This section was prepared by RMC Water and Environment.

3B.9 HYDROLOGY AND WATER QUALITY – WATER

3B.9.1 AFFECTED ENVIRONMENT

REGIONAL HYDROLOGY

The "Water" Study Area is characterized by a typical Mediterranean climate with wet, cool winters, and warm, dry summers. Most of the rainfall occurs between November and April with an average annual rainfall of 18 to 21 inches for the "Water" Study Area. The 10-year, 24-hour estimated precipitation amount for the "Water" Study Area is approximately 2.5 inches and the 100-year, 24-hour estimated precipitation is 3.75 inches (Western Regional Climate Center 2004).

The "Water" Study Area is located north of the Sacramento-San Joaquin Delta (Delta) within the Valley-American Hydrologic Unit, which is located at the southern end of the 27,210-square mile Sacramento River Basin. The Valley-American Hydrologic Unit is divided into two hydrologic areas, which are separated by the Lower American River, with the Coon-American Hydrologic Area (HA) located to the north and the Morrison Creek HA to the south. Natomas Central Mutual Water Company's (NCMWC's) service area or Zone 1 of the "Water" Facility Study Area, is situated in the western portion of the Coon-American HA along the Sacramento River. The conveyance improvements proposed by the City are located within Zone 4 of the "Water" Study Area and correspond with the northeastern section of the Morrison Creek HA. Exhibit 3B.9-1 illustrates this relationship. Section 3A.9, "Hydrology and Water Quality – Land" provides a description of the hydrologic conditions within the SPA.

In addition to these hydrologic areas, the "Water" Study Area includes an approximately 20-mile stretch of the Sacramento River; between River Miles 66 and 46. This portion of the Sacramento River corresponds with Zone 2 of the "Water" Study Area and would convey surface water not diverted by NCMWC to the south to the existing Freeport Project intake facility.

SACRAMENTO RIVER – ZONE 2 OF THE "WATER" STUDY AREA

Flows in the Sacramento River vary widely and are influenced by rainfall and upstream dams and diversions. Typically, the flow is highest during the winter and spring months and lowest in the summer and late fall. During the period of record (1949 through 2008), the maximum average daily flow at the Freeport gauging station was 115,000 cubic feet per second (cfs) on February 19, 1986 with a corresponding stage height of 25.00 feet; the minimum average daily flow was 3,970 cfs on October 15, 1977 (U.S. Geological Survey [USGS] 2003).

Over the past century, numerous water projects have been constructed as part of the Central Valley Project (CVP), the State Water Project (SWP), and other water storage and delivery projects developed by local water districts or purveyors. Total reservoir storage capacity in or affecting the Sacramento River basin is estimated at approximately 15,000,000 AF – or 15.0 MAF. Historically, these reservoirs have been operated to provide agricultural and domestic water supplies and flood control and, more recently, for other purposes including recreation and environmental releases (CALFED 2000).

To support agriculture and the urban populations of central and southern California, the CVP and State Water Project (SWP) were constructed to store and convey water from areas with surplus supplies to users in areas where demands exceed available local supplies. Exhibit 3B.9-1 shows the major components of the CVP and SWP that are located in the Sacramento River basin. The Sacramento River serves as the primary pathway to convey water southward to the Delta where water is re-diverted for agricultural and urban uses in the San Francisco Bay Area, San Joaquin Valley and southern California.

Over 400 water diversion intakes have been identified on the Sacramento River between Shasta Dam and the City of Sacramento. Of these diversion facilities, about 96% are reported to be unscreened or inadequately screened to protect anadromous fish from entrainment. The majority of these diversion intakes are located on the 140-mile reach between the City of Sacramento and the Colusa/Glenn County line (Herren and Kawasaki 2001).

Central Valley Project

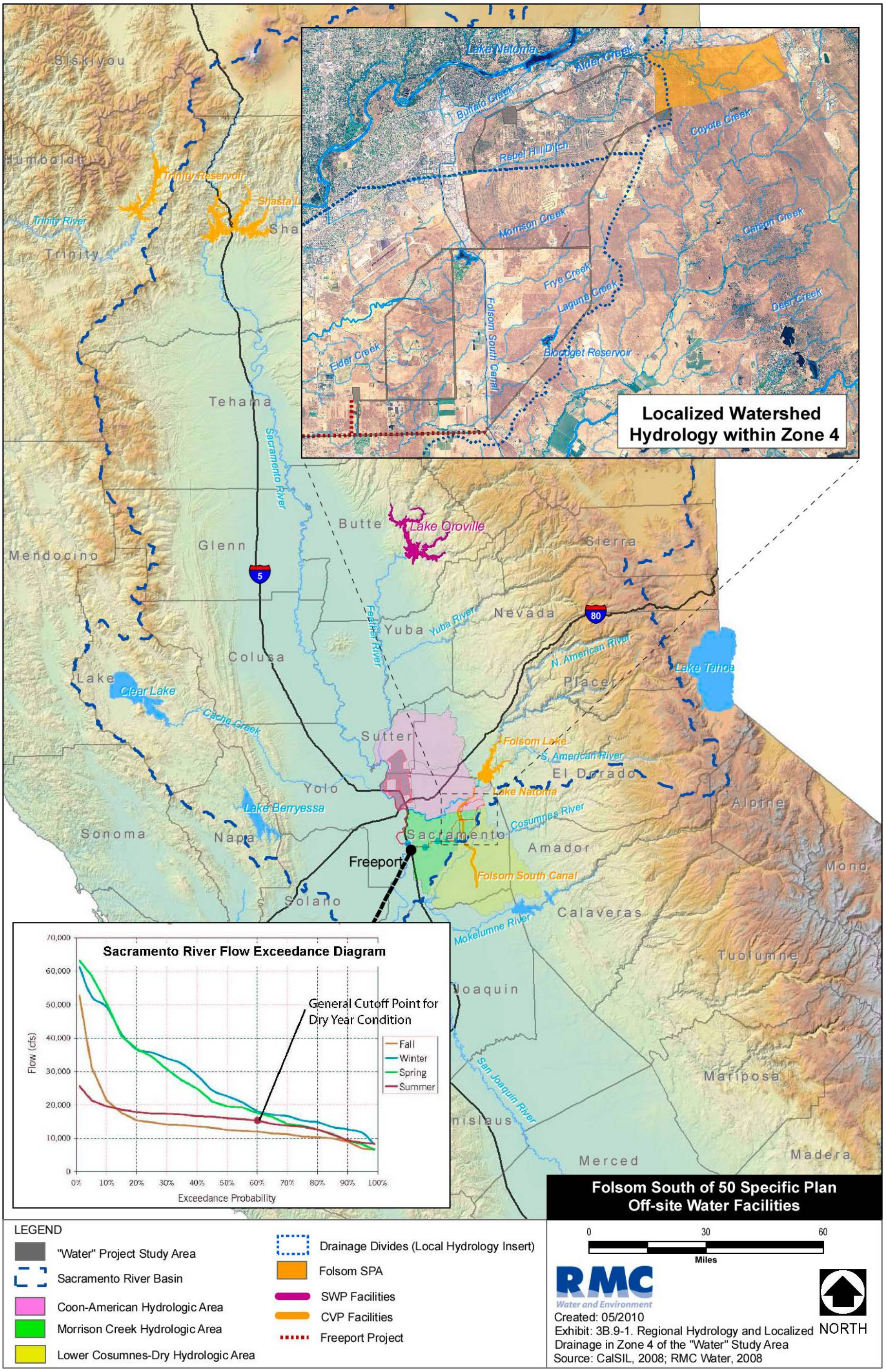
The CVP facilities consist of a series of reservoirs and conveyance canals on the Sacramento, American, Stanislaus, and San Joaquin Rivers. Major CVP reservoirs in the Sacramento River Basin are listed in Table 3B.9-1. The CVP is operated and maintained by the U.S. Bureau of Reclamation (Reclamation) and delivers approximately 7.0 MAF/yr of water to portions of the Sacramento and San Joaquin Valleys; communities in Placer, El Dorado, Sacramento Counties, the east and south San Francisco Bay areas; and fish hatcheries and wildlife refuges in the Central Valley.

Table 3B.9-1
Major Federal and State Reservoirs in the Sacramento River Basin

Reservoir Name	Stream	Capacity (TAF)	Owner
Shasta	Sacramento River	4,552	Recalamtion
Davis	Big Grizzly Creek	84	DWR
Antelope	Indian Creek	22	DWR
Frenchman	Little Last Chance Creek	55	DWR
Thermalito	Feather River	81	DWR
Oroville	Feather River	3,537	DWR
Folsom	American River	974	Reclamation
Stony Gorge	Stony Creek	50	Reclamation
East Park	Stony Creek	50	Reclamation
Whiskeytown	Clear Creek	241	Reclamation

Notes: Reclamation = U.S. Bureau of Reclamation; DWR = California Department of Water; TAF = thousand acre-feet
Source: SWRCB 1999

The CVP provides water to local users according to provisions of existing settlement contracts and water service contracts. Settlement contracts were executed with water users that hold senior water rights that were established before the CVP or were established independent of the CVP. These water rights include pre-1914 and post-1914 appropriative water rights. Generally, for these settlement contracts, Reclamation agreed to deliver a "base supply" corresponding to the estimated amount of the water contractor's prior-1914 water rights, and sometimes additional amounts of CVP water. Water service contracts were established with other parties who did not hold any prior rights to water on the Sacramento River or who desired to acquire additional water supplies beyond those provided by their water rights. The NCMWC holds a settlement contract with Reclamation that has both "base supply" and "project water" elements. The City would receive an assignment of part of that contract's project water.



Surface Water Hydrology and Localized Drainage **Exhibit 3B.9-1**

State Water Project

The SWP is administered by the California Department of Water Resources (DWR) and delivers water from northern California to users in portions of Butte and Sutter Counties, the San Francisco Bay area, San Joaquin Valley, and southern California. Twenty-nine entities have long-term water supply contracts for SWP water supplies with maximum delivery amounts totaling about 4.2 MAF, of which about 4.1 MAF are delivered to contracting agencies with service areas located south of the Delta.

Lake Oroville is used to store and regulate deliveries of SWP water (see Exhibit 3B.9-1). Water is released from Lake Oroville down the Feather and Sacramento Rivers and eventually flows into the Delta. Some of this water is diverted into the North Bay Aqueduct, which serves communities in Napa and Solano Counties. The remaining water travels further south in the Delta where it is re-diverted at the H.O. Banks Pumping Plant to the California Aqueduct.

Water-Year Classification and Flow Exceedance

The Sacramento Valley 40-30-30 Index (Index) was developed by the State Water Resources Control Board (SWRCB) as part of its Bay-Delta regulatory activities. The Index is computed as a weighted average of a water year's April-July unimpaired runoff (40%), the same water year's October–March unimpaired runoff (30%), and the previous water year's Index (30%). A cap of 10 MAF is put on the previous water year's index in order to account for required flood control reservoir releases.

A water year with a 40-30-30 Index equal to or greater than 9.2 MAF is classified as "wet," while a water year with an Index equal to or less than 5.4 MAF is classified as "critical." Water years with 40-30-30 index values between 5.4 and 9.4 MAF are classified as "above normal," "below normal," or "dry" (DWR 2004a).

Based on 30 years of data records (1968 through 1998) and spanning a variety of water year types, individual monthly average flows in the Sacramento River have ranged from a low of 4,500 cfs in October 1978 to a maximum of 87,000 cfs in January 1997. Overall, average monthly flows for the 30 years of record range between 13,000 and 40,600 cfs, with the lowest flows occurring in October and highest flows in February. The 30-year average monthly flow during the wetter months of December through May is 32,200 cfs. During the typically drier months of June through November the average monthly flow is 16,500 cfs. (Central Sacramento County Groundwater Management Plan [CSCGMP] 2006)

The exceedance diagram for the Sacramento River, based on 2020 forecasted conditions (this year is used in statewide surface water models), for each season is provided in Exhibit 3B.9-1. Forecasted conditions project the operation of reservoirs and regulation of stream flows into the future while imposing 73 years of historical hydrology on this operational scheme. For example, Exhibit 3B.9-1 indicates that up to approximately 15,000 to 27,000 cfs of Sacramento River water flows past Freeport Project diversion during the summer 60% of the time (see location of red dot on Exhibit 3B.9-1). This is the general cutoff point for a dry year condition. The remaining 40 percent of the time, approximately 8,000 cfs to 15,000 cfs flows past Freeport. More important is that approximately 8,000 cfs is flowing in the Sacramento River in all seasons (100% of the time), even in the most critically dry conditions (CSCGMP 2006).

California Simulation Model II

The California Simulation Model II (CALSIM II) is a water resources planning model for the CVP and SWP Systems[1], jointly developed by DWR and Reclamation. The primary purpose of CALSIM II is to evaluate the water supply reliability of the CVP and SWP with and without various assumed facilities, and with different modes of facility operations. Operations of many other local facilities were also incorporated at varying levels of

[1] CALSIM II's geographic coverage includes the valley floor drainage area of the Sacramento and San Joaquin Rivers, upper Trinity River, a portion of the Tulare Basin, and Southern California areas served by the CVP and SWP.

detail. For this analysis, the CALSIM II model includes the operation of the Freeport Project and applies the Long-Term CVP and SWP Operations Criteria and Plan (OCAP) as the modeling base. Detailed modeling assumptions can be found in the OCAP Biological Assessment (Reclamation 2009) and in the Benchmark Studies Assumptions Document (Reclamation/DWR 2002).

LOCALIZED DRAINAGE FOR ZONE 4 OF THE "WATER" STUDY AREA

Morrison Creek Stream Group

Much of Zone 4 of the "Water" Study Area is located within the drainage are comprising the Morrison Creek Stream Group, which drains an area of approximately 53.4 square miles. These drainage features are illustrated in the insert of the upper right-hand corner of Exhibit 3B.9-1. Stream flow data has been collected from 1959 through 1987 and again in 1997 through present. Based on these periods of measurement, the maximum discharge for Morrison Creek was 2,730 cubic feet per second (cfs), which occurred on February 17, 1986. No observed flow occurred during the summers of 1960, 1962, and 1965 (USGS 2003).

Morrison Creek and the other contributing streams (Elder, Frye, and Laguna Creeks) are mostly channelized west of Sunrise Boulevard. Each drainage feature has been significantly altered from its original drainage path into a more-or-less linear, trapezoidal cross-section containing little or no riparian vegetation. Flows within the winter months generally consist of localized stormwater runoff. During the summer months, two of the creeks experience low-velocity return flows from a wide-range of urban uses. Typically, the flow is highest during the winter and spring months and lowest in the summer and late fall. Flows within Morrison Creek either empty into Beach-Stone Lakes or are pumped into the Sacramento River by a series of pumps operated by the City of Sacramento.

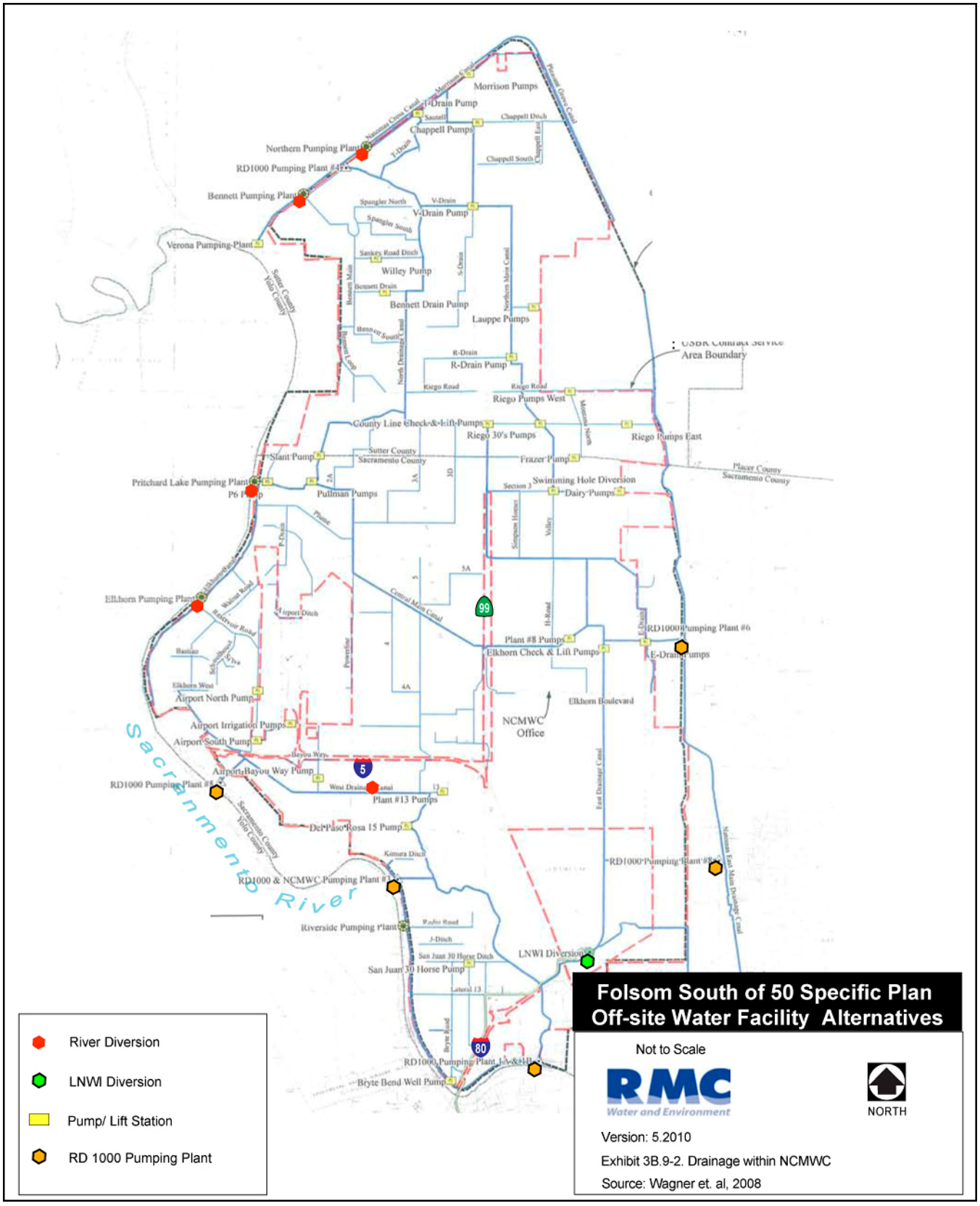
Alder and Buffalo Creeks

Surface runoff in areas generally north of White Rock Road drains into Alder Creek or Buffalo Creek. Alder Creek drains an area of 7,146 acres into the American River via Lake Natoma (MacKay & Somps 2004). Alder Creek is an unlined, perennial stream within a relatively deep ravine. It contains a small pond (Alder Creek Pond) that was created by a human-made impoundment about 1,000 feet east of Folsom Boulevard.

Buffalo Creek drains a 470-acre area south of Alder Creek's watershed and drains into an aqueduct off the American River approximately one mile west of Zone 4 of the "Water" Study Area (see inset in Exhibit 3B.9-1). Buffalo Creek between the Aerojet administrative complex and the American River is an improved, unlined trapezoidal drainage and flood control channel (MacKay & Somps 2004). Buffalo Creek crosses the FSC through a 20-foot-wide concrete flume and then flows northerly through culverts under the Regional Transit Light Rail tracks, Folsom Boulevard, and U.S. 50. Large diameter culvert crossings are also located at Coloma Road, Gold Express Drive, Gold Country Drive, and South Bridge Street.

NATOMAS CENTRAL MUTUAL WATER COMPANY SERVICE AREA – ZONE 1 OF THE "WATER" STUDY AREA

NCMWC currently maintains three water-pumping plants along the Sacramento River and two along the Natomas Cross Canal (see Exhibit 3B.9-2). These pumping plants divert surface water into NCMWC's service area. Currently, the combined Sacramento River diversion capacity for the five systems is 630 cfs. In cooperation with the California Department of Fish and Game (DFG) and Reclamation, NCMWC is proposing to consolidate its existing diversion/intakes into two new facilities with fish screens on the Sacramento River. Further information on this proposal is provided in the supporting EIR/EIS (State Clearinghouse No. 2003092006), which is available for download at http://www.usbr.gov/mp/nepa/documentShow.cfm?Doc_ID=3301.



NCMWC Service Area and Drainage Facilities **Exhibit 3B.9-2**

Within the NCMWC's service area, surface water is distributed to its shareholders via five primary irrigation systems that are interlinked. The systems are supplied by the five existing pumping plants discussed above and include the Northern, Bennett, Central, Elkhorn, and Riverside System(s). NCMWC's canal systems use gravity for deliveries by maintaining water levels above that of surrounding ground levels. Reclamation District (RD) 1000's drainage canals also are used by NMCWC to distribute water within its service area (see Exhibit 3B.9-2).

NCMWC operates a closed system whereby tailwater (i.e., runoff from the fields) within the system is recirculated as irrigation supply. Water is pumped into the canal system, mixed with the tailwater, and distributed throughout the service area. The water is lifted again to the highline canals or applied directly to the fields.

The water is recirculated to the Riverside, Central, Bennett, and Northern systems using RD 1000's Pumping Plants Nos. 2, 3, and 4. Recirculation to the Elkhorn System has never been established due to lack of access to the drainage systems. At the end of the irrigation season, the tailwater is pumped back into the Sacramento River (generally, 2 to 5 thousand acre feet). The rice fields serve as a filtering mechanism that cleans the water as it is used during the irrigation season, and then held in a settling basin before release.

FLOODING

The Federal Emergency Management Agency (FEMA) provides information on flood hazard and frequency for cities and counties on its Flood Insurance Rate Maps (FIRM) and identifies designated zones of flood hazard potential. In general, flooding occurs along waterways and in areas with constricted storm drain systems or surface water ponding. The Sacramento River and its tributaries that flow through the Sacramento Valley form part of the drainage system covering over 27,210 square miles including northern portions of the Sierra Nevada and Coast Range. High flows of moderate duration within the river basin can result in flooding at downstream locations during intense rainstorms. In addition, snowmelt in the Sierra Nevada can produce high flows of longer duration during the spring.

In addition to the major reservoirs, which are also managed to provide storage for flood control purposes, a flood damage reduction system was constructed in the Sacramento Valley to control and direct high river flows away from urban areas and to minimize hazards to adjacent land uses, improvements, and populations. The flood damage reduction system consists of a series of levees and bypasses, located to take advantage of natural overflow basins. The system includes: levees along the Sacramento River south of Ord Ferry; levees along the lower portions of the Feather, Bear, and Yuba Rivers; levees along the American River; and, the Colusa, Sutter, and Yolo Bypasses.

Bypasses are located parallel to the Sacramento River and receive excess flows from the Sacramento, Feather, and American Rivers through a series of overflow channels and weirs. When flows of the Sacramento River are high, the three bypasses form one continuous waterway flowing to the Delta. The Sacramento River intersects these bypasses at several locations, including: the Butte Slough Outfall Gates, the Fremont Weir at Verona, the Sacramento Weir north of the American River confluence, and the East Levee Toe Drain at the terminus of the Yolo Bypass upstream of Rio Vista (U.S. Army Corps of Engineers [USACE] 2002). This system of levees and flood control weirs provides flood protection to Zones 1, 2, and 3 of the "Water" Study Area, portions of which are contained within the limits of a 100-year flood event (Federal Emergency Management Agency [FEMA] 1998). Zone 4 of the "Water" Study Area is generally situated outside the limits of the 500-year flood zone with the exception of localized drainage channels, which are delineated within the 100-year flood zone.

SEICHE/TSUNAMI

Tsunamis originating in the Pacific Ocean would dissipate in the San Francisco Bay, and therefore pose a negligible hazard to the "Water" Study Area, due to its inland location. Seiches, while having no recorded occurrences within Sacramento County in the historic record, could occur in the Sacramento River under the right circumstances thereby potentially overtopping levees or lead to levee failure. However, based on water depths

within Sacramento River and the low expected ground motions anticipated for the "Water" Study Area (see Section 3B.7, "Geology, Soils, and Paleontological Resources – Water"), the risk of a seiche of sufficient magnitude to overtop the levees is low and is not discussed further in the "Water" sections of this EIR/EIS.

WATER QUALITY

Sacramento River

Water quality within the Sacramento River is generally good, and supports a variety of beneficial uses including drinking water supplies, irrigation supplies, recreation, and protection of fish and other aquatic life (Domagalski et al., 2000). Because most of the water in the Sacramento River and its major tributaries (Yuba, Feather, and American Rivers) is derived from melting snow that enters the rivers through managed discharges from upstream reservoirs, these waterways yield exceptionally high quality runoff, carrying low concentrations of dissolved minerals, sediments, and other constituents.

As water moves downstream through the watershed, it accumulates various pollutants and constituents from a variety of sources. Major sources of constituents that are added to the river include: soils eroded from upland and riparian areas; discharges from agricultural practices, including increased salts, pesticides, and soils; runoff from urban land uses containing oils, grease, and other materials; and discharges from municipal wastewater treatment facilities that may contribute a variety of nutrients, organic materials and disinfectants, such as chlorine.

Untreated water diverted at the City of West Sacramento Bryte Bend WTP, located on the Sacramento River and at the approximate midway point between the NCMWC service area and the Freeport Project intake/diversion facility, shows good water quality with no constituents exceeding applicable drinking water standards or posing a threat to other beneficial uses. Table 3B.9-2 shows water quality data obtained from this location. As monitored at the Bryte Bend WTP, untreated water routinely meets all drinking water maximum concentration levels (MCLs) except for turbidity, odor, and iron. As is typical in an undisinfected water source, the water contains elevated bacterial counts. No regulated volatile organic chemicals or synthetic organic chemicals have been detected.

Table 3B.9-2
Raw and Treated Water Quality Data for the Bryte Bend Water Treatment Plant

Parameter	Units	Municipal Drinking Water Standards				Treated Sacramento River Water			Raw Sacramento River Water		
		MCL	SMCL	PHG (MCLG)	DLR	Min	Max	Avg	Min	Max	Avg
Aluminum	ppb	1,000		600	50	29	130	66	150	570	360
Arsenic	ppb	10		0.004	2	<2	<2	<2	1.5	2	2
Barium	ppm	1		2	.1	<0.1	<0.1	<0.1	23	33	27.6
Chromium (total)	ppb	50		(100)	10	<10	<10	<10	<5	2.4	NA
Fluoride	ppm	2.0		1	.1	<0.1	<0.1	<0.1	<0.1	0.1	NA
Nickel	ppb	100		12	10	<5	<5	<5	<5	3	NA
Nitrate as NO_3	ppm	45		45	2	<2	<2	<2	<0.1	0.87	NA
Selenium	ppb	50		(50)	5	<5	<5	<5	<5	<5	<5
Gross Alpha particle activity	pCi/L	15		(0)	3	<1.0	0.00	<2.25	<1	<1.03	NA
Gross Beta particle activity	pCi/L	50		(0)	4	<0.75	0.00	<2.20	0	0	0
Trichloroethylene	ppb	5		0.8	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table 3B.9-2
Raw and Treated Water Quality Data for the Bryte Bend Water Treatment Plant

Parameter	Units	Municipal Drinking Water Standards				Treated Sacramento River Water			Raw Sacramento River Water		
		MCL	SMCL	PHG (MCLG)	DLR	Min	Max	Avg	Min	Max	Avg
Total coliform bacteria	% positive samples	5% per mo.		(0)			0				
Trihalomethanes (total)	ppb	80		NA	0.5						
– Bromodichloromethane	ppb				0.5	4.2	5.5	4.9	<0.5	<0.5	NA
– Bromoform	ppb				0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA
– Chloroform	ppb				0.5	20	20	20	<0.5	<0.5	NA
– Dibromochloromethane	ppb				0.5	0.8	0.8	0.8	<0.5	<0.5	NA
Secondary Drinking Water Standard											
Chloride	ppm		500	NS		4	9	6	3	7	5
Copper	ppm		1	NS	0.05	<0.1	<0.1	<0.1	2.8	6.4	4.6
Iron	ppb		300	NS	100	<20	<20	<20	95	680	411
Manganese	ppb		50	NS	20	<2	<2	<2	30	30	30
pH	units		6.5–8.5	NS		7.6	8.4	8.0	7.8	7.9	7.8
Specific Conductance	µmhos/ cm		1,600	NS		149	226	179	138	195	166
Sulfate	ppm		500	NS	0.5	14	16	15	5	10	7
Total dissolved solids	ppm		1,000	NS		100	154	120	76	126	104
Turbidity	NTU		5	NS	0.1	*	0.05	*	*	*	*
Zinc	ppm		5.0	NS	0.05	0.02	0.1	0.04	*	*	*
Other Inorganic Constituents											
Alkalinity (total)	ppm			2		47	80	68	56	75	69
Bicarbonate alkalinity	ppm			2		57	97	81	68	91	82
Boron	ppb				100	*	*	*	69	70	69.5
Calcium	ppm			1		12	16	13	12	59	27
Hardness as CaCO3	ppm			3		55	78	64	55	75	62
Magnesium	ppm			0.1		6	9	7	6	8.5	7.2
Potassium	ppm			1		1.0	1.3	1.1	<1	1.3	NA
Sodium	ppm			1		8	15	13	7.8	10	8.7

Notes:
DLR – Detection Limit for purposes of reporting
MCL – Maximum Contaminant Level
MCLG – Maximum Contaminant Level Goal
Umhos/cm – micromhos per centimeter
NA – Not Applicable
ND – Not Detected
NS – No Standard
NTU – Nephhelometric turbidity unit
pCi/L – picocuries per liter
PHG – Public Health Goal
ppb – parts per billion
ppm – parts per million
SMCL – Secondary Maximum Contaminant Level
* - note sampled or not reported

Source: City of West Sacramento 2007 and 2008

Total Maximum Daily Loads

A total maximum daily load (TMDL) refers to the amount of a specific pollutant a river, stream or lake can assimilate and still meet federal water quality standards as provided in the Clean Water Act. A TMDL accounts for all sources of pollution, including point sources, non-point sources, and natural background sources. Section 303(d) of the Clean Water Act requires that regulatory agencies determine TMDLs for all water bodies that do not meet water quality standards, and the Section 303(d) list of impaired waterbodies provides a prioritization and schedule for development of TMDLs for the State.

Generally, the government agency that has permitting authority develops and implements the TMDLs. This written document includes the sources of the pollutant (both point and nonpoint sources) and designates a specific amount of the impairing pollutant that each source can contribute. To implement the TMDL, the agency works with local governments and the public to determine how to reduce pollutant loads to bring the impaired water into compliance. Implementation often involves BMPs or additional regulation of point-source discharges.

The SWRCB, in compliance with Section 303(d) of the Clean Water Act (33 USC Section 1313[d]) prepared, and EPA-approved, a 2006 list of "impaired" water bodies in the State of California. The list includes a priority schedule for the development of TMDLs for each contaminant or "stressor" impacting the water body. The Sacramento River (from Knights Landing to the Delta) is identified in the 2006 California Section 303(d) List and TMDL Priority Schedule as an impaired water body for the following contaminants: mercury, and unknown toxicity (SWRCB 2007). The Delta (eastern portion), downstream of Zone 2 of the "Water" Study Area, has been designated as impaired for a variety of contaminants, including pesticides (chlorpyrifos, DDT, diazinon, and Group A pesticides) resulting from agricultural and urban runoff/storm sewers, mercury (from abandoned mine drainage), exotic species, and unknown toxicity (unknown cause).

Sacramento County Coordinated Monitoring Program

Water quality conditions within Morrison Creek were characterized in a recent sampling program conducted in conjunction with Sacramento County's Coordinated Monitoring Program (Camp Dresser & McKee and Laboratory Data Consultants 2004). This sampling effort provides the most recent water quality data available for Morrison Creek and the first monitoring data for Morrison Creek to be included in the County's coordinated monitoring program. The data set represents a limited set of conditions in the watershed; however, provides a general assessment of water quality conditions and reflect several distinct seasonal differences typical of urbanized area streams.

The wet-weather (winter storm) event samples recorded low levels of conventional inorganic minerals. The wet-weather samples consistently demonstrated elevated counts of coliform bacteria and total suspended solid (TSS) levels 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 also detected 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. (Camp Dresser & McKee and Laboratory Data Consultants 2004).

Dry-weather samples from Morrison Creek were evaluated for only a selected set of parameters; however, it is apparent that concentrations for TSS, 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 wet-weather event samples. (Camp Dresser & McKee and Laboratory Data Consultants 2004).

Sacramento-San Joaquin Delta

Water quality in the Delta changes in response to freshwater inflow, tidal action, releases from upstream reservoirs, agricultural and water supply diversions, and discharges into the Delta system. Seasonal trends reflect the effects of higher spring/summer runoff and fall/winter low-flow periods.

Trends in water quality in the Delta reflect the effects of inflows, tidal exchanges with the San Francisco Bay, diversions, and pollutant releases in the Delta. The north Delta tends to have better water quality in large part because of the inflow from the Sacramento River. The quality of water in the west Delta is strongly influenced by tidal exchange with the San Francisco Bay. During low-flow periods, seawater intrusion results in increased salinity. In the south Delta, water quality tends to be poorer because of the combination of inflows of poorer water quality from the San Joaquin River, agricultural return flows from Delta islands, and effects of CVP and SWP pumping that can sometimes increase seawater intrusion from the Bay. Delta water quality is influenced by the following:

- Discharges from Delta islands that have elevated concentrations of total organic carbon and salts.
- High-salinity water from Suisun and San Francisco Bays that intrudes into the Delta during periods of lower Delta outflow.
- Bromides associated with seawater that lead to the formation of brominated compounds in treated water supplies.
- Agricultural drainage into the Delta that can contain elevated levels of nutrients, suspended solids, organic carbon, salinity, selenium, and boron in addition to pesticides.
- Heavy metals, including cadmium, copper, mercury, and zinc, continue to enter the Delta. Sources of these metals include runoff from abandoned mine sites, tailings deposits, downstream sediments where metals have been deposited over the past 150 years, urban runoff, and industrial and municipal wastewater.

Concentrations of total dissolved solids (TDS) in the western Delta result primarily from the intrusion of saline water from the San Francisco Bay system. The extent of seawater intrusion into the Delta is a function of daily tidal fluctuations, freshwater inflow from the Sacramento and San Joaquin Rivers, the rate of exports at the SWP/CVP intake pumps, and the operation of various control structures (e.g., Delta Cross-Channel Gates and Suisun Marsh Salinity Control System) (DWR 2001).

Water Rights Decision D-1641 (X-2)

Water Rights Decision D-1641 establishes requirements for Delta outflow, known as "X-2" requirements. The term X-2 specifically refers to the location of 2 parts per thousand (ppt) salinity within the Delta. Its position varies and is measured in kilometers upstream of the Golden Gate Bridge. The length of time that X-2 must be positioned at set locations in the Delta each month is determined by a formula that considers the previous month's inflow to the Delta from the Sacramento and San Joaquin Rivers. February through June are the months regulated by this X-2 standard.

X-2 is currently used as the primary indicator in managing Delta outflows. It also reflects a variety of biological consequences related to the magnitude of: (1) fresh water flowing downstream through the Delta, and (2) saltwater moving upstream within the lower portion of the Delta. The outflow that determines the location of X-2 also affects the upstream and downstream movements of various aquatic organisms, as well as overall water operations of the CVP and SWP. The Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta defines requirements for maintaining X-2 at Port Chicago and Chipps Island (RWQCB, Region 2 2007).

3B.9.2 REGULATORY FRAMEWORK

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The following Federal plans, policies, regulations, and laws related to water quality and flooding are relevant to the Off-site Water Facilities alternatives, and are described in detail in Section 3A.9, "Hydrology and Water Quality – Land:"

- Federal Clean Water Act (CWA)
- Water Quality Criteria and Standards, Section 303 and 303(d) of the CWA
- National Pollutant Discharge Elimination System Permit Program
- Section 401 CWA Water Quality Certification or Waiver
- Antidegradation Policy
- Safe Drinking Water Act
- Federal Emergency Management Agency (FEMA)
- U.S. Army Corps of Engineers Sacramento and San Joaquin River Basins Comprehensive Study

Central Valley Project Improvement Act

On October 30, 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA) under Public Law 102-575. The CVPIA modified the priorities of the CVP and established aggressive goals for the restoration of the fish and wildlife in California's Central Valley. The CVPIA provided the Secretary of the Interior with a number of authorities as tools to accomplish those goals. At the same time, the CVPIA recognized that additional management and measurement tools were needed and would be developed over time. In order to assist urban areas, agricultural water users, and others in meeting their future water needs, the CVPIA authorized all individuals or districts who receive CVP water under water service or repayment contracts, water rights settlement contracts (e.g., NCMWC) or exchange contracts to transfer, subject to certain terms and conditions, all or a portion of the water subject to such contract to any other California water users or water agency, State or Federal agency, Indian Tribe, or private non-profit organization (e.g., Applicants) for project purposes or any purpose recognized as beneficial under applicable State law.

One of the purposes of the CVPIA is to improve the operational flexibility of the CVP and to increase water-related benefits provided by the CVP to the State of California through expanded use of voluntary water transfers and improved water conservation. In addition, the CVPIA included ten major areas of change: (1) 800,000 acre-feet of water dedicated to fish and wildlife annually; (2) tiered water pricing applicable to new and renewed contracts; (3) water transfers provision, including sale of water to users outside the CVP service area; (4) special efforts to restore anadromous fish population by 2002; (5) restoration fund financed by water and power users for habitat restoration and enhancement and water and land acquisitions; (6) no new water contracts until fish and wildlife goals achieve; (7) no contract renewals until completion of a Programmatic Environmental Impact Statement; (8) terms of contracts reduced from 40 to 25 years with renewal at the discretion of the Secretary of the Interior; (9) installation of the temperature control device at Shasta Dam, fish passage measures at Red Bluff Diversion Dam; and (10) firm water supplies for Central Valley wildlife refuges along with development of a plan to increase CVP yield. Those CVP changes that facilitate the Off-site Water Facility Alternatives include the water transfers provision, which dictates the sale of water to users outside the CVP service area.

Operations Criteria and Plan for Long-Term Operation of the Central Valley Project/State Water Project

Reclamation prepared its Operations Criteria and Plan (OCAP) for the Long-term Operation of the CVP/SWP in 2008 in response to a biological opinion (BO) from USFWS in 2004 (Reclamation 2008). The 2008 OCAP covers the continued operation of the CVP and SWP and includes the operation of the temporary barriers project in the south Delta and the 500 cfs increase in SWP Delta export limit July through September. In addition to current day

operations, the OCAP outlines operation relationships to the following related actions: (1) an intertie between the California Aqueduct (CA) and the Delta-Mendota Canal (DMC), (2) Freeport Project, (3) the operation of permanent gates, which will replace the temporary barriers in the South Delta, (4) changes in the operation of the Red Bluff Diversion Dam (RBDD), and (5) Alternative Intake Project for the Contra Costa Water District (CCWD). A detailed summary of all operational components and associated modeling assumptions are included in the 2008 OCAP, which is available for reviewing at: http://www.usbr.gov/mp/cvo/ocap_page.html.

NCMWC takes its water deliveries from the CVP's Shasta Division, which includes facilities that provide the following benefits: (1) flood control, (2) navigation maintenance, (3) agricultural water supplies, (4) M&I water supplies (5) hydroelectric power generation, (6) conservation of fish in the Sacramento River, and (7) protection of the Sacramento-San Joaquin Delta from intrusion of saline ocean water. The Shasta Division includes Shasta Dam, Lake, and Powerplant; Keswick Dam, Reservoir, and Powerplant, and the Shasta Temperature Control Device.

The Sacramento River Division of the CVP was authorized after completion of the Shasta Division. Total authorized diversions for the Sacramento River Division are approximately 2.8 million AFY. Historically the total diversion has varied from 1.8 million AFY in a critically dry year to the full 2.8 million AFY in wet years. It includes facilities for the diversion and conveyance of water to CVP contractors on the west side of the Sacramento River. The division includes the Sacramento Canals Unit, which was authorized in 1950 and consists of the RBDD, the Corning Pumping Plant, and the Corning and Tehama-Colusa Canals.

Reclamation operates the Shasta, Sacramento River, and Trinity River divisions of the CVP to meet (to the extent possible) the provisions of SWRCB Order 90-05. If Reclamation cannot meet the SWRCB order an exception will be requested. An April 5, 1960, Memorandum of Agreement (MOA) between USBR and the DFG originally established flow objectives in the Sacramento River for the protection and preservation of fish and wildlife resources. The MOA provided for minimum releases into the natural channel of the Sacramento River at Keswick Dam for normal and critically dry years. Since October 1981, Keswick Dam has operated based on a minimum release of 3,250 cfs for normal years from September 1 through the end of February, in accordance with an agreement between Reclamation and DFG. This release schedule was included in SWRCB Order 90-05, which maintains a minimum release of 3,250 cfs at Keswick Dam and RBDD from September through the end of February in all water years, except critically dry years.

Flood Control

Under Executive Order 11988 FEMA is responsible for management of floodplain areas defined as the lowland and relatively flat areas adjoining inland and coastal waters subject to a one percent or greater chance of flooding in any given year (the 100-year floodplain). FEMA requires that local governments covered by Federal flood insurance pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the 100-year floodplain.

FEMA is currently sponsoring a national FIRM map revision program, which consists of converting their existing floodplain delineation map to digital maps that are GIS compatible. DWR is assisting FEMA with this conversion. According to DWR, FEMA considers this digital conversion to be a "new study" and, therefore, all requirements of Chapter 10 of 44 CFR are considered applicable to the floodplain. Where insufficient geotechnical information is available to evaluate the integrity of the levee, the levee will be considered uncertified and not able to provide protection for the base flood (one percent annual chance flood). This map revision process is not expected to change the current flood designations for areas crossed as part of the Off-site Water Facility Alternatives.

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 Act enacted in 1986 established an accelerated schedule for setting MCLs for drinking water.

EPA has delegated to the California Department of Public Health (CDPH) the responsibility for administering California's drinking-water program. CDPH 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 and shown for certain constituents in Table 3B.9-2.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The following state plans, policies, regulations, and laws related to water quality and flooding are relevant to the Off-site Water Facilities alternatives, and are described in detail in Section 3A.9, "Hydrology and Water Quality – Land:"

- Title 22 Standards
- Porter-Cologne Water Quality Control Act
- California State Nondegradation Policy
- California Toxics Rule and State Implementation Plan
- National Pollutant Discharge Elimination System (NPDES) Permit System and Waste Discharge Requirements for Construction
- NPDES Municipal Stormwater Permit Program, Sacramento County and the City of Folsom are co-permittees for a regional NPDES MS4 permit through the Central Valley RWQCB. First issued in 1990, the latest permit was adopted on 11 September, 2008 (NPDES Permit No. CAS082597, WDR Order No. R5-2008-0142
- Senate Bill (SB) 5, the Central Valley Flood Protection Act of 2008
- Central Valley Flood Protection Plan

State Water Resources and Regional Water Quality Control Boards

The SWRCB carries out its water quality protection authority through the adoption of specific Water Quality Control Plans (Basin Plans). These plans establish water quality standards for particular bodies of water. California water quality standards are composed of three parts: the designation of beneficial uses of water, water quality objectives to protect those uses, and implementation programs designed to achieve and maintain compliance with the water quality objectives.

The Central Valley RWQCB is responsible for the Water Quality Control Plan, Central Valley Basin (RWQCB 2004). The RWQCB implements management plans to modify and adopt standards under provisions set forth in Section 303(c) of the Federal CWA and California Water Code (Division 7, Section 13240). Under Section 303(d) of the 1972 CWA, the State is required to develop a list of waters with segments that do not meet water quality standards. The law requires RWQCB to establish priority rankings for waters on the lists and develop action plans, referred to as TMDL, to improve water quality.

The SWRCB adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Board 2000). This policy provides implementation measures for numerical criteria contained in the California Toxics Rule, promulgated in May 2000 by the U.S. EPA. When combined with the beneficial use designations in the Basin Plan, these documents establish statewide water quality standards for toxic constituents in surface waters.

Basin Plans and Water Quality Objectives

Basin Plans designate beneficial uses for California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Beneficial uses represent the services and qualities of a water body (i.e., the reasons why the water body is considered valuable), while water quality objectives represent the standards necessary to protect and support those beneficial uses. Basin plans are primarily implemented by using the NPDES permitting system and the issuance of waste discharge requirements (WDRs) to regulate waste discharges so that water quality objectives are met. Basin plans provide the technical basis for determining waste discharge requirements and taking regulatory enforcement actions if deemed necessary.

Basin plans have been adopted for the Sacramento and San Joaquin River Basin (Central Valley RWQCB 2004) and for the San Francisco Bay Region (San Francisco Bay RWQCB 2007). Both the Central Valley and San Francisco Bay RWQCBs (Regions 5 and 2, respectively) have set water quality objectives for all surface waters in their respective regions for the following substances and parameters: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. In addition, Region 2 has adopted standards for bioaccumulation, population and community ecology, sulfides, and constituents of concern for municipal and agricultural water supplies, while the Central Valley RWQCB has adopted standards for pesticides.

Specific objectives for concentrations of chemical constituents are also applied to bodies of water based on their designated beneficial uses (Central Valley RWQCB 2004; San Francisco Bay RWQCB 2007). Beneficial uses applied to the Sacramento River include municipal supply, irrigation, stock watering, industrial, power, warm and cold freshwater habitat, navigation, spawning, migration, and contact and non-contact recreation. Water quality objectives applicable to all groundwaters have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and in Central Valley Region 5, for toxicity (Central Valley RWQCB 2004; RWQCB, San Francisco Bay 2007).

NPDES Program – Industrial Activities

Operation of the Off-site Water Facility Alternatives would require compliance with the requirements of the NPDES permit for Discharges of Stormwater Associated with Industrial Activities. This general NPDES permit covers all stormwater and some non-stormwater discharges associated with certain industrial activities. The Off-site Water Facilities would be covered according to its North American Industry Classification System (NAICS), No 22131. Additional activities associated with the site, such as vehicle maintenance would also trigger coverage.

The City is required to submit a Notice of Intent to the Central Valley RWQCB to file for a NPDES General Industrial Permit for Stormwater Discharges. The General Industrial Permit requires control of pollutant discharges using best available technology economically achievable (BAT) and best conventional pollutant technology (BCT) to prevent pollutants as necessary to meet water quality standards. Also, all facility operators must prepare, retain on site, and implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP has two objectives: 1) to help identify the sources of pollution that affect the quality of industrial stormwater and non storm discharges; and 2) to describe and ensure the implementation of BMPs to reduce or prevent pollutants in the discharges. Development and implementation of BMPs constitutes compliance with BAT and BCT and, in most cases, compliance with water quality standards.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND LAWS

The following regional and local plans, policies, regulations, and laws related to water quality and flooding are relevant to the Off-site Water Facilities alternatives, and are described in detail in Section 3A.9, "Hydrology and Water Quality – Land:"

- Sacramento Stormwater Quality Partnership
- Sacramento County General Plan, Agricultural, Conservation, and Safety Elements

Sacramento County General Plan

The following additional Sacramento County General Plan goals and policies as contained in the Conservation Element are relevant to the Off-site Water Facilities:

GOAL: Surface water quality which promotes a healthy aquatic environment, and is safe for public use and enjoyment.

GOAL: Adequate long-term quantity and high quality of ground water resources for both human and natural systems.

- **Policy CO-11:** Hazardous materials shall not be stored in the 100 year floodplain in such a manner as to pose a significant potential for surface water contamination.

Sacramento Water Forum

The Sacramento Water Forum process brought together a diverse group of stakeholders that included water managers, business and agricultural leaders, environmentalists, citizen groups, and representatives of local governments to evaluate available water resources and the future water needs of the Sacramento Metropolitan Area. The coequal objectives of the Water Forum Agreement (WFA) are (1) to provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and (2) to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The first objective will be met by additional diversions of surface water for the conjunctive use of surface water and groundwater, expanded water demand management programs, and use of recycled water. The second objective will be met by regulating American River flow patterns (or "modifying" American River flow) to improve in-stream fish habitat (spawning/hatching/rearing), as well as implementation of the Habitat Management Element of the WFA.

Demand management/water conservation is essential to meeting the coequal objectives of the WFA. As a signatory to the WFA and as a water contractor under Reclamation's CVP, the City is committed to implementing the water conservation best management practices (BMPs) defined in the Water Conservation Element of the WFA. Technical studies prepared in support of the WFA indicate that implementation of the BMPs (most notably the provision for water meter retrofits and demand pricing) will result in a demand factor reduction of 25.6% relative to the 1990 baseline by the year 2030.

The Water Forum EIR (State Clearinghouse No. 1995082041), certified in 1999, evaluated the City's water supply needs in combination with other water supply needs in the region, including SCWA. The City and SCWA agreed to a series of actions and commitments related to diversions of surface water, dry-year supplies, fishery flows, habitat management, water conservation, and groundwater management. The Water Forum EIR evaluated the provision of water for a 30-year planning period based on land use projections. The 2005 Zone 40 Water Supply Master Plan (WSMP) prepared by SCWA relied on the County of Sacramento General Plan to identify where urban development would occur within the county, consistent with WFA purveyor-specific agreements for water service to those areas.

Under the WFA, the City plans to increase its average and wet year American River diversions from an agreed upon baseline amount of 20,000 AF to a year 2030 level of 34,000 AF. Under the WFA, in drier years, the City would divert and use a decreasing amount of surface water from 34,000 AF to 22,000 AF or the equivalent, in a three stage stepped and ramped reduction in proportion to the decrease in the March through November unimpaired inflow to Folsom Reservoir, from 950,000 to 400,000 AF. Under stage 1, the City would divert a decreasing amount from 34,000 AF to 30,000 AF in proportion to the decrease in unimpaired inflow to Folsom Reservoir from March through November when the at times when inflow is greater than 870,000 AF, but less than 950,000 AF. Under stage 2, the City diverts 27,000 AF when the March through November unimpaired inflow to Folsom Reservoir is greater than 650,000 AF but less than or equal to 870,000. Under stage 3, the City would divert 22,000 AF when the March through November unimpaired inflow to Folsom Reservoir is greater than 400,000 AF but less than or equal to 650,000 AF.

In the driest years, when the March through November unimpaired inflow to Folsom Reservoir is less than or equal to 400,000 AF, the City would reduce its diversions to 20,000 AF or the equivalency based on actual flows. In addition, the City would reduce diversions in the driest years by encouraging additional, extra-ordinary conservation to effectively achieve a reduction to 18,000 AF. The WFA encouraged the City to enter into agreements with other suppliers that have access to both surface water and groundwater for an equivalent exchange of the amount of reduction needed by the City as outlined above in the three stages of reduction. Under these arrangements, those other suppliers would use groundwater in lieu of surface water equivalent to the amount that they would continue to divert.

City of Rancho Cordova

Applicable policies of the City of Rancho Cordova's General Plan relating to water quality and hydrology are provided below.

- **Policy S.2.1:** Support and encourage efforts to limit and reduce the potential for community flooding from the Cosumnes or American Rivers.
- **Policy S.2.2:** Manage the risk of flooding by discouraging new development located in an area that is likely to flood.
- **Policy S.2.3:** Discourage the creation of new parcels when the presence of easements, floodplain, marsh, or riparian habitat, and/or other features would leave insufficient land to build and operate structures. This policy shall not apply to open space lots specifically created for dedication to the City or another appropriate party for habitat protection, flood control, drainage, or wetland maintenance.
- **Policy S.2.4:** Ensure that adequate drainage exists for both existing and new development.

3B.9.3 Environmental Consequences and Mitigation Measures

Thresholds of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. For the purposes of this analysis, an impact to surface water quality and/or hydrology would be significant if the Off-site Water Facility Alternatives would:

- violate any water quality standards, waste discharge requirements, or otherwise degrade water quality, including changes to the position of X-2;

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

ANALYSIS METHODOLOGY

This analysis considers the potential for the Off-site Water Facility Alternatives to impact local and regional surface hydrology and water quality based on the components described in Chapter 2, "Alternatives." The impact analysis focuses on foreseeable changes to existing hydrologic and water quality conditions in the context of the below-mentioned significance criteria. The impact analysis provides a discussion for each of the major Off-site Water Facility components in the context of the construction, off-site staging areas, and post-construction operation. Potential hydromodification impacts resulting from new impervious surfaces at the WTP (on- or off-site) were assessed by using the Sacramento Method to calculate pre- and post-construction runoff. Mitigation measures are identified where appropriate.

For the purposes of surface water modeling and assessing changes to the Sacramento River, the conditions for the operations of the Off-site Water Facilities were analyzed by post-processing results from recent runs from the California Simulation Model II (CALSIM II) which is a statewide water supply water supply systems operations model developed by DWR and USBR. The primary purpose of CALSIM II is to evaluate the water supply reliability of the CVP and SWP with and without various assumed future facilities, and with different modes of facility operations.

CALSIM II is the best available tool for modeling operations of the CVP and SWP hydrology and is the only systemwide hydrologic model being used by Reclamation and DWR to conduct planning and impact analyses of the Sacramento River and Delta. The CALSIM II model is recognized as a valuable tool for conducting comparative analysis for new facilities or changes in operations. In comparative applications, such as for this EIR/EIS, the model is run twice; once to represent a base condition (No Project Alternative) and a second time with a specific change (with Off-site Water Facilities) to assess the change that would result from the Off-site Water Facility Alternatives. Potential errors or uncertainties that exist in the "No Project Alternative" simulation are also present in the "Off-site Water Facility Alternatives" simulation. Thus, the effects from potential errors or uncertainties are, to some extent, reduced or accounted for when assessing the effects of the Off-site Water Facility Alternatives based on hydrologic changes between alternatives. Appendix M-IX provides additional detail regarding the methodology used for the for the CALSIM II modeling.

For the purposes of this analysis, the following assumptions were made in applying CALSIM II to the Off-site Water Facility Alternatives:

- Reclamation would approve the Freeport as an additional point of delivery for NCMWC's CVP Contract;
- The analysis depicts a "worst-case" for NCMWC whereby it analyzes project water (not base supply) being re-allocated into an urban demand pattern for the assignment;
- The analysis assumes an "efficiency" of 80% in the use of water conveyed through the Off-site Water Facilities, which means that only 20 percent of the water diverted makes it back to the Sacramento River via the regional wastewater treatment plant operated by the SCRSD. This estimate is considered conservative, but was deemed appropriate given plans for regional water recycling;
- The diversion of surface water as part of the Off-site Water Facilities would occur at the existing Freeport Project diversion and intake facility; and
- For the purposes of this EIR/EIS analysis, the efficiency of irrigation return flow to the Sacramento River is assumed to be 35% – or an efficiency rate of 75%.

The information contained in this section is also used in the analysis of secondary environmental effects associated with changes in groundwater levels (Section 3B.7, "Groundwater Resources – Water"), water supply conditions (Section 3B.16, "Utilities and Service Systems – Water"), and drinking water quality (Section 3B.8, "Hazards and Hazardous Materials – Water").

ISSUES NOT DISCUSSED FURTHER IN THIS EIR/EIS

Placement of Housing within a 100-Year Floodplain—The Off-site Water Facilities would not involve the construction of residential housing and, therefore, would not place housing within a 100-year flood hazard area as mapped on the most recent Federal Flood Insurance Rate Map. For this reason, this issue is irrelevant for the Off-site Water Facility Alternatives and not addressed further in this EIR/EIS.

IMPACT ANALYSIS

Impacts that would occur under each of the Off-site Water Facility Alternatives are identified as follows:

NCP (No USACE Permit Alternative)

PA (Proposed Off-site Water Facility Alternative)

1 (Off-site Water Facility Alternative 1 – Raw Water Conveyance – Gerber/Grant Line Road Alignment and White Rock WTP)

1A (Off-site Water Facility Alternative 1A Raw Water Conveyance – Gerber/Grant Line Road Alignment Variation and White Rock WTP)

2 (Off-site Water Facility Alternative 2 Treated Water Conveyance – Douglas Road Alignment and Vineyard SWTP)

2A (Off-site Water Facility Alternative 2A Treated Water Conveyance – Excelsior Road Alignment Variation and Vineyard SWTP)

2B (Off-site Water Facility Alternative 2B Treated Water Conveyance – North Douglas Tanks Variation and Vineyard SWTP)

3 (Off-site Water Facility Alternative 3 Raw Water Conveyance – Excelsior Road Alignment and White Rock WTP)

3A (Off-site Water Facility Alternative 3A Raw Water Conveyance – Excelsior Road Alignment Variation and White Rock WTP)

4 (Off-site Water Facility Alternative 4 Raw Water Conveyance – Easton Valley Parkway Alignment and Folsom Boulevard WTP)

4A (Off-site Water Facility Alternative 4A Raw Water Conveyance – Easton Valley Parkway Alignment Variation and Folsom Boulevard WTP).

The impacts for each alternative are compared relative to the PA at the end of each impact conclusion (i.e., similar, greater, lesser).

IMPACT 3B.9-1 Potential Temporary, Short-Term Construction-Related Drainage and Water Quality Effects. *Construction of the Off-site Water Facilities could generate discharges to surface water resources that could potentially violate water quality standards or waste discharge requirements.*

NCP, PA, 1, 1A, 3, 3A, 4, and 4A

Construction of the Off-site Water Facilities would involve excavation, soil stockpiling, grading, and the installation of support buildings, storage tanks, pumping facilities, and pipelines. During site grading, trenching, and construction activities, large areas of bare soil would be exposed to erosive forces for long periods of time. Bare soils are much more likely to erode than vegetated areas due to the lack of dispersion, infiltration, and retention created by covering vegetation. Construction activities involving soil disturbance, excavation, cutting/filling, stockpiling, dewatering and grading activities could result in increased erosion and sedimentation to surface waters. At locations where the crossing of a water feature (e.g. Morrison Creek), the removal of riparian vegetation and disturbance of the creek bed or bank could also result in the weakening the bank's structure and increase its susceptibility to erosion. Disturbing the geomorphic characteristics and stability of the channel bed and banks may initiate chronic erosion in natural channels. Such impacts could be exacerbated if the riparian vegetation is not reestablished and stabilized prior to the next high-flow or precipitation event and could result in **potentially significant direct** impacts within the immediate vicinity of construction and **indirect** impacts to water quality further downstream. ***[Similar]***

Hazardous materials associated with construction would be limited to substances associated with mechanized equipment, such as gasoline and diesel fuels, engine oil, and hydraulic fluids. If precautions are not taken to contain contaminants, accidental spills of these substances during construction could produce contaminated stormwater runoff (nonpoint source pollution), a major contributor to the degradation of water quality in surface waters. Without proper containment and incident response measures in place, the operation of construction equipment could result in **potentially significant direct** and **indirect** impacts to water quality. ***[Similar]***Prior to construction grading, the City must file an NOI with the Central Valley RWQCB to comply with the General NPDES Construction Permit and prepare the SWPPP, which addresses the measures that would be included in the project to minimize and control construction and post-construction runoff to the "maximum extent practicable." However, without these documents available for review as part of this EIR/EIS, the City is unable to determine their adequacy in achieving applicable water quality standards. In addition, NPDES permits require the implementation of BMP's that achieve a level of pollution control to the maximum extent practical, which may not necessarily be completely protective of aquatic life. This represents a **potentially significant**, **direct impact**. For these reasons, the implementation of the prescribed mitigation would be required to ensure that the Off-site Water Facilities SWPPP and Grading Plan(s) include measures necessary to minimize water quality impacts as a result of project construction and post-construction runoff. ***[Similar]***

Mitigation Measure 3B.9-1a: Acquire Appropriate Regulatory Permits and Prepare and Implement SWPPP and BMPs.

The City shall prepare a SWPPP specific to the selected Off-site Water Facility Alternative and secure coverage under SWRCB's NPDES stormwater permit for general construction activity (Order 2009-0009-DWQ). The SWPPP shall identify specific actions and BMPs relating to the prevention of stormwater pollution from project-related construction sources by identifying a practical sequence for site restoration, BMP implementation, contingency measures, responsible parties, and agency contacts. The SWPPP shall reflect localized surface hydrological conditions and shall be reviewed and approved by the City prior to commencement of work and shall be made conditions of the contract with the contractor selected to build the Off-site Water Facilities. The SWPPP shall incorporate control measures in the following categories:

- soil stabilization and erosion control practices (e.g., hydroseeding, erosion control blankets, mulching, etc.;
- dewatering and/or flow diversion practices, if required (see Mitigation Measure 3B.9-1b);
- sediment control practices (temporary sediment basins, fiber rolls, etc.);
- temporary and post-construction on- and off-site runoff controls;
- special considerations and BMPs for water crossings, wetlands, drainages, and vernal pools;
- monitoring protocols for discharge(s) and receiving waters, with emphasis placed on the following water quality objectives: dissolved oxygen, floating material, oil and grease, pH, and turbidity;
- waste management, handling, and disposal control practices;
- corrective action and spill contingency measures;
- agency and responsible party contact information, and
- training procedures that shall be used to ensure that workers are aware of permit requirements and proper installation methods for BMPs specified in the SWPPP.

The SWPPP shall be prepared by a qualified SWPPP practitioner with BMPs selected to achieve maximum pollutant removal and represent the best available technology that is economically achievable. Emphasis for BMPs shall be placed on controlling discharges of oxygen-depleting substances, floating material, oil and grease, acidic or caustic substances or compounds, and turbidity. Performance and effectiveness of these BMPs shall be determined either by visual means where applicable (i.e., observation of above-normal sediment release), or by actual water sampling in cases where verification of contaminant reduction or elimination, (inadvertent petroleum release) as required to determine adequacy of the measure.

Implementation: City of Folsom Utilities Department

Timing: Development of the SWPPP prior to construction of all Off-site Water Facilities and implementation throughout construction.

Enforcement:
1. Central Valley Regional Water Quality Control Board.
2. For all project-related improvements that would be located within the City of Folsom: City of Folsom Community Development Department.

3. For improvements within unincorporated Sacramento County or City of Rancho Cordova: Sacramento County Planning and Community Development Department or City of Rancho Cordova Planning Department.

Mitigation Measure 3B.9-1b: Properly Dispose of Hydrostatic Test Water and Construction Dewatering in Accordance with the Central Valley Regional Water Quality Control Board.

All hydrostatic test water and construction dewatering shall be discharged to an approved land disposal area or drainage facility in accordance with Central Valley RWCQB requirements. The City or its construction contractor shall provide the Central Valley RWQCB with the location, type of discharge, and methods of treatment and monitoring for all hydrostatic test water discharges. Emphasis shall be placed on those discharges that would occur directly to surface water bodies.

Implementation: City of Folsom Utilities Department

Timing: Incorporation measures into SWPPP prior to construction and implementation throughout construction, as appropriate.

Enforcement:

1. Central Valley Regional Water Quality Control Board.
2. For all project-related improvements that would be located within the City of Folsom: City of Folsom Community Development Department.
3. For improvements within unincorporated Sacramento County or City of Rancho Cordova: Sacramento County Planning and Community Development Department or City of Rancho Cordova Planning Department.

Mitigation Measure: Implement Mitigation Measures 3A.3-1a and 3A.3-1b.

Implementation: City of Folsom Utilities Department

Timing: Incorporation of measures into SWPPP prior to construction and implementation throughout construction.

Enforcement:

1. Central Valley Regional Water Quality Control Board.
2. For all project-related improvements that would be located within the City of Folsom: City of Folsom Community Development Department.
3. For improvements within unincorporated Sacramento County or City of Rancho Cordova: Sacramento County Planning and Community Development Department or City of Rancho Cordova Planning Department.

2, 2A, and 2B

Under Off-site Water Facility Alternatives 2, 2A, and 2B, construction of the Off-site Water Facilities would involve similar construction-related impacts during pipeline installation and construction of above -or below-ground structures (e.g., pump stations). However, the construction area and corresponding disturbance area where soils would be exposed to rainfall would be substantially reduced under these alternatives with consolidation of treatment operations at Vineyard SWTP and storage within the SPA. However, the potential for adverse water quality effects to occur during construction would continue to exist. As a result, **direct** and **indirect** construction-related water quality impacts could be **potentially significant**. ***[Lesser]***

Mitigation Measure: Implement Mitigation Measures 3B.9-1a and 3B.9-1b.

With the implementation of the above mitigation measures, impacts to surface water quality for all the Off-site Water Facility Alternatives would be reduced to a **less-than-significant** level through the inclusion of focused BMPs for the protection of surface water resources. Monitoring and contingency response measures would be included to verify compliance with water quality objectives for all surface waters crossed during construction. Particular emphasis would be placed on dissolved oxygen, floating material, oil and grease, pH, and turbidity as these are generally the water quality constituents of most concern during construction-related activities.

IMPACT 3B.9-2 Exceedance of Surface Water Quality Standards during Operation. *The operation of the Off-site Water Facilities could result in changes to the quality of surface water resources that could potentially violate water quality standards or waste discharge requests.*

NCP, PA, 1, 1A, 2, 2A, 2B, 3, 3A, 4, and 4A

Operation of the Off-site Water Facilities has the potential to result in minor changes in downstream water quality of the Freeport Project including concentrations of salinity and the potential to alter both upstream and downstream Sacramento River water temperatures by altering in-stream flows through the operation of the Off-site Water Facility Alternatives, a corresponding change in delivery schedule, and change in the location and type discharge following the proposed M&I beneficial use. The following analysis addresses these topics and presents the results of the analysis of related impacts from operations of the Off-site Water Facilities. The operation of the Off-site Water Facility Alternatives would result in NCMWC reducing its current diversion during the irrigation season and the City diverting the purchased contract water at Freeport at an average rate of 10 cfs annually and up to a maximum of 15.5 cfs during the months of July and August. The resulting total diversions from the Sacramento River are roughly equivalent to existing conditions and any changes as a result of the change to an M&I delivery schedule, as described in Impact 3B.9-4, equate to a minor fraction of total Delta outflow. As a result, this change is less than the 1% change in Delta outflow of 11,400 cfs that is required to maintain X-2 at Chipps Island (SWRCB 1999). In this context, potential **direct** and **indirect** impacts are considered **less than significant** and not expected to significantly affect the position of X-2. ***[Similar]***

The addition of a new point of diversion for diversions currently under NCMWC's CVP settlement contract as part of the operation of the Off-site Water Facilities would not be expected to adversely affect reservoir releases or result in other changes in CVP and SWP operations. In this context, the City does not expect the Off-site Water Facility Alternative's operation to result in significant adverse, indirect changes in water temperature within rivers and managed waterways in the Sacramento River basin. Rather, the operation of the Off-site Water Facilities is expected to facilitate two potential, minor benefits in water temperature by (1) adding increased flows to the section of the Sacramento River, upstream of Freeport, and (2) contributing to higher reservoir levels in CVP reservoir facilities during the summer months as a result of the change to an M&I delivery schedule. These **direct** and **indirect** impacts would be **less than significant**. ***[Similar]***

Another potential water quality change associated with the operation of the Off-site Water Facility Alternatives would be associated with the changes in the type of the return flows anticipated between agricultural and M&1 uses. Under existing conditions, water used for agricultural uses within NCMWC's service area that ultimately drains back to the Sacramento River consists of irrigation return flows. Irrigation return flows may contain detectable levels of various water quality pollutants including nitrogen-based fertilizers, pesticides, and sediment. Higher water temperatures have also been documented within agricultural irrigation return flows.

With a corresponding change to M&I use, water used within the SPA that ultimately drains back to the Sacramento River would consist of disinfected, secondary-treated effluent discharged from Sacramento Regional County Sanitation District's (SRCSD) WWTP. The disinfected, secondary-treated effluent discharged from SRCSD WWTP is regulated by the Central Valley RWQCB under NPDES No. CA0077682. For the purposes of

this analysis, changes in water quality within the Sacramento would be a function of the additional discharges of disinfected, secondary-treated wastewater from SRCSD's WWTP and the corresponding reductions in irrigation return flows from NCMWC's service area. These changes in nutrient loadings would be further influenced by the additional flows that would occur within the Sacramento River between NCMWC's service area and Freeport and downstream of Freeport and would be contingent on hydrologic conditions and the corresponding assimilative capacity of the river at any given point in the hydrologic year. Given all the various existing stressors that characterize existing river conditions combined with the fact that the Off-site Water Facility Alternatives would involve only minor hydrologic changes and essentially a trading in the type of inputs to the system, potential indirect impacts to water quality in relation to cumulative sources of existing loadings are considered **less-than significant**.***[Similar]***

The potential impacts of increased wastewater discharges to SRCSD's WWTP and corresponding changes in the quality of effluent discharged from the WWTP are discussed in Impact 3A.15.3 of Section 3A.15 "Utilities – Land." Impact 3A.13.3 specially addresses the potential impacts of the corresponding increases in wastewater discharges to the SRCSD's WWTP and SRCSD's ability to meet its waste discharge requirement, which are partially driven by the applied beneficial use, which includes municipal supply, irrigation, stock watering, industrial, power, warm and cold freshwater habitat, navigation, spawning, migration, and contact and non-contact recreation, and other economic considerations. ***[similar]***As described in Chapter 2, "Alternatives," the assignment of water from NCMWC to the City would not result in increased pumping of groundwater in the NCMWC's service areas to support continued agricultural uses. In recognizing that no increase in groundwater usage would occur as a result of the Off-site Water Facilities, no changes to agricultural return flows or Sacramento River water quality, in terms of higher levels of dissolved solids, are anticipated. As a result, no corresponding adverse changes to the Sacramento River water quality would occur and potential **direct** and **indirect** impacts would be **less than significant**. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

IMPACT 3B.9-3 Alteration of Drainage Patterns Resulting in Off-site Flooding and/or Erosion. *The Off-site Water Facilities could result in the alteration of existing drainage patterns thereby increasing the rate or amount of surface runoff in a manner that could result in substantial flooding and/or erosion or siltation on- or off-site.*

NCP, PA, 1, 1A, 3, and 3A

The construction of a new WTP and storage facility under these alternatives has the potential to alter the surface infiltration characteristics of the WTP/storage site, which could result in increases in both the volume and discharge rate of stormwater runoff thereby potentially contributing to flooding on site or at downstream locations. Pump station and well facilities could also contribute to increased runoff, but at a far lesser magnitude. Following construction, the impervious surfaces created with the storage and treatment facilities and paved areas are expected to result in increases in peak runoff flows. Under these alternatives, the WTP site is located in the headwaters of Buffalo Creek, which flows west and is tributary to the Lower American River (see Exhibit 3B.9-1). All drainage runoff from the WTP would enter Buffalo Creek at two locations and, without mitigation, could contribute to hydro-modification within the drainage catchment and downstream scouring. In addition, development of the WTP site could require a minor alteration of Buffalo Creek, to facilitate development of the site.

Based on direction provided in Section 2 of the County's Drainage Manual, the Sacramento Method charts were used in estimating drainage discharges for a design storm event for an assumed overland flow system. The Sacramento Method uses the urban unit hydrograph as a basis for estimating runoff hydrographs using design charts that have been created to expedite design flow calculations for basins less than 640 acres (260 hectares) (Sacramento City/County Drainage Manual 1996). The Sacramento Method charts are based on discrete recurrence interval where peak flow is given versus drainage area for the 10- and 100-year reoccurrence intervals.

The main variables used in the simplified charts are the percentage of impervious surface area and total drainage area, which for the WTP and storage tank areas equals approximately 10 acres. Based on conditions observed on site, existing site conditions were assumed to have a 20% impervious surface cover. Under the developed Off-site Water Facilities condition, the impervious surface cover was increased to 95% to provide a worst-case estimate of peak runoff.

Using Exhibits 2-16 and 2-22 in the Sacramento City/County Drainage Manual, the results reveal the estimated rate of stormwater runoff (in cfs) produced on site for a 10- and 100-year storm event. Rates of runoff are the absolute maximum that would occur during a 24-hour storm and, therefore, provide a conservative estimate for determining the net change in post-Off-site Water Facilities runoff. Based on the simplified method, the Off-site Water Facilities WTP could produce up to 21.0 cfs during a 10-year storm event; a net increase of 6.0 cfs when compared with existing conditions. Similarly, the net increase in peak runoff during a 100-year storm event is estimated at 31.0 cfs; up 9.0 cfs from the existing condition. Appendix M-VIII provides the unit hydrographs used to derive these values.

The net increase in peak runoff as a result of these Off-site Water Facility Alternatives would likely be partially attenuated by several of the containment areas, landscaped areas, paved walkways, and crushed rock roadways included as part of the WTP design and, therefore, it is reasonable to conclude that the above values likely over-estimate post-Off-site Water Facilities drainage flows. However, given that no formal Drainage Plan has been developed to attenuate post-construction drainage flows, the Sacramento Method provides a basic means for comparison and, based on the results, it is reasonable to conclude that the Off-site Water Facilities would result in a net increase in drainage discharge from the WTP site. This increase in peak flows could contribute to additional downstream flooding and/or bank scour. These **direct** and **indirect** impacts could be **potentially significant**. ***[Similar]***

Mitigation Measure 3B.9-3a: Prepare and Implement Drainage Plan(s) for Structural Facilities.

The City shall prepare a Drainage Plan for the selected Off-site Water Facility WTP and shall incorporate measures to maintain off-site runoff during peak conditions to pre-construction discharge levels. The Drainage Plan shall provide both short- and long-term drainage solutions to ensure the proper sequencing or drainage facilities during and following construction. The City shall evaluate options for on-site detention including, but not limited to, providing temporary storage within a portion or portions of proposed paved areas, linear infiltration facilities along the site perimeter, and/or other on-site opportunities for detention, retention, and/or infiltration facilities. Design specifications for the detention, retention, and/or infiltration facilities shall provide sufficient storage capacity to accommodate the 10-year, 24-hour storm event. In addition, the Drainage Plan shall delineate the overland release path for flows generated by a 100-year frequency storm, so that structural pad elevations for buildings, containment facilities, storage tank, and container storage areas are placed a minimum of one foot above the property's highest frontage curb elevation.

Implementation: City of Folsom Utilities Department

Timing: Development of the Drainage Plan prior to start of construction.

Enforcement:

1. Central Valley Regional Water Quality Control Board.
2. For all project-related improvements that would be located within the City of Folsom: City of Folsom Community Development Department.
3. For improvements within unincorporated Sacramento County or City of Rancho Cordova: Sacramento County Planning and Community Development Department or City of Rancho Cordova Planning Department.

Mitigation Measure 3B.9-3b: Ensure the Provision of Sufficient Outlet Protection and On-site Containment.

Energy dissipaters, vegetated rip-rap, soil protection, and/or other appropriate BMPs shall be included within all storm-drain outlets to slow runoff velocities and prevent erosion at discharge locations for the WTP. A long-term maintenance plan shall be implemented for all drainage discharge control devices. The WTP layout shall also include sufficient on-site containment and pollution-control devises for drainage facilities to avoid the off-site release of water quality pollutants, oil and grease.

Implementation: City of Folsom Utilities Department

Timing: Incorporation of measures into the Drainage Plan prior to start of construction.

Enforcement:

1. Central Valley Regional Water Quality Control Board.
2. For all project-related improvements that would be located within the City of Folsom: City of Folsom Community Development Department.
3. For improvements within unincorporated Sacramento County or City of Rancho Cordova: Sacramento County Planning and Community Development Department or City of Rancho Cordova Planning Department.

2, 2A, and 2B

A WTP would not be constructed under these alternatives and, therefore, these Off-site Water Facility Alternatives would result in only a minor net increase in peak runoff from the new equalization tanks and pumping station. The construction of the equalization tanks would occur within the SPA and would be subject to the requirements of the Folsom South of 50 Specific Plan. Given only a minimal increase in impervious surfaces outside the SPA would be anticipated under these alternatives, these **direct** and **indirect** impacts to localized drainage facilities would be **less than significant**. ***[Lesser]***

Mitigation Measure: No mitigation measures are required.

4 and 4A

Following construction of these Off-site Water Facility Alternatives, the impervious surfaces associated with the WTP, storage facilities and paved areas are expected to result in increases in peak drainage flows that would in turn be discharged to Buffalo Creek, similar to that of Off-site Water Facility Alternative 1, but at a different location. Although all drainage runoff would enter an existing stormwater collection system, there is a potential for this drainage runoff to exceed the capacity of existing off-site drainage infrastructure during peak rainfall conditions thereby potentially contributing to on- and/or off-site flooding. These **direct** and **indirect** impacts could be **potentially significant**. ***[Similar]***

Mitigation Measure: Implement Mitigation Measure 3B.9-3a and 3B.9-3b.

With the implementation of the above mitigation measures, impacts to on- and off-site drainage patterns would be mitigated to a **less-than-significant** level through the preparation of a formal drainage plan to attenuate post-construction runoff thereby minimizing the potential for on and off-site flooding and long-term hydromodification impacts.

IMPACT 3B.9-4 Changes to Flow within the Sacramento River. *The Off-site Water Facilities could result in adverse effects to existing flows within the Sacramento River.*

NCP, PA, 1, 1A, 2, 2A, 2B, 3, 3A, 4, and 4A

Operation of the Off-site Water Facility Alternatives could potentially affect flows within the Sacramento River by diverting CVP water through the Freeport Project as opposed to the Riverside Pumping Plant within NCMWC's service area. Table 3B.9-3 shows how flows would change with the Off-site Water Facilities as compared to existing conditions. As indicated in Chapter 2, "Alternatives," the operation of the Off-site Water Facilities would not increase the diversion of CVP water, but would only add a new point of diversion. The new point of diversion would be located approximately 20 miles south of NCMWC's service area and is expected to provide a minor addition to the total volume of flow within portions of the Sacramento River between NCMWC and Freeport; hence Zone 2 of the "Water" Study Area. This additional flow would be highest during the summer months, peaking at 1,087 AF or 18.1 cfs during the months of July and August. This direct impact is considered **less than significant**. ***[Similar]***

The diversion of surface water at the Freeport Project intake was analyzed in an EIR/EIS prepared in 2003 by the FRWA. The City does not propose an increase in the Freeport Project's maximum diversion capacity of 185 mgd. Therefore, the operations of the Off-site Water Facility Alternatives would remain within the confines of the Freeport Project's existing capacity. The potential impacts of operating the Freeport Project diversion were previously addressed in an EIR/EIS prepared by the FRWA. The Freeport Project EIR/EIS is incorporated by reference into this EIR/EIS as described in Chapter 1, "Introduction"). The CALSIM simulation completed for the Freeport Project EIR/EIS concluded that hydrologic responses to the operation of Freeport Project deliveries are distributed throughout the SWP and CVP system and that average annual changes would be slightly greater during dry periods. Very infrequent, larger increases and reductions in storage and flow within the Lower Sacramento River, south of Freeport, were also observed in some individual months even though Freeport Project diversions were small or not occurring. These changes were concluded as not substantial, infrequent, and, therefore, **less than significant**. ***[Similar]***

Based on modeling conducted by SWRI, Inc (2008), using CALSIM II, the principle changes in flow as a result of the operation of the Off-site Water Facilities occur downstream of Freeport and are a consequence of modifying the current agricultural delivery schedule for the 8,000 AFY of CVP water to an M&I delivery schedule. This change in delivery modifies the timing of diversions to smaller, more consistent withdrawals of surface water throughout the year as opposed to large diversions during the summer months when crop water demands are high. This phenomenon is demonstrated in Table 3B.9-3 whereby the Off-site Water Facility Alternatives results in a net decrease in CVP water use during the months of July and August. The data produced by SWRI is provided in its entirety in Appendix M-IX.

The change in the delivery schedule also results in minor corresponding increases in surface water diversions during other months (see Table 3B.9-3) when irrigation demands decrease or are absent. As shown in Table 3B.9-3, the Off-site Water Facility Alternatives would result in an increased diversion of CVP water on the order of 920 AF and 800 AF during the months of June and September, respectively. These increases would be offset by reductions in deliveries during the months of July and August of 3,040 AF. Additionally, as shown in Table 3B.9-3, these Off-site Water Facilities-related changes are estimated at 3 cfs or <0.04% of the total minimum flow at Freeport[2].

[2] Assuming a minimum base flow of 8,000 cfs within the Sacramento River (CSCGMP 2006).

Table 3B.9-3
Effects of Off-site Water Facility Alternatives on Sacramento River Flows

	Units	Total	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
CVP Supplies (NCMWC CVP Contract Total)	AF	120,200	--	14,000	27,700	23,000	18,700	18,700	16,100	2,000	--	--	--	--
No Action (Existing Conditions)														
NCMWC Demand Pattern	%	100	--	11.6	23.0	19.1	15.6	15.6	13.4	1.7	--	--	--	--
NCMWC Deliveries	AF	120,200	--	14,000	27,700	23,000	18,700	18,700	16,100	2,000	--	--	--	--
NCMWC Deliveries	cfs(2)	--		18.1	465.5	386.6	314.3	314.3	270.6	33.6				
NCMWC Return Water (1)	AF	37,863	--	4,410	8,726	7,245	5,891	5,891	5,072	630	--	--	--	--
Off-site Water Facility Alternative(s) Conditions														
Purchased Contract Demand Pattern(2)	%	100	6.5	7.0	9.5	11.5	12.0	12.0	10.0	8.5	6.5	5.5	5.5	5.5
Purchased Contract Deliveries	AF	8,000	520	560	760	920	960	960	800	680	520	400	400	400
Purchased Contract Deliveries	cfs(5)	10.33	0.67	0.72	0.98	1.19	1.24	1.24	1.03	0.88	0.67	0.52	0.52	10.33
Purchased Contract Return Water	AF	1,800	94	101	137	166	173	173	144	122	94	79	79	79
NCMWC Demand Pattern (Post-Purchased Contract)	%	100	--	12.5	24.7	20.5	13.1	13.1	14.3	1.8	--	--	--	--
NCMWC Deliveries (Post-Purchased Contract)	AF	110,200	--	14,000	27,700	23,000	14,700	14,700	16,100	2,000	--	--	--	--
NCMWC Return Water (Post-Purchased Contract)	AF	34,713	--	4,410	8,726	7,245	4,631	4,631	5,072	630	--	--	--	--
Off-site Water Facility Alternative(s) Effects														
Change in CVP Water Use	AF	0	520	560	760	920	-3,040	-3,040	800	680	520	440	440	440
Change in Lower Sacramento River Flow (2)	AF	-1,080	94	101	137	166	-1,087	-1,087	144	122	94	79	79	79
Change in Lower Sacramento River Flow (3)	cfs	NA	2	2	3	3	-18	-18	2	2	2	1	1	1
Change As a Percent of Minimum Freeport Flow (4)	%	NA	0.02	0.02	0.04	0.03	-0.19	-0.23	0.04	0.03	0.02	0.02	0.02	0.02

Assumptions/Notes: CVP = Central Valley Project; NCMWC = Natomas Central Mutual Water Company; cfs = cubic feet per second; AF = acre feet; NA = not available

(1) Return Flow for the Off-site Water Facility Alternatives is calculated based on a return efficiency of 80% whereby only 20% of the diverted flow returns to the River. NCMWC's return efficiency is assumed to be 65%.

(2) Purchased Contract Water = 8,000 AF; NCMWC Deliveries = 120,200 AF. Modeling assumes that up to 2,000 AF could still be diverted by NCMWC during wet and normal years. During dry years, the modeling assumes that the City would take delivery of the full 6,000 AFY. See Appendix M-IX for additional modeling detail.

(3) Refers to portions of the Lower Sacramento River, south of Freeport.

(4) The change in minimum Freeport Flow is based on an average monthly minimum flow of 10,000 cfs.

(5) Cubic feet per second over 30 days.

Source: SWRI 2008

Beyond the actual change in the timing of diversion, the change in where surface water is applied as a result of the operation of the Off-site Water Facility Alternatives are also expected to result in corresponding reductions in the efficiency of return water draining back to the Sacramento River. Under existing conditions, approximately 35 percent of the CVP water applied within the NCMWC service area drains back into the river as a result of the complex network of drainage conveyance facilities operated by NCMWC. With operation of the Off-site Water Facilities, approximately 20 percent of the CVP Water would return to the Sacramento River with the largest source of return water coming from discharges from the SRCSD Wastewater Treatment Plant (WWTP).

Based on the conditions shown in Table 3B.9-3 for the Off-site Water Facility Alternatives and related effects to surface flows within the Sacramento River, the impacts of the Off-site Water Facility Alternatives to hydrologic conditions within the Delta would be minor and not expected to adversely affect CVP and SWP reservoir operations or pumping in the south Delta. From a perspective of total water diverted, changes in the Sacramento River as attributed to the Off-site Water Facility Alternatives would be insignificant given that Off-site Water Facility Alternatives would divert water currently assigned and diverted from an existing upstream user and would not change the amount of water diverted, only the location of the point of diversion and timing. Further, it is reasonable to conclude that the Off-site Water Facility Alternatives would not significantly reduce the flows in the Sacramento River at times when the Off-site Water Facilities would increase diversions as a result of the change to an M&I delivery schedule since more water would be present in the Sacramento River at these times. Based on this determination, the Off-site Water Facility Alternatives would not result in any significant direct or indirect changes in Delta inflow and outflow that could otherwise interfere with any CVP and SWP export diversions. For this reason, these **direct** and **indirect** impacts would be **less than significant**. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

IMPACT 3B.9-5 Exceed Drainage Capacity and Contribute Sources Polluted Runoff. *The Off-site Water Facilities could create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.*

NCP, PA, 1, 1A, 3, and 3A

As previously indicated under Impact 3B.9-3, a formal Drainage Plan has not been prepared for the WTP and/or other Off-site Water Facilities components. Given that the conveyance pipeline would be completely buried underground following construction with no corresponding increase in impervious surfaces, no changes in post-construction runoff volumes are anticipated from the conveyance facilities that could otherwise overwhelm existing drainage infrastructure. Drainage runoff from the On-site or White Rock WTP site would enter Buffalo Creek near its headwaters, either east or west of Prairie City Road, respectively. Although typical engineering standards require that all storm drain pipelines are capable of conveying a 10-year frequency storm while providing temporary storage for the 100-year event, without the availability of actual engineering plans the City unable to confirm compliance with these standards. Without confirmation that the WTP's design satisfies this minimum criteria, there remains a potential for the WTP to contribute additional peak runoff that could exceed the channel capacity of Buffalo Creek, which ultimately becomes a piped waterway west of Hazel Avenue. Based on these determinations, the **direct** impacts would be **potentially significant**. ***[Similar]***

In relation to potential non-point source water quality impacts, the operation of the WTP would be required to comply with the SWRCB's Water Quality Order No. 97-03-DWQ, NPDES General Industrial Permit No. CAS000001, which applies to discharges of stormwater associated with industrial activities. Post-construction stormwater BMPs and monitoring standards would be required for the Off-site Water Facilities consistent with the General Industrial Permit and NAICS No. 22131 classification to achieve pollutant removal to the maximum extent practical. Compliance with the conditions set forth in the General Permit would address water quality concerns related to leaks and spills of chemicals stored and used at the WTP. In addition, State Law establishes minimum qualifications and an associated certification program for water treatment facility and distribution

operators to ensure that staff is informed of all WTP operating protocols and procedures. Further, compliance with the Municipal Program element of the newly adopted MS4 permit would be required. For these reasons, Alternatives 1, 1A, 3, and 3A would not create substantial additional sources of polluted runoff and the associated **indirect** impacts are **less than significant**. ***[Similar]***

Mitigation Measure: Implement Mitigation Measures 3B.9-3a and 3B.9-3b.

2, 2A, and 2B

Under Off-site Water Facility Alternatives 2, 2A, and 2B, water treatment would occur at the Vineyard SWTP. Beyond adding additional treated water demand to the Vineyard SWTP, the Off-site Water Facility Alternatives 2, 2A, and 2B would not create a new potential source of polluted runoff and a **less-than-significant** impact would occur. ***[Lesser]***

Mitigation Measure: No mitigation measures are required.

4 and 4A

As previously indicated, a formal drainage plan has not been prepared for the Off-site Water Facility Alternatives. However, based on a preliminary review, drainage runoff from the WTP site would enter into an existing drainage conveyance system that discharges into Buffalo Creek. Following construction, the conveyance pipeline would be completely buried underground, and therefore would not result in increased amounts of impervious surfaces. Based on these determinations, only the WTP component has the potential to exceed the capacity of existing drainage systems and, therefore, the **direct** and **indirect** impacts could be **potentially significant**. ***[Similar]***

Mitigation Measure: Implement Mitigation Measure 3B.9-3a and 3B.9-3b.

With the implementation of the above mitigation measures, impacts to existing drainage infrastructure and would be reduced to a **less-than-significant** level through the preparation of a formal drainage plan to attenuate post-construction runoff thereby minimizing the potential for off-site flooding and long-term water quality impacts. The implementation of Mitigation Measure 3B.9-3a would require that all storm drain pipelines and the proposed detention basin include sufficient capacity to minimize concerns related to the effects of hydromodification.

IMPACT 3B.9-6 Impede or Redirect Flood Flows. *The Off-site Water Facilities could place structures within a 100-year flood hazard area, which would impede or redirect flood flows.*

NCP, PA, 1, 1A, 2, 2A, 2B, 3, 3A, 4, and 4A

The WTP and storage facilities would not be constructed within a delineated 100-year flood hazard area or floodway per CDPH requirements. As a result, the construction and operation of this Off-site Water Facilities feature would not place structures within a 100-year flood hazard area as mapped on the most recent federal Flood Insurance Rate Map. Small segments of the proposed conveyance pipelines under all the alternatives would cross floodways or flood zones associated with Morison Creek, Elder Creek, or Laguna Creek. These crossings would be completed using in-channel or trenchless construction techniques and would be installed at sufficient depth below existing and/or planned flood control facilities.

Following construction, the conveyance pipeline would generally be submerged a minimum of five feet below the ground surface and set back from local waterways. Facilities installed beneath the bed of the local creeks would be constructed within a 100-year flood zone, but would be situated, beneath the channel bed. Additionally, construction of these facilities, particularly at water crossings, would likely occur during the summer months and would be of limited duration and, therefore, would be unlikely to expose workers to significant risk of injury or

death as a result of flooding. However, without the availability of site-specific engineering plans, the City is unable to ensure that the conveyance pipeline is placed within suitable bedding materials at the required depths below the channel bed. The improper placement of the conveyance pipeline at waterway crossings could destabilize the impacted portion of the channel bed and banks thereby contributing to changes in downstream changes in hydrology. The **direct** and **indirect** impacts of these changes are considered **potentially significant**. ***[Similar]***

Mitigation Measure: Implement Mitigation Measures 3B.7-1a and 3B.9-1a.

With the implementation of recommendations from a licensed geotechnical engineer as required by Mitigation Measure 3B.7.1a combined with measures designed to minimize impacts to channel morphology during construction as required by Mitigation Measure 3B.9.1a, the Off-site Water Facility Alternatives would not result in significant impedances or redirection of flood flows and the impact would be **less-than-significant**.

IMPACT 3B.9-7 Inundation from Flooding or Mudflows. *The Offsite Water Facility Alternatives would not expose people or structures to a significant risk of loss, injury or death involving inundation by flooding, including flooding as a result of the failure of a levee or dam, seiche, or tsunami or inundation by mudflows.*

NCP, PA, 1, 1A, 2, 2A, 2B, 3, 3A, 4, and 4A

In recognition of the "Water" Study Area's inland location, the threat of tsunamis or seiche is considered negligible. The WTP site(s) are situated in upland locations and do not require levees for flood protection. Although, the WTP site(s) are situated downslope of Folsom Reservoir, their development would occur in existing developed areas or those currently planned for development. Based on these circumstances, the hazard of inundation from a tsunamis, seiche, or failure of a levee or dam is minimal and **no impact** would occur. ***[Similar]***

As described in Section 3B.7, "Geology, Soils, and Paleontological Resources," the topography within the vicinity of Zone 4 of the Off-site Water Facilities Study Area consists of only gradual slopes and, therefore, the hazard of mudflows of adversely affecting the Off-site Water Facilities is very low. For this reason, **no impact** would occur. ***[Similar]***

Mitigation Measure: No mitigation measures are required.

3B.9.4 RESIDUAL SIGNIFICANT IMPACTS

With implementation of the mitigation measures listed above, implementation of the Offsite Water Facility Alternatives would not result in any residual significant impacts related to increased risk of flooding from stormwater runoff, from water quality effects from long-term urban runoff, or from short-term alteration of drainages and associated surface water quality and sedimentation. Based on these circumstances, the Off-site Water Facility Alternatives would not result in any residential significant and unavoidable adverse impacts to surface water hydrology and water quality.

Based on the hydrologic modeling conducted in support for this EIR/EIS using CALSIM II, potential impacts to flows within the Sacramento River as a result of the operation of the Off-site Water Facility Alternative would be less than significant and no mitigation would be required.