3.4 DRAINAGE, HYDROLOGY, AND WATER QUALITY

3.4.1 AFFECTED ENVIRONMENT

DRAINAGE AND HYDROLOGY

Watersheds are land areas that collect surface runoff and drain to specific marshes, streams, rivers, and lakes, or to the groundwater table. Watersheds can be described in a regional or local context depending upon the scale of the drainage system. The largest watershed in Sacramento County is the Lower Sacramento Watershed (LSW), which is also one of the largest in the United States, covering most of northern California. The LSW drains the Sacramento Valley, the Modoc Plateau, and parts of the Cascade and Sierra Nevada Mountain Ranges, ultimately via the Sacramento River. Tributaries of the LSW include the Feather, Yuba, Pit, and American Rivers.

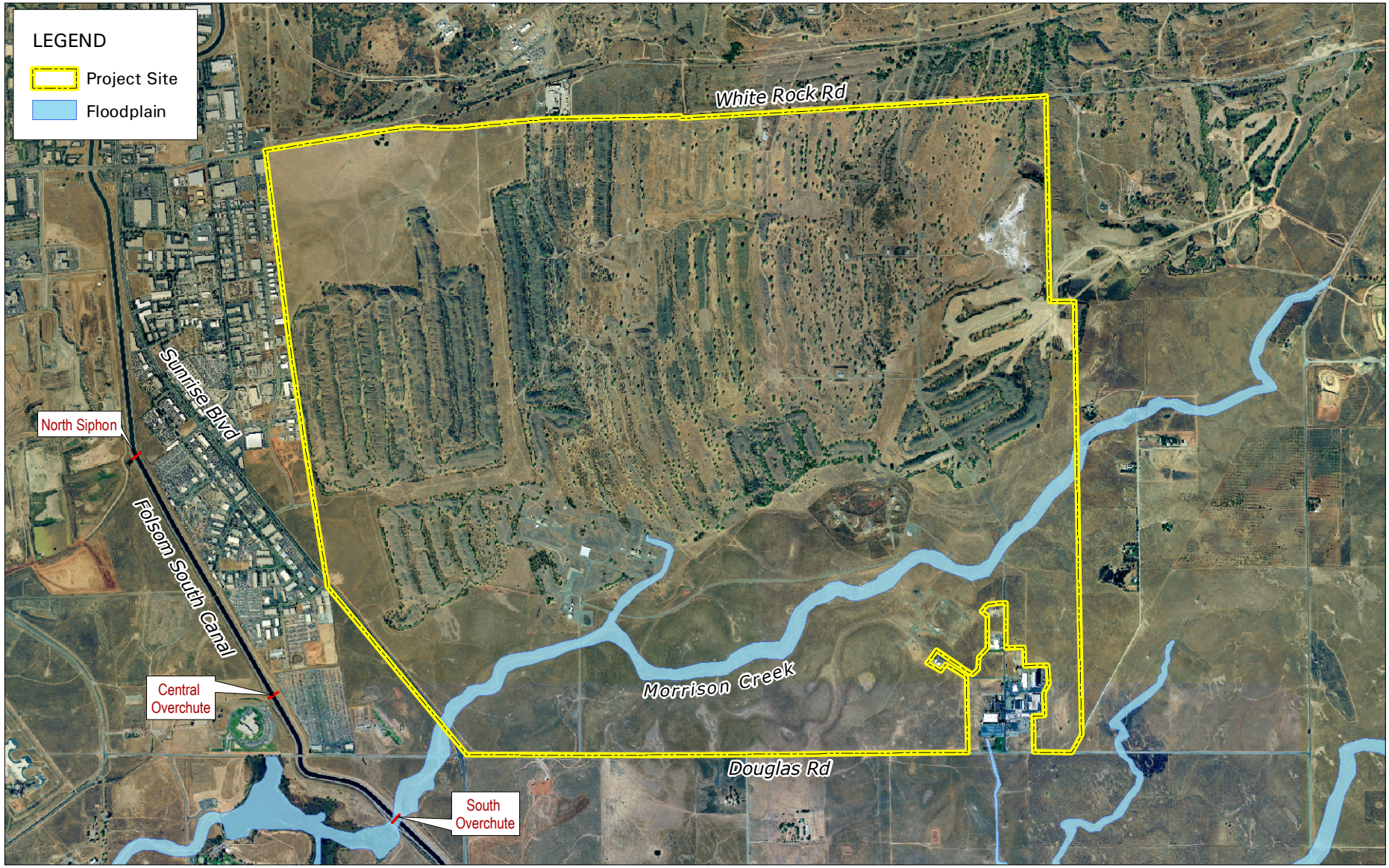
The project site lies fully within the greater Morrison Creek watershed (Wood Rodgers 2005), one of many subwatersheds within the LSW. Morrison Creek flows generally west from the Sierra Nevada foothill region to Laguna Creek near Interstate 5 (I-5); Laguna Creek then flows to the Sacramento River. In the project vicinity, the south branch of Upper Morrison Creek flows west-southwest through the southern portion of the project site, as shown in Exhibit 3.4-1.

Stormwater runoff from the site flows generally westward toward Sunrise Boulevard just upstream of the Cordova Industrial Park development area. Flow eventually reaches and crosses (via overchutes and culvert/siphon) the Folsom South Canal (Canal), an irrigation and water supply system owned and operated by the U.S. Bureau of Reclamation. Runoff from the site currently crosses the Canal at four locations (Wood Rodgers 2005).

Upper Morrison Creek exits the project site via an existing box culvert beneath Sunrise Boulevard near the intersection with Douglas Road. Flow is conveyed downstream in a partially improved drainage canal excavated within the historical Morrison Creek streambed. Flow is conveyed beneath Douglas Road through a pair of 60-inch pipe culverts and continues to an overchute (the “south overchute”) at the Canal (Wood Rodgers 2005). Beyond the Canal, discharge empties into Mather Lake. There is an existing drainage constraint at the Douglas Road culvert, resulting in flooding of both Douglas Road and Sunrise Boulevard during major storm events.

The County of Sacramento (County) has studied the local hydrology and developed hydraulic models of the LSW system. However, the Morrison Creek watershed has not been previously studied by the Federal Emergency Management Agency (FEMA) for the purpose of drafting an effective Flood Insurance Study (FIS) or Flood Insurance Rate Map (FIRM). The California Department of Water Resources (DWR), under the Awareness Flood Mapping Program, has recently prepared area floodplain maps. However, existing floodplains mapped under the Awareness Program provide only approximate possible flood conditions because they lack detailed stream topography (Wood Rodgers 2003a). These floodplains are shown simply as flood-prone areas without specific depth and other flood hazard data. DWR’s effort was directed toward advising the public and other interested parties of the approximate flooding risks present in these unmapped watersheds. The Awareness Flood Mapping Program is not used as a regulatory tool (Wood Rodgers 2005). Exhibit 3.4-1 presents the Awareness Program’s floodplain delineation of Morrison Creek and its tributaries in the project vicinity.

Stream channels in the project vicinity are incised within the area’s rolling topography, and the defined floodways and floodplains are narrow and generally confined to the stream channels. However, localized flooding occurs or may occur at some off-site roadways adjacent to (both upstream and downstream of) the project site, including White Rock Road to the north and Douglas Road and Sunrise Boulevard to the west.



Source: Wood Rodgers 2005

Awareness Floodplain Map

EXHIBIT 3.4-1

Rio del Oro Specific Plan Project DEIR/DEIS
City of Rancho Cordova and USACE
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NORTH

EDAW

Drainage and Conveyances

Both natural and improved drainage conveyances are located within the project site boundary. Off-site flows entering the project site from the north are conveyed through several pipe culverts beneath White Rock Road. Although much of the area upstream of the project site consists of piles of dredge tailings, the culverts beneath White Rock Road are undersized, and flows from the north could overtop White Rock Road and enter the project site at locations other than those near existing culverts. From the east, much of the flow entering the project site is restricted to the Morrison Creek streambed (Wood Rodgers 2005).

There are several intermittent drainage watercourses on the project site, which are present mostly in areas of the project site not previously disturbed by mining activities. These intermittent watercourses include Morrison Creek and an adjacent overflow area to the north where flow may have historically divided across the site during large flood events. An existing nonengineered levee along this upstream section of Morrison Creek helps confine the majority of creek flow to the south, where it feeds several small wetlands and seasonal depressions. North of Morrison Creek are short runs of seasonally active gullies and ditches. However, the majority of overland watercourses that once may have been present on the project site have disappeared as a result of historical mining activities (Wood Rodgers 2005).

Small networks of drainage ditches and small-diameter roadway culverts exist in areas proximate to the industrial and rocket testing facilities constructed by Aerojet. The adjacent Security Park industrial area (not part of the project site) is also serviced by both pipe and ditch systems that flow to the south and ultimately traverse Douglas Road at various culvert locations. The capacity of these existing conveyances is unknown (Wood Rodgers 2005).

The project would direct site runoff to three Canal crossings (the “north siphon,” “central overchute,” and “south overchute”), each of which corresponds to watersheds of the developed project. The developed project watersheds are similar to those currently present at the project site, but have been designed to maximize existing downstream capacities at the Canal crossings.

Preproject (existing conditions) hydrologic analyses were conducted by Wood Rodgers in 2000, 2003, and 2005. Each analysis represents a further understanding and revised approach to delineating on-site subsheds, determining existing flow paths and physical properties of surface materials, analyzing revised land use plans, and coordinating with advisory and regulatory organizations. Each analysis conducted in support of the project indicates that drainage infrastructure problems exist downstream of the project site, with the exception of the central overchute, as described below and shown in Table 3.4-1.

Table 3.4-1
Folsom South Canal Crossings—Contributing Area, Capacity, and Peak Flows[a]

Folsom South Canal Crossing Structure	Existing Capacity (cfs)	Contributing Area (acres)	10-Yr 24-Hr Peak Flow (cfs)	100-Yr 24-Hr Peak Flow (cfs)	100-Yr 10-Day Peak Flow (cfs)
North siphon [b]	300	2,120	245	438[c]	315
Central overchute	380	244	76	138	84
South overchute	620	6,351	564	1,013[c]	842[c]

Notes:
10-Yr = 10-year; 24-Hr = 24-hour; 100-Yr = 100-year; cfs = cubic feet per second
[a] Peak flow is the amount of water flowing through a particular location during a particular event.
[b] The north siphon consists of a set of three parallel 42-inch culverts.
[c] Exceeds capacity.
Source: Modified from Wood Rodgers 2005

The north siphon lacks capacity for large flow events. The capacity of the siphon is exceeded during the 100-year 24-hour rainfall event, resulting in flooding of Sunrise Boulevard and surrounding infrastructure. Flows occur at greater than peak capacity at the south overchute and at both the existing Sunrise Boulevard and Douglas Road crossings. The capacity of the Sunrise Boulevard culvert is approximately 600 cubic feet per second (cfs), above which flooding of the roadway occurs. The capacity of the Douglas Road culvert is approximately 350 cfs before flooding of the roadway occurs.

Watersheds

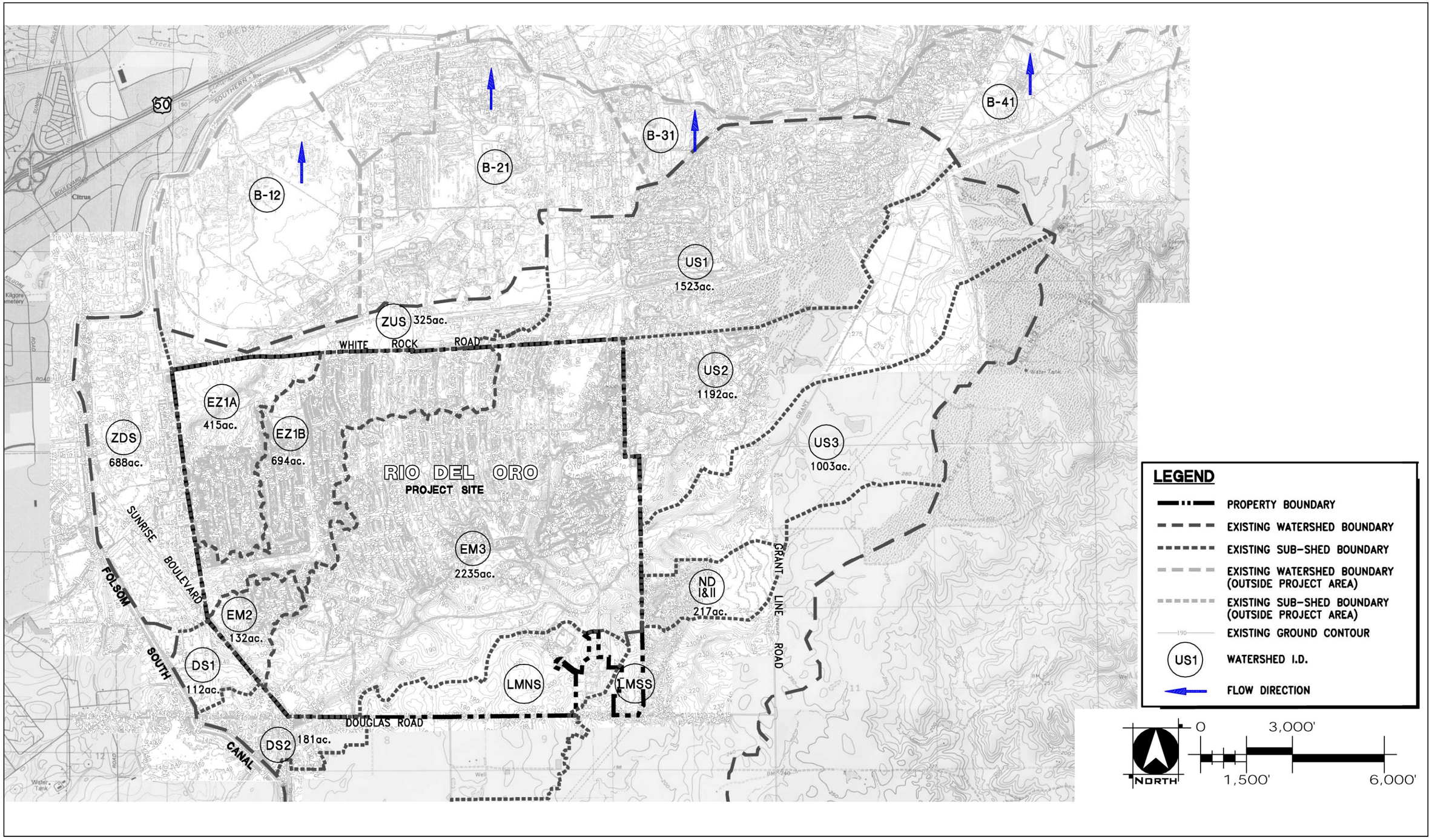
Five upstream off-site watersheds contribute flow southwest across the project site and toward the Canal crossings that convey flow downstream. Limited infrastructure exists upstream of the project site, and much of the off-site upstream area contains dredge tailings, similar to the project site. MacKay & Somps is providing drainage and engineering support for the Aerojet-owned land north of the project site; therefore, the boundaries of the northern off-site watersheds were coordinated with MacKay & Somps as part of the *Master Drainage Study for Rio del Oro* (Wood Rodgers 2005). There are also six existing on-site watersheds that drain generally southwesterly to downstream conveyance features. Finally, there are three existing off-site downstream watersheds. Current land uses within these three watersheds include areas of industrial and business development, as well as undeveloped grazing/farmlands. Infrastructure including roadways, buildings, utilities, and drainage conveyance systems are present in the developed areas. Although each of these watersheds crosses the Canal at a different location, they all generally flow southwesterly to downstream conveyance features and ultimately drain to Morrison Creek southwest of Mather Field. The existing watersheds are shown in Exhibit 3.4-2 and listed in Table 3.4-2 below.

Table 3.4-2
Watersheds that Contribute Flow Through the Project Site

Watershed Location	Watershed Name	Acres
Off-site upstream	Zinfandel Upstream Watershed (ZUS)	325
	Upstream Watershed 1 (US1)	1,523
	Upstream Watershed 2 (US2)	1,192
	Upstream Watershed 3 (US3)	1,192
	North Douglas I and II Watershed (NDI&II)	NA[1]
On-site	Existing-Zinfandel 1A (EZ1A)	Together with EZ1B encompasses 1,109 acres
	Existing-Zinfandel 1B (EZ1B)	Together with EZ1A encompasses 1,109 acres
	Existing Morrison 2 (EM2)	132
	Existing Morrison 3 (EM3)	1,296
	Lower Morrison North (LMNS)	NA[1]
	Lower Morrison South (LMSS)	NA[1]
Off-site downstream	Zinfandel Downstream (ZDS)—drains to north siphon crossing	688
	Downstream 1 (DS1)—drains to central overchute crossing	112
	Downstream 2 (DS2)—drains to south overchute crossing	181

[1] NA = not applicable. Because flows from these watersheds are diverted to the Lower Morrison Creek Sunrise Douglas drainage, acreages were not calculated for the Rio del Oro project.

Source: Wood Rodgers 2005



Source: Wood Rodgers 2005

Watersheds in the Project Area

EXHIBIT 3.4-2

Groundwater Hydrology

Tertiary age (approximately 1.8–65 million years ago) sedimentary deposits of the Sacramento Valley form a large northwest trending asymmetrical groundwater basin (Central Basin). Regional groundwater flow within this basin is characterized by flow from the basin margins toward the center of the Sacramento Valley and the Sacramento River. Eastern Sacramento County is considered to be a recharge area for the regional aquifers (ERM 2003). The Mehrten and Laguna Formations are the principal water-bearing units. The project site is located within the recharge area characterized by these units.

Groundwater flow gradients vary widely within Sacramento County and generally mimic topography, with the steepest gradients in the foothills of eastern Sacramento County and shallower gradients in flat-lying areas in the central portion of the county. Groundwater in the vicinity of the project site flows primarily toward the west and southwest.

Groundwater within the project site occurs in both a shallow aquifer zone and an underlying deeper aquifer zone (Mehrten Formation). This deep aquifer zone is separated from the shallow aquifer by a discontinuous clay layer (City of Rancho Cordova 2005a). The thickness of the deep aquifer ranges from approximately 200 feet near the project site to more than 2,000 feet in the western portion of Sacramento County. Because the clay layer mentioned above is discontinuous, vertical movement of groundwater between the two aquifers is possible. For instance, if heavy pumping in the deep aquifer reduces the pressure head in the system, groundwater from the shallow aquifer may be induced to recharge the deeper aquifer. Conversely, if groundwater levels are lowered as a result of pumping in the shallow aquifer, the potential exists for the upward movement of groundwater to recharge the shallow aquifer (City of Rancho Cordova 2005a). Recharge to the aquifer system occurs from a combination of three main sources: stream recharge, subsurface inflows from adjacent areas, and percolation of rainfall and applied water (irrigation).

Black volcanic sands characterize the main water-bearing zones of the Mehrten Formation. Groundwater yields for the Mehrten Formation are highly variable because of the heterogeneous nature of the sediments, but in general, the water-bearing zones yield between 1,000 and 1,400 gallons per minute (gpm) with a specific capacity of 46–100 gpm per foot of drawdown (ERM 2003). Water yields are highest in the central portion of the valley, where well-sorted sands are predominant, and lowest along the eastern margins of the Sacramento Valley.

The primary water-bearing units within the Laguna Formation consist of sands and lenticular lenses of gravel. Groundwater yields for the Laguna Formation are highly variable because of the diverse nature of the sediments. Groundwater wells installed in the sand and gravel units can yield up to 1,800 gpm of groundwater.

A Hazardous Materials Technical Study prepared by ERM in 2003 to document the history and current status of soil, surface water, and groundwater investigations associated with the project site indicates that depth to first groundwater generally ranges from 50 to 125 feet.

WATER QUALITY

Groundwater Quality

Groundwater at various locations beneath the project site is contaminated with volatile organic compounds (VOCs) as a result of activities associated with the aerospace industry. As a result of this contamination, groundwater at the project site may not be employed for beneficial uses. Details are provided in Section 3.13, “Hazards and Hazardous Materials.”

Surface Water Quality

The northern two-thirds of the project site is composed of highly disturbed land consisting of piles of dredge tailings from historical gold mining activities, which may extend up to 60 feet below the ground surface. The

southern third of the project site consists of generally undisturbed, undeveloped land. Scattered remnants of structures associated with rocket testing activities are present in those portions of the project site associated with development Phases 2–5. In addition to the project site, the greater Morrison Creek watershed also drains other largely undeveloped lands located south of U.S. Highway 50 (U.S. 50). However, this area contains numerous pockets of relatively high-density development and commercial-industrial centers along Sunrise Boulevard and White Rock Road.

Morrison Creek does not currently have any specific designated beneficial uses attributed to it in the water-quality control plan (Basin Plan) adopted by the Central Valley Regional Water Quality Control Board (RWQCB) (described in the "Regulatory Framework" section below). Consequently, the Central Valley RWQCB applies the Basin Plan's "tributary rule" and assigns to Morrison Creek the beneficial uses designated for the nearest downstream location. The Central Valley RWQCB also regulates waste discharges in undesignated streams to ensure that downstream water quality conditions and beneficial uses are not degraded. Thus, Morrison Creek is subject to regulation for the existing designated uses in the Sacramento River, which include municipal water supply; irrigation supply; contact and noncontact recreation; warm and cold freshwater, migration, and spawning habitat; wildlife habitat; and navigation.

Water quality conditions in Morrison Creek have been characterized through recent sampling and analysis conducted for the County's Coordinated Monitoring Program (CMP) (Camp Dresser & McKee and Laboratory Data Consultants 2004). Table 3.4-3 provides a summary of wet-weather and dry-weather sample data that have been collected from Morrison Creek downstream of the project site near Bradshaw Road. These data are the most recent water quality data available for Morrison Creek and the first monitoring data for Morrison Creek to be included in the County CMP. The data set represents a limited set of conditions in the watershed. However, the data provide a general assessment of water quality conditions and reflect several distinct seasonal differences typical of urbanized area streams.

Table 3.4-3
Water Quality Summary for Morrison Creek Samples

Constituent	Units	Water Quality Objective [a]	Wet-Weather Events			Dry-Weather Event
			12/14-15/03	2/2/04	2/17-18/04	4/13/04
Conventional Physical-Chemical Parameters						
Dissolved oxygen (field)	mg/L	7.0[c]	6.2	11.0	7.0	12.0
Specific conductance (field)	µS/cm	—	87	81	64	316
Temperature (field)	°C	< 2.8 change[d]	10.8	11.3	13.3	19.8
pH (field)	standard	6.5–8.5	5.7	6.1	6.2	9.2
Hardness—total	mg/L as $CaCO_3$	—	30	—	—	—
Solids, total suspended	mg/L	Narr.[e]	40	41	54	3
Solids, total dissolved	mg/L	—	79	—	—	—
Turbidity	NTU	< 20% change[f]	43	—	—	—
Bacteriological Parameters						
Escherichia coli	MPN/100 mL	235[g]	5,000	5,000	5,000	230
Fecal coliform	MPN/100 mL	400[h]	8,000	8,000	7,000	300

Table 3.4-3
Water Quality Summary for Morrison Creek Samples

Constituent	Units	Water Quality Objective [a]	Wet-Weather Events			Dry-Weather Event
			12/14-15/03	2/2/04	2/17-18/04	4/13/04
Nutrients						
Nitrite + nitrate	mg/L-N	10[i]	0.7	—	—	—
Phosphorus—total	mg/L-P	—	0.3	—	—	—
Trace Metals						
Arsenic—dissolved	µg/L	10[j]	1.03	—	—	—
Arsenic—total	µg/L	—	1.4	—	—	—
Cadmium—dissolved	µg/L	2.2[k]	<0.008	—	—	—
Cadmium—total	µg/L	5[i]	0.2	—	—	—
Chromium—dissolved	µg/L	130[k]	0.91	—	—	—
Chromium—total	µg/L	50[i]	5.32	—	—	—
Copper—dissolved	µg/L	9.0[k]	4.12	—	—	—
Copper—total	µg/L	1,000[i]	11.4	—	—	—
Iron—dissolved	µg/L	300[i]	67.1	—	—	—
Iron—total recoverable	µg/L	—	1,900	—	—	—
Lead—dissolved	µg/L	2.5[k]	0.462	—	—	—
Lead—total recoverable	µg/L	15[i]	10.4	—	—	—
Mercury—dissolved	ng/L	50[k]	2.59	—	—	—
Mercury—total	ng/L	50[l]	12.2	—	—	—
Mercury—total methyl	ng/L	—	0.394	—	—	—
Nickel—dissolved	µg/L	52[k]	1.37	—	—	—
Nickel—total	µg/L	100[i]	5.07	—	—	—
Zinc—dissolved	µg/L	120[k]	23.4	—	—	—
Zinc—total	µg/L	5,000[i]	78.1	—	—	—
Polycyclic Aromatic Hydrocarbons [b]						
Benz(a)anthracene	µg/L	0.0044	0.0174	—	—	—
Benzo(a)pyrene	µg/L	0.0044	0.0542	—	—	—
Benzo(b)fluoranthene	µg/L	0.0044	0.0317	—	—	—
Benzo(k)fluoranthene	µg/L	0.0044	0.0307	—	—	—
Chrysene	µg/L	0.0044	0.0322	—	—	—
Indeno(1,2,3-cd)pyrene	µg/L	0.0044	<0.001	—	—	—
Total PAHs	µg/L	—	0.5448	—	—	—

Table 3.4-3
Water Quality Summary for Morrison Creek Samples

Constituent	Units	Water Quality Objective [a]	Wet-Weather Events			Dry-Weather Event
			12/14-15/03	2/2/04	2/17-18/04	4/13/04
Chlorinated Pesticides [b]						
2-4-D	µg/L	70	<0.5	—	—	—
4,4'-DDT	µg/L	0.59	0.05	—	—	—
Endosulfan I	µg/L	56	<0.01	—	—	—
Organophosphate Pesticides [b]						
Chlorpyrifos	µg/L	0.02/0.014	<0.05	<0.05	<0.05	0.03
Diazinon	µg/L	0.08/0.05	0.2	0.32	0.2	<0.05
Triazine Pesticides [b]						
Simazine	µg/L	4	0.83	1.3	2.4	0.08
Semivolatile Organic Compounds [b]						
Bis(2-ethylhexyl)phthalate	µg/L	1.8	1.25	—	—	—
2,4-Dinitrophenol	µg/L	70	0.813	—	—	—
2-Methyl-4,6-dinitrophenol	µg/L	13.4	0.295	—	—	—
Pentachlorophenol	µg/L	0.28	0.306	—	—	—

Note: °C = degrees Celsius; $CaCO_3$ = calcium carbonate; µg/L = micrograms per liter; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; mg/L-N = milligrams per liter of nitrate; mg/L-P = milligrams per liter of phosphorous; ng/L = nanograms per liter; mL = milliliter; MPN/100 mL = most probable number per 100 milliliters; NA = not available or not applicable; NTU = nephelometric turbidity units; PAH = polycyclic aromatic hydrocarbon; — = information not reported or not collected

[a] Lowest applicable regulatory objectives.

[b] Sample results only shown for organic compounds that have applicable water quality objectives and were detected at a concentration greater than 1/100 of the applicable objective.

[c] Basin Plan dissolved oxygen objectives: minimum of 7.0 mg/L; monthly median dissolved oxygen shall not be below 95% of saturation; 95th percentile value shall not be lower than 75% saturation.

[d] Basin Plan temperature objective: intrastate waters shall not be increased more than 2.8°C (5°F) above natural receiving water temperature.

[e] Basin Plan narrative objective: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

[f] Basin Plan numeric turbidity objectives for allowable change from natural background condition: (a) less than 1 NTU change where background turbidity is between 0 and 5 NTUs; (b) less than 20% change where background turbidity is between 5 and 50 NTUs; (c) change of less than 10 NTUs where background turbidity is between 50 and 100 NTUs; and (d) less than 10% change where background turbidity exceeds 100 NTUs.

[g] Basin Plan: adopted criteria, but not yet approved by the U.S. Environmental Protection Agency.

[h] Basin Plan: current approved criteria to be superseded by E. coli criteria.

[i] Basin Plan: objective adopted from Title 22 drinking water quality Maximum Contaminant Level.

[j] Basin Plan: dissolved aquatic life criteria.

[k] California Toxics Rule: chronic aquatic life criteria; hardness dependent criteria based on 100 mg/L hardness; pH dependent criteria based on pH 7.4.

[l] California Toxics Rule human health criteria.

Source: Adapted from Camp Dresser & McKee and Laboratory Data Consultants 2004

The wet-weather (winter storm) event samples had low levels of conventional inorganic minerals as demonstrated by the low conductance and total-hardness values; however, the wet-weather samples were consistently elevated with coliform bacteria and total suspended solids that are indicative of fecal contaminant sources, likely from livestock and other animal sources and sediment transport in the watershed, respectively. The single wet-weather sample analyses for organic compounds indicated elevated values for several polycyclic aromatic hydrocarbons (PAHs) and the organophosphate pesticide diazinon. PAHs, which are byproducts of combustion (primarily gasoline, wood, oil, and coal) and are contained in some asphalt sealants, can enter streams via atmospheric deposition and urban stormwater runoff.

The CMP monitoring data found elevated PAH concentrations at all sample locations along urban creeks; however, they were not detected in any of the Sacramento River or American River samples. Diazinon is a common household pesticide and dormant-season agricultural pesticide, for which the registration for residential sale expired in fall 2004. Consequently, it is expected that the historical elevated values of this highly mobile contaminant in Sacramento Valley urban streams will eventually diminish as its use becomes limited to commercial agricultural uses. Dry-weather samples from Morrison Creek were evaluated for only a selected small set of parameters; however, it is apparent that concentrations for total suspended solids, coliform bacteria, and diazinon were lower than the winter-storm-event samples. Specific conductance and the organophosphate pesticide chlorpyrifos, another highly mobile pesticide of concern, were slightly elevated relative to storm-event samples.

The 2002 version of the Section 303(d) list for California issued by the State Water Resources Control Board (SWRCB), discussed below in the “Regulatory Framework” section, identifies impaired status for a 21-mile stretch of Morrison Creek for diazinon. The potential sources listed are agriculture and urban runoff/storm sewers. The agricultural source of diazinon in this area of Morrison Creek is from aerial deposition/spraying. The total maximum daily limit (TMDL) Priority (e.g., a process to establish a limit) is listed as “High.”

3.4.2 REGULATORY FRAMEWORK

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Emergency Management Agency

FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA also issues Flood Insurance Rate Maps (FIRMs) that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design standard for flood protection is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 annual exceedance probability (AEP) (i.e., the 100-year flood event). Specifically, where levees provide flood protection, FEMA requires that the levee crown have 3 feet of freeboard above the 1-in-100-AEP water surface elevation, except in the vicinity of a structure such as a bridge, where the levee crown must have 4 feet of freeboard for a distance of 100 feet upstream and downstream of the structure.

Federal Clean Water Act

EPA is the lead federal agency responsible for water quality management. The Clean Water Act of 1972 (CWA) is the primary federal law that governs and authorizes water-quality control activities by EPA as well as the states. Various elements of the CWA address water quality, as discussed below. Wetland protection elements administered by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA, including permits to dredge or fill wetlands, are discussed in Section 3.10, “Biological Resources.”

Under federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the CWA requires states to adopt water quality standards for all surface

waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question, and (2) criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. In California, EPA has designated the SWRCB and its nine RWQCBs with authority to identify beneficial uses and adopt applicable water quality objectives.

National Pollutant Discharge Elimination System Permit Program

The National Pollutant Discharge Elimination System (NPDES) permit program was established by the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify the following:

- effluent and receiving-water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge;
- prohibitions on discharges not specifically allowed under the permit; and
- provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities.

More specifically, the discharge prohibitions and limitations in an NPDES permit for wastewater treatment plants are designed to ensure the maintenance of public health and safety, protection of receiving-water resources, and safeguarding of the designated beneficial uses. Discharge limitations typically define allowable effluent quantities for flow, biochemical oxygen demand (BOD), total suspended matter, residual chlorine, settleable matter, total coliform, oil and grease, pH, and toxic pollutants. Limitations also typically encompass narrative requirements regarding mineralization and toxicity to aquatic life.

In November 1990, EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity, if the project would disturb more than 5 acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects that disturb between 1 and 5 acres. Phase 2 of the municipal permit system (known as the “NPDES General Permit for Small MS4s”) required small municipal areas of less than 100,000 persons to develop stormwater management programs. The RWQCBs in California are responsible for implementing the NPDES permit system (see additional information below).

Section 401 Water Quality Certification or Waiver

Under Section 401 of the CWA, an applicant for a Section 404 permit (to discharge dredged or fill material into waters of the United States) must first obtain a certificate from the appropriate state agency stating that the fill is consistent with the state’s water quality standards and criteria. In California, the authority to either grant water quality certification or waive the requirement is delegated by the SWRCB to the nine RWQCBs.

Federal Antidegradation Policy

The federal antidegradation policy, established in 1968, is designed to protect existing uses and water quality and national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions:

- Existing instream uses and the water quality necessary to protect those uses shall be maintained and protected.
- Where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development.
- Where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Section 303(d) Impaired Waters List

Under Section 303(d) of the CWA, states are required to develop lists of water bodies that would not attain water quality objectives after implementation of required levels of treatment by point-source dischargers (municipalities and industries). Section 303(d) requires that the state develop a TMDL for each of the listed pollutants. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. The TMDL can also act as a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The TMDL prepared by the state must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. The TMDL must also include an analysis that shows the linkage between loading reductions and the attainment of water quality objectives. EPA must either approve a TMDL prepared by the state or, if it disapproves the state's TMDL, issue its own. NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated.

Safe Drinking Water Act

Under the Safe Drinking Water Act (Public Law 93-523), passed in 1974, EPA regulates contaminants of concern to domestic water supply. Contaminants of concern relevant to domestic water supply are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are regulated by EPA primary and secondary Maximum Contaminant Levels (MCLs) that are applicable to treated water supplies delivered to the distribution system. MCLs and the process for setting these standards are reviewed triennially. Amendments to the SDWA enacted in 1986 established an accelerated schedule for setting MCLs for drinking water.

EPA has delegated to the California Department of Health Services (DHS) the responsibility for administering California's drinking-water program. DHS is accountable to EPA for program implementation and for adopting standards and regulations that are at least as stringent as those developed by EPA. The applicable state primary and secondary MCLs are set forth in Title 22, Division 4, Chapter 15, Article 4 of the California Code of Regulations.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

State regulations applicable to the demonstration of adequate water supply for the future water demands resulting from the project are addressed in Section 3.5, "Utilities and Service Systems."

In California, the SWRCB has broad authority over water-quality control issues for the state. The SWRCB is responsible for developing statewide water quality policy and exercises the powers delegated to the state by the federal government under the CWA. Other state agencies with jurisdiction over water quality regulation in California include DHS (for drinking-water regulations), the California Department of Pesticide Regulation, the California Department of Fish and Game (DFG), and the Office of Environmental Health and Hazard Assessment.

Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The regional boards are required to formulate and adopt Basin Plans for all areas in the region and establish water quality

objectives in the plans. The Central Valley RWQCB is responsible for the regional area in which the project site is located.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) of 1969 is California's statutory authority for the protection of water quality. Under the act, the state must adopt water quality policies, plans, and objectives that protect the state's waters for the use and enjoyment of the people. The act sets forth the obligations of the SWRCB and RWQCBs to adopt and periodically update their Basin Plans. The Basin Plan identifies the designated beneficial uses for specific surface water and groundwater resources, applicable water quality objectives necessary to support the beneficial uses, and implementation programs that are established to maintain and protect water quality from degradation. The act also requires waste dischargers to notify the RWQCBs of their activities through the filing of Reports of Waste Discharge (RWDs) and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), NPDES permits, Section 401 water quality certifications, or other approvals. The RWQCBs also have authority to issue waivers to RWDs/WDRs for broad categories of "low threat" discharge activities that have minimal potential for adverse water quality effects when implemented according to prescribed terms and conditions.

California State Nondegradation Policy

In 1968, as required under the federal antidegradation policy described above, the SWRCB adopted a nondegradation policy aimed at maintaining high quality for waters in California. The nondegradation policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. The policy provides as follows:

a. *Where the existing quality of water is better than required under existing water quality control plans, such quality would be maintained until it has been demonstrated that any change would be consistent with maximum benefit to the people of the State and would not unreasonably affect present and anticipated beneficial uses of such water.*

b. *Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high-quality waters would be required to meet waste discharge requirements which would ensure (1) pollution or nuisance would not occur and (2) the highest water quality consistent with the maximum benefit to the people of the State would be maintained.*

California Toxics Rule

In May 2000, the SWRCB adopted and EPA approved the California Toxics Rule (CTR), which establishes numeric water quality criteria for approximately 130 priority pollutant trace metals and organic compounds. The SWRCB subsequently adopted its State Implementation Policy (SIP) of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries. The SIP outlines procedures for NPDES permitting for toxic-pollutant objectives that have been adopted in Basin Plans and in the CTR.

NPDES Permit System and Waste Discharge Requirements for Construction

The SWRCB and Central Valley RWQCB have adopted specific NPDES permits for a variety of activities that have potential to discharge wastes to waters of the state. The SWRCB's statewide stormwater general permit for construction activity (Order 99-08-DWQ, as amended) is applicable to all land-disturbing construction activities that would disturb more than 1 acre. The Central Valley RWQCB's general NPDES permit for construction dewatering activity (Order 5-00-175) authorizes direct discharges to surface waters up to 250,000 gallons per day for no more than a 4-month period each year. All of the NPDES permits involve similar processes, including submittal to the Central Valley RWQCB of Notices of Intent (NOIs) to discharge, and implementation of

Stormwater Pollution Prevention Plans (SWPPPs) that include best management practices (BMPs) to minimize those discharges. As mentioned above, the Central Valley RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain waste discharges to land or waters of the state. In particular, Central Valley RWQCB Resolution R5-2003-0008 identifies activities subject to waivers of RWDs and/or WDRs, including minor dredging activities and construction dewatering activities that discharge to land.

Construction activities subject to the general construction activity permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce nonstormwater discharges to storm sewer systems and other waters. The permit also requires dischargers to consider the use of permanent postconstruction BMPs that will remain in service to protect water quality throughout the life of the project. All NPDES permits also have inspection, monitoring, and reporting requirements. In response to a court decision, the Central Valley RWQCB also implemented mandatory water quality sampling requirements in Resolution 2001-046 for visible and nonvisible contaminants in discharges from construction activities. Water quality sampling is now required if the activity could result in the discharge of turbidity or sediment to a water body that is listed as impaired under Section 303(d) because of sediment or siltation, or if a release of a nonvisible contaminant occurs. Where such pollutants are known or should be known to be present and have the potential to contact runoff, sampling and analysis is required. NPDES permits require the implementation of design and operational BMPs to reduce the level of contaminant runoff. Types of BMPs include source controls, treatment controls, and site planning measures.

Discharges subject to the SWRCB's NPDES general permit for construction activity are subject to development and implementation of a SWPPP. The SWPPP includes a site map and description of construction activities and identifies the BMPs that will be employed to prevent soil erosion and discharge of other construction-related pollutants (e.g., petroleum products, solvents, paints, cement) that could contaminate nearby water resources. A monitoring program is generally required to ensure that BMPs are implemented according to the SWPPP and are effective at controlling discharges of stormwater-related pollutants.

NPDES Municipal Stormwater Permit

The urban municipal entities, including the County, the City of Rancho Cordova (City), and the Cities of Citrus Heights, Folsom, Galt, and Sacramento, are co-permittees for an area wide NPDES municipal stormwater permit through the Central Valley RWQCB. A Stormwater Quality Improvement Plan (SQIP) developed by the County for compliance with the NPDES permit is the guiding document for the City (County of Sacramento 2003). The SQIP is composed of six program elements developed to reduce contaminants discharged into receiving-water bodies. The six Minimum Control Measure elements of the SQIP are public education and outreach, public involvement/participation, detection and elimination of illicit discharges, construction-site runoff control, postconstruction runoff control in new development and redevelopment, and pollution prevention/good housekeeping for municipal operations. For each Minimum Control Measure, the City has selected a suite of BMPs and measurable goals to address the specific stormwater problems within the city or county limits. The Stormwater Division of the County Department of Water Resources has principal authority of ensuring that development proceeds in compliance with the SQIP, County drainage and stormwater quality standards, and the use of on-site and regional stormwater-quality treatment facilities. In association with the SQIP, several accessory programs are in place, including a Storm Water Ordinance, construction standards, and design review guidelines to reduce contaminants in stormwater runoff.

Of particular relevance to the project is the City's coordination of BMP review and implementation under the construction-site runoff control program. Under the new-development element of the SQIP, commercial and industrial properties and facilities are required to implement stormwater-quality treatment and/or source-control BMPs in their projects. New-development and redevelopment control measures include development of structural and nonstructural controls, ordinances or regulatory mechanisms, and long-term operations and maintenance (O&M) practices. The "pollution prevention/good housekeeping for municipal operations" element of the SQIP addresses routine O&M activities for drainage systems, roadways, parks and open spaces, and other municipal

operations to help ensure a reduction in pollutants entering the storm sewer system. The pollution prevention/ good housekeeping program includes a training component to prevent and reduce stormwater pollution from municipal operations. The pollution prevention/good housekeeping BMPs can be separated into two broad categories: source controls and materials management. Source controls are BMPs designed to prevent or reduce pollutants at the source and include maintenance of the storm drainage system, structural floatable controls, street maintenance, staff training, flood control projects, and litter ordinances. Materials management BMPs are designed to reduce pollutants with nonstructural controls such as pesticide education and spill prevention control.

The new-development/redevelopment element of the SQIP requires projects to implement postconstruction stormwater runoff control measures that are addressed in the *Guidance Manual for On-site Stormwater Quality Control Measures* (City of Sacramento and County of Sacramento 2000). This manual includes a Control Measure Decision Matrix that identifies source and treatment controls that are required based on land use and the impervious area of the site. The new-development/redevelopment element is designed to reduce stormwater pollutants using regional water-quality control measures, such as detention basins, for areas of large development (i.e., areas generally greater than 100 acres); and implementation of on-site source control and/or stormwater treatment measures for commercial, industrial, and multifamily residential land uses in areas not served by regional water-quality control measures. On-site stormwater pollutant source-control measures are typically low-technology operational and/or structural practices that prevent or reduce pollutants at the source, are implemented for specific outdoor activities of concern, and primarily involve implementation of good-housekeeping practices (spill prevention, proper storage methods, and proper cleanup procedures). On-site stormwater-treatment control measures are implemented when source-control measures are determined to be inadequate in preventing stormwater pollution. Treatment control measures capture and treat stormwater runoff through settling, filtration, and/or biodegradation. The treated runoff is then released or percolated into the ground. Various treatment control measures have been determined to be appropriate for conditions in Sacramento County including swales, filter strips, media filters, and infiltration.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Rancho Cordova General Plan

Goals and policies of the *Rancho Cordova General Plan* (City General Plan) relating to water resources that the City has found to be applicable to the proposed project and alternatives under consideration are provided in Appendix F.

3.4.3 ENVIRONMENTAL CONSEQUENCES

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines), a drainage, hydrology, or water quality impact is considered significant if implementation of the proposed project or alternatives under consideration would do any of the following:

- violate any water quality standards or waste discharge requirements, including NPDES waste discharge or stormwater runoff requirements, state or federal antidegradation policies, enforceable water quality standards contained in the Central Valley RWQCB Basin Plan or statewide water-quality control plans, or federal rulemakings to establish water quality standards in California;
- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the level of the local groundwater table;
- 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 that would result in substantial erosion or siltation on-site or off-site;

- create or contribute runoff water that would exceed the capacity (peak flow) of existing or planned stormwater drainage systems;
- substantially degrade water quality;
- place within a 100-year flood hazard area structures that would impede or redirect flood flows; or
- 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.

ANALYSIS METHODOLOGY

This analysis relies on information provided by various public agencies, as well as site-specific technical planning studies generated to support the proposed development and this draft environmental impact report/draft environmental impact statement (DEIR/DEIS). Hydrology and drainage–related studies in support of this DEIR/DEIS analysis include the *Rio del Oro Groundwater Impact Evaluation Technical Memorandum* (WRIME 2005) and the 2005 *Master Drainage Study for Rio del Oro* (Wood Rogers 2005), which included review and incorporation of the following documents:

- *Sacramento City/County Drainage Manual Volume 2: Hydrology Standards*, County of Sacramento Department of Water Resources, December 1996 (County of Sacramento 1996);
- *Final Master Drainage Study for Sunrise Douglas Community Plan Area*, The Spink Corporation, October 1998 (Spink Corporation 1998);
- *Morrison Creek Stream Group Hydrologic Analysis*, prepared by James M. Montgomery for the County of Sacramento, March 1992 (County of Sacramento 1992);
- *Master Drainage Study for the Villages of Zinfandel*, Wood Rodgers, Inc., revised March 2003 (Wood Rodgers 2003b); and
- *Morrison Creek Hydrologic and Hydraulic Analysis*, Wood Rodgers, Inc., May/July 2004 (Wood Rodgers 2004a).

Effects associated with drainage, hydrology, and water quality that could result from construction and operational activities related to buildout of the project site were evaluated based on expected construction practice, on the materials used, and on the locations and duration of the activities. A review of published literature included maps, books, and primary-source documents cited above. The effects of the project were compared to environmental baseline conditions (i.e., existing conditions) to determine the duration and magnitude of impacts, consistent with the State CEQA Guidelines.

IMPACT ANALYSIS

Program Level Impacts and Mitigation Measures

Effects that would occur under each alternative development scenario are identified as follows: PP (Proposed Project), HD (High Density), IM (Impact Minimization), NF (No Federal Action), and NP (No Project). The impacts for each alternative are compared relative to the PP at the end of each impact conclusion (i.e., similar, greater, lesser).

IMPACT 3.4-1

Potential Increased Risk of Flooding from Increased Stormwater Runoff. *Project implementation would increase the amount of impervious surface on the project site, thereby increasing surface runoff. This increase in surface runoff would result in an increase in both the total volume and the peak discharge rate of stormwater runoff, and therefore could result in greater potential for on- and off-site flooding.*

PP

Buildout of the Proposed Project Alternative would significantly increase the amount of impervious surface (e.g., buildings, roads, parking surfaces) on the project site. The various types of proposed land uses would each contribute different relative amounts of stormwater runoff corresponding to the percentage of impervious surface associated with each land use category, which ranges from 2% (wetlands/open space) to 95% (major roads and stormwater detention). The total amount of impervious surface generated by development of the Proposed Project Alternative (development Phases 1–5) would be approximately 49.2% of the entire project site, or about 1,882 acres. This increase in impervious surface would increase the peak discharge rate of stormwater runoff generated on the project site.

Project development requires installation of an on-site conveyance and detention/water quality treatment system and the conveyance of off-site flows through the property. When combined, the on- and off-site runoff must pass through existing downstream off-site conveyance systems located within the Cordova Industrial Park development area, including culvert crossings under Douglas Road and Sunrise Boulevard, and then cross the Folsom South Canal at three existing locations.

Exhibit 2-6a shows the proposed extent of on-site drainage features, including parkways, detention basins, and water quality treatment features associated with the Proposed Project Alternative. In determining the design of project drainage improvements, Wood Rodgers incorporated the following assumptions:

- The design of the project site drainage system was based on the flow capacities at the Canal crossings.
- These capacities were apportioned to the area of the upstream contributing watersheds to determine the appropriate discharge per acre for the project site and future development upstream of the project site. Peak flows discharging from the project site would be managed via detention basins such that flows would not exceed the calculated appropriate discharge per acre during a 100-year flood.
- Proposed runoff detention facilities would be designed only to mitigate on-site runoff from the project site. Thus, future upstream development must also adhere to the calculated discharge constraints.
- Runoff from upstream off-site watersheds would be conveyed through the site in open-channel parkways (described below in Impact 3.4-2). On-site runoff would be conveyed to these open-channel parkways in a storm drainage pipe system.

Exhibit 2-6b shows the proposed off-site drainage features, including outflow locations where flow exits the project site, conveyance structures to and under Sunrise Boulevard, conveyance structures to the Folsom South Canal, and associated siphon and overchute structures beneath or over the canal. The Folsom South Canal, located west and downstream of the project site, was neither designed nor intended to serve as a drainage system, but rather to convey American River water east and south for irrigation and domestic uses. Therefore, the canal would not receive any runoff from the project site. Rather, all runoff from the project site would be conveyed over or

under the canal via the existing overchutes and siphons as previously described under "Affected Environment" (Table 3.4-1). Based on discussions with the County Department of Water Resources, the existing peak runoff rates during major storm events exceed the conveyance capacity of the north and south canal crossings and contribute to shallow flooding conditions on Sunrise Boulevard.

In response to the capacity limitations of the Canal crossings, the project drainage system has been designed to decrease the overall peak rate of runoff from the site as compared to existing conditions. As shown in Table 3.4-4, the current total capacity of the three Canal crossings is 1,300 cfs, and the project would reduce the total flow through the crossings to 1,259 cfs by redirecting the flow paths of runoff leaving the project site and conveyed under or across the Folsom South Canal. This represents a decrease of 16% (237 cfs) of total peak flow at these locations. Peak rates of runoff in the north siphon would decrease by 30% and the peak runoff rate at the south overchute would decrease by 42%. The peak runoff rate at the central overchute crossing would increase by about 198 cfs but would remain below the total conveyance capacity of the crossing.

Although existing capacity constraints at the canal crossings would remain, implementation of the Proposed Project Alternative would result in a beneficial impact related to stormwater runoff, because the project would reduce the peak flow rates of water in the crossings to levels below the existing (preproject) conditions and would thus reduce the potential for off-site flooding effects on Sunrise Boulevard.

While it appears that the project applicant(s)' proposed *Master Drainage Study for Rio del Oro* (Wood Rodgers 2005) would appropriately convey upstream off-site runoff and would appropriately detain project-related on-site runoff, final designs and specifications have not been submitted or approved by the City. Therefore, implementation of the Proposed Project Alternative could result in **potentially significant, direct** impacts related to stormwater runoff and the subsequent risk of flooding. **No indirect** impacts would occur.

Table 3.4-4
Existing and Projected Peak Flows at Folsom South Canal Crossings under the Rio del Oro Project

Folsom South Canal Crossing Structure	Existing Capacity (cfs)	100-Yr 24-Hr Peak Flow[1] (cfs)		Change in Peak Flow Rates (Existing minus Proposed)	
		Existing	Project	Change (cfs)	Change (%)
North siphon	300	438	334	-104	-24
Central overchute	380	138	336	+198	+143
South overchute	620	1,013	589	-424	-42
Total	**1,300**	**1,496**	**1,259**	**-237**	**-16**

Note: cfs = cubic feet per second
[1] Only the 100-year/24-hour flows are shown because these were determined to have the highest flow rates.
Sources: Wood Rodgers 2005, data compiled by EDAW in 2005

HD

The total acreage designated for residential uses would remain constant under the High Density Alternative, as shown in Table 2-10 (see Chapter 2, "Alternatives"); however, because of the higher density residential land use, the amount of impervious surface would increase by 10.8 acres as compared with the Proposed Project Alternative.

It is anticipated that the drainage plans and facilities under the High Density Alternative would be substantially similar to those prepared for the Proposed Project Alternative. Because final designs and specifications have not been submitted to or approved by the City, implementation of the High Density Alternative could result in **potentially significant, direct** impacts related to stormwater runoff and the subsequent risk of flooding. **No indirect** impacts would occur. ***[Similar]***

IM Impacts under the Impact Minimization Alternative would be less than those under the Proposed Project Alternative because approximately 500 fewer acres of impervious surface would result from development.

However, since final designs and specifications have not been submitted to or approved by the City, implementation of the Impact Minimization Alternative could result in **potentially significant, direct** impacts related to stormwater runoff and the subsequent risk of flooding. **No indirect** impacts would occur. ***[Similar]***

NF Impacts under the No Federal Action Alternative would be less than those under the Proposed Project Alternative because approximately 328 fewer acres of impervious surface would result from development. The total impervious surface area under this alternative is projected to be 1,639 acres, or 43% of the total project site. This would be approximately 5% less (200 fewer acres) of impervious surfaces as compared to the Proposed Project Alternative.

The drainage plan for this alternative would incorporate three detention basins of similar sizes and in the same locations as under the Proposed Project Alternative (Exhibit 2-18). Major conveyance channels and trunk pipelines under this alternative would be substantially similar to those required under the Proposed Project Alternative (Exhibit 2-6a through 2-6b). However, this alternative would require additional drainage crossings/bridges over designated "Natural Resources" areas in order to serve the three proposed single-family residential areas in the southern portion of the project site. Further, a 2- to 3-acre detention basin would be constructed within each of these three single-family residential housing areas to improve stormwater quality before discharge into the designated Natural Resources area.

Since final designs and specifications have not been submitted or approved by the City, implementation of the No Federal Action Alternative could result in **potentially significant, direct** impacts related to stormwater runoff and the subsequent risk of flooding. **No indirect** impacts would occur. ***[Similar]***

NP Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Mining activities would not alter the existing hydrology and drainage conditions at the project site, and the limited amount of water discharges would not increase the potential for flooding from stormwater runoff. According to the *Grantline West Mitigated Negative Declaration* (City of Rancho Cordova 2005b), there are no drainages at the Grantline West site that would be affected by mining activities. Existing drainage swales and berms at the Aerojet Mining Amendment site currently direct water around the area of mining activities and would not be affected by the additional mining operations. Furthermore, a natural berm constructed during earlier dredge mining activities separates the Aerojet mining site from existing swales on adjacent undisturbed land. Mining activities would, however, result in direct, less-than-significant impacts.

The project site would ultimately be reclaimed to postmining form under the No Project Alternative and no project-related impacts would occur; thus, **no direct or indirect** impacts would occur.

Mitigation Measure 3.4-1: Prepare and Submit Final Drainage Plans to the City and Implement Requirements.

PP, HD, IM, NF

Before the approval of grading plans and building permits, the project applicant(s) for all project phases shall submit final drainage plans to the City demonstrating that off-site upstream runoff would be appropriately conveyed through the project site, and that project-related on-site runoff would be appropriately contained in detention basins to reduce flooding impacts. Furthermore, the project applicant(s) for all project phases may be required to participate in drainage improvements along Sunrise Boulevard; this will be determined through continuing consultation with the Sacramento County Department of Water Resources.

Timing: Before approval of grading plans and building permits for all project phases.

Enforcement: City of Rancho Cordova Public Works Department.

NP

No mitigation measures are required.

Implementation of Mitigation Measure 3.4-1 would reduce the potentially significant impact associated with the potential increased risk of flooding from increased stormwater runoff under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.4-2

Exposure of People or Structures to a Significant Risk of Flooding as a Result of the Failure of a Levee. *Project implementation could expose people or structures to a significant risk of flooding as a result of the failure of a levee.*

PP

Both natural and improved drainage conveyances are located within the project site boundary. Most of the flow entering the site from the east is restricted to the Morrison Creek streambed. Although a levee currently exists along a section of Morrison Creek that helps confine the majority of the creek flow to the south, where it feeds several small wetlands and seasonal depressions that naturally attenuate increased flow, it is a nonengineered levee that is not designed or maintained for the purpose of flood control. (City of Rancho Cordova 2004, Wood Rodgers 2005.)

The section of Morrison Creek that runs through the project site has not received detailed study by FEMA for the purpose of drafting an FIS or a FIRM. DWR has undertaken efforts through the Awareness Floodplain Mapping System to approximate floodplain delineations of undocumented watercourses throughout the state. The County studied the local hydrology and developed hydrologic and hydraulic models of the system, and floodplain maps were subsequently prepared by DWR. Exhibit 3.4-1 shows the Awareness Floodplain map of the project site under existing conditions.

The Proposed Project Alternative's on-site storm drainage flow conveyance system would be composed of drainage parkways, storm drainage pipes, and Morrison Creek. The pipe system would include trunk storm drains, parkways, detention basins, and local collection and conveyance infrastructure. The proposed open-channel drainage parkway system would provide an aesthetically and environmentally preferable alternative to an enclosed drainage system. Several drainage canals are proposed for construction within the drainage parkways, which would vary from approximately 200 to 375 feet wide from top of bank to top of bank. The canals would vary in length from 1,500 to 15,000 feet long. Design of the drainage canals, as detailed in

the *Master Drainage Study for Rio del Oro* (Wood Rodgers 2005), would incorporate the following features:

- Water flow has been designed to accommodate a lack of regular removal of vegetation from channels (the presence of channel vegetation and associated aquatic organisms generally helps to improve water quality).
- Channels have been designed so that in the event of a 100-year flood, the water surface elevation would be a minimum of 1 foot below the channel banks and water would not flow at a rate faster than 6.0 feet per second.
- When the channels are filled to maximum capacity, the water flow depth would not exceed 8 feet.
- Channels would be constructed in the shape of a trapezoid, with 4-foot horizontal to 1-foot vertical side slopes.
- The width of the drainage parkways would permit the final construction alignments of the channels to meander through the project site, and would also facilitate the construction of wetland buffer areas alongside the proposed streambanks.
- A 3-foot-high berm placed within the channels at specific locations near the storm drainage pipe outlets would create a parallel low-flow water quality swale (i.e., during low flows, water would be diverted into a vegetated swale, thus improving water quality), with gaps in the berm to allow low flows to merge with the main channel flow.
- The majority of the historical Morrison Creek streambed would be preserved through the project site (throughout the designated wetland preserve) to ensure that existing wetlands, vernal pools, and other water-dependent habitats would not receive less runoff as a result of project development.

With incorporation of the design criteria summarized above and described in detail in the *Master Drainage Study for Rio del Oro* (Wood Rodgers 2005), the Proposed Project Alternative would not expose people or structures to a significant risk of flooding as a result of the failure of existing on-site levees or new levees that would be constructed. Therefore, this is considered a **less-than-significant, direct** impact. **No indirect** impacts would occur.

HD

Virtually the same drainage plan as presented in the master drainage study for the Proposed Project Alternative would be developed under the High Density Alternative. Therefore, it is anticipated that with implementation of drainage improvements that attenuate peak flows consistent with the *Master Drainage Study for Rio del Oro*, and with the incorporation of design criteria described above, the High Density Alternative would not expose people or structures to a significant risk of flooding as a result of the failure of existing on-site levees or new levees that would be constructed. Therefore, this is considered a **less-than-significant, direct** impact. **No indirect** impacts would occur. ***[Similar]***

IM

Approximately 25% of the project site would become a wetland preserve under the Impact Minimization Alternative. The drainage plan that would be developed for this alternative would require much less intensive drainage improvements, utilizing the wetlands for stormwater detention and flood control. It is not anticipated that the construction of levees would be required under this alternative. Therefore, this alternative would result in **less-than-significant, direct** impacts. **No indirect** impacts would occur. ***[Similar]***

NF Approximately 835 acres of the project site would be designated as undeveloped "Natural Resources" under the No Federal Action Alternative. The drainage plan that would be developed for this alternative would still include drainage parkways, storm drainage pipes, and three detention basins, but would entail jack-and-bore construction techniques underneath jurisdictional wetlands. A 2- to 3-acre detention basin would also be required in each of the proposed single-family residential housing areas in the southern portion of the project site. The drainage plan for this alternative would also utilize the designated Natural Resources areas for additional stormwater detention and flood control. It is not anticipated that the construction of levees would be required under this alternative. Therefore, this alternative would result in **less-than-significant, direct** impacts. **No indirect** impacts would occur. ***[Similar]***

NP Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Mining activities would not increase on- or off-site drainage flows, and no levees would be constructed.

Because development would not occur under the No Project Alternative, there would be no project-related risk of increased flooding from a levee failure; thus, **no direct** or **indirect** impacts would occur. ***[Lesser]***

Mitigation Measure: No mitigation measures are required.

IMPACT 3.4-3

Potential Temporary Construction-Related Drainage and Water Quality Effects. *Drainage and water quality impacts could result from construction activities at the project site.*

PP General construction activities within the project site would be extensive, as shown in Exhibits 2-6a and 2-6b. The interior drainage system would be substantially modified and replaced with a system of three detention basins, 155 acres of drainage parkways, golf course ponds, pipelines, wetlands, and a network of parks. The drainage system in the northern two-thirds of the project site has already been extensively modified, and consists of depressions between piles of dredge tailings left behind during historical gold mining operations. The southern third of the project site consists of generally undisturbed, undeveloped land with natural drainages such as Morrison Creek and a series of small wetlands and seasonal depressions. Because construction activities would occur over such a large area (approximately 3,828 acres), the substantial construction-related alteration of drainages could result in soil erosion and stormwater discharges of suspended solids, increased turbidity, and potential mobilization of other pollutants from project construction sites as contaminated runoff to on-site and ultimately off-site drainage channels. Many construction-related wastes have the potential to degrade existing water quality by altering the dissolved-oxygen content, temperature, pH, suspended-sediment and turbidity levels, or nutrient content, or by causing toxic effects in the aquatic environment. Project construction activities that are implemented without mitigation could violate water quality standards or cause direct harm to aquatic organisms.

Consequently, project-related impacts on water quality within on- and off-site drainage channels as a result of temporary construction activities are considered **direct** and **potentially significant**. **No indirect** impacts would occur.

HD Construction of buildings and roadways would occur on the same amount of land under the High Density Alternative as under the Proposed Project Alternative, but with a higher density of dwelling units constructed on that same acreage. As with the Proposed Project Alternative,

widespread construction-related alteration of drainages could result in the discharge of contaminated stormwater or sedimentation. Impacts would likely occur at a similar level as under the Proposed Project Alternative because similar construction activities would occur over the same amount of land. This would be a **potentially significant**, **direct** impact. **No indirect** impacts would occur. ***[Similar]***

IM — Impacts under the Impact Minimization Alternative would be less than those under the Proposed Project Alternative because building and roadway construction would occur on approximately 500 fewer acres. However, a substantial alteration of the existing drainages would still occur, and temporary construction-related disturbances at the project site would still have the potential to result in the discharge of contaminated stormwater or sedimentation. This would be a **potentially significant, direct** impact. **No indirect** impacts would occur. ***[Lesser]***

NF — Impacts under the No Federal Action Alternative would be less than those under the Proposed Project Alternative because building and roadway construction would occur on approximately 328 fewer acres. However, substantial alteration of the existing drainages would still occur, and temporary construction-related disturbances at the project site would still have the potential to result in the discharge of contaminated stormwater or sedimentation. This would be a **potentially significant, direct** impact. **No indirect** impacts would occur. ***[Lesser]***

NP — Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Mining activities have the potential to result in short-term water quality effects from runoff and sedimentation. Mining operators would be required to prepare a SWPPP, apply BMPs, and comply with County erosion control policies, which would reduce potential water quality effects. Mining activities would therefore result in direct, less-than-significant impacts. However, because no new construction would take place under the No Project Alternative, no project-related construction disturbances would occur; thus, **no direct** or **indirect** project-related impacts would occur. ***[Lesser]***

Mitigation Measure 3.4-3: Implement Measures or Best Management Practices to Reduce Water Quality Effects of Temporary Construction Activities.

PP, HD, IM, NF — Before the approval of grading permits and improvement plans, the project applicant(s) for all project phases shall consult with the City, the SWRCB, and the Central Valley RWQCB to acquire the appropriate regulatory approvals that may be necessary to obtain Section 401 water quality certification, an SWRCB statewide NPDES stormwater permit for general construction activity, and any other necessary site-specific WDRs or waivers under the Porter-Cologne Act. The project applicant(s) shall prepare and submit the appropriate NOIs and prepare the SWPPP and any other necessary engineering plans and specifications for pollution prevention and control. The SWPPP and other appropriate plans shall identify and specify:

- the use of erosion and sediment-control BMPs, including construction techniques that will reduce the potential for runoff as well as other measures to be implemented during construction;
- the means of waste disposal;
- the implementation of approved local plans, nonstormwater-management controls, permanent postconstruction BMPs, and inspection and maintenance responsibilities;

- the pollutants that are likely to be used during construction that could be present in stormwater drainage and nonstormwater discharges, and other types of materials used for equipment operation;
- spill prevention and contingency measures, including measures to prevent or clean up spills of hazardous waste and of hazardous materials used for equipment operation, and emergency procedures for responding to spills;
- personnel training requirements and procedures that will be used to ensure that workers are aware of permit requirements and proper installation methods for BMPs specified in the SWPPP; and
- the appropriate personnel responsible for supervisory duties related to implementation of the SWPPP.

Where applicable, BMPs identified in the SWPPP shall be in place throughout all site work and construction and shall be used in all subsequent site development activities. BMPs may include such measures as the following:

- Implementing temporary erosion-control measures in disturbed areas to minimize discharge of sediment into nearby drainage conveyances. These measures may include silt fences, staked straw bales or wattles, sediment/silt basins and traps, geofabric, sandbag dikes, and temporary vegetation.
- Establishing permanent vegetative cover to reduce erosion in areas disturbed by construction by slowing runoff velocities, trapping sediment, and enhancing filtration and transpiration.
- Using drainage swales, ditches, and earth dikes to control erosion and runoff by conveying surface runoff down sloping land, intercepting and diverting runoff to a watercourse or channel, preventing sheet flow over sloped surfaces, preventing runoff accumulation at the base of a grade, and avoiding flood damage along roadways and facility infrastructure.

All construction contractors shall retain a copy of the approved SWPPP on the construction site.

Timing: Before the approval of grading permits and improvement plans and throughout all site work and construction for all project phases.

Enforcement: City of Rancho Cordova Public Works Department, State Water Resources Control Board, and Central Valley Regional Water Quality Control Board.

NP No mitigation measures are required.

Implementation of Mitigation Measure 3.4-3 would reduce water quality effects from temporary construction activities under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives because the project applicant(s) would conform with applicable local and state regulations regulating construction discharges. This mitigation measure would reduce potentially significant impacts under these alternatives to a **less-than-significant** level. Several technical studies have been conducted regarding water-quality control feature impacts on groundwater (e.g., City of Fresno Nationwide Urban Runoff Project and *California Storm Water Best Management Practices Handbook* prepared by the Stormwater Quality Task Force) and surface water (e.g., *Cumulative Water Quality Analysis Report for the Lahontan Development 1996–2002* [Huffman & Carpenter 2003]). These studies have identified that water-quality control features such as revegetation, erosion control measures, and detention and infiltration basins have been successful in controlling water quality and avoiding water quality impacts (metals and organic compounds associated with stormwater are typically lost within the first

few feet of the soil of the retention basins associated with groundwater). Technical studies associated with the Lahontan Development (residential and golf course development) demonstrated that the use of a variety of BMPs (e.g., source control, detention basins, revegetation, and erosion control) have been able to maintain surface water quality conditions in adjacent receiving waters (Martis Creek).

IMPACT 3.4-4

Long-Term Water Quality Effects from Urban Runoff. *The project would convert a large area of undeveloped land to residential and commercial uses, thereby changing the amount and timing of potential long-term waste discharges in stormwater runoff to Morrison Creek and other drainage courses on-site.*

PP

The conversion of undeveloped land to urban land uses would alter the types, quantities, and timing of contaminant discharges in stormwater runoff. Overall, the potential for the Proposed Project Alternative to cause or contribute to long-term discharges of urban contaminants (e.g., oil and grease, fuel, trash) into the stormwater drainage system and ultimate receiving waters would increase compared to existing conditions. Some contaminants associated with existing on-site cattle grazing activities (e.g., sediment, nutrients) would decrease as these uses are phased out during project development. The potential discharges of contaminated urban runoff from paved and landscaped areas could increase or could cause or contribute to adverse effects on aquatic organisms in receiving waters. Urban contaminants typically accumulate during the dry season and may be washed off when adequate rainfall returns in the fall to produce a “first flush” of runoff. The amount of contaminants discharged in stormwater drainage from developed areas varies based on a variety of factors, including the intensity of urban uses such as vehicle traffic, types of activities occurring on-site (e.g., office, commercial, industrial), types of contaminants used on-site (e.g., pesticides, herbicides, cleaning agents, petroleum byproducts), contaminants deposited on paved surfaces, and the amount of rainfall.

The Rio del Oro Specific Plan and Master Drainage Study include specific drainage-design features to reduce the potential adverse impacts from urban stormwater runoff in conformance with County development standards. Stormwater runoff generated within the project site would be collected in new drainage systems that would include water quality treatment measures. As shown in Exhibit 2-6a and discussed below, three detention basins are proposed, which would serve to detain peak flows as well as meet water quality objectives for long-term urban runoff.

- The proposed northwest basin would consist of 7 acres and would have 4-foot horizontal to 1-foot vertical side slopes. The elevation of the basin bottom would be approximately 100 feet and the basin would have nearly 100 acre-feet of available storage.

- The proposed central basin would consist of 6 acres and would have 4-foot horizontal to 1-foot vertical side slopes. The elevation of the basin bottom would be 134 feet and the basin would have nearly 70 acre-feet of available storage.

- The proposed southwest basin would consist of 26 acres and would have 4-foot horizontal to 1-foot vertical side slopes. This basin may be jointly used for recreation. The elevation of the basin bottom would be approximately 110 feet and the basin would have nearly 500 acre-feet of available storage.

Before approval of the final small-lot subdivision map for all project phases, detailed hydrology plans and a water quality study would be required and prepared by a qualified engineer retained by the project applicant(s). Drafts of these plans would be submitted to the City for review and approval concurrently with development of tentative subdivision maps for all project phases. These plans would finalize the water quality improvements and further detail the structural and nonstructural BMPs proposed for the project. The plans would include a quantitative analysis of proposed conditions incorporating a combination of parallel low-flow channels, pipe outfalls, and

water quality bioswales that connect with the main drainage channels. The water quality study would provide calculations that show that the proposed water quality BMPs meet or exceed requirements established by the Central Valley RWQCB and would provide details regarding the size, geometry, and functional timing of storage and release (Mathies, pers. comm., 2005). The stormwater drainage system contained in the *Master Drainage Study for Rio del Oro* (Wood Rodgers 2005), and the SWPPP and associated water quality BMPs discussed in Mitigation Measure 3.4-3 above, appears to meet the requirements established in the City's Joint NPDES Permit, which controls water pollution by regulating point sources that discharge pollutants into waters of the United States and regulates all wet- and dry-weather runoff discharge in Sacramento County.

The County's Municipal Stormwater Permit was adopted by the Central Valley RWQCB in December 2002, and the City is a joint participant with the County's NPDES. Participation in the NPDES Municipal Stormwater Permit allows for the City to discharge urban runoff from Municipal Separate Storm Sewer Systems (MS4s) in their municipal jurisdictions. The NPDES permit requires that the City impose water quality and watershed protection measures for all development projects. The NPDES permit also requires every new construction project to:

- eliminate or reduce nonstormwater discharge to stormwater systems and other waters of the nation,
- develop and implement a SWPPP, and
- perform inspections of stormwater control structures and pollution prevention measures.

However, because final design plans and specifications have not been submitted to or approved by the City, implementation of the Proposed Project Alternative could result in **potentially significant, direct** impacts related to the potential for contaminants to enter receiving waters, thus resulting in adverse effects from long-term urban runoff. **No indirect** impacts would occur.

HD

The amount of contaminants discharged in stormwater drainage would likely be higher under the High Density Alternative than under the Proposed Project Alternative because of the increased density of residential, commercial, and industrial land uses. However, the Rio del Oro Specific Plan and Master Drainage Study include specific drainage-design features to reduce the potential adverse impacts from urban stormwater runoff in conformance with County development standards.

Before approval of the final small-lot subdivision map for all project phases, detailed hydrology plans and a water quality study would be required and prepared by a qualified engineer retained by the project applicant(s). Drafts of these plans would be submitted to the City for review and approval concurrently with development of tentative subdivision maps for all project phases. These plans would finalize the water quality improvements and further detail the structural and nonstructural BMPs proposed for the project. The plans would include a quantitative analysis of proposed conditions incorporating a combination of parallel low-flow channels, pipe outfalls, and water quality bioswales that connect with the main drainage channels. The water quality study would provide calculations that show that the proposed water quality BMPs meet or exceed requirements established by the Central Valley RWQCB and would provide details regarding the size, geometry, and functional timing of storage and release (Mathies, pers. comm., 2005).

However, because final design plans and specifications have not been submitted to or approved by the City, implementation of the High Density Alternative could result in **potentially significant, direct** impacts related to the potential for contaminants to enter receiving waters,

thus resulting in adverse effects from long-term urban runoff. **No indirect** impacts would occur. ***[Greater]***

IM

The amount of contaminants discharged in stormwater drainage would likely be lower under the Impact Minimization Alternative than under the Proposed Project Alternative because of the decreased density of residential, commercial, and industrial land uses. The Rio del Oro Specific Plan and Master Drainage Study include specific drainage-design features to reduce the potential adverse impacts from urban stormwater runoff in conformance with County development standards.

Before approval of the final small-lot subdivision map for all project phases, detailed hydrology plans and a water quality study would be required and prepared by a qualified engineer retained by the project applicant(s). Drafts of these plans would be submitted to the City for review and approval concurrently with development of tentative subdivision maps for all project phases. These plans would finalize the water quality improvements and further detail the structural and nonstructural BMPs proposed for the project. The plans would include a quantitative analysis of proposed conditions incorporating a combination of parallel low-flow channels, pipe outfalls, and water quality bioswales that connect with the main drainage channels. The water quality study would provide calculations that show that the proposed water quality BMPs meet or exceed requirements established by the Central Valley RWQCB and would provide details regarding the size, geometry, and functional timing of storage and release (Mathies, pers. comm., 2005).

However, because final design plans and specifications have not been submitted to or approved by the City, implementation of the Impact Minimization Alternative could result in **potentially significant, direct** impacts related to the potential for contaminants to enter receiving waters, thus resulting in adverse effects from long-term urban runoff. **No indirect** impacts would occur. ***[Lesser]***

NF

The amount of contaminants discharged in stormwater drainage would likely be lower under the No Federal Action Alternative than under the Proposed Project Alternative because of the decreased amount of residential, commercial, and industrial land uses. The drainage plan for this alternative would incorporate three detention basins, of similar sizes and in the same locations as under the Proposed Project Alternative (Exhibit 2-18). Major conveyance channels and trunk pipelines under this alternative would be substantially similar to those required under the Proposed Project Alternative (Exhibit 2-6a through 2-6b). However, this alternative would require additional drainage crossings/bridges over designated “Natural Resources” areas in order to serve the three proposed single-family residential areas in the southern portion of the project site. Further, a 2- to 3-acre detention basin would be constructed within each of these three single-family residential housing areas to improve storm water quality prior to discharge into the designated Natural Resources area.

Before approval of the final small-lot subdivision map for all project phases, detailed hydrology plans and a water quality study would be required and prepared by a qualified engineer retained by the project applicant(s). Drafts of these plans would be submitted to the City for review and approval concurrently with development of tentative subdivision maps for all project phases. These plans would finalize the water quality improvements and further detail the structural and nonstructural BMPs proposed for the project. The plans would include a quantitative analysis of proposed conditions incorporating a combination of parallel low-flow channels, pipe outfalls, and water quality bioswales that connect with the main drainage channels. The water quality study would provide calculations that show that the proposed water quality BMPs meet or exceed

requirements established by the Central Valley RWQCB and would provide details regarding the size, geometry, and functional timing of storage and release (Mathies, pers. comm., 2005).

However, because final design plans and specifications have not been submitted to or approved by the City, implementation of the No Federal Action Alternative could result in **potentially significant, direct** impacts related to the potential for contaminants to enter receiving waters, thus resulting in adverse effects from long-term urban runoff. **No indirect** impacts would occur. ***[Lesser]***

NP

Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. Mining activities have the potential to result in long-term water quality effects from runoff and sedimentation. Mining operators would be required to prepare a SWPPP, apply BMPs, and comply with County erosion-control policies, which would reduce potential water quality effects. Mining activities would therefore result in direct, less-than-significant impacts.

Because no new construction would take place under the No Project Alternative, there would be no project-related water quality impact as a result of long-term urban runoff; thus, **no direct or indirect** impacts would occur. ***[Lesser]***

Mitigation Measure: Implement Mitigation Measure 3.4-1.

Implementation of Mitigation Measure 3.4-1 would reduce the potentially significant impact associated with potential long-term water quality effects of urban runoff under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.4-5

Effects on Groundwater Recharge. *Shallow and deep percolation of rainwater and related runoff and consequent depth to groundwater could be affected locally by the development of additional impervious surface, which may limit infiltration and recharge.*

PP

The water resources engineering firm Water Resources and Information Management Engineering, Inc. (WRIME), was retained to evaluate how percolation/infiltration and ultimately the depth to groundwater at the project site would be affected by project development. Changes in groundwater recharge were evaluated by comparing proposed land use scenarios against the baseline developed for the *2002 Zone 40 Water Supply Master Plan* (Zone 40 WSMP), which includes hydrologic data for the years 1970–1995. Because the project site is located within the area covered by the Zone 40 WSMP, the analysis for this project used the same Sacramento County Integrated Groundwater and Surface Water Model (SACIGSM) that was used for the Zone 40 analysis.

The Proposed Project Alternative would require a total of approximately 8,888 acre-feet of water per year. Based on the water demand estimate for the Proposed Project Alternative, and a technical analysis performed by WRIME (2005), the water table is expected to be 6 feet higher in the long term as a result of implementing the Proposed Project Alternative. The groundwater table would rise primarily as a result of the introduction of new, project-related surface-water supplies and the associated increase in percolation of seasonally applied landscape irrigation water.

Based on the evaluation of the depth to groundwater in the area, the seasonal fluctuation of depth to groundwater, and the potential future uses of groundwater in the area for local and/or regional

municipal and/or industrial demands, the estimated changes in the depth to groundwater as a result of project implementation would be minimal and well within the existing range of natural seasonal variations. Thus, the minor changes in groundwater levels resulting from reduced recharge of the aquifer from rainfall recharge, when coupled with increased seasonal groundwater recharge from landscape irrigation activities within the project site, would not appreciably change hydrogeologic variables such as groundwater flow or direction. In addition, the minor effects on groundwater hydrologic conditions that could result from implementing the Proposed Project Alternative would not appreciably alter the existing groundwater contaminant plumes that are in the process of being remediated by Aerojet General Corporation (Aerojet) and McDonnell Douglas Corporation (MDC). Additionally, there would be continued monitoring of the groundwater plume, as some changes in flow direction are anticipated. Therefore, potential project-related effects on groundwater recharge would be a **less-than-significant, direct** impact. **No indirect** impacts would occur.

HD

Construction of buildings and roadways would occur on the same amount of land under the High Density Alternative as under the Proposed Project Alternative, but with a higher density of dwelling units constructed on that same acreage.

The High Density Alternative would require approximately 9,245 acre-feet of water per year. Based on the water demand estimate for the High Density Alternative, the water table is expected to be 2 feet higher in the long term. The reduced depth to groundwater would occur for the same reasons described above for the Proposed Project Alternative. However, because this alternative would apply a greater housing density to the same amount of land, percolation of landscape irrigation water would occur in a smaller area than under the Proposed Project Alternative. Thus, this alternative would raise the water table by only 2 feet, as opposed to the 6 feet expected under the Proposed Project Alternative.

In addition, the minor effects on groundwater hydrologic conditions that would result from implementing the High Density Alternative would not appreciably alter the existing groundwater contaminant plumes that are in the process of being remediated by Aerojet and MDC. Therefore, potential project-related effects on groundwater recharge under the High Density Alternative would be a **less-than-significant, direct** impact. **No indirect** impacts would occur. ***[Lesser]***

IM

The Impact Minimization Alternative would require approximately 7,370 acre-feet of water per year. Based on the water demand estimate for this alternative, the water table is expected to be 6 feet higher in the long term. The reduced depth to groundwater would occur for the same reasons described above for the Proposed Project Alternative.

In addition, the minor effects on groundwater hydrologic conditions that would result from implementing the Impact Minimization Alternative would not appreciably alter the existing groundwater contaminant plumes that are in the process of being remediated by Aerojet and MDC. Therefore, potential project-related effects on groundwater recharge under the High Density Alternative would be a **less-than-significant, direct** impact. **No indirect** impacts would occur. ***[Similar]***

NF

Implementation of the No Federal Action Alternative would require approximately 8,118 acre-feet of water per year. Based on the water demand estimate for this alternative, and based on the results of the studies summarized above for the Proposed Project, High Density, and Impact Minimization Alternatives, it can be inferred that changes to the water table under the No Federal Action Alternative would be nearly identical to those that would occur under the Proposed Project Alternative as discussed above.

In addition, the minor effects on groundwater hydrologic conditions that would result from implementing the No Federal Action Alternative would not appreciably alter the existing groundwater contaminant plumes that are in the process of being remediated by Aerojet and MDC. Therefore, potential project-related effects on groundwater recharge under the No Federal Action Alternative would be a **less-than-significant, direct** impact. **No indirect** impacts would occur. ***[Similar]***

NP

Under the No Project Alternative, mining activities at the project site, which are not part of the Rio del Oro project, would continue under existing Conditional Use Permits—one originally issued by the County, and the other issued by the City—and possibly under one or more future individual Implementation Permits expected to be issued by the City. A minimal amount of water for mining activities (i.e., washing equipment and wetting on-site roads) would be obtained from East Well No. 1, which is located on the Clark Cattle Company site. This well is currently used for existing mining operations and is periodically monitored. Use of water from this well would not significantly affect groundwater resources.

Mining activities would remove a substantial amount of the existing dredge tailings from the project site. The hydrologic soil type governs the infiltration potential of soils and resulting recharge to the groundwater system. Because the dredge tailings are composed of piles of loose cobbles, they have the greatest water infiltration potential of any soil type in Sacramento County as ranked by the Natural Resources Conservation Service (NRCS 1993). The results of a hydrologic study performed by WRIME (2005) indicate that removal of the surface dredge tailings is not expected to substantially alter the project site's potential for groundwater recharge; the dredge tailings extend well below the ground surface (up to 60 feet), so the same hydrologic soil types would still be present to provide a similar amount of recharge. Mining activities would have a direct, less-than-significant impact on groundwater recharge.

Because no development would occur under the No Project Alternative, there would be no project-related direct or indirect impacts on groundwater recharge; thus, **no direct or indirect** impacts would occur. ***[Lesser]***

Mitigation Measure: No mitigation measures are required.

Project Level (Phase 1) Impacts and Mitigation Measures

IMPACT 3.4-6

Potential Increased Risk of Flooding from Increased Stormwater Runoff. *Implementation of development Phase 1 would increase the amount of impervious surface on this portion of the project site, thereby increasing surface runoff. This increase in surface runoff would result in an increase in both the total volume and the peak discharge rate of stormwater runoff, and therefore could result in greater potential for on- and off-site flooding.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.4-1 for further discussion of this impact.

Implementation of Mitigation Measure 3.4-1 would reduce the potentially significant impact associated with the potential increased risk of flooding from increased stormwater runoff under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.4-7	Exposure of People or Structures to a Significant Risk of Flooding as a Result of the Failure of a Levee. *Implementation of development Phase 1 could expose people or structures to a significant risk of flooding as a result of the failure of a levee.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.4-2 for further discussion of this impact.

IMPACT 3.4-8	Potential Temporary Construction-Related Drainage and Water Quality Effects. *Drainage and water quality impacts could result from construction activities at the project site with implementation of development Phase 1.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.4-3 for further discussion of this impact.

Implementation of Mitigation Measure 3.4-3 would reduce potentially significant water quality effects from temporary construction activities under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.4-9	Long-Term Water Quality Effects of Urban Runoff. *Development Phase 1 would convert a large area of undeveloped land to residential uses, thereby changing the amount and timing of potential waste discharges in stormwater runoff to drainage courses on-site.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. Refer to Impact 3.4-4 for further discussion of this impact.

Implementation of Mitigation Measure 3.4-1 would reduce the potentially significant impact associated with potential long-term water quality effects of urban runoff under the Proposed Project, High Density, Impact Minimization, and No Federal Action Alternatives to a **less-than-significant** level.

IMPACT 3.4-10	Effects on Groundwater Recharge. *Shallow and deep percolation of rainwater and related runoff and consequent depth to groundwater could be affected locally by the development of additional impervious surface, which may limit infiltration and recharge.*

Impacts would be the same under Phase 1 as under the program (entire project site) level analysis for all alternatives. However, it is anticipated that the recharge potential from development and subsequent landscape irrigation activities and the resulting elevation gain of the water table would be less than that predicted in the program level *Rio del Oro Development Project, Groundwater Impact Evaluation Technical Memorandum* (WRIME 2005). Refer to Impact 3.4-5 for further discussion of this impact.

CUMULATIVE IMPACTS

Local hydrology, drainage, and water quality conditions are often affected by regional activities, in addition to local activities and related projects. Past and present projects from the Sierra Nevada (dams and reservoirs, mining operations, logging, urban development) to the Sacramento–San Joaquin Delta (water supply diversions, agricultural diversions, flood control projects, urban development, river channelization) affect hydrology and water quality conditions in Sacramento County. The following evaluation of cumulative hydrology, drainage, and water quality impacts is made in light of the extent to which local and regional activities can affect hydrologic conditions in Sacramento County. However, the focus is on effects on water bodies in the project vicinity and

immediately upstream and downstream (e.g., Morrison Creek) and how the Rio del Oro project and related projects may affect the hydrology, drainage, and water quality conditions locally.

Surface Water Quality

The project, along with several related projects (e.g., Easton Master Planned Community, Sunrise Douglas Master Planned Community, Capital Village, and Villages of Zinfandel) would potentially discharge stormwater runoff to the Morrison Creek watershed, potentially degrading the water quality of the system. As indicated under Impact 3.4-4 of this DEIR/DEIS, the project would change the amount and timing of potential waste discharges in stormwater runoff to Morrison Creek and other drainage courses on-site from existing conditions. However, implementation of structural and nonstructural BMPs would reduce the overall amount of potential contaminant discharges compared to existing conditions.

There are no assurances that the related projects would incorporate the same degree or methods of treatment as the Rio del Oro project; however, each related project that would discharge stormwater runoff would be required to comply with NPDES discharge permits from the Central Valley RWQCB, which adjusts requirements on a case-by-case basis to avoid significant degradation of water quality. Therefore, while a greater quantity of urban runoff may be discharged to the Morrison Creek system, and ultimately to the Sacramento River, with implementation of the related projects because of an increase in impervious surface, the associated surface-water quality impacts of each project are expected to be less than significant because of improved or similar quality of runoff compared to existing conditions.

The Rio del Oro project, along with several of the related projects mentioned above, could require construction activities and facilities such as stormwater outfalls, utility crossings, discharges from storm drains, and accidental overflows, which could result in releases of sediment or contaminants to Morrison Creek or tributaries within the Morrison Creek watershed. Mitigation measures included in this section, as well as specific requirements to be included in the SWPPPs prepared for project development, would reduce or eliminate the potential for releases of sediment and contaminants. These measures would reduce impacts on water quality from construction activities associated with the project to less-than-significant levels by reducing releases of contaminants to below applicable water-quality protection standards. As discussed above, technical studies conducted regarding impacts of water-quality control features on groundwater and surface water have demonstrated that the use of a variety of BMPs (e.g., source control, detention basins, revegetation, and erosion control) have been able to maintain surface water quality conditions in adjacent receiving waters. For all of these reasons, the project would not result in a cumulatively considerable incremental contribution to any significant cumulative impacts.

Surface Drainage and Flood Control

The drainage facilities identified as part of the Rio del Oro project would be constructed to safely control and convey stormwater runoff. Proposed detention/water quality basins would mitigate peak runoff leaving the site to levels that downstream infrastructure (crossings) at the Folsom South Canal could convey. Additionally, the project would decrease the peak 100-year flow from the site (Wood Rodgers 2005). Future development upstream of the project site would be required to meet similar standards through mitigation as well. Therefore, the Rio del Oro project would not contribute at all to any cumulative impacts that might be caused by related projects, and it would not result in any cumulatively considerable contribution to any significant cumulative impacts.

Groundwater Quality

As discussed in Section 3.13, “Hazards and Hazardous Materials,” the Rio del Oro project and the related projects on Aerojet property would involve construction, demolition, and operation on land that is known to contain contaminated soil and groundwater. However, project implementation on 2,728 acres of the 3,828-acre site cannot occur until investigation and cleanup activities for remediation of contaminants identified in soil and soil vapor have satisfied the requirements of DTSC and Central Valley RWQCB. These requirements are intended to ensure that the residual concentrations of contaminants at the conclusion of cleanup activities are protective of human

health and the environment. Furthermore, the implementation of a SWPPP and associated BMPs would ensure that the project would not result in a cumulatively considerable incremental contribution to any significant cumulative impact related to groundwater quality or to any resulting hazards to public health.

3.4.4 RESIDUAL SIGNIFICANT IMPACTS

With implementation of the mitigation measure listed above, project implementation would not result in any residual significant impacts related to increased risk of flooding from stormwater runoff or levee failure, water quality effects from long-term urban runoff, short-term alteration of drainages and associated surface water quality and sedimentation, groundwater recharge, or groundwater quality.