FACW*	W
old man's whiskers	*Geum triflorum*	FACU	U
curlycup gumweed	*Grindelia squarrosa*	FACU	U
mannagrass	*Glyceria* species	FACW/OBL	W
meadow barley	*Hordeum brachyantherum*	FACW*	W
western blue flag	*Iris missouriensis*	FACW	W / U
toad rush	*Juncus bufonius*	FACW	W
soft rush	*Juncus effusus*	FACW	W / U
rush	*Juncus* species	OBL to NOL	W / U
western juniper	*Juniperus occidentalis*	NOL	U
prairie Junegrass	*Koeleria cristata*	NOL	U
fewflowered peavine	*Lathyrus pauciflora*	NOL	U
birdsfoot-trefoil	*Lotus corniculatus*	FAC	W / U
silky lupine	*Lupinus sericeus*	UPL	U
tarweed	*Madia* species	FACU/UPL	U
showy oniongrass	*Melica spectabilis*	FAC	W
yellow sweetclover	*Melilotus officinalis*	FACU	U
peppermint	*Mentha piperita [citrata] or [x p.]*	FACW	W
common large monkeyflower	*Mimulus guttatus*	OBL	W
firecracker penstemon	*Penstemon eatonii*	UPL	U
small-flowered penstemon	*Penstemon procerus*	NI (Natl. Ind. FAC*, Reg. 0&8 Ind. FAC*)	W / U
varileaf phacelia	*Phacelia heterophylla*	FACU	U
ponderosa pine	*Pinus ponderosa*	FACU	U
bulbous bluegrass	*Poa bulbosa*	UPL	U
Sandberg's bluegrass	*Poa sandbergii [secunda]*	FAC* to FACU	W / U
quaking aspen	*Populus tremuloides [tremula]*	FAC	W
black cottonwood	*Populus trichocarpa [balsamifera]*	FAC	W
slender cinquefoil	*Potentilla gracilis*	FAC	W / U
choke cherry	*Prunus virginiana*	FACU	U
Douglas fir	*Pseudotsuga menziesii*	FACU*	U
celery-leaf buttercup	*Ranunculus sceleratus*	OBL	W
squaw currant	*Ribes cereum*	FAC*	W / U
watercress	*Rorippa nasturtiumaquaticum [Nasturtium officinale]*	OBL	W
rose	*Rosa* species	FACW* to NOL	W / U
curly dock	*Rumex crispus*	FAC	W
narrowleaf willow	*Salix exigua*	OBL	W
peachleaf willow	*Salix amygdaloides*	FACW	W
Pacific willow	*Salix lasiandra [lucida var. lasiandra]*	FACW	W
rigid [yellow] willow	*Salix rigida [lutea]*	OBL	W
small-fruited bulrush	*Scirpus microcarpus*	OBL	W
tall ragwort	*Senecio serra*	FACU*	U

Common Name	Scientific Name	Wetland Indicator Status	In Wetland (W) or Upland (U)
Oregon checker-mallow	*Sidalcea oregana*	FACW	W / U
blue-eyed grass	*Sisyrinchium* species	FACW to FACU	W
bottlebrush squirreltail	*Sitanion hystrix*	FACU	U
false Solomon's seal	*Smilacina* species	FAC	W
Canada goldenrod	*Solidago canadensis*	FACU	U
hooded ladies-tresses	*Spiranthes romanzoffiana*	FACW	W
western needlegrass	*Stipa occidentalis*	NOL	U
snowberry	*Symphoricarpos albus*	FACU	W / U
common dandelion	*Taraxacum officinale*	FACU	U
gray, spineless horsebrush	*Tetradymia canescens*	NOL	U
field pennycress	*Thlaspi arvense*	NI (Natl. Ind. FACU?, Reg. 0&8 Ind. NI)	U
yellow salsify	*Tragopogon dubius*	NOL	U
white clover	*Trifolium repens*	FAC*	W
broadleaf cattail	*Typha latifolia*	OBL	W
stinging nettle	*Urtica dioica*	FAC	W / U
California false hellebore	*Veratrum californicum*	FACW	W
common mullein	*Verbascum thapsus*	NOL	U

An asterisk (*) following a Regional Indicator identifies tentative assignments based on limited information from which to determine the indicator status.

A question mark (?) following a National Indicator denotes a tentative assignment based on the botanical literature and not confirmed by regional review.

[Synonymy] per Reed 1988 and per Kartesz 1994; see also USDA Plants Database
http://plants.usda.gov/

Wetland Indicator Status per Reed 1988 and 1993 supplement (see also USDA Plants Database)

WETLAND INDICATOR STATUS	
OBL	**Obligate Wetland** - Plants that occur almost always in wetlands (estimated probability >99%) under natural conditions, but which may also rarely occur in non-wetlands (<1% probability). Examples: broadleaf cattail, skunk cabbage
FACW	**Facultative Wetland** - Plants that usually occur in wetlands (estimated probability 67%-99%), but also occur in non-wetlands an estimated 1%-33% of the time. Examples: Oregon ash, red-osier dogwood
FAC	**Facultative** - Plants that are equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%). Examples: red alder, salmonberry
FACU	**Facultative Upland** - Plants that usually occur in non-wetlands (estimated probability 67-99%), but occasionally are found in wetlands (estimated probability 1%-33%). Examples: bigleaf maple, Himalayan blackberry
UPL	**Upland** - Plants that almost always occur in non-wetlands (<1% probability of occurring in wetlands).
NOL	**Not Listed** - Plants that are not on the list; assumed to be UPL but may not have occurred in the region when indicators were assigned.
NI	**No Indicator** - Insufficient information available or plant is widely tolerant.
NO	**No Occurrence** - The species does not occur in the region.

National Indicators reflect the range of estimated probabilities (expressed as a frequency of occurrence) of a species occurring in wetlands versus non-wetland across the entire distribution of the species. A frequency, for example, of 67%-99% (Facultative Wetland) means that 67%-99% of sample plots containing the species randomly selected across the range of the species would be wetland. When two indicators are given, they reflect the range from the lowest to the highest frequency of occurrence in wetlands across the regions in which the species is found. A positive (+) or negative (-) sign was used with the Facultative Indicator categories to more specifically define the regional frequency of occurrence in wetlands. The + sign indicates a frequency toward the higher end of the category (more frequently found in wetlands), and a - sign indicates a frequency toward the lower end of the category (less frequently found in wetlands). The Regional Supplements to the 1987 Corps Wetland Delineation Manual have removed the significance of the + and - signs and these have been deleted.

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Regional Indicators express the estimated probability (likelihood) of a species occurring in wetlands versus non-wetlands in the region. Regional Indicators reflect the unanimous agreement of the Regional Interagency Review Panel. The Northwest Region is Region 9, California is Region 0, and the Intermountain Region is Region 8.

The wetland indicator categories should not be equated to degrees of wetness. Many obligate wetland species occur in permanently or semi-permanently flooded wetlands, but a number of obligates also occur in and some are restricted to wetlands which are only temporarily or seasonally flooded. The facultative upland species include a diverse collection of plants, which range from weedy species adapted to exist in a number of environmentally stressful or disturbed sites (including wetlands), to species in which a portion of the gene pool (an ecotype) always occurs in wetlands. Both the weedy and ecotype representatives of the facultative upland category occur in seasonally and semi-permanently flooded wetlands.

Appendix F: References

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Appendix G: Soil Texture Class Abbreviations

Field Book for Describing and Sampling Soils, Version 2.0, Page 2-29

Soil Texture Class or Subclass	Conventional Code	NASIS* Code
Coarse Sand	cos	COS
Sand	s	S
Fine Sand	fs	FS
Very Fine Sand	vfs	VFS
Loamy Coarse Sand	lcos	LCOS
Loamy Sand	ls	LS
Loamy Fine Sand	lfs	LFS
Loamy Very fine Sand	lvfs	LVFS
Coarse Sandy Loam	cosl	COSL
Sandy Loam	sl	SL
Fine Sandy Loam	fsl	FSL
Very Fine Sandy Loam	vfsl	VFSL
Loam	l	L
Silt Loam	sil	SIL
Silt	si	SI
Sandy Clay Loam	scl	SCL
Clay Loam	cl	CL
Silty Clay Loam	sicl	SICL
Sandy Clay	sc	SC
Silty Clay	sic	SIC
Clay	c	C

*National Soil Information System: http://nasis.usda.gov/intro/

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