4.7 HYDROLOGY AND WATER QUALITY

This section describes the hydrologic and water quality conditions within the Park and vicinity and evaluates the potential for the Project to result in significant impacts related to unfavorable surface water or flooding hazards. The Project includes several Program Actions that involve ground disturbance, construction, and discharges of water to natural drainages. These activities have the potential to affect water quality, cause erosion, or change flows within stream channels. This section evaluates the baseline conditions and Program Actions that could have an effect on hydrology and water quality. Section 4.0, Environmental Analysis, provides a description of DPR's analytical methodology that is applied to each resource category, including hydrology and water quality, from a program and area-specific perspective.

4.7.1 EXISTING CONDITIONS

4.7.1.1 Climate and Precipitation

The Park is located within a semi-Mediterranean climatic zone with hot dry summers and cold wet winters. The Grass Valley No. 2 Climate Station, located approximately 0.3 miles west of the Park, records precipitation and temperature. Annual temperatures range from an average low of 34°F in January to an average high of 91°F in July. Rainfall in the summer is rare and is usually generated from thunderstorms. Winters are generally mild and wet, with the majority of precipitation occurring from November through May. Rainfall averages approximately 53 inches per year and is usually accompanied by a southwest wind. Averaging about 30 inches total per year, snow depth rarely reaches more than 8 inches at any one time (DPR 1978). The annual evapotranspiration rate (the rate at which water is lost to evaporation from the ground surface and from transpiration by vegetation) is about 54 inches per year. California Irrigation Management Information Service (CIMIS), 1999, Reference Evapotranspiration Map (Zone 13). Table 4.7-1, Meteorological Data, presents monthly average temperature, rainfall, and evapotranspiration data.

4.7.1.2 Surface Water Occurrence and Quality

The surface topography in the Park is characterized by moderate to steep slopes situated between the west-flowing South Fork Wolf Creek to the north and Little Wolf Creek to the south. The two streams are located within the Wolf Creek watershed, a tributary to the Bear River. The Bear River flows into the Feather River, which drains into the Sacramento River system.

A topographic divide that extends east to west through the Park creates two separate watersheds within the Park boundary; the Little Wolf Creek Watershed and South Fork Wolf Creek Watershed (see Figure 4.7-1, Watershed Map). The northern part of the Park (the north side of Union Hill) slopes toward South Fork Wolf Creek, which flows

along the northern edge of the Park. Little Wolf Creek enters the east side of the Park and flows westward through the south central portion of the Park and through the San Dam before leaving the Park's western boundary and continuing westward to Wolf Creek. Small ephemeral drainages that carry water only during heavy storms are located throughout the Park.

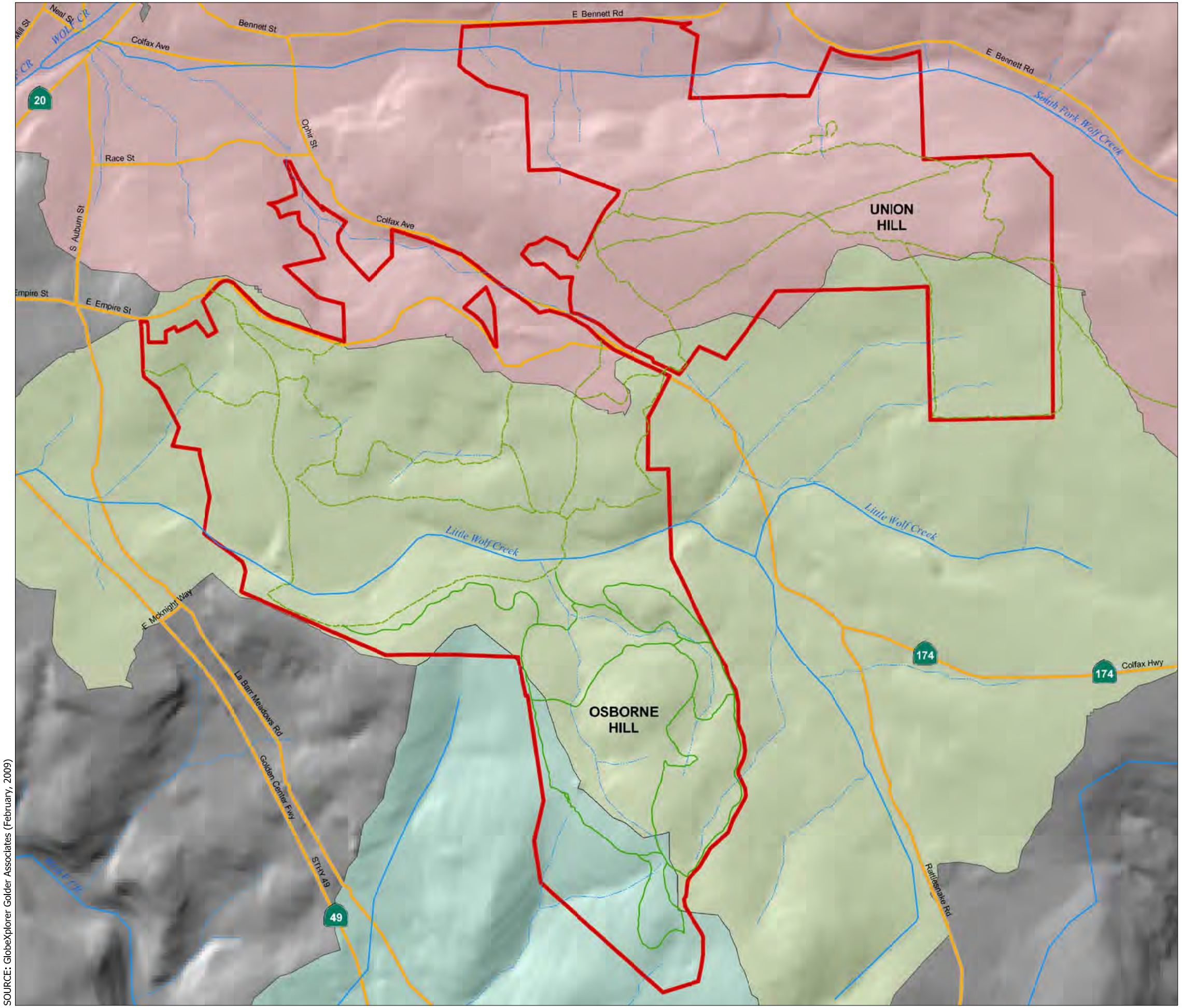
TABLE 4.7-1
METEOROLOGICAL DATA

Month	High Temp.	Average Temp.	Low Temp.	Rain (Inches)	ET (inches)
January	52.9	42.2	31.4	9.86	1.24
February	55	44.2	33.3	9.21	1.96
March	56.9	46.4	35.9	8.52	3.10
April	62.6	50.8	39	3.69	4.80
May	70.3	57.6	44.9	1.97	6.51
June	79.3	65.1	50.8	0.62	7.80
July	86.6	70.9	55.2	0.18	8.99
August	86.4	70.3	54.2	0.23	7.75
September	81	65.4	49.7	1.10	5.70
October	71.5	57.1	42.7	2.72	3.72
November	58.1	46.7	35.3	7.08	1.80
December	53.1	42.1	31	7.89	0.93
			Annual Total	**53.07**	**54.30**

Notes:
1. Temperature in degrees Fahrenheit.
2. Temperature and rainfall from Grass Valley No. 2 weather station (NCDC #3573, 39°13' W, 121°4' N, and elevation 2,400 ft. msl).
3. ET = Evapotranspiration. ET data from California Irrigation Management Service (CIMIS), 1999, Reference Evapotranspiration Map (Zone 13).

Nine of the 10 identified Remediation Areas are located within the Little Wolf Creek Watershed. The Magenta Drain, some historic mine and mill sites, and portions of the Park trail system extend into the South Fork Wolf Creek Watershed (Union Hill area). Surface water runoff from these Remediation Areas drains to the South Fork Wolf Creek through overland flow, a system of ephemeral drainages, or other localized drainages created during or following mining activities.

Past mining activities often involved channeling of water into ditches for use in ore processing which modified and disrupted natural draining patterns. The Little Wolf Creek drainage was modified during the mining era by the construction of the Sand Dam. The Sand Dam construction was initiated in 1917 to impound tailings and water from the Empire Mine Stamp Mill and Cyanide Plant and prevent Empire Mine's mill



Little Wolf Creek Watershed
South Fork Wolf Creek Watershed
South Watershed
Empire Mine SHP Boundary
Perennial Stream
Ephemeral Drainage
Major Road
Osborne Hill Trail (09/08)
Empire Mine SHP Trail

N

0 1000'

SCALE: 1" = 1000'-0"

SOURCE: GlobeXplorer Golder Associates (February, 2009)

Figure 4.7-1
Watershed Map

EMPIRE MINE SHP
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tailings from the entering natural waterways, as required by the California Debris Commission (Commission). The dam was constructed by placing waste rock originating from the Pennsylvania mine across Little Wolf Creek.

Little Wolf Creek now flows into the Sand Dam marsh area, which was created with the trapped tailing materials upstream of the dam and exits through the Sand Dam arrestor (energy dissipation system). It eventually leaves the Park approximately 1,150 feet below the Sand Dam and then flows approximately 2,500 feet before joining Wolf Creek west of SR 49 (DPR 2006). Portions of the Sand Dam tailings area typically pond water during the winter when rainfall is high, but the Sand Dam is typically dry during the rest of year.

Stacy Lane Pond (Remediation Area 7) is an ephemeral feature that collects surface runoff from the surrounding drainage area. The Stacy Lane Pond consists of an embankment constructed from waste rock and a tailing deposit suspected to originate from the Pennsylvania or W.Y.O.D. milling operations. McQuiston (1986) indicates that from 1918 through 1928 the mine produced and milled an additional 1.4 million tons of ore, with approximately 58,000 tons being discharged to Stacy Lane Pond. Remediation Area 7 is an approximate 2.8-acre tailings deposit with an embankment constructed from waste rock material. The embankment could also contain tailings. The Stacy Lane Pond dam is approximately 25 to 30 feet in height. The pond accumulates storm water during periods of heavy precipitation and dries during the summer. The Stacy Lane Trail crosses the tailings deposit just south of the pond.

The Conveyance Corridor (Area 3) is a natural drainage historically used to hydraulically transport tailings from the former Cyanide Plant (Area 2) to Little Wolf Creek and the Sand Dam Area (Area 4). Residual deposits of tailings and other mine and mill-related materials remain within the Conveyance Corridor. Two of the four rock and concrete-lined channels, constructed in 2007, divert stormwater runoff around the Red Dirt Pile to the Conveyance Corridor.

The Magenta Drain (Area 6) is located in the northwest part of the Park near SR 174 and drains groundwater from the Empire Mine. Based on information presented by MFG (2008n), the drain tunnel follows a gradient of approximately 0.7% for a distance of nearly 3,000 feet from the Empire Mine shaft to the portal located in Woodpecker Ravine, which is a tributary to South Fork Wolf Creek. Discharge from the Magenta Drain is influenced by pumping water from the main shaft of the Empire Mine. The water extracted from the main shaft is used to irrigate the grounds in the Historic Grounds area and Visitor Center. Based on detailed monitoring data (MFG December 2006; MFG 2008l), fluctuations in water levels in the main shaft at Empire Mine result in changes in flow at Magenta Drain with a lag time of less than 20 minutes. The magnitude of the fluctuations and the short lag time confirms that the Magenta Drain is hydraulically connected to the Empire Mine workings through various shafts, adits, and/or tunnels.

The Regional Water Quality Control Board (RWQCB) regulates water quality in the region and identifies beneficial uses and establishes water quality objectives, which together with an anti-degradation policy, make up the water quality standards required by the Clean Water Act (CWA). The Central Valley Water Board's *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (i.e., Basin Plan), (RWQCB 2007) contains the federally required water quality standards. Little Wolf Creek and South Fork Wolf Creek watersheds are part of the larger Bear River watershed in the Sacramento River Basin. The water quality objectives are established based upon the beneficial uses of the California's waters, and take into consideration the past, present, and probable future beneficial uses, environmental characteristics of the hydrologic unit under consideration (including the quality of water currently present), water quality conditions that could reasonably be achieved, economic considerations, the need for developing housing, and the need to develop and use recycled water (California Water Code section 13241).

The Basin Plan designates the following beneficial uses for surface water within the Bear River Watershed:

- Municipal and Domestic Supply;
- Agricultural Supply;
- Hydropower Generation;
- Industrial Service Supply;
- Water Contact Recreation;
- Non-contact Water Recreation;
- Canoeing and Rafting;
- Warm Freshwater Habitat;
- Cold Freshwater Habitat;
- Wildlife Habitat;
- Migration of Aquatic Organisms for warm and cold water fish; and
- Spawning, Reproduction, and/or Early Development for warm and cold water fish.

The RWQCB considers all groundwater in the region as suitable or potentially suitable, at a minimum, for municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply.

Mine waste rock material from underground mining activities contains the non-ore-bearing rocks and soil that were removed during mining and tunneling operations. Once removed, this material was not processed because it did not contain economically significant metal concentrations. Empire Mine mill tailing materials are fine-grained deposits (sand size or smaller) that have been crushed in a stamp mill and processed to

remove the gold using mercury or cyanide, or a combination of the two methods. Both mine waste rock and mill tailing materials have the potential to discharge COCs to waters of the state and cause, or threaten to cause, pollution or a nuisance, including impacts to beneficial uses of waters of the state. Based on these potential impacts to water quality, and in accordance with Title 27 of the California Code of Regulations (27 CCR) § 22480, the various source of waste will be classified as Group A, B, or C mining waste based on an assessment of the potential risk of water quality degradation posed by each specific waste group and then will be managed, treated or disposed of accordingly. The Remediation Option entitled "placement of removed materials within the Park," provided in section 2.6.3, describes the process of how the wastes will be classified and then managed.

The Project Proponents are currently conducting monitoring and sampling programs to assess water quality to determine the degree of impact on surface water quality from past mining activities. Section 4.6, Hazards and Hazardous Materials, contains an extensive discussion of COC at the Park and the potential ways that waters of the state, people, animals and plants could be impacted and potential exposure pathways.

There are three components of the surface water sampling and reporting program at the Park. These include:

- Industrial stormwater monitoring and reporting (ISWPPP, General Permit #WDR-97-03-DWQ);
- Magenta Drain monitoring (NPDES Order CA0085171 and WDR Order No. R5-2006-0058); and,
- Surface water monitoring program on Little Wolf Creek, South Fork Little Wolf Creek, and Conveyance Corridor (*Final Surface Water Monitoring 2007 Work Plan Empire Mine State Historic Park*.

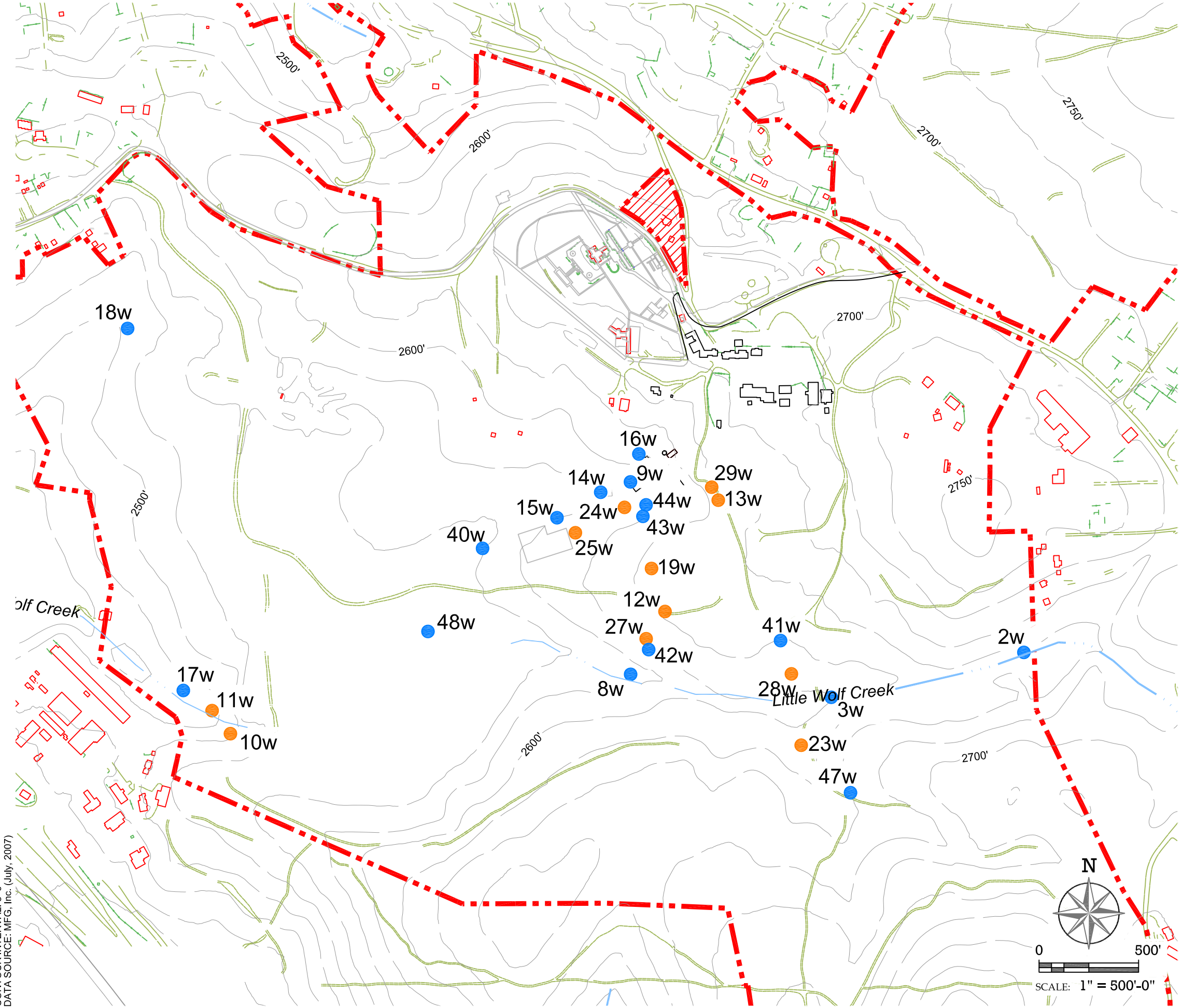
The various components of the surface water monitoring and reporting program are summarized below.

1. The federal Clean Water Act regulations (40 CFR 122.26(b)(14)(i)-(xi)) require industrial facilities that discharge storm water associated with industrial activities to obtain an National Pollutant Discharge Elimination System (NPDES) permit for storm water discharges. Storm water discharges associated with inactive mine operations are subject to these requirements under 40 CFR 122.26 (b)(14)(iii). In California, the State Water Resources Control Board (SWRCB) maintains a general NPDES permit (No. CAS000001) for stormwater discharges associated with industrial activities (including inactive mine operations). The DPR submitted an Industrial Stormwater Pollution Prevention Plan (ISWPPP) and implemented a Monitoring Program to comply with the State's NPDES permit in accordance with the General Permit #WDR-97-03-DWQ).

Stormwater and receiving water is monitored at a network of surface water sampling points within the Park. The location and designation of the stormwater and receiving water sample points are shown on Figure 4.7-2, Storm Water and Receiving Water Sampling Points. DPR staff document the results of the monitoring for the ISWPPP in an annual report.

The Magenta Drain discharge is a point source regulated under Section 13260 of the California Water Code and the Federal Clean Water Act, 33 USC 1251. On September 27, 2005 the DPR submitted an NPDES permit application, including a Report of Waste Discharge, for the Magenta Drain. The RWQCB subsequently issued Waste Discharge Requirements (WDR) Order No. R5-2006-0058 and Time Schedule Order (TSO) No. R5-2006-0059 requiring DPR implement a sampling program to monitor the water quality of the discharge from the Magenta Drain Tunnel. Surface water samples are collected for chemical analysis at effluent monitoring point (EFF-001) and three receiving water stations (RWS-001, 002, and 003) monthly. In addition, DPR staff measures the monitoring parameters at the monitoring point (EFF-001) on a weekly basis. Surface water monitoring reports, documenting the results of the monitoring program are generated monthly. Newmont established a continuous monitoring station in Woodpecker Ravine approximately one hundred feet downstream from the Magenta Drain portal to monitor flow, pH, conductivity and temperature.

2. In March 2007, the Project Proponents implemented a surface water monitoring program to collect data on the South Fork of Wolf Creek, Little Wolf Creek and the Conveyance Corridor, the three surface water bodies within Park boundaries. Surface water quality monitoring was initiated on September 25, 2007 pursuant to the Final Surface Water Monitoring 2007 Work Plan Empire Mine State Historic Park (MFG, 2007a) (Surface Water Work Plan). Monitoring stations are located in the South Fork at the west and east boundaries of the Union Hill section of the Park (SF-1 and SF-2), in Little Wolf Creek near the eastern park boundary (LWC-1) and down stream of the west Park boundary (LWC-2); and, in the Conveyance Corridor (CC-1) downstream from the former Cyanide Plant and upstream of the Sand Dam Marsh. The sample points are shown on Figure 4.7-3, Surface Water Monitoring Locations. Continuous monitoring stations (15 minute intervals) were installed at three of the five sampling locations (LWC-1, LWC-2, and CC-1) to monitor flow, pH, conductivity and temperature. A precipitation intensity gauge was also installed at CC-1. LWC-1, LWC-2, and CC-1 are monitored monthly and SF-1 and SF-2 were monitored quarterly. Newmont



Empire Mine SHP Boundary

In Holding

Water Samples Status:

Active

Inactive

CONTOUR INTERVAL: 5'-0"
DATA SOURCE: MFG, Inc. (July, 2007)

Figure 4.7-2
Storm Water
and Receiving Water Sample Points

EMPIRE MINE SHP
SITE CHARACTERIZATION
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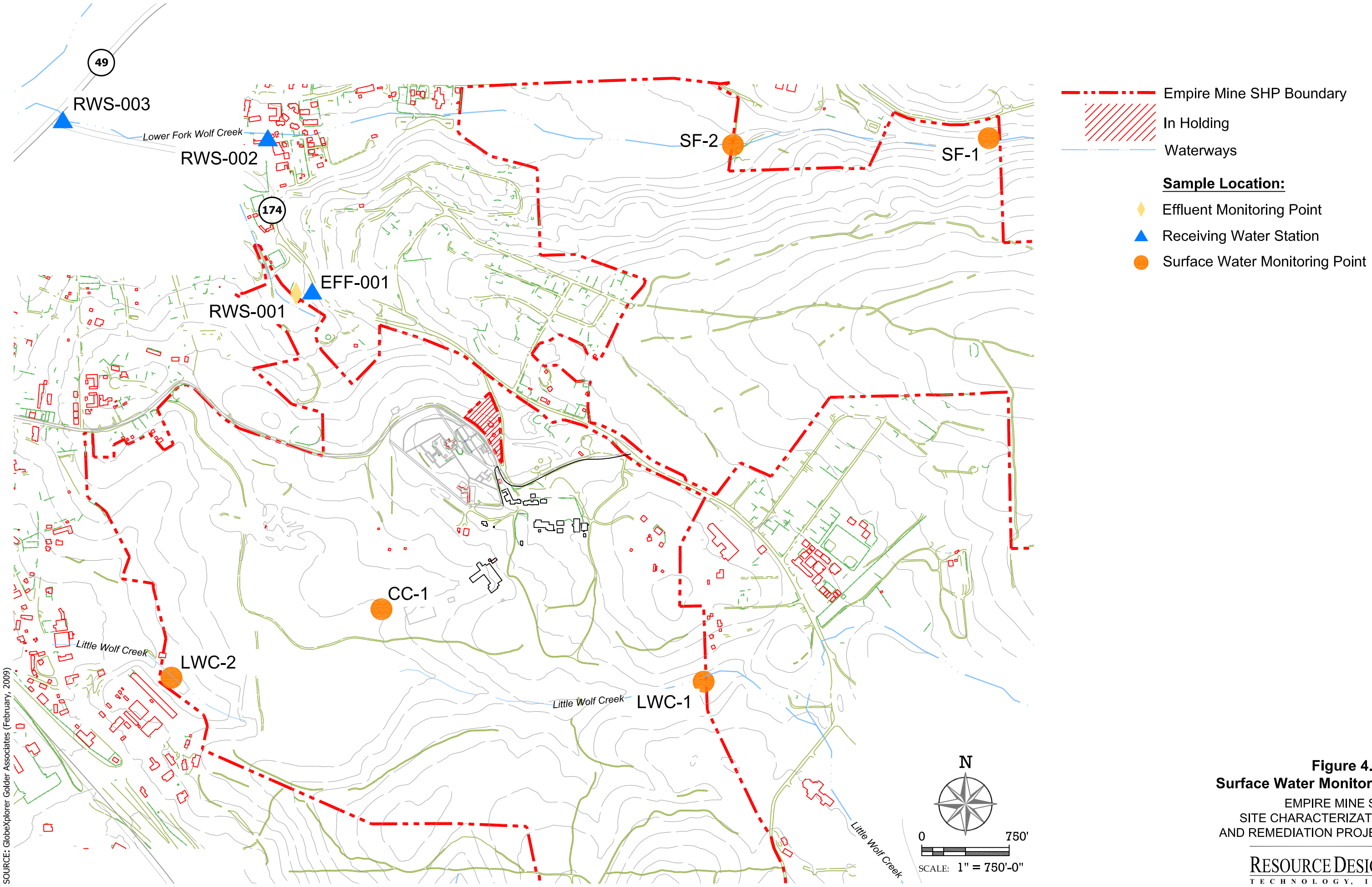

Figure 4.7-3
Surface Water Monitoring

EMPIRE MINE SHP
SITE CHARACTERIZATION
AND REMEDIATION PROJECT

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samples these locations for metals and water quality parameters and reports the data to RWQCB quarterly. The Surface Water Work Plan proposes to conduct the monitoring program at the two stations on Little Wolf Creek, the Conveyance Corridor monitoring station, and the two stations on the South Fork of Wolf Creek for a one-year period. The one year period was completed in the third quarter 2008. Monitoring has continued beyond the one-year period for the monitoring station on Little Wolf Creek and at the Conveyance Corridor, but was discontinued at the South Fork of Wolf Creek stations.

The results of the February 2009 Surface Water Monitoring program (DPR 2009) for the Magenta Drain are shown below in Table 4-7.2 Water Quality Data: Magenta Drain Surface Water Monitoring Point (EFF-001), Table 4-7.3, Weekly Monitoring Parameters – Magenta Drain Portal (EFF-001), and Table 4-7.4, Monthly Monitoring Parameters – Magenta Drain Receiving Water Locations. Levels exhibit some seasonal fluctuations but these results are generally typical of the analytical results from previous monthly events.

TABLE 4.7-2
WATER QUALITY DATA: MAGENTA DRAIN SURFACE WATER MONITORING POINT (EFF-001)

Constituents	Results / Units (µg/L)[1]	Lbs/day	Final Effluent Limitations/ Interim Effluent Limitations (*Interim Limits from TSO*)		Comments
			Average Monthly µg/L	Maximum Daily µg/L	
Aluminum	<50	0.06676	71 *(151,000)*	140	
Antimony	0.18	0.000240192	6 *(415)*	NA	Estimated result*
Arsenic	**70**	0.093408	10 *(558,000)*	NA	Exceeded final limit*
Barium	28	0.0293568	1,000 *(10,400)*	NA	
Beryllium (quarterly)	<0.1	0.00013352	NA	NA	Sampled quarterly
Cadmium	<0.1	0.00013344	0.26 2,100	0.53 (4,200)	
Chromium	<0.1	0.00013344	36 220	72 (450)	
Chromium VI	<0.2	0.00026688	NA	NA	
Cobalt	0.64	0.000854016	50 *(1,080)*	NA	
Copper	<0.1	0.00013344	1.2 170	2.3 (350)	
Cyanide	<1.0	0.00013344	NA	NA	Sampled quarterly

Constituents	Results / Units (µg/L)[1]	Lbs/day	Final Effluent Limitations/ Interim Effluent Limitations (*Interim Limits from TSO*)		Comments
			Average Monthly µg/L	Maximum Daily µg/L	
(quarterly)					
Iron	**7,300**	9.74112	300 *(75,600,000)*	NA	Exceeded final limit
Lead	<0.1	<0.00013344	0.23 560	0.47 (1,100)	
Manganese	**3,000**	4.0032	50 *(2,700,000)*	NA	Exceeded final limit
Mercury	0.0012	1.60128E-09	0.05 4.9	0.10 (9.2)	
Methyl Mercury (quarterly)	0.00029 2	3.89645E-10	NA	NA	Sampled quarterly
Molybdenum (quarterly)	0.98		NA	NA	Sampled quarterly
Nickel	0.13*	0.000173472	8.6 65	17 (130)	Estimated result*
Selenium (quarterly)	<0.1		NA	NA	Sampled quarterly
Thallium	<0.1	<0.00013344	1.7 5,900	5.6 (20,000)	

Notes:
NA- Not Applicable
All metals results are total recoverable.
[1]Results in **bold** type exceed their respective limits
** Estimated Concentration or Detected, but Not Quantified (DNQ). The sample results for cobalt, copper, thallium, vanadium and zinc have a “B” flag notation by the lab, indicating that the reported values are below the reporting limit (RL) but greater than or equal to the method detection limit (MDL) and are considered estimates.

TABLE 4.7-3
WEEKLY MONITORING PARAMETERS – MAGENTA DRAIN PORTAL (EFF-001)

Parameter	Result	Units	Final Limits
DECEMBER 3, 2008			
Flow[1]	100	gpm	NA
pH	**6.06**	standard units	6.5-8.5
Turbidity	**20.3**	NTU	Not > 5
Specific Conductivity	617	µs/cm	None determined
Temperature	57.6	F°	
Dissolved Oxygen	7.19	mg/L	Not < 7.0
Dissolved Oxygen	**71.1**[2]	% Saturation	Not < 85%
DECEMBER 10, 2008			
Flow[1]	61	gpm	NA
pH	**6.05**	standard units	6.5-8.5
Turbidity	**17.7**	NTU	Not > 5
Specific Conductivity	585	µmhos/cm	None determined
Temperature	57.1	F°	
Dissolved Oxygen	8.20	mg/L	Not < 7.0
Dissolved Oxygen	**80.1**	% Saturation	Not < 85%
DECEMBER 17, 2008			
Flow[1]	92	gpm	NA
pH	**6.49**	standard units	6.5-8.5
Turbidity	**22.1**	NTU	Not > 5
Specific Conductivity	624	µmhos/cm	None determined
Temperature	57.6	F°	
Dissolved Oxygen	7.01	mg/L	Not < 7.0
Dissolved Oxygen	**75.5**	% Saturation	Not < 85%
DECEMBER 22, 2008			
Flow[1]	68	gpm	NA
pH	**6.15**	standard units	6.5-8.5
Turbidity	**7.82**	NTU	Not > 5
Specific Conductivity	589	µmhos/cm	None determined
Temperature	57.2	F°	
Dissolved Oxygen	7.95	mg/L	Not < 7.0
Dissolved Oxygen	**78.0**	% Saturation	Not < 85%
DECEMBER 31, 2008			
Flow[1]	109	gpm	NA
pH	**6.16**	standard units	6.5-8.5
Turbidity	**18.3**	NTU	Not > 5
Specific Conductivity	631	µmhos/cm	None determined
Temperature	57.7	F°	

Parameter	Result	Units	Final Limits
Dissolved Oxygen	7.80	mg/L	Not < 7
Dissolved Oxygen	**76.7**	% Saturation	Not < 85%
AVERAGE MONTHLY			
Flow[1]	86.0		
pH	**6.18** gpm		
Turbidity	**17.24** NTU		
Specific Conductivity	609.2 µmhos/cm		
Temperature	57.4 F°		
Dissolved Oxygen	7.63 mg/L		
Dissolved Oxygen	**76.3** % Saturation		

TABLE 4.7-4
MONTHLY MONITORING PARAMETERS – MAGENTA DRAIN RECEIVING WATER LOCATIONS

	Units	RWS-001	RWS-002	RWS-003	Final Limits
Dissolved Oxygen[1]	mg/L	8.39	10.62	11.24	Not < 7
Dissolved Oxygen[1]	% saturation	**82.0**	86.9	93.9	Not < 85%
Specific Conductivity[2]	µmhos/cm (mg/L)	611 (295)	135.6 (62.9)	247 (116.8)	None set
pH[3]	pH units	**6.37**	6.91	6.79	6.5-8.5
Temperature[4]	F°	56.8	43.5	45.8	See note 3
Turbidity Field Lab	NTU	**33.9** 66.3	0.85 0.44	0.73 0.44	Not >5 NTU
Color	Color units	10	12	12	Not > 15
Calcium	µg/L	98,800	13,300	32,400	NA
Magnesium	µg/L	16,700	7,040	9,400	NA
Hardness as $CaCO_3$	mg/L	315	62.2	120	NA

Notes:

1. The monthly median of mean daily DO shall not fall below 85% of saturation nor the DO be reduced below 7.0 mg/L at any time.
2. Permit requires specific conductivity reported in both µmhos/cm and mg/L.
3. pH not to be below 6.5, above 8.5, nor changed more than 0.5 units.
4. Temperature is based on beneficial uses for both COLD and WARM under the Basin Plan, and includes the objective that at no time or place shall the temperature of COLD or WARM intrastate waters be increased by more than 5 degrees Fahrenheit above natural receiving water temperatures.

4.7.1.3 Magenta Drain NPDES Monitoring and Reporting Program

DPR conducts weekly field monitoring at the Magenta Drain portal (and three receiving water stations). One water receiving station is located approximately 100 feet downstream of the portal, and two are located in the South Fork of Wolf Creek. Monthly and quarterly sampling is conducted at the Magenta Drain portal and the samples are analyzed for metals and general water quality parameters. Additional quarterly sampling is conducted at the portal for chronic and acute toxicity. Sampling at the receiving water stations includes color, turbidity, and hardness analyzed monthly and radionuclides analyzed annually. Generally, results from the monthly and quarterly sampling report all metal constituents within the interim and final effluent limitations established in the WDRs and NPDES permit, with the exceptions of arsenic, iron and manganese. These three constituents routinely meet the interim, but not the final effluent limitations.

4.7.1.4 Surface Water Monitoring Program

Table 4.7-5, Water Quality Data: Surface Monitoring Points, shows water-quality data obtained in January (wet season) and August (dry season) 2008 from surface-water sampling locations. Surface water samples are analyzed at either SVL Analytical of Kellogg, Idaho or ACZ Laboratories, Inc. of Steamboat Springs, Colorado. Both laboratories are accredited through the National Environmental Laboratory Accreditation Program by the California Department of Health Services (at a California–certified laboratory). Newmont collects samples from points on Little Wolf Creek and the Conveyance Corridor. Further, Newmont collected surface-water samples quarterly from September 2007 through August 2008 from the South Fork Wolf Creek locations. Along Little Wolf Creek, Newmont collects samples upstream near the eastern Park boundary (LWC-1), and downstream of the Sand Dam arrestor (LWC-2). Newmont also collects samples near the downstream end of the Conveyance Corridor near its confluence with the Sand Dam area (CC-1). Along South Fork Wolf Creek, Newmont collected samples at the upstream (SF-1) and downstream (SF-2) sampling locations near the Park boundaries (Figure 4.7-3). Little Wolf Creek and South Fork Wolf Creek generally have surface flow year round, whereas flow in the Conveyance Corridor typically only occurs after major storm events in the winter.

As shown in Table 4.7-5, the reported pH is neutral to slightly alkaline (7.5 to 8.2 units) in Little Wolf Creek, acidic (4.7 units) in the Conveyance Corridor, and slightly alkaline (7.8 to 8.2 units) in South Fork Wolf Creek. Total dissolved solids (TDS) levels are typically less than 100 mg/L in Little Wolf Creek, South Fork Wolf Creek, and the Conveyance Corridor. Calcium and bicarbonate are the primary TDS components from the two creeks; while Calcium and sulfate are the primary TDS components in the Conveyance Corridor. In general, surface-water quality within Little Wolf Creek and South Fork Wolf Creek meet RWQCB Basin Plan standards (MFG and Clear Creek Consultants, 2008a). Newmont collected several storm-water samples from the

Conveyance Corridor that exceeded U.S. EPA stormwater benchmark values for total aluminum, cadmium, copper, iron, manganese, lead, and zinc (MFG and Clear Creek Consultants 2008a).

Newmont collected water samples from the Magenta Drain that had elevated levels of iron, manganese, and arsenic. The pH was neutral to slightly alkaline, at 7.8 to 8.0 units. TDS levels ranged from about 40 milligrams per liter (mg/L) to 280 mg/L. The most common general water quality constituents were calcium, bicarbonate, and sulfate (MFG 2008l).

4.7.1.5 Flooding

The Federal Emergency Management Agency (FEMA) has mapped a 100-year flood plain along South Fork Wolf Creek in the northwestern corner of the Park in a relatively flat meadow area between East Bennett Road and Footwall Drive. The flood plain varies from approximately 200 feet to 300 feet wide, and is shown on FEMA Map 06022100608D.

A 100-year flood plain has not been designated for Little Wolf Creek; high flows within Little Wolf Creek and other ephemeral drainages are generally contained within the creek banks. Creek flows spread out within the Sand Dam impoundment and are then released through the spillway.

4.7.1.6 Groundwater Occurrence and Quality

Groundwater at the Park occurs within a complex system of fractured bedrock and underground mine workings. Two wells (IW-1 and IW-2) extract water from the main Empire shaft at a depth of 239 and 250 feet below ground surface (bgs), respectively, for irrigation use during dry months and other non-potable water uses at the Park (MFG 2008a). The depth to groundwater is approximately 160 feet bgs. The primary extraction well (Well No. 1) extracts water at approximately 175 gallons per minute (gpm); the rate of well recharge is 6 inches in a 24-hour period (Payne 2008). The extraction well is pumped periodically for irrigation and fire suppression.

TABLE 4.7-5
WATER QUALITY DATA: SURFACE MONITORING POINTS

Analyte	Type	Units[1]	Sample Location, Sample Date, and Stream Flow Rate									
			LWC-1		CC-1		LWC-2		SF-1		SF-2	
			1/8/2008	8/4/2008	1/8/2008	8/5/2008	1/8/2008	8/4/2008	3/4/2008	8/5/2008	3/4/2008	8/5/2008
			2.7 cfs[2]	0.09 cfs	0.05 cfs	0 cfs	4.6 cfs	0.05 cfs	3.4 cfs	0.21 cfs	5.0 cfs	0.10 cfs
Aluminum	Dissolved	mg/L	<0.03	0.03	5.33	NA	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
	Total	mg/L	0.27	0.3	8.67	NA	0.12	<0.03	0.24	0.06	0.2	0.04
Antimony	Dissolved	mg/L	<0.0004	<0.0004	<0.0004	NA	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
	Total	mg/L	<0.0004	<0.0004	<0.0004	NA	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Arsenic	Dissolved	mg/L	0.009	0.0023	0.0006	NA	0.0014	0.0042	<0.0005	<0.0005	<0.0005	0.0007
	Total	mg/L	0.0019	0.0041	0.0205	NA	0.0024	0.0033	<0.0005	<0.0005	<0.0005	<0.0005
Barium	Dissolved	mg/L	0.0369	0.0172	0.0522	NA	0.0177	0.0405	0.026	0.0164	0.0225	0.0163
	Total	mg/L	0.0376	0.0193	0.292	NA	0.0191	0.041	0.0278	0.0168	0.0235	0.0173
Cadmium	Dissolved	mg/L	<0.0001	<0.0001	0.0631	NA	0.0002	0.0004	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	<0.0001	<0.0001	0.0655	NA	0.0002	0.0003	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	Dissolved	mg/L	5.5	6	62.3	NA	17.1	66.5	8.9	15	10.6	15.3
Chromium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	0.0005	<0.0001	0.001	NA	0.0002	<0.0001	0.0003	<0.0001	0.0002	<0.0001
Cobalt	Dissolved	mg/L	0.00009	0.00011	0.0611	NA	0.00012	0.00066	0.00014	0.00012	0.00013	0.0001
	Total	mg/L	0.00017	0.00021	0.0635	NA	0.00016	0.00041	0.00023	0.00015	0.00017	0.00009
Copper	Dissolved	mg/L	0.0005	0.0009	0.0623	NA	0.002	0.0019	<0.0005	0.0006	<0.0005	<0.0005
	Total	mg/L	0.0007	0.0013	0.0842	NA	0.0023	0.0012	0.0007	<0.0005	0.0005	<0.0005
Iron	Dissolved	mg/L	<0.02	<0.02	0.15	NA	<0.02	<0.02	<0.02	<0.02	0.06	0.03
	Total	mg/L	0.35	0.53	1.68	NA	0.16	0.02	0.38	0.18	0.34	0.23
Lead	Dissolved	mg/L	0.0001	<0.0001	0.0038	NA	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	0.0001	0.0002	0.072	NA	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Magnesium	Dissolved	mg/L	2.2	2.1	16.1	NA	3.1	7.7	3.9	6.5	5.1	7
Manganese	Dissolved	mg/L	0.009	0.005	1.23	NA	<0.005	<0.005	0.029	0.006	0.037	0.006
	Total	mg/L	0.02	0.035	1.22	NA	<0.005	<0.005	0.043	0.016	0.041	0.011
Mercury	Dissolved	mg/L	<0.0002	<0.0002	0.0003	NA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Analyte	Type	Units[1]	Sample Location, Sample Date, and Stream Flow Rate									
			LWC-1		CC-1		LWC-2		SF-1		SF-2	
			1/8/2008	8/4/2008	1/8/2008	8/5/2008	1/8/2008	8/4/2008	3/4/2008	8/5/2008	3/4/2008	8/5/2008
			2.7 cfs[2]	0.09 cfs	0.05 cfs	0 cfs	4.6 cfs	0.05 cfs	3.4 cfs	0.21 cfs	5.0 cfs	0.10 cfs
	Total	mg/L	<0.0002	<0.0002	0.0007	NA	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	Dissolved	mg/L	<0.0006	<0.0006	0.0391	NA	0.0009	0.0049	<0.0006	0.0012	0.0007	0.0011
	Total	mg/L	<0.0006	<0.0006	0.0404	NA	<0.0006	0.0023	0.001	<0.0006	0.0013	0.0006
Potassium	Dissolved	mg/L	0.7	0.6	16.6	NA	1.4	1	0.9	1	1	1
Silica	Dissolved	mg/L	16	14.9	27.5	NA	13.6	11.6	17.1	20.3	17.4	20.1
Sodium	Dissolved	mg/L	4	3.8	16.1	NA	4.3	5.4	3	4.8	3.2	5
Thallium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	<0.0001	0.0001	0.0003	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Vanadium	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	NA	<0.0002	<0.0002	0.0007	<0.0002	0.0008	<0.0002
	Total	mg/L	0.0004	<0.0002	0.0027	NA	<0.0002	<0.0002	0.0009	<0.0002	0.0008	0.0002
Zinc	Dissolved	mg/L	0.006	0.002	1.33	NA	0.008	0.007	<0.002	<0.002	0.002	<0.002
	Total	mg/L	0.005	0.004	1.27	NA	0.006	0.008	0.004	<0.002	0.003	<0.002
Bicarbonate		mg/L	17	23	<2	NA	34	109	36	62	44	65
Carbonate		mg/L	<2	<2	<2	NA	<2	<2	<2	<2	<2	<2
Chloride		mg/L	4	3	10	NA	4	4	<5	3	2	3
Cyanide, WAD		mg/L	<0.005	<0.005	<0.005	NA	<0.005	<0.005	NA	NA	NA	NA
Hardness as $CaCO_3$		mg/L	23	24	222	NA	56	198	38	64	48	67
Nitrate+Nitrite as N		mg/L	1.12	0.67	0.38	NA	0.74	0.37	0.55	0.41	0.5	0.35
pH (lab)		Std Units	7.5	7.7	4.7	NA	7.8	8.2	8.1	8.2	8	8.2
Specific Cond. (lab)		uS/cm	65	68	600	NA	132	403	89	143	105	149
Sulfate		mg/L	<1	2	250	NA	22	83	2	4	3	5

Analyte	Type	Units[1]	Sample Location, Sample Date, and Stream Flow Rate									
			LWC-1		CC-1		LWC-2		SF-1		SF-2	
			1/8/2008	8/4/2008	1/8/2008	8/5/2008	1/8/2008	8/4/2008	3/4/2008	8/5/2008	3/4/2008	8/5/2008
			2.7 cfs[2]	0.09 cfs	0.05 cfs	0 cfs	4.6 cfs	0.05 cfs	3.4 cfs	0.21 cfs	5.0 cfs	0.10 cfs
TDS		mg/L	40	40	420	NA	80	280	70	90	70	90
Total Alkalinity		mg/L	17	23	<2	NA	34	109	36	62	44	65
TSS		mg/L	<5	13	36	NA	<5	<5	<5	<2	<2	<2

Notes:
Data from: MFG and Clear Creek Consultants, 2008a and 2008b
[1] mg/L = milligrams per liter
[2] cfs = cubic feet per second
NA = Not Analyzed
TDS = total dissolved solids
TSS = total suspended solids
LWC-1= Little Wolf Creek upstream station
LWC-2 = Little Wolf Creek downstream station
CC-1 = Conveyance Corridor station just upstream of Sand Dam Area
SF-1 = South Fork of Wolf Creek upstream station
SF-2 = South Fork of Wolf Creek downstream station

Table 4.7-6, Water Quality Data: On-Site Irrigation Well and Magenta Drain, presents water quality data collected from Irrigation Well IW-2 and the Magenta Drain during and following a 2008 pumping test at Irrigation Well IW-1. Although transient in nature, this data provides a side by side analysis of the water quality data collected from the two sources during the same time period. In general, the pH is neutral to slightly alkaline, at 7.7 to 7.9 units. TDS levels range from about 260 mg/L to 390 mg/L, with calcium, bicarbonate, and sulfate being the most common constituents. Similar to the water discharged at the Magenta Drain, the water pumped from the main Empire shaft has elevated levels of iron, manganese, and arsenic (MFG 2008a). Water quality data collected indicates iron concentrations ranging from 0.18 mg/L to 6.47 mg/L, manganese concentrations ranging from 0.38 mg/L to 2.75 mg/L, and arsenic concentrations ranging from 0.0058 mg/L to 0.0935 mg/L. The main Empire shaft water meets the RWQCB water-quality criteria for agricultural use except for periodic exceedances for pH and manganese (MFG and Clear Creek Consultants, Inc. 2008b) (see Table 2.0-2).

TABLE 4.7-6
WATER QUALITY DATA: ON-SITE IRRIGATION WELL AND MAGENTA DRAIN[1]

			Sample Location, and Sample Date					
			Irrigation Well			Magenta Drain		
Analyte	**Type**	**Units**	**8/4/2008**	**8/7/2008**	**8/10/2008**	**8/4/2008**	**8/7/2008**	**8/10/2008**
Aluminum	Dissolved	mg/L	0.07	<0.03	<0.03	<0.03	0.05	<0.03
	Total	mg/L	<0.03	<0.03	<0.03	<0.03	0.13	<0.03
Antimony	Dissolved	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
	Total	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Arsenic	Dissolved	mg/L	0.0653	0.0935	0.0058	0.0012	0.0007	0.0012
	Total	mg/L	0.0623	0.084	0.0179	0.0072	0.137	0.17
Barium	Dissolved	mg/L	0.0145	0.02	0.0042	0.0127	0.0111	0.0128
	Total	mg/L	0.0134	0.0196	0.0042	0.0131	0.0347	0.0245
Cadmium	Dissolved	mg/L	0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001
	Total	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Calcium	Dissolved	mg/L	77.7	90.3	51.3	48.1	42.6	50.9
Chromium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	Dissolved	mg/L	0.00089	0.00113	0.00047	0.00038	0.00024	0.00029
	Total	mg/L	0.00092	0.00117	0.00038	0.00034	0.00112	0.00067
Copper	Dissolved	mg/L	0.0008	0.0006	0.0027	<0.0005	<0.0005	<0.0005
	Total	mg/L	0.0013	0.002	0.0023	<0.0005	<0.0005	0.0009
Iron	Dissolved	mg/L	4.43	6.41	0.18	0.02	0.02	0.03
	Total	mg/L	4.75	6.47	0.99	0.74	15.8	24.7
Lead	Dissolved	mg/L	0.003	0.0004	0.0008	<0.0001	<0.0001	<0.0001
	Total	mg/L	0.0061	0.004	0.0035	<0.0001	0.0002	0.0001
Magnesium	Dissolved	mg/L	15.2	16.4	12.6	11	10.3	11.2

Analyte	Type	Units	Sample Location, and Sample Date					
			Irrigation Well			Magenta Drain		
			8/4/2008	8/7/2008	8/10/2008	8/4/2008	8/7/2008	8/10/2008
Manganese	Dissolved	mg/L	2.01	2.75	0.389	0.395	0.233	0.464
	Total	mg/L	1.93	2.62	0.376	0.465	2.85	1.18
Mercury	Dissolved	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Total	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	Dissolved	mg/L	0.001	0.0012	0.0025	0.0006	<0.0006	0.0013
	Total	mg/L	0.0026	0.003	0.0012	0.0015	0.0015	0.0026
Potassium	Dissolved	mg/L	1.4	1.5	1	1	0.9	1
Silica	Dissolved	mg/L	23.6	22.9	24.8	23.3	23.3	22.7
Sodium	Dissolved	mg/L	12.3	13.6	9.2	8.9	8.2	9
Thallium	Dissolved	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Total	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Vanadium	Dissolved	mg/L	<0.0002	<0.0002	0.0007	0.0003	<0.0002	<0.0002
	Total	mg/L	<0.0002	0.0002	<0.0002	<0.0002	0.0011	0.0004
Zinc	Dissolved	mg/L	0.075	0.03	0.099	0.005	0.004	0.006
	Total	mg/L	0.062	0.031	0.101	0.003	0.008	0.005
Bicarbonate		mg/L	126	143	85	86	78	89
Carbonate		mg/L	<2	<2	<2	<2	<2	<2
Chloride		mg/L	6	6	6	6	6	6
Cyanide, WAD		mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hardness as CaCO3		mg/L	257	293	180	165	149	173
Nitrate+Nitrite as N		mg/L	1.04	0.09	0.33	0.84	0.15	0.88
pH (lab)		Std Units	7.7	7.8	7.8	8	8	7.8
Specific Cond. (lab)		uS/cm	534	596	397	358	326	370
Sulfate		mg/L	125	143	88	71	64	74
TDS		mg/L	360	390	260	230	200	230
Total Alkalinity		mg/L	126	143	85	86	78	89
196	196	196	196	196	196	196	196	196

Notes:
[1] Data collected during the August 2008 pumping test in Irrigation Well IW-1
Data from: MFG 2008a
TDS = total dissolved liquids
TSS = total suspended solids

4.7.1.7 Water Supply

Potable water at the Park is supplied by the Nevada Irrigation District (NID). DPR extracts water from main Empire shaft for use as irrigation water for the historic grounds and for other non-potable uses, including fire suppression. In addition, DPR could obtain irrigation water from an irrigation well that would be located at the Park for use in dust suppression during implementation of Program Actions (5,000 gallons of water

would be pumped at a time into a portable water tank).

4.7.2 REGULATORY SETTING

4.7.2.1 Federal

Federal Clean Water Act

The federal CWA was established in 1972 to maintain the chemical, physical, and biological integrity of the nation's waters (Federal Water Pollution Control Act/Clean Water Act, 33 U.S.C. 1251 *et seq.*). It was also intended to provide a mechanism for regulating discharges of pollutants into the Waters of the U.S. and gave the U.S. EPA authority to implement pollution control programs, such as setting wastewater standards for industry and water quality standards for all contaminants in surface waters.

Section 400 *et seq.* of the CWA applies to permits and licenses required for activities that may impact the nation's surface water (Waters of the U.S.). Waters of the U.S. are subject to Section 404 of the CWA. Section 404 establishes a requirement to obtain a permit prior to any activity that involves any discharge of dredged or fill material into the Waters of the U.S., including wetlands. In general, if the fill to be placed into Waters of the U.S. is limited to an area of no more than 0.5 acres, such fill can be approved through the United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) program.

The SWRCB and RWQCB enforce Section 401 of the federal CWA, including administration of the NPDES permits for various discharges into Waters of the U.S. (CWA §402). The new NPDES Stormwater Phase II requires implementation of Best Management Practices (BMPs) to maintain water quality by controlling run-off from construction and post construction operations. A Notice of Intent (NOI) to discharge stormwater is filed with the SWRCB when a project is subject to a NPDES permit and a Stormwater Pollution Prevention Plan (SWPPP) must be approved prior to the start of work (for ground disturbance over 1 acre in size).

United States Army Corp of Engineers

USACE is responsible for implementing regulatory control and guidance using two statutory authorities, the Rivers and Harbor Act (Sections 9 and 10) which governs specified activities in "navigable waters" of the United States and the CWA (Section 404) which governs specified activities in "other waters of the United States" (USACE 2009). In addition, USACE districts use NWPs to authorize categories of activities with minimal effects on the aquatic environment.

The USACE defines wetlands as lands that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Typically, USACE jurisdictional wetlands meet three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. Activities that could result in any discharge into navigable waters are also covered under CWA Section 401.

4.7.2.2 State

California Department of Fish and Game (CDFG)

CDFG regulates activities within watercourses, lakes and in-stream reservoirs. Under California Fish and Game Codes 1600-1603, an entity proposing an activity that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the CDFG must receive a Lake or Streambed Alteration Agreement from the CDFG pursuant to Section 1601 of the California Fish and Game Code. Typically, this requirement applies to any work proposed within the 100-year floodplain of a stream or river and associated riparian areas. Construction activities within the channel of Little Wolf Creek, South Fork Wolf Creek are subject to CDFG's Section 1601 jurisdiction. Magenta Drain and/or the drainage ditches could be subject to the jurisdiction of the CDFG, pursuant to Section 1601 of the Fish and Game Code.

State Water Resources Control Board

SWRCB has jurisdiction over water quality for both surface water and groundwater at the Park. SWRCB Resolution 68-16, commonly referred to as the non-degradation policy, requires maintenance of the existing water quality within a specific surface-water or groundwater system. SWRCB Order No. 2003-0003-DWQ addresses the discharge of "low-threat" waters from activities such as construction dewatering. DPR would also be required to file a NOI for stormwater discharges, and prepare a SWPPP under the NPDES General Permit requirements. Individual RWQCBs operate under the SWRCB.

Regional Water Quality Control Board

The RWQCB regulates water quality in the Central Valley Region of California. The RWQCB has adopted The Water Quality Control Plan (Basin Plan) for the Regional Water Quality Control Board Central Valley Basin, Fourth Edition-1998, the Sacramento River Basin and the San Joaquin River Basin (RWQCB 1998). The Basin Plan describes water-quality goals and objectives that are applicable to the Project. The RWQCB, in conjunction with the DTSC, issued Cleanup and

Abatement Order, Imminent and/or Substantial Endangerment Determination and Partial Consent Order (No. R5-2006-0731). The Program and Project Actions described in Section 2.6.3 are being implemented, in part, to comply with this Order. In addition, the RWQCB is responsible for managing the implementation of the SWRCB resolutions and orders described above.

California Environmental Protection Agency, Department of Toxic Substances Control

DTSC is responsible for implementing parts of the California Health & Safety Code related to hazardous materials and toxic substances that may cause a threat to human health and the environment. DTSC, in conjunction with RWQCB, issued the Cleanup and Abatement Order, Imminent and/or Substantial Endangerment Determination and Partial Consent Order (Docket No. HAS-CO 06/07-101). As discussed above, the Program and Project Actions described in Section 2.6.3 are being implemented, in part, to comply with this Order.

4.7.2.3 Local

DPR is exempt from local regulations, including general plans, specific plans, and zoning ordinances, to the extent that such requirements conflict with DPR's own General Plan for the Park (California Constitution Article XI Section 7). However, DPR must comply with the Park's General Plan, as well as applicable state and federal rules and regulations governing historic buildings, structures, and districts and any local regulations applicable to impacts located outside the Park boundaries.

4.7.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.7.3.1 Thresholds of Significance

The following thresholds have been prepared based on the State CEQA Guidelines (Appendix G) and Section 15065 of the State CEQA Guidelines. The Project would have a significant impact on hydrology or water quality if it will:

- Violate any water-quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water, which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures, which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Allow inundation by seiche, tsunami, or mudflow.

4.7.3.2 Programmatic EIR Impact Assessment

To identify potentially significant impacts resulting from the Project, each proposed Program Action was assessed against the significance thresholds listed in Section 4.7.3 (subsection entitled "Thresholds of Significance"). Table 4.0-1 indicates the Project Actions necessary for each proposed Program Action. The Program Actions are described in detail in Section 2.6.3. The discussion below provides an analysis of the potential impacts to hydrology and water quality from each Program Action, assesses the significance of each impact, and if necessary, identifies measures that would reduce impacts to a level below significance. Table 4.7-7, Program EIR Hydrology Impacts Analysis, summarizes the Draft PEIR hydrology impacts analysis.

Impact 4.7-1: Program Actions Could Result in a Release of Sediment, Site-Related Constituents, or Alteration of pH that Could Violate Water Quality Standards or Site Waste Discharge Requirements

Several Program Actions could result in the disturbance of surface soils, waste rock, and mill tailings at the Park. Disturbance or exposure of these materials could result in their movement or transport to drainages and other surface-water bodies. As discussed above, soils, waste rock, and mill tailings at the Park contain naturally-occurring concentrations of metals and other mining-related constituents such as mercury and cyanide. Release of these materials to streams, creeks, ponds, wetlands, or other surface-water features could result in the presence of sediment, or concentrations of specific constituents in excess of applicable water quality standards or waste discharge

requirements.

Project Actions identified in Section 2.6.3 and Table 4.0-1 that could result in disturbance or transport of these materials include:

- Operation of heavy construction equipment;
- Transportation of contaminated soils leaving the Park and importation of clean fill material entering the Park;
- Demolition and/or removal of any structures, including temporary facilities;
- Grading activities;
- Boring activities;
- Excavation activities;
- Blasting activities;
- Scarifying activities;
- Dredging and sediment removal;,
- Stormwater BMP installation and maintenance activities;
- Removal of trees and other vegetation;
- Construction of ancillary structures, including utilities for either a temporary or permanent active water treatment facility;
- Construction and installation of permanent exclusion barriers;
- Construction and maintenance of access roads; and/or
- Monitoring activities.

As shown in Table 4.0-1, twelve of the thirteen remediation options could utilize one or more of the Project Actions that could potentially result in disturbance or transport of soils, waste rock, or mill tailings. The need for construction equipment or other vehicles to cross drainages, such as Little Wolf Creek, could also result in a temporary increase in the discharge of sediment and other materials containing elevated metals concentrations into surface water. Other impacts to water quality could include releases of fuels and maintenance fluids from Project-related vehicles and construction equipment. These releases could result in a violation of water quality standards and waste discharge requirements.

Prior to any construction-related activity, the Project Proponents will develop a Health and Safety Plan (or a Park-wide Plan could be used) that will be reviewed by the DTSC and RWQCB. The plan will provide guidelines for safe work practices to prevent any hazards to the public, project personnel, or the environment from the release of hazardous materials or waste (chemical and biological). Specific items to be included are:

Workers will complete a 40 hour training program in Hazardous Waste Operations and Emergency Response (i.e., HAZWOPER training) and will be provided with the appropriate personal protective equipment.

Specific Project Requirement HAZMAT-3 requires the Project Proponents to set up decontamination areas for vehicles and equipment at entry/exit points and maintain the existing decontamination wash facility located in the Maintenance Yard. The decontamination areas will be designed to completely contain all wash water generated from washing vehicles and equipment. The Project Proponents will install BMPs, as necessary, to prevent the dispersal of wash water beyond the boundaries of the decontamination area, including over-spray.

Standard Project Requirement HYDRO-1 requires that prior to the start of Program Actions involving ground disturbances, the Project Proponents will prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) that identifies the temporary BMPs (e.g., tarping any stockpiled materials or soil; constructing silt fences, installation of straw bale barriers, fiber rolls, etc.) and permanent BMPs (e.g., utilizing structural containment and planting vegetation) to be used in all Remediation Areas, to reduce or eliminate the discharge of soil, surface water runoff, and pollutants during excavation, grading, aggregate cover installation, and any other ground disturbing activities. The SWPPP will also include BMPs for hazardous waste and contaminated soil management, and a Spill Prevention and Control Plan (SPCP).

Standard Project Requirement HYDRO-2 states that the Project Proponents will install adequate energy dissipaters at water discharge points, as needed.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 4.7-2: Program Actions Could Result in a Temporary Release of Chemical Reagents or Water with Chemical Concentrations that Could Violate Water Quality Standards or Site Waste Discharge Requirements

Project Actions also include active treatment measures, such as the construction and operation of a permanent and/or temporary water treatment facility. Such a facility could use chemical reagents or treatment processes to oxidize and precipitate targeted metals from water within the facility and then discharge the water downstream of the facility at, or below, the NPDES permit discharge limits and other applicable water-quality criteria. Process upsets could result in the temporary discharge of chemical reagents and/or water with chemical concentrations that violate water-quality standards or site waste discharge limits. DPR will submit a Report of Waste Discharge to RWQCB to determine if modifications to its existing WDR or whether new WDRs are required. DPR will implement Standard Project Requirement HYDRO-1, which is discussed in Impact 4.7-1 (above) to ensure that the temporary release of chemical reagents or water with chemical concentrations will not violate water quality standards or WDRs.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 4.7-3: Program Actions Could Result in Alteration of Drainage Patterns, Resulting in Substantial Erosion or Siltation, or a Substantial Increase in Surface Runoff that Could Exceed the Capacity of Stormwater Drainage Systems or Result in Substantial Additional Sources of Polluted Runoff

Several Program Actions identified in Section 2.6.3 and Table 4.0-1 would result in alteration of the ground surface and could cause a change in the topography that would change drainage patterns. These Project Actions include:

- Operation of heavy construction equipment;
- Grading activities;
- Boring activities;
- Excavation activities;
- Blasting activities;
- Scarifying activities;
- Dredging and sediment removal;,
- Stormwater BMP installation and maintenance activities;
- Removal of trees and other vegetation;

- Construction of ancillary structures, including utilities for either a temporary or permanent active water treatment facility;
- Construction and installation of permanent exclusion barriers;
- Construction and maintenance of access roads; and/or
- Monitoring activities.

As shown in Table 4.0-1, twelve of the thirteen remediation options could utilize one or more of the Project Actions that could potentially alter the ground surface and change drainage patterns. These activities would remove vegetation and modify slopes. The exposed soils, waste rock, or mill tailings could be subject to erosion and have less water retention capacity during storms, resulting in increased surface runoff. The lack of vegetation and the potential increased runoff velocities could result in greater turbidity and sediment in the runoff. Both the sediment itself and potential mining constituents in the soils, waste rock, and mill tailings would be additional sources of polluted runoff. Alteration of the surface could also cause runoff to be concentrated or constrained within specific stormwater channels or other conveyance features.

DPR will implement Standard Project Requirements HYDRO-1 and HYDRO-2 to prevent substantial erosion or siltation, maintain flows that do not exceed the capacity of stormwater drainage systems, and minimize additional sources of polluted runoff. Incorporation of the Standard Project Requirements would reduce the potential impacts to less than significant. Impact 4.7-1 provides a detailed explanation of HYDRO-1 and HYDRO-2.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

4.7.3.3 Area-Specific Impact Assessment

To identify potentially significant impacts resulting from the Project, each proposed Program Action was assessed for each of the Remediation Areas using the significance thresholds listed in Section 4.7.3 (subsection entitled “Thresholds of Significance”). Table 4.7-8, Area-Specific Hydrology Impacts Analysis, summarizes the Area-specific hydrology impacts analysis.

TABLE 4.7-7
PROGRAM EIR HYDROLOGY IMPACTS ANALYSIS

Program Actions	Thresholds of Significance									
	Release of sediment constituents, or alteration of PH could violate water quality, standards, or site waste discharge requirements.	Substantially effect groundwater supplies as a result of withdrawals or recharge interference.	Substantial alteration of drainage patterns resulting in substantial erosion or siltation.	Substantial alteration of drainage patterns resulting in substantially increased surface runoff or flooding.	Increased runoff would exceed the capacity or stormwater drainage systems; substantial additional sources of polluted runoff.	Other substantial degradation to water quality.	Placement of housing within a 100-year flood hazard area.	Placement of structures within a 100-year hazard area that would impede or redirect flows.	Exposure of people or structures to a significant risk.	Inundation by seiche, tsunami, or mudflow.
CHARACTERIZATION										
Characterization(e.g., soil sampling)	NI	NI	NI	NI	NI	NI	NA	NA	NA	NA
EVALUATION										
Evaluation (e.g., bench scale testing)	NI	NI	NI	NI	NI	NI	NA	NA	NA	NA
INTERIM OPTIONS										
Fences	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA
Signs	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA
Installation of Zeolite Treatment Cells	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA
Installation of Straw Wattles	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA
Use of soil tackifiers/binding agents	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA
Construction of a temporary plant at the Magenta Drain Area	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA

Program Actions	Thresholds of Significance									
	Release of sediment constituents, or alteration of PH could violate water quality, standards, or site waste discharge requirements.	Substantially effect groundwater supplies as a result of withdrawals or recharge interference.	Substantial alteration of drainage patterns resulting in substantial erosion or siltation.	Substantial alteration of drainage patterns resulting in substantially increased surface runoff or flooding.	Increased runoff would exceed the capacity or stormwater drainage systems; substantial additional sources of polluted runoff.	Other substantial degradation to water quality.	Placement of housing within a 100-year flood hazard area.	Placement of structures within a 100-year hazard area that would impede or redirect flows.	Exposure of people or structures to a significant risk.	Inundation by seiche, tsunami, or mudflow.
REMEDIATION OPTIONS										
Selective Removal and/or Replacement of Surface Materials	LS	NI	LS	LS	LS	LS	NA	NA	NA	NA
Complete Removal and/or Replacement of Surface Materials	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Placement of Cover over Selected Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Use of Institutional Controls	NI	NI	NI	NI	NI	NI	NA	NA	NA	NA
Implement Active Treatment Measures	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Implement Passive Treatment Measures	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
In-Situ Cover Establishment and Stabilization	LS	NI	LS	NI	NI	NI	NA	NA	NA	NA
Stormwater Collection and Diversion Structures	LS	NI	LS	NI	NI	NI	NA	NA	NA	NA
Other Water Treatment Measures	LS	NI	LS	NI	NI	NI	NA	NA	NA	NA
Remediation of Structures	LS	NI	LS	NI	NI	NI	NA	NA	NA	NA
Use of Engineering Controls to Prevent Access	NI	NI	NI	NI	NI	NI	NA	NA	NA	NA

Program Actions	Thresholds of Significance									
	Release of sediment constituents, or alteration of PH could violate water quality, standards, or site waste discharge requirements.	Substantially effect groundwater supplies as a result of withdrawals or recharge interference.	Substantial alteration of drainage patterns resulting in substantial erosion or siltation.	Substantial alteration of drainage patterns resulting in substantially increased surface runoff or flooding.	Increased runoff would exceed the capacity or stormwater drainage systems; substantial additional sources of polluted runoff.	Other substantial degradation to water quality.	Placement of housing within a 100-year flood hazard area.	Placement of structures within a 100-year hazard area that would impede or redirect flows.	Exposure of people or structures to a significant risk.	Inundation by seiche, tsunami, or mudflow.
On-site Removal and/or Replacement of Material	LS	NI	LS	NI	NI	NI	NA	NA	NA	NA
Maintenance and Enhancement of Existing Cover	LS	NI	NI	NI	NI	NI	NA	NA	NA	NA

Notes:

PSU = Potentially Significant and Unavoidable
PS = Potentially Significant Impact
LS = Less than Significant Impact – with Project Specific and Standard Project Requirements
LSM = Less than Significant Impact with Mitigation Incorporated
NI = No Impact
NA = Not Applicable

TABLE 4.7-8
AREA-SPECIFIC HYDROLOGY IMPACTS ANALYSIS

Remediation Areas	Thresholds of Significance									
	Release of sediment constituents, or alteration of PH could violate water quality, standards, or site waste discharge requirements.	Substantially effect groundwater supplies as a result of withdrawals or recharge interference.	Substantial alteration of drainage patterns resulting in substantial erosion or siltation.	Substantial alteration of drainage patterns resulting in substantially increased surface runoff or flooding.	Increased runoff would exceed the capacity or stormwater drainage systems; substantial additional sources of polluted runoff.	Other substantial degradation to water quality.	Placement of housing within a 100-year flood hazard area.	Placement of structures within a 100-year hazard area that would impede or redirect flows.	Exposure of people or structures to a significant risk.	Inundation by seiche, tsunami, or mudflow.
Area 1: Mine Yard and Stamp Mill Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 2: Cyanide Plant Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 3: Conveyance Corridor and Adit Project Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 4: Sand Dam Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 5: Historic Mine and Mill Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 6: Magenta Drain Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 7: Stacy Lane Pond Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 8: Historic Grounds Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 9: Residences and Residences' Yards Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 10: Trails Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA

Notes:
PSU = Potentially Significant and Unavoidable
PS = Potentially Significant Impact
LS = Less than Significant Impact – with Project Specific and Standard Project Requirements
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Impact 4.7-4: Program Actions Could Result in a Release of Sediment, Site-Related Constituents, or Alteration of pH that Could Violate Water Quality Standards or Site Waste Discharge Requirements at Remediation Area 6.

Program Actions could result in the disturbance of surface soils, waste rock, and mill tailings at Remediation Areas 1 through 5, and 7 through 10. The Red Dirt Pile has been covered and vegetation has been established on the side slopes of the cover. Actions considered for the Magenta Drain (Area 6) are related to water treatment and sediment removal from Woodpecker Ravine.

As discussed above, soils, waste rock, and mill tailings at the Park contain naturally-occurring concentrations of metals and other mining-related constituents such as mercury and cyanide. Disturbance or exposure of these materials could result in their movement or transport to drainages and other surface-water bodies, resulting in polluted runoff. Release of these materials to streams, creeks, ponds, wetlands, or other surface-water features could result in the presence of sediment, or concentrations of specific constituents, in excess of applicable water quality standards or waste discharge requirements. The need for construction equipment or other vehicles to cross drainages, such as Little Wolf Creek, could also result in a temporary increase in the discharge of sediment and other materials containing elevated metals concentrations into surface water. Other impacts to water quality could include releases of fuels and maintenance fluids from Project-related vehicles and construction equipment.

DPR will implement Standard Project Requirement HYDRO-1 and HYDRO-2, which are discussed in detail in Impact 4.7-1 (above) to comply with cleanup goals and/or water quality objectives and to ensure that downstream beneficial uses specified in the Basin Plan.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 4.7-5: Program Actions Could Result in Alteration of Drainage Patterns, Resulting in Substantial Erosion or Siltation, or a Substantial Increase in Surface Runoff that Could Exceed the Capacity of Stormwater Drainage Systems or Result in Substantial Additional Sources of Polluted Runoff at All 10 Remediation Areas.

Project Actions in all 10 Remediation Areas could result in alteration of drainage patterns. Stormwater diversion channels installed at the Red Dirt Pile could lead to additional surface runoff. Installation of active or passive treatment systems in Area 6 could alter drainage patterns and affect flood flows. These Project Actions include:

- Operation of heavy construction equipment;

- Demolition and/or removal of any structures, including temporary facilities;
- Temporary and permanent fencing installation;
- Grading activities;
- Boring activities;
- Excavation activities;
- Blasting activities;
- Scarifying activities;
- Dredging and sediment removal;,
- Stormwater BMP installation and maintenance activities;
- Removal of trees and other vegetation;
- Construction of ancillary structures, including utilities for either a temporary or permanent active water treatment facility;
- Construction and installation of permanent exclusion barriers;
- Construction and maintenance of access roads; and/or
- Monitoring activities.

DPR will implement Standard Project Requirements HYDRO-1 and HYDRO-2, which are described in detail in Impacts 4.7-1 (above) to prevent substantial erosion or siltation, maintain flows that do not exceed the capacity of stormwater drainage systems, and minimize additional sources of polluted runoff.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

4.7.4 EFFECTS CONSIDERED NO IMPACT OR LESS THAN SIGNIFICANT WITHOUT PROJECT REQUIREMENTS

The following subsections describe environmental effects that were determined to be less than significant.

This Project does not involve construction of any facilities that would significantly increase groundwater usage, interfere with groundwater recharge, or lower the local groundwater table. The only Project-related use of groundwater would be for dust suppression during Project Actions. The water would be supplied by Irrigation Well No. 1, which has a production rate of 175 gpm and a recovery rate of approximately 6 inches in a 24-hour period. Since there would be no change in the baseline rate of groundwater pumping, the Project would not cause the production rates of pre-existing nearby wells to drop to a level that would not support existing land uses or planned uses for which permits have been granted. Therefore, the Project would not have a

TABLE 4.7-8
AREA-SPECIFIC HYDROLOGY IMPACTS ANALYSIS

Remediation Areas	Thresholds of Significance									
	Release of sediment constituents, or alteration of PH could violate water quality, standards, or site waste discharge requirements.	Substantially effect groundwater supplies as a result of withdrawals or recharge interference.	Substantial alteration of drainage patterns resulting in substantial erosion or siltation.	Substantial alteration of drainage patterns resulting in substantially increased surface runoff or flooding.	Increased runoff would exceed the capacity or stormwater drainage systems; substantial additional sources of polluted runoff.	Other substantial degradation to water quality.	Placement of housing within a 100-year flood hazard area.	Placement of structures within a 100-year hazard area that would impede or redirect flows.	Exposure of people or structures to a significant risk.	Inundation by seiche, tsunami, or mudflow.
Area 1: Mine Yard and Stamp Mill Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 2: Cyanide Plant Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 3: Conveyance Corridor and Adit Project Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 4: Sand Dam Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 5: Historic Mine and Mill Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 6: Magenta Drain Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 7: Stacy Lane Pond Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 8: Historic Grounds Area	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 9: Residences and Residences' Yards Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA
Area 10: Trails Areas	LS	NI	LS	LS	LS	NI	NA	NA	NA	NA

Notes:
PSU = Potentially Significant and Unavoidable
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