# Chapter 26
# Mineral Resources

## 26.1 Environmental Setting/Affected Environment

This section describes existing mineral resources (natural gas and aggregate resources) within the mineral resources study area that could be affected by construction and operation of the BDCP alternatives. The study area (the area in which impacts may occur) for natural gas resources includes the Plan Area (the area covered by the BDCP) and Areas of Additional Analysis (see Chapter 3, *Description of Alternatives*, Section 3.3.1) because the potential to affect natural gas production does not extend beyond the water conveyance construction and restoration implementation areas. The study area for aggregate resources includes the Plan Area, the six aggregate production study areas listed in Table 26-1, as well as the Areas of Additional Analysis, because aggregate may be purchased within this broader region. The information in this chapter has been extracted from publications by the California Department of Conservation (DOC); California Geological Survey (CGS) (formerly the California Division of Mines and Geology); the DOC Division of Oil, Gas, and Geothermal Resources (DOGGR); United States Geological Survey (USGS); and the general plans for counties that have land within the study area that could be affected by the alternatives. Certain topics discussed in this section are related to topics discussed in other sections of this Environmental Impact Report/Environmental Impact Statement (EIR/EIS). Chapter 24, *Hazards and Hazardous Materials*, Impact HAZ-1, discusses the potential health risks of relocating or capping natural gas wells that are within the proposed construction footprint of alternatives. This section does not describe the mineral resource setting or potential alternative effects upstream of the Plan Area (the Upstream of the Delta Region) or within the SWP and CVP Export Service Areas (Export Service Areas). Action alternative effects in the Export Service Areas are addressed in Chapter 30, *Growth Inducement and Other Indirect Effects*, and changes in operation of upstream reservoirs are not expected to affect mineral resources.

### 26.1.1 Potential Environmental Effects Area

The study area evaluated for potential effects on mineral resources is primarily the Plan Area, as defined in Chapter 1*, Introduction*, Section 1.5, comprising portions of the counties containing the statutory Delta, Suisun Marsh, and Yolo Bypass: Yolo, Solano, Contra Costa, San Joaquin, Sacramento, and Alameda (Figure 1-9). Because the Delta region proper produces almost no aggregate and contains no Mineral Resource Zones (MRZs), the study area includes all land within the six aggregate production areas listed in Table 26-1 where aggregate is produced and which contain MRZs (Section 26.1.2.1, *Aggregate Resources*), and Areas of Additional Analysis. For effects on aggregate resource demand, the broader region that is a potential source of aggregate resources for construction of water conveyance facilities is addressed, as identified by CGS. Certain alternatives include proposed electric transmission line corridors to the west or east of the Plan Area. Transmission lines in these areas of additional analysis are not expected to have any effects on natural gas wells, natural gas fields, natural gas distribution pipelines, or aggregate resources, because if any of these resource features occurred in these transmission line alignment areas, they could easily be avoided or accommodated (see Section 26.3.1.1, *Construction and Footprint Effects*), such that there would be no interference with accessing them. Accordingly, impacts related to these resources as a result of

constructing or operating and maintaining these proposed transmission corridors are not discussed further.

## 26.1.2 Existing Mineral Resources in the Study Area

In 2007, California ranked third in the nation for non-fuel mineral production, with a market value of $4.3 billion for approximately 30 industrial minerals (Kohler 2007). California ranks number one in the nation in the production of sand and gravel, Portland cement, diatomite, and natural sodium sulfate; it ranks second in the nation for masonry cement. California was the country's only producer of boron and rare earth metals in 2007. Other minerals produced include gold and silver, common clay, bentonite clay (including hectorite), crushed stone, dimension stone, feldspar, fuller's earth, gemstones, gypsum, iron ore (used in cement manufacture), kaolin clay, lime, magnesium compounds, perlite, pumice, pumicite, salt, soda ash, and zeolites. In 2007, there were about 660 active mines producing non-fuel minerals, employing about 10,000 people. California's leading industrial mineral is construction sand and gravel, with an estimated total value of $1.37 billion for 143.3 million tons produced in 2007 (Kohler 2007). Active mineral commodity producers in the study area are shown in Figure 26-1.

Mineral resources in the state are identified and classified by CGS, which implements the state's Mineral Land Classification Project in compliance with the Surface Mining and Reclamation Act (SMARA). The State Mining and Geology Board (SMGB) prioritizes areas for classification and designation through this program. CGS identifies and maps the lands containing significant mineral deposits, and classifies the areas into MRZs based on their mineral resource potential. Classification is based on geologic and economic factors without regard to existing land use or land ownership; mineral resource significance is based on whether the land is actively mined under a valid permit or meets established criteria of marketability and threshold value. Because aggregate is California's most important mineral resource, it was the first commodity in the state to be classified by CGS into MRZs. Four MRZ primary categories are used in classifying mineral resources (California Department of Conservation, State Mining and Geology Board 2009).

- **MRZ-1.** Available information indicates that significant mineral resources are not present or little likelihood exists for their presence.
- **MRZ-2a.** Geologic data indicate that significant mineral resources underlie the area. Lands included in this category are of prime importance because they contain known economic mineral deposits.
- **MRZ-2b.** Geologic data indicate that significant mineral resources underlie the area. The area has discovered deposits that are either inferred reserves or deposits that are presently subeconomic as determined by limited sample analysis, exposure, and past mining history. With future advances in technology or changes in economics, the area could be upgraded to MRZ-2a.
- **MRZ-3a.** The area is considered to have a moderate potential for the discovery of economic mineral deposits. Further exploration work could result in the reclassification of specific localities into the MRZ-2a or MRZ-2b categories.
- **MRZ-3b**. The geologic evidence leads to the plausible conclusion that economic mineral deposits are present in the area and that it is in a geologic setting that appears to be a favorable environment for the occurrence of specific mineral deposits.
- **MRZ-4.** There is a lack of knowledge of the area regarding mineral occurrence.

Of the four primary MRZ classifications, the MRZ-2 classification is perhaps the most important for land use planning because of the high likelihood for occurrence of substantial mineral deposits in such areas. SMGB may determine that some MRZ-2a or MRZ-2b areas contain mineral resources with statewide or regional significance and initiate a public process for designation. Designated areas are incorporated into state regulations (Title 14 California Code of Regulations [CCR], Division 2, Chapter 8, Subchapter 1, Article 2). Such designations require that a lead agency's land use decisions involving these areas be made in accordance with its established mineral resource management policies, and they require consideration of the importance of the designated mineral resource to the market region or state as a whole, not just its importance to the lead agency's area of jurisdiction (Section 2763 of Public Resources Code [PRC], Division 2, Chapter 9).

### 26.1.2.1 Aggregate Resources

CGS classification reports include an assessment of the quantity, quality, and extent of aggregate deposits in a study area. Reports include aggregate resource classification and mapping, quantitative calculations of permitted and nonpermitted aggregate resources, calculated 50-year demand for aggregate resources, and an estimate of when the permitted resources will be depleted (Kohler 2006; Clinkenbeard 2012). Kohler (2006) indicates that the only factor that shows strong correlation to historical aggregate use is population change. Consequently, the study reports historical aggregate use on a per capita basis for each aggregate study area. Per capita demand values are then used to project future aggregate demand based on population projections by the California Department of Finance through 2050. Fifty-year demand and permitted aggregate resources for areas in the Plan Area and the surrounding aggregate study areas are shown in Table 26-1 (Clinkenbeard 2012).

**Table 26-1. Comparison of 50-Year Demand to Permitted Aggregate Resources for Aggregate Study Areas as of January 1, 2011[a]**

| Aggregate Study Area[b] | 50-Year Demand (million tons) | Permitted Aggregate Resources (million tons) | Percentage of Permitted Aggregate Resources as Compared to the 50-Year Demand |
|---|---|---|---|
| Yuba City–Marysville P-C Region | 403 | 392 | 97 |
| Sacramento-Fairfield P-C Region (includes Yolo County) | 196 | 128 | 65 |
| **Sacramento County** | **670** | **42** | **6** |
| North San Francisco Bay P-C Region | 521 | 110 | 21 |
| South San Francisco Bay P-C Region | 1,381 | 404 | 29 |
| Stockton-Lodi P-C Region | 436 | 232 | 53 |

Source: Clinkenbeard 2012.

P-C region = production-consumption region.

[a] Study areas with less than 10 years of permitted resources are in **bold** type.

[b] Aggregate study areas follow either a P-C region boundary or a county boundary. A P-C region includes one or more aggregate production districts and the market area that those districts serve. Aggregate resources are evaluated within the boundaries of the P-C region. County studies evaluate all aggregate resources within the county boundary.

Statewide aggregate demand has declined over the last few years because of the recession. Demand declined from 246 million tons in 2007 to 156.7 million tons in 2008 and to 127.5 million tons in 2010, which is the most recent year for which data are available (Kohler 2007; Kohler 2008; Clinkenbeard and Smith 2010).

New aggregate sources are also in the process of being permitted and developed and others are being considered. For example, in 2009 Triangle Rock Products, Inc. received permission to expand its Sacramento area Florin Road facility (Clinkenbeard and Smith 2009). The expansion is for 10.7 million tons of gravel over a 12-year life span or more than 890,000 tons per year. Teichert Aggregates has received permission from Sacramento County for a new quarry in the eastern county that will supply up to 7 million tons per year with a total volume of 135 million tons (County of Sacramento 2010). Similarly, Sacramento County certified the Final EIR for a quarry on the property adjacent to the Teichert site, and approved the project, Stoneridge Quarry, in December 2011. The Stoneridge Quarry will produce up to 6 million tons per year with 350 million tons available over its expected 100-year life (County of Sacramento 2011). For this quarry, the owners petitioned to have their lands reclassified from MRZ-3 (for Portland cement concrete [PCC] aggregate) to an upgraded MRZ-2 classification (Clinkenbeard 2010). That analysis resulted in a reclassification of 414 acres of the property as MRZ-2 for construction aggregate, which was subsequently approved. Similarly, revised mineral land classifications were completed for the proposed Riddle Surface Mine property in Stanislaus County and the Powerhouse Aggregate Project in Butte County, which reclassified 436 acres and 460 acres, respectively, as MRZ-2 for construction aggregate (Smith and Clinkenbeard 2010, 2011). Additionally, the hard-rock gold mine Lincoln Mine Project in Amador County is permitted and under construction. That gold mine can extract up to 150 tons per day and majority of the waste rock will be sold and hauled away for use as aggregate product consistent with the project's Conditional Use Permit (Tietz et al. 2011).

Eagle Rock Aggregates Inc. (a subsidiary of Polaris Minerals Corp.) completed construction of a receiving, storage, and distribution terminal at the Port of Richmond in fall 2007, which was designed to receive shipments of high-quality sand and gravel from Vancouver Island, British Columbia, Canada (U.S. Geological Survey 2010). In addition to Eagle Rock Aggregates Inc., CEMEX, Heidelberg Cement, and Shamrock Materials, Inc., also imported aggregate from Canada into the state. In 2007, about 1.8 million tons of aggregate were imported into California from Canada and Mexico. Imported construction aggregate may offset the shortage of construction aggregate to meet long-term demand in the state.

### 26.1.2.2 Oil and Gas Resources

In 2007, California produced 219 billion cubic feet of associated gas (i.e., gas that is found with oil) and 93 billion cubic feet of non-associated gas (i.e., gas that is not associated with oil). Most of the state's natural gas fields are located in the Sacramento Valley (Figure 26-2). The Rio Vista gas field, discovered in the Delta in 1936, is the largest field producing non-associated gas in the state, occupying portions of Sacramento, Solano, and Contra Costa Counties. In 2007, this gas field produced 19.8 billion cubic feet of natural gas. Since the 1940s, gas supply has been inadequate to meet state demand because of the tremendous growth in population and industry. By the early 1980s, more than 80% of the gas used in California was from sources outside the state. Net natural gas production is declining in California; production dropped by approximately 3% in 2007 from 2006 levels (California Department of Conservation 2008).

California ranks fourth among the oil-producing states. As of 2007, statewide oil production had declined to 1942 levels (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2008). California's overall oil production rate fell slightly in 2007 compared to the previous year, averaging about 666,300 barrels per day. Although it is an important resource in California, oil extraction is not widespread in the study area.

DOGGR places oil and gas wells into one of six categories: plugged, active injector, active producer, canceled, dual, and new. The number of oil and gas wells in each category in the study area is shown in Table 26-2.

**Table 26-2. Oil and Gas Wells within the Study Area, by County**

| Well Category | Contra Costa County | Sacramento County | San Joaquin County | Solano County | Yolo County | Total |
|---|---|---|---|---|---|---|
| Plugged | 348 | 473 | 661 | 799 | 489 | 2,770 |
| Active injector | | 3 | 2 | 2 | | 7 |
| Active producer | 43 | 206 | 114 | 124 | 29 | 516 |
| Canceled drill (not shown on map) | 2 | 12 | 5 | 9 | 5 | 33 |
| Dual | 0 | 0 | 81 | 15 | 0 | 96 |
| New | 0 | 8 | 4 | 5 | 0 | 17 |
| Total | 393 | 702 | 867 | 954 | 523 | 3,439 |

Source: California Department of Conservation 2010
Note: There are no oil and gas wells within the study area in Alameda and Sutter Counties.

Existing oil, natural gas, and non-fuel mineral resources in the study area are discussed below by county.

## Alameda County

The northeastern corner of Alameda County is in the study area. No mineral resources are located in this area. There are no natural gas fields or oil and gas wells in Alameda County within the study area.

## Contra Costa County

An important geologic deposit of Domegine sandstone is in the southeastern portion of Contra Costa County near the Delta. This deposit has been valuable for use in the manufacture of heat-resistant glass for the United States space program as well as local trench backfill (Contra Costa County 2005). Active mineral production operations in the Contra Costa County in the study area include stone, sand, and gravel mining near Antioch (Figure 26-1).

The most productive oil and gas fields in Contra Costa County in the study area are Brentwood, Oakley, East Brentwood, Dutch Slough, and a portion of Rio Vista (Figure 26-2). These fields are north of Brentwood and east of Antioch. In 2008, Contra Costa County fields produced nearly 1,900 barrels of oil and more than 13 billion cubic feet of natural gas, and there were 43 producing wells in April 2009 (California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009) (Figure 24-5). There are 393 oil and gas wells (including all well types) in Contra Costa County within the study area (Table 26-2 and Figure 24-5).

## Sacramento County

The northern and central parts of the study area encompass a portion of Sacramento County, including the City of Sacramento. According to the Sacramento County General Plan (Sacramento County 2011), mineral resources in the county include sand and gravel, clay, gold, silver, peat, topsoil, lignite, natural gas, and petroleum. Resources within the study area include oil and gas. The county's natural gas production area is mostly within the Rio Vista gas field (Figure 26-2). In 2008, Sacramento County produced more than 14 billion cubic feet of natural gas, and in April 2009, there were 206 producing wells (California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009). There are 702 wells in Sacramento County within the study area (Figure 24-5).

There are no MRZ-2 areas or active mineral production in Sacramento County within the Delta. An MRZ-2 area for Portland cement concrete grade aggregate has been designated in an area east of the Delta (California Department of Conservation, Division of Mines and Geology 1988a).

## San Joaquin County

The primary mineral resources being extracted in San Joaquin County are sand, gravel, and natural gas (San Joaquin County 1992). Peat soil, placer gold, and silver are also mined to a lesser extent. Active permitted production operations in San Joaquin County in the study area are identified in Figure 26-1.

CGS classified MRZ areas in San Joaquin County in land classification Special Report 160 (California Department of Conservation, Division of Mines and Geology 1988b). MRZ-2 areas for sand and gravel in the Delta are located southwest of Manteca, south of Tracy, and southeast of Tracy near the Stanislaus County boundary. Sand and gravel extraction occurs in the southwestern portion of the county in the Corral Hollow Creek alluvial fan near Tracy and along the Mokelumne, Calaveras, and Stanislaus Rivers in the eastern portion of the county (San Joaquin County 1992). The Corral Hollow Creek sector is the primary construction aggregate production district in the county, with more than 80% of the aggregate material used in the region produced here. The 1992 San Joaquin County General Plan states that existing aggregate reserves in the county represent 28% of the projected 50-year demand and suggests that alternative sources of construction materials, including development of MRZ-3 areas, might be required when aggregate reserves are depleted.

Natural gas has been extracted from San Joaquin County since 1854, with the highest levels of extraction occurring in the Delta vicinity (San Joaquin County 1992) (Figure 24-5). The Lathrop, McDonald Island, and Union Island gas fields account for most of the extracted natural gas, and there are 21 natural gas fields within the county that either are or have been active (Figure 26-2). Additionally, according to the 1992 General Plan, Pacific Gas and Electric Company has operated a gas storage project on McDonald Island since 1959. In 2008, San Joaquin County produced 73 billion cubic feet of natural gas, and there were 114 producing wells in April 2009 (California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009) (Figure 24-5). There are approximately 867 oil and gas wells (producing and nonproducing) in San Joaquin County within the study area (Table 26-2) and (Figure 24-5).

## Solano County

The west and central Delta encompass portions of Solano County, including the City of Rio Vista and Suisun Marsh. Non-fuel mineral resources mined or produced in Solano County include mercury,

sand and gravel, clay, stone products, calcium, and sulfur (Solano County 2008). Active production of calcium, stone, and sand and gravel takes place in Suisun Marsh and the portion of Solano County within the Delta (Figure 26-1). Historic mercury mines are located west of Suisun Marsh in Solano County. Solano County MRZs are described in SMARA Land Classification Report 146 Parts I and III (California Department of Conservation, Division of Mines and Geology 1986, 1987) and in Special Report 156 (California Department of Conservation, Division of Mines and Geology 1988a). There are no MRZ-2 classified lands in the portion of Solano County located within the study area.

Natural gas production fields in the county are in Lindsey Slough, Van Sickle Island, Elkhorn Slough, Millar, Cache Slough, Sherman Island, Winters, Ryer Island, Rio Vista, and Suisun Bay, among others (Solano County 2008). Figure 26-2 shows their locations. In 2008, Solano County produced more than 20,000 barrels of oil and more than 18 billion cubic feet of natural gas, and there were 124 producing wells in the county in April 2009 (California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009). There are 954 oil and gas wells (including all well types) in Solano County within the study area (Table 26-2); their locations are shown in Figure 24-5. The Rio Vista gas field is the largest producer of natural gas, and Lindsey Slough production ranks third in DOGGR District 6, with 2.6 billion cubic feet in 2008 (Solano County 2008; California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009).

MRZ-3 areas are present in Suisun Marsh (Solano County 2008), but there are no lands classified as MRZ-2 within Suisun Marsh. Geologic formations underlying Suisun Marsh contain accumulations of natural gas; these formations and the accumulated gas within them constitute the Suisun Marsh gas fields. Gas has been extracted from the Suisun Marsh fields since their discovery in 1938. According to the Suisun Marsh Protection Plan (Protection Plan) (San Francisco Bay Conservation and Development Commission 1976), four of the seven known gas fields in the Suisun Marsh were used for gas production in the 1970s; these were on Grizzly Island, Ryer Island, Van Sickle Island, and Kirby Hill. In 1972, 27 producing wells operated in these fields. The Suisun Marsh gas fields yield relatively high-quality natural gas made up almost entirely of hydrocarbons such as methane, ethane, butane, and propane, with few impurities (San Francisco Bay Conservation and Development Commission 1976).

Facilities for the long-term storage of natural gas are necessary because of the seasonal variation in gas supply and demand. The most common storage method involves the injection and storage of natural gas in naturally occurring underground geologic reservoir formations. The best geologic formation for this purpose is an *anticline trap*, which consists of highly permeable reservoir rock and thick impermeable cap rock sealing the reservoir—these formations are found beneath the Suisun Marsh fields (San Francisco Bay Conservation and Development Commission 1976). Because of high demand for natural gas as a fuel and the finite reserves of the resource, the fields are expected to be completely depleted at some point in the future. After depletion, the remaining geologic formations may be suitable for the underground storage of natural gas extracted from other fields and transported to the San Francisco Bay Area by pipeline or tanker (Solano County 2008).

## Sutter County

A small portion of Sutter County is in the Yolo Bypass. No mineral resources are present in this area. There are no natural gas fields or oil and gas wells in Sutter County within the study area.

### Yolo County

The northern Delta encompasses a portion of Yolo County, including the City of West Sacramento. According to the 2030 Countywide General Plan (County of Yolo 2009), mined aggregate and natural gas are the two primary mineral resources produced here. Numerous gas fields are located in the Delta, primarily in the Yolo Bypass; their locations are shown in Figure 26-2 (County of Yolo 2009). Deep onshore gas wells, reaching a depth of nearly 2 miles, are located near Clarksburg, and producing wells are also located on Merritt Island (Figure 24-5). In 2008, Yolo County produced more than 3 billion cubic feet of natural gas and 68 barrels of oil; there were 29 producing wells in April 2009 (California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009). There are 523 oil and gas wells (including producing and nonproducing wells) in Yolo County within the study area (Table 26-2 and Figure 24-5). One small gas field is located within the jurisdiction of the City of West Sacramento, where there are 24 inactive wells. Of these wells, only two were formerly productive. No MRZ-2 areas are within the city's sphere of influence (City of West Sacramento 2000).

Mercury mining took place in the Cache Creek watershed in Lake County from the 1800s through the mid-1900s; however, no active or historical mercury mines are present in Yolo County within the study area.

Aggregate mining occurs in the Cache Creek MRZ-2 area outside the Delta (California Department of Conservation, Division of Mines and Geology 1988a). The Cache Creek MRZ-2 area is a significant high-grade aggregate deposit known to contain more than 900 million tons of sand and gravel (County of Yolo 2009). No MRZ-2 areas are located within the Delta in Yolo County (California Department of Conservation, Division of Mines and Geology 1988a; City of West Sacramento 2000; County of Yolo 2009).

## 26.2 Regulatory Setting

This section provides the regulatory setting for mineral resources, including potentially relevant federal, state, and local requirements applicable to the action alternatives.

### 26.2.1 Federal Plans, Policies, and Regulations

#### 26.2.1.1 Buy America Act

The Buy America Act was passed by Congress and signed by the President in 1933. All federal construction projects or funded projects must have at least 50% American manufactured or non-manufactured materials. These restrictions apply unless it is impracticable, or materials are non-available or too costly.

#### 26.2.1.2 Surface Mining Control and Reclamation Act of 1977

There are no known coal mines in the study area that would be regulated pursuant to the Surface Mining Control and Reclamation Act of 1977.

#### 26.2.1.3 Cosumnes River Preserve Management Plan

The Cosumnes River Preserve is managed by the Cosumnes River Preserve Partners, which includes the U.S. Bureau of Land Management.

## 26.2.2 State Plans, Policies, and Regulations

### 26.2.2.1 Surface Mining and Reclamation Act of 1975

Mining activities are regulated in California by SMARA (PRC Section 2710 et seq.). This law's purpose is to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations to ensure that adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition that is readily adaptable for alternative land uses. Production and conservation of minerals are encouraged, and consideration is given to values relating to recreation, wildlife, range and forage, and aesthetic enjoyment, while eliminating residual hazards to public health and safety. These goals are achieved through land use planning by allowing jurisdictions to balance the economic benefits of resource extraction with the need to provide other land uses.

Sections 2761(a) and (b) and Section 2790 of SMARA provide for a mineral lands inventory process known as *classification-designation*, which is administered by CGS and SMGB. *Classification* is the process of identifying lands containing significant mineral deposits. *Designation* is the formal recognition by SMGB of areas containing mineral deposits of regional or statewide significance, following a public participation process. The objective of classification and designation processes is to ensure, through appropriate lead agency policies and procedures, that mineral deposits of statewide or of regional significance are available when needed (California Department of Conservation, State Mining and Geology Board 2009).

It is also the intent of this process, through the adoption of local mineral resource management policies, that significant mineral resources be considered in future local land-use planning decisions (PRC Section 2762). PRC Section 2762 directs that if a use is proposed that might threaten the potential recovery of minerals from an area that has been classified MRZ-2, the county (or city) must specify its reasons for permitting use, provide public notice of those reasons, and forward a copy of its statement of reasons to the State Geologist and SMGB.

SMARA defines activities that constitute *surface mining* (for example, open-pit mining of naturally exposed minerals); activities such as borrow pitting also constitute surface mining activities as defined by SMARA. Activities that are excluded from the SMARA regulations are identified in PRC Section 2714. Exclusions include mining operations conducted by the California Department of Water Resources (DWR) for state water resources projects; however, a management plan is still required, as described in PRC Section 2714(i)(1).

> Surface mining operations conducted on lands owned or leased, or upon which easements or rights-of-way have been obtained, by the Department of Water Resources for the purpose of the State Water Resources Development System or flood control, and surface mining operations on lands owned or leased, or upon which easements or rights-of-way have been obtained, by the Reclamation Board for the purpose of flood control, if the Department of Water Resources adopts, after submission to and consultation with, the Department of Conservation, a reclamation plan for lands affected by these activities, and those lands are reclaimed in conformance with the standards specified in regulations of the board adopted pursuant to this chapter. The Department of Water Resources shall provide an

annual report to the Department of Conservation by the date specified by the Department of Conservation on these mining activities.

#### 26.2.2.2 California Department of Conservation, Division of Oil, Gas, and Geothermal Resources Construction-site Plan Review Program

DOGGR regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells. As part of DOGGR's responsibilities for implementing PRC Section 3208.1, districts have developed the Construction-site Plan Review Program to assist local agencies in identifying and reviewing the status of oil or gas wells near proposed development. The program is aimed at addressing potentially dangerous issues associated with development near oil or gas wells. DOGGR serves in an advisory role to make relevant information available to local agencies. Section 3208.1 of the PRC states that if any property owner, developer, or local permitting agency either fails to obtain an opinion from DOGGR, or fails to follow the advice of DOGGR when development occurs near an oil or gas well, then the owner of the property on which the well is located may be responsible for re-abandonment costs should a future problem arise with the well. To use the DOGGR Well Review Program, the developer or property owner submits a completed Well Review Program Application to DOGGR (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2007). Before issuing building or grading permits, local permitting agencies review and implement DOGGR's preconstruction well requirements. Interaction between local permitting agencies and DOGGR helps resolve land-use issues and allows for responsible development in oil and gas fields.

### 26.2.3 Regional and Local Plans, Policies, and Regulations

In general, local governments have adopted general plans, codes, and ordinances to incorporate provisions of SMARA that protect significant mineral resources from incompatible land uses and regulate mining operations and reclamation. These, as well as other mineral-related regulations, policies, and plans, are summarized below, and include measures that would be relevant to borrow sites, if not covered under a statutory exclusion (see discussion of SMARA in the previous section).

#### 26.2.3.1 Delta Protection Commission

The Delta Protection Act of 1992 established the Delta Protection Commission and required the Commission to prepare and adopt a Land Use and Resource Management Plan. Section 20050 of the *Land Use and Resource Management Plan for the Primary Zone of the Delta* (LURMP) (Delta Protection Commission 2010) addresses natural gas wells and pipelines.

Utilities and Infrastructure:

**P-1.** Impacts associated with construction of transmission lines and utilities can be mitigated by locating new construction in existing utility or transportation corridors, or along property lines, and by minimizing construction impacts. Before new transmission lines are constructed, the utility should determine if an existing line has available capacity. To minimize impacts on agricultural practices, utility lines shall follow edges of fields. Pipelines in utility corridors or existing rights-of-way shall be buried deep to avoid adverse impacts to terrestrial wildlife. Pipelines crossing agricultural areas shall be buried deep enough to avoid conflicts with normal agricultural or construction activities. Utilities shall be designed and constructed to minimize any detrimental effect on levee integrity or maintenance, agricultural uses and wildlife within the Delta. Utilities shall consult with communities early in the planning process for the purpose of creating an appropriate buffer from residences, schools, churches, public facilities and inhabited marinas.

### 26.2.3.2 Suisun Marsh Protection Plan

The Protection Plan (San Francisco Bay Conservation and Development Commission 1976) addresses the presence of and access to natural gas resources in Suisun Marsh. The plan includes the following policies.

1. Transportation of natural gas by underground pipeline is the most economical and safe method of gas transportation in the Suisun Marsh area. Future gas pipelines should be permitted if they are consistent with the Protection Plan and if the design and construction meet the following standards:
    a. Existing pipeline systems are utilized to the maximum extent feasible.
    b. The pipeline design meets all applicable safety standards of the Office of Pipeline Safety Operations (OPSO) and other regulatory agencies.
    c. The pipeline route avoids tidal marshes and managed wetlands wherever possible and, if that is not possible, the route crosses as little marsh or managed wetland as possible.
    d. Wide track or amphibious construction equipment is used in tidal marsh or managed wetland areas. Pads or mats are used as needed to prevent any construction equipment from sinking into the soft marsh muds and damaging the marsh plants.
    e. The "trench and push" construction method is used in all tidal marsh and managed wetland areas where feasible, so that the construction zone is kept as small as possible and the minimum amount of heavy equipment passes through the marsh or wetland area.
    f. Prior to any pipeline construction or related activities in the Marsh, the contractors consult with the Department of Fish and Game to determine at what time such construction or related activities should be conducted so as to create the least possible adverse impact on breeding, migration, or other fish and wildlife activities.
    g. Prior to any underground pipeline construction in the Marsh, the contractors consult with the Solano County Mosquito Abatement District to ensure existing recirculation water ditches are not blocked and levees are adequately repaired after pipeline construction, or that effective mosquito control measures are maintained.
    h. At slough, mudflat and bay crossings of gas pipelines, the trench is dredged in a manner that minimizes turbidity and prevents interference of the dredging operation with fish or wildlife.
    i. A regular surface and aerial inspection of the pipeline route is carried out as required by OPSO.
2. If additional gas wells or ancillary facilities are required for gas exploration, production, or injection, the drilling should be accomplished with the following safeguards:
    a. Drilling operations conform to the regulations of the California Division of Oil and Gas designed to prevent damage to natural resources.
    b. The drilling operation is confined to as small an area as possible and does not irreversibly damage unique vegetation or fish and wildlife habitats.
    c. After drilling is complete, all drilling muds, water waste, and any other fluids are removed entirely from the site and disposed of in a manner that does not adversely affect the Marsh.

d. All buildings, tanks, "Christmas trees" or other facilities related to the production or storage of natural gas do not result in the permanent loss of water surface in the Marsh.

3. Construction and drilling in tidal marsh and managed wetland areas should occur only during the dry months of the years (generally May through August) when these activities would not disturb wintering waterfowl.

4. If gas wells are abandoned, they should be sealed in accordance with Division of Oil and Gas regulations; the drilling or production facilities should be removed; and the surface area should be revegetated with native vegetation within one growing season after abandonment.

5. Storage of natural gas in depleted gas reservoirs is a reasonable use of the resource and should be permitted. Storage facilities should meet all safety standards of the Division of Oil and Gas.

6. Because the Suisun Marsh offers both natural gas and depleted gas fields suitable for gas storage, and because it is close to the urban Bay Area and the proposed waterfront industrial area on the Sacramento River, gas will probably continue to be transported out of, into, and around the Marsh. All gas transportation into and out of the Marsh is now by underground pipeline systems. If other types of systems for the transport or storage of liquefied natural gas (LNG) are proposed for the Suisun Marsh area, a detailed investigation of the hazards and impacts of LNG facilities should be carried out prior to approval of the facilities.

#### 26.2.3.3 Alameda County Code and East County Area Plan

The Alameda County Code encourages mine development in compatible areas before encroachment of conflicting uses. Mineral resource areas that have been classified by CGS or designated by SMGB are to be protected from intrusion by incompatible land uses that may impede or preclude mineral extraction or processing to the extent possible for consistency with the county's General Plan (Alameda County 2000).

#### 26.2.3.4 Contra Costa County General Plan

Relevant goals and policies of the Contra Costa County General Plan (Contra Costa County 2005) are listed below.

- **Goal 8-M:** To ensure the continued viability of mineral extraction operations that are important to the county's economy.
- **Goal 8-N:** To protect areas of identified valuable mineral resources from incompatible nearby land uses through zoning and other land use regulations.
- **Goal 8-O:** To minimize and buffer the impact of surface mining activities on the surrounding land uses and the natural environment.
    - **Policy 8-54:** Mining and quarrying shall be a permitted use in certain privately owned areas that are in an open space designation in the General Plan and that contain known mineral deposits with potential commercial value.
    - **Policy 8-56:** Incompatible land uses shall not be permitted within the mineral resource impact areas identified as containing significant sand and gravel deposits.
    - **Policy 8-61:** Reclamation plans prepared for the closure of quarries shall include conditions addressing the future use of the property, and a condition of the reclamation shall assure that future use.

- **Implementation Measure 8-bu:** Establish a buffer zone around designated resource areas that will be rezoned to restrictive agricultural zones of A-20, A-40, or A-80.
- **Implementation Measure 8-bx:** Require the posting of bonds for all new mining and quarrying permits to guarantee timely and faithful performance of reclamation and mining plans.
- **Implementation Measure 8-by:** In analyzing the environmental effects of mining operations, the county shall consider, at a minimum, the following concepts in granting a new permit:
  - Natural vegetation for buffering
  - Adequate setbacks
  - Central location of processing equipment and equipment storage
  - Dust control
  - Adequate access roads
  - Erosion control
  - Revegetation and reestablishment of natural appearing features on the site
  - Ultimate land use
  - Hours of operation
  - Night lighting
  - Security fencing
  - Noise impacts
  - Protection of water quality

### 26.2.3.5 Contra Costa County Ordinance Code

County Ordinance Code, Title 8, Division 88, Chapter 11 provides county requirements for surface mining and reclamation. A land use permit and a management plan are required for earth material extraction.

### 26.2.3.6 City of Rio Vista Zoning Ordinance

Title 17 Zoning, Chapter 17.64, Natural Gas Operations, includes regulation for proposed development. Proposed development may not interfere with existing or proposed natural gas wells. The ordinance may limit uses allowed within 145 feet of any existing well or within the drilling envelope of a proposed well site.

### 26.2.3.7 Sacramento County General Plan

The Sacramento County General Plan (Sacramento County 2011) outlines objectives, policies, and implementation measures in the Conservation Element to protect mineral resources of the county. The primary goal with respect to mineral resources is to protect the resource for economic extraction with minimal adverse impacts. Objectives, policies, and implementation measures are summarized below.

- **Objective 1:** Known mineral resources protected from land uses which would preclude or inhibit timely mineral extraction to meet market demand.
    - **Policy CO-37:** Apply the aggregate resources combining land use category to additional areas as subsequent studies determine them to contain mineral resources which are feasible and appropriate for mining. The aggregate resources combining land use category shall not be a prerequisite to (SM) surface mining combining zoning or regulation through the procedures of an existing special planning area zoning designation in conjunction with proposed surface mining.
    - **Policy CO-38:** Sewer interceptor and trunk alignments shall be routed to avoid areas planned for aggregate resource mining to the extent practical. Where such alignments are impractical, they shall be designed to minimize aggregate resources which would be precluded from mining, and make reasonable attempt to preserve the future use of mined areas for flood control or recharge purposes.
- **Objective 2:** Resources and options for future extraction identified within the context of an ongoing local resource evaluation and management program.
    - **Implementation Measure 1:** Determine the extent and quality of aggregate resources west of Bradshaw Road between Florin and Elder Creek Roads, on Aerojet property, the Cosumnes River above Wilton Road and other locations with potential mineral resources. (PLANNING)
    - **Implementation Measure 2:** Study the feasibility of establishing, in conjunction with use permit approval for surface mining, a resource extraction fee to fund a staff geologist and consultant services as necessary to implement policies and programs relating to mineral resource protection.
    - **Implementation Measure 3:** Establish regular coordination with the California Geological Survey, provide them with information regarding aggregate resource depletion in the County, and solicit financial and technical assistance for resource studies.
- **Objective 3:** Orderly extraction of minerals and subsequent reclamation of mined areas with minimal adverse impacts on aquifers, streams, scenic values, and surrounding residential uses.
    - **Policy CO-39:** Surface mining operations shall be subject to appropriate mitigation measures and shall avoid creating any significant nuisances, hazards, and adverse environmental impacts, unless the Board of Supervisors makes the findings to override as required by CEQ Guidelines Section 15091.
    - **Policy CO-40:** Extractive uses and associated processing uses and facilities shall maintain adequate minimum setbacks to protect adjoining land uses.
    - **Policy CO-41:** Surface mining shall not be allowed without adequate plans for reclamation of mined areas. Reclamation plans should be based on a plan for post-mining land use that is consistent with the land use strategies of the General Plan.
    - **Policy CO-42:** Gold extraction utilizing cyanide leaching systems shall not be permitted.
    - **Policy CO-43:** Hardrock mining shall be conducted in a way that mitigates long-term undesirable impacts.

- **Implementation Measure 1:** Continue to monitor implementation of use permit conditions approved for surface mining operations or regulation through the procedures of an existing special planning area zoning designation. (PLANNING)
- **Implementation Measure 2:** Maintain and update information pertaining to appropriate state-of-the-art techniques for erosion control, reclamation, nuisance prevention and environmental impact mitigation relative to surface mining operations. (PLANNING)
- **Implementation Measure 3:** Provide pertinent applications, plans and environmental documents to all agencies which may be involved with future reclamation uses, including service providers, parks agencies, and resource management agencies. (PLANNING)
- **Implementation Measure 4**: Prepare a comprehensive plan for hard rock mining that helps to guide a cohesive and logical pattern for future mining activities based on estimated mineral supply needs, evaluation of environmental impacts and minimizing effects on adjacent land uses (PLANNING).

- **Objective 4:** Sequential timing of mining of aggregate areas linked to the timing of urban development.
  - **Policy CO-44:** Due to the predicted shortages of aggregates in Sacramento County, mining of mineral resources within the Urban Services Boundary (USB) is encouraged, where consistent with Habitat Conservation Plans or other County initiated conservation programs and where such mining does not preclude successful completion of these plans, to avoid the potential loss of these mineral resources as a result of potential urban development. This policy is not intended to preclude mining outside the USB.
    - **Implementation Measure 1**: Develop a strategy for mining within the USB that is consistent with other land uses and the preservation strategies that are currently being developed for the South Sacramento Habitat Conservation Plan. (PLANNING)
    - **Implementation Measure 2:** Develop a strategy for mining Mather AFB lands that is consistent with other land uses and the preservation strategies that are currently being developed for the South Sacramento Habitat Conservation Plan and the reuse needs for the Base. (PLANNING)
- **Objective 5:** Ten percent and twenty percent of demand for aggregates met by recycled or substitute materials by 2010 and 2020 respectively.
  - **Policy CO-45:** To the maximum extent possible, all base material utilized in County and private road construction shall be composed of recycled asphalt concrete and roadway base material.
    - **Implementation Measure 1:** Modify construction standards for County roads to utilize recycled products without altering the engineering properties per the Sacramento County Standard Construction Specifications, and upon approval of the Municipal Services Agency. (MSA-DOT)
    - **Implementation Measure 2:** Develop appropriate conditions applicable to projects involving private roads. (MSA-PLANNING)

- **Implementation Measure 3:** Investigate the use of recycled concrete or substitute materials in other construction applications. (PLANNING and COUNTY ENGINEERING)
- **Implementation Measure 4:** Investigate concrete recycling operations elsewhere and determine appropriate mitigation measures. (PLANNING)

### 26.2.3.8 Zoning Code of Sacramento County

The Zoning Code of Sacramento County Title II, Article 4, allows for mining uses in the Surface Mining Combining Zone with a conditional use permit. The zone is designed to protect the mineral resources of the county from incompatible land use and to manage the mineral resources consistent with stated goals.

### 26.2.3.9 San Joaquin County General Plan

Relevant objectives and policies of the San Joaquin County General Plan (San Joaquin County 1992) are listed below.

- **Objective 1:** To protect extractive resources from urban development or encroachment.
- **Objective 2:** To provide for the production of extractive resources while protecting people, property, and the environment from hazards caused by resource extraction.
    - **Policy 1:** Mineral deposits of significant quantity, value, or quality, as identified by CGS reports as MRZ-2, shall remain in open space uses until extraction of resources, unless the immediate area has been committed to other uses.
    - **Policy 2:** Mined lands shall be reclaimed as soon as reasonably possible.
    - **Policy 3:** The county shall permit the development of its oil and natural gas resources, provided that such development ensures adequate protection to the resource and the environment, protects public health and safety, and is compatible with the current and projected uses of the land.
        - **Implementation Measure 1:** The county shall continue to require a permit for all resource extraction activities.
        - **Implementation Measure 2:** All development in areas of significant sand and gravel deposits, as identified by SMGB, shall require a discretionary permit conditioned to protect the resources.
        - **Implementation Measure 3:** A reclamation plan, in accordance with SMARA, shall accompany all applications for mining or mineral extraction permits.

### 26.2.3.10 Solano County General Plan

Relevant goals and policies of the Solano County General Plan (Solano County 2008) are listed below.

- **Policy RS.P-33:** The county shall preserve, for future use, areas with important mineral resources by preventing residential, commercial, and industrial development that would be incompatible with mining practices to the extent feasible.

- **Implementation Regulation RS.I-17:** Evaluate impacts related to extracting mineral resources from new areas as part of the required permitting process to ensure that remediation occurs after minerals are extracted. Comply with regulations found in SMARA.

- **Suisun Marsh Policy Addendum to the 2008 General Plan:** Extraction and removal of minerals or natural materials from existing quarries and borrow areas within the Secondary Management Area of the Suisun Marsh should be allowed to continue where not in conflict with protection of the marsh and in conformance with county codes. Sites governed by the above provisions include: two on the Tule Vista Livestock Company properties, of which one is located east of Scally Road and the other located northeast of Beldon's Landing; one on the Guy Stewart property 1,500 feet west of Shiloh Road; two on the Barnes property 8,000 feet west of Shiloh Road in the Kirby Hills; and two on the Wagent property 3,000 feet west of Shiloh Road. These are in addition to existing sites under county land use permit.

### 26.2.3.11 Solano County Code

Chapter 29 of the Solano County Code contains requirements for permitting and reclamation of mines in compliance with SMARA.

### 26.2.3.12 Yolo County General Plan

Relevant goals, policies, and implementation actions of the Yolo County General Plan (County of Yolo 2009) are listed below.

- **Goal CO-3 Mineral Resources:** Protect mineral and natural gas resources to allow for their continued use in the economy.

- **Action CO-A39:** Encourage the responsible development of aggregate deposits along Cache Creek as significant both to the economy of Yolo County and the region (Policy CO-3.1).

- **Action CO-A40:** Encourage recycling of aggregate materials and products (Policy CO-3.1).

- **Action CO-A44:** Coordinate individual surface mining reclamation plans so that the development of an expanded riparian corridor along Cache Creek may be achieved (Policy CO-3.1).

- **Action CO-A47:** Ensure that mined areas are reclaimed to a usable condition that is readily adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and groundwater management facilities.

- **Policy CO-3.2:** Ensure that mineral extraction and reclamation operations are compatible with land uses both onsite and within the surrounding area, and are performed in a manner that does not adversely affect the environment.

- **Action CO-A46:** Maintain standards and procedures for regulating surface mining and reclamation operations so that potential hazards and adverse environmental effects are reduced or eliminated (Policy CO-3.1, Policy CO-3.2).

- **Action CO-A52.2:** Implement the Cache Creek Area Plan (Policy CO-3.2).

- **Action CO-A49:** Consider the exploration, drilling, and extraction of natural gas as compatible with agriculture and open space uses (Policy CO-3.3).

- **Action CO-A50:** Evaluate any impacts to identified natural gas fields as part of the development review process (Policy CO-3.3).
- **Action CO-A51:** Require that abandoned gas wells be sealed in accordance with DOC regulations and that all drilling or production facilities be removed. Further require that the disturbed surface area be reincorporated into adjoining agricultural operations or revegetated with native vegetation within one year after abandonment (Policy CO-3.3).

- **Policy CO-3.4:** Within the Delta Primary Zone, ensure compatibility of permitted land use activities with applicable, natural gas policies of the Land Use and Resource Management Plan of the Delta Protection Commission.
- **Policy CO-3.5:** Preserve and protect the County's unique geologic and physical features, which include geologic or soil "type localities," and formations or outcrops of special interest (DEIR MM GEO-1a).

#### 26.2.3.13 Yolo County Code

Yolo County Code, Title 10-Environment, contains requirements for in-channel and off-channel surface mining, as well as for mine reclamation. Sections 8-2.2311 and 8-2.2312 of Title 8, Land Development and Zoning, require that commercial surface mining operations occur in a Sand and Gravel Combining Zone in areas zoned A-1 or A-P within the boundaries of the Off-Channel Mining Plan. Chapter 11 of Title 8, Land Development and Zoning, is the county's gravel mining fee ordinance.

## 26.3 Environmental Consequences

This section describes the potential mineral-related effects that would result from BDCP-related construction, operation, and restoration activities. The evaluated effects include the loss of access to mineral resources related to BDCP activities.

### 26.3.1 Methods for Analysis

This section describes the qualitative and quantitative methods used to evaluate mineral-related effects of the BDCP alternatives within the study area. These effects would be associated with construction and operation of the conveyance facilities under the BDCP alternatives. Restoration activities are evaluated on a program level using qualitative and quantitative methods to identify potential mineral-related impacts within the proposed Restoration Opportunity Areas (ROAs).

#### 26.3.1.1 Construction and Footprint Effects

The potential for construction and the physical footprint of the conveyance facilities to directly or indirectly affect fuel and nonfuel mineral resource availability and extraction was evaluated. Construction activities could affect mineral resources by the volume of construction aggregate required. The alternatives' footprints could prevent physical access to mineral resources such as aggregates or natural gas. Such an effect would result if the facilities covered an underlying resource so that it was no longer available. For example, if a canal or tunnel was placed over an underlying aggregate resource, that portion of the resource would no longer be accessible. Similarly, if a canal or tunnel was placed over an existing active natural gas well it could reduce access to the underlying

natural gas resource. This analysis entailed use of geographic information system (GIS) data to quantify the number of oil and gas wells, areal extent of natural gas fields, designated mineral zones, and individual mineral commodity producers affected by the footprints of all components of the alternatives, including conveyance-related activities.

*Borrow* is a general term used for fine-grained materials that are used as fill in areas such as embankment construction, in-river rock slope protection, and haul roads. These fine-grained borrow materials may come from excavations for canals or tunnels when they contain suitable materials. Where sufficient borrow material is not available from BDCP-related excavation, it may be obtained from new sources in the vicinity of the alternatives or from commercial operations. As noted in Section 26.2.2.1, borrow pitting constitutes surface mining and a management plan is required even when DWR projects are excluded from SMARA regulations. However, borrow materials are not considered a mineral resource in the same manner as aggregate, and borrow is only addressed in this chapter with respect to the overall volume required and where offsite sources may be required.

Construction of new electrical transmission facilities could conflict with existing natural gas wells or gas distribution pipelines. Because of the minimal size of power pole footprints, the relative ease of relocating gas distribution lines, and the flexibility of relocating power pole locations, no adverse effects are anticipated, and this issue is not addressed further.

### 26.3.1.2 Operational Effects

Operational effects on mineral resources could result from the use of aggregate for maintenance actions. For example, aggregates would be used for road maintenance; riprap used for erosion control on levees, stream banks, and structure foundations would need replacing over time. These needs are evaluated on a qualitative basis. In general, however, operation of the conveyance facilities involves the movement of water in the constructed facilities; these actions would not affect availability of mineral resources.

### 26.3.1.3 Restoration Effects

Because restoration activities have been developed at a coarse, conceptual scale, this analysis uses a programmatic approach to addressing impacts on mineral resources. Important mineral resource sites and mineral extraction operations were identified within potential ROA footprints using the same methodology as was used for assessing the effects of the conveyance facilities. These impacts will be discussed in greater detail and specificity in subsequent project-level environmental documentation after the restoration activities are finalized.

## 26.3.2 Determination of Effects

Adverse effects under NEPA and significant impacts under CEQA would occur if the BDCP alternatives would result in either of the following conditions.

- Loss of availability of a known mineral resource that would be of value to the region or the state.
    - For purposes of this analysis, loss of availability of a known mineral resource would occur when a non-renewable mineral resource is irretrievably used. In this analysis, this impact applies primarily to aggregate resources.

- For aggregate resources, an effect is considered adverse when use of the resource would result in a substantial depletion (loss of availability) of construction-grade aggregate within the six aggregate production study areas (Table 26-1), which would cause remaining supplies to be inadequate for future development based on 50-year demand estimates, and thereby substantially contribute to the need for new aggregate development.

- Loss of availability of a locally important mineral resource recovery site delineated by a local general plan, specific plan, or other land use plan.
  - For purposes of this analysis, "locally important mineral resource recovery site delineated by a local general plan, specific plan, or other land use plan" refers to natural gas well(s), natural gas field(s), an aggregate mine site, or an MRZ.
  - Any complete covering or permanent blockage of access to an aggregate resource (mines or MRZs) or natural gas field such that the resource cannot be recovered would be considered adverse.
  - With respect to natural gas wells, substantial loss of existing production resulting from the need to abandon producing wells that cannot be replaced would be considered adverse.
  - Any permanent elimination of a substantial portion of a county's active natural gas wells would be considered adverse.
  - Temporary obstructions or effects on relatively small areas would not be considered adverse. For the purposes of this analysis, temporary refers to activities occurring during the construction period.
  - Some of the distribution lines that lead from individual natural gas wells to larger collection lines may need to be relocated due to project facilities, including roads and transmission lines. These distribution lines are very small diameter (approximately 2 inches) and shallowly buried (approximately 2–3 feet) and their relocation would not impact the production from their associated natural gas wells. Consequently, this impact is not considered adverse and is not discussed further.

While taking borrow material requires a management plan under SMARA, borrow material is not a mineral resource such as gravel, sand, or quarried rock, and CGS does not map it within MRZs. Borrow is more commonly identified on an as-needed basis for individual projects. Consequently, while borrow volumes needed for each alternative are identified in this chapter, there is no NEPA or CEQA effect threshold related to borrow as a mineral resource. Other aspects related to use of borrow are addressed in Chapter 10, *Soils*.

Effects on mineral resources would be primarily restricted to the study area and would be primarily associated with the disturbance and footprint of the conveyance facilities and restoration areas. However, adjacent counties are addressed with respect to availability of aggregate resources.

Proposed conservation measures to reduce environmental stressors in the study area are described in Chapter 3, *Description of Alternatives,* Section 3.6.2. These measures generally include projects to improve water quality, enforce regulations, and improve fisheries. None of these activities would affect mineral resources; therefore, effects related to these other conservation measures (CM12–17, CM20–22) are not discussed in this chapter.

## Consistency with Local Plans and Policies

Constructing the proposed water conveyance facilities (CM1) and implementing CM2–CM22 could potentially result in incompatibilities with plans and policies related to protecting oil, gas, and mineral resources, and encouraging their use. This section summarizes ways in which the BDCP is compatible or incompatible with those plans and policies. Potential incompatibilities with local plans or policies, or with those not binding on the state or federal governments, do not necessarily translate into adverse environmental effects under NEPA or CEQA. Even where an incompatibility "on paper" exists, it does not by itself constitute an adverse physical effect on the environment, but rather may indicate the potential for a proposed activity to have a physical effect on the environment. The relationship between plans, policies, and regulations and impacts on the physical environment is discussed in Chapter 13, *Land Use*, Section 13.2.3.

The LURMP and the Protection Plan have polices that focus on minimizing impacts of natural gas and oil extraction on the resources they protect. The LURMP recommends using existing utility corridors, burying pipelines, and designing utilities to avoid compromising levee integrity. The Protection Plan similarly recommends underground pipelines and storage for natural gas, and measures to avoid damaging tidal marshes and wetlands, or disturbing fish and wildlife or their habitat. The BDCP is compatible with these policies because it does not involve transporting, extracting, or consuming natural gas or oil resources from within the Delta or Suisun Marsh, and would adhere to all policies and regulations for protecting these areas. The BDCP might be considered incompatible where construction of water conveyance facilities and restoration areas or their operation could impair access to natural gas wells or fields, or cause them to be abandoned (e.g., Impact MIN-1: *Loss of availability of locally important natural gas wells as a result of constructing the water conveyance facilities*; Impact MIN-2: *Loss of availability of extraction potential from natural gas fields as a result of constructing the water conveyance facilities*; Impact MIN-5: *Loss of availability of locally important natural gas wells as a result of implementing Conservation Measures 2–22*; Impact MIN-6: *Loss of availability of extraction potential from natural gas fields as a result of implementing Conservation Measures 2–22*). However, oil and gas production in the Delta comprise a very small percentage of statewide and individual counties' production; should wells or fields have to be permanently abandoned, the production loss would not be substantial. Where wells or fields have to be abandoned, it is likely that the resource could be accessed with directional drilling from another location. If suitable alternate land and easements were not available or feasible, the BDCP would be incompatible, but this is likely to be the case for only a small number of an already small proportion of wells or fields. Furthermore, the BDCP incorporates mitigation measures that include designing conservation measures to avoid displacing wells (Mitigation Measure MIN-5); and to maintain access to natural gas fields (Mitigation Measure MIN-6). Because implementation of Mitigation Measures MIN-5 and MIN-6 cannot assure that all or a substantial portion of existing natural gas wells and fields will remain accessible after implementation of an alternative, these impacts are considered significant and unavoidable. Nevertheless, considering the relatively minor potential for lost production or access to resources, the availability of methods to continue extraction, and mitigation measures, the BDCP would be compatible with the LURMP and the Protection Plan.

The *Alameda County East County Area Plan, Contra Costa County General Plan, Sacramento County General Plan, Solano County General Plan, San Joaquin County General Plan,* and the *Yolo County General Plan* all have policies or goals to protect oil, gas, and hard-rock mineral resources, encourage economic production, and protect the local environment and existing land uses. The BDCP is compatible with these plans and policies. As previously described, the Delta region produces a

relatively minor proportion of oil and gas for its counties and the state, and the BDCP would affect a minor portion of this amount. Where access to wells or gas fields would be temporarily obstructed, it is likely extraction could continue or resume using directional drilling from another location when construction is completed. If a natural gas well or field would be permanently obstructed (covered), and an appropriate alternate well location not available or feasible, BDCP would be incompatible. However, this is likely to occur in only a small number of cases. In the one restoration opportunity area where conservation measures could inundate an existing aggregate mine, (Impact MIN-11: *Loss of availability of locally important aggregate resource sites [mines and MRZs] as a result of implementing Conservation Measures 2–22*), Mitigation Measure MIN-11 provides for the BDCP proponents to purchase the mine's permitted production and use the aggregate in BDCP construction, thereby fulfilling general plan policy to economically develop the resource. Moreover, BDCP proponents will participate in the public processes for local and regional aggregate evaluation and permitting (Mitigation Measure MIN-14), which will integrate the BDCP aggregate resource needs into land use decisions being made by agencies as part of established mineral resource management policies, and contribute to their economic development. Overall, considering the relatively minor potential for lost production or access to resources, the availability of methods to continue extraction, and mitigation measures, the BDCP would be compatible with county general plans.

## 26.3.3 Effects and Mitigation Approaches

### 26.3.3.1 No Action Alternative

The No Action Alternative describes expected future conditions resulting from a continuation of existing policies and programs by federal, state, and local agencies in the absence of the BDCP alternatives as of the year 2060. As described in Chapter 3, *Description of Alternatives*, Section 3.5.1, the No Action Alternative assumptions are limited to Existing Conditions, programs adopted during the early stages of development of the EIR/EIS, facilities that are permitted or are assumed to be constructed by 2060, and foreseeable changes in development that would occur with or without the BDCP.

The No Action Alternative analysis considered the range of programs and projects in the study area and adjacent areas that might have effects on natural gas resources and aggregate resources independent of the BDCP (Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*). The programs, plans, and projects included under the No Action Alternative are summarized in Table 26-3, along with their anticipated effects on mineral resources.

Under the No Action Alternative, DOGGR regulatory programs that have jurisdiction over natural gas well development and abandonment would continue with no substantive changes. Similarly, programs that regulate mineral resources and programs to identify and conserve mineral resources would be implemented with no substantive changes in the future. CGS and SMGB programs would continue to classify and designate important MRZs and DOC would continue to regulate mineral extraction under SMARA, and continue to ensure that mining areas are reclaimed to adequately support future end uses following completion of regulated activities.

**Table 26-3. Effects on Minerals from the Plans, Policies, and Programs for the No Action Alternative**

| Agency | Program/Project | Status | Description of Program/Project | Effects on Mineral Resources |
|---|---|---|---|---|
| California Department of Fish and Wildlife | Yolo Bypass Wildlife Area Land Management Plan | | The Yolo Bypass Wildlife Area comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass. | This program could, but is unlikely to reduce access to natural gas wells as well as aggregate resources. |
| California Department of Water Resources | Mayberry Farms Subsidence Reversal and Carbon Sequestration Project | Completed October 2010 | Permanently flood 308-acre parcel of DWR owned land (Hunting Club leased) and restore 274 acres of palustrine emergent wetlands within Sherman Island to create permanent wetlands and to monitor waterfowl, water quality, and greenhouse gases. | This project is approximately 274 acres and could reduce access to natural gas wells as well as aggregate resources. |
| California Department of Fish and Wildlife | Lower Sherman Island Wildlife Area (LSIWA) Land Management Plan (LMP) | | The Lower Sherman Island Wildlife Area occupies roughly 3,100 acres, primarily marsh and open water, at the confluence of the Sacramento and San Joaquin Rivers in the western Sacramento–San Joaquin River Delta (Delta). | This program could, but is unlikely to reduce access to natural gas wells as well as aggregate resources. |
| Freeport Regional Water Authority and Bureau of Reclamation | Freeport Regional Water Project | Project was completed late 2010. | Project includes an intake/pumping plant near Freeport on the Sacramento River and a conveyance structure to transport water through Sacramento County to the Folsom South Canal. | This project is approximately 50-70 acres and could reduce access to natural gas wells as well as aggregate resources. |
| Reclamation District 2093 | Liberty Island Conservation Bank | | This project includes the restoration of inaccessible, flood prone land, zoned as agriculture but not actively farmed, to area enhancement of wildlife resources. | This project is approximately 186 acres and could reduce access to natural gas wells as well as aggregate resources. |
| DWR | Dutch Slough Tidal Marsh Restoration Project | Planning phase | Wetland and upland habitat restoration in area used for agriculture. | Inundation and covering over much of 1,166-acre site could reduce access to natural gas wells as well as aggregate resources. |
| City of Stockton | Delta Water Supply Project (Phase 1) | Currently under construction | This project consists of a new intake structure and pumping station adjacent to the San Joaquin River; a water treatment plant along Lower Sacramento Road; and water pipelines along Eight Mile, Davis, and Lower Sacramento Roads. | This project is approximately 106 acres and could reduce access to natural gas wells as well as aggregate resources. |
| DWR | Delta Levees Flood Protection Program | Ongoing | Levee rehabilitation projects in the Delta. | This project could utilize limited aggregate resources. |

| Agency | Program/Project | Status | Description of Program/Project | Effects on Mineral Resources |
|---|---|---|---|---|
| SAFCA, Central Valley Flood Protection Board, USACE | Flood Management Program | Ongoing | South Sacramento Streams Project component consists of levee, floodwall, and channel improvements. | This project could utilize limited aggregate resources. |
| NMFS/USFWS | 2008 and 2009 Biological Opinion | Ongoing | The Biological Opinions issued by NMFS and USFWS establish certain RPAs to be implemented. Some of the RPAs require extensive areas of habitat restoration. | This program could reduce access to natural gas wells as well as aggregate resources. |

There are projects under consideration in the study area (Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*) that could reduce access to natural gas resources including implementation of the NMFS and USFWS 2008 and 2009 Biological Opinions requiring restoration of 8,000 acres of tidal habitat. Generally, other projects in the study area have a minimal footprint and would not require moving existing active natural gas wells. The actions arising from the Biological Opinions may block access to the underlying natural gas fields. Various management plans (Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*) are being developed for areas within the region that could affect active natural gas wells or block access to underlying natural gas fields. These management plans include such projects as the Lower Sherman Island and Yolo Bypass Wildlife Areas Land Management Plans (California Department of Fish and Game) and the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (San Joaquin Council of Governments). These plans, however, do not necessarily require removal of active natural gas wells. Also, habitat conservation plans (e.g., Yolo County Habitat/Natural Community Conservation Plan and Solano Multispecies Habitat Conservation Plan) are being prepared to provide known mitigation procedures and conservation bank locations that allow development to proceed. Even if certain plan actions block vertical access to natural gas fields, directional drilling could provide access to these fields. Consequently, no major effect on access to natural gas resources is anticipated with the No Action Alternative.

A variety of smaller or standard projects in the study area and the broader region will use aggregate resources. These projects include highway and road improvement, housing development, levee improvements (e.g., the DWR Delta Levees Flood Protection Program and the Sacramento Area Flood Control Agency Flood Management Program), and the Folsom Dam Safety and Flood Damage Reduction Project. As discussed in Section 26.1 and shown in Table 26-1, many areas in the study area, the broader region, and statewide only have small percentages of permitted aggregate resources available compared with the projected 50-year aggregate demand (Kohler 2006). However, projects of the scale described above are currently being supplied by the permitted aggregate sources and similarly are within the available permitted regional aggregate resource base (Table 26-1). Additionally, ongoing permitting of new or expanded aggregate extraction sites in Sacramento County is not accounted for in Kohler (2006). Considered together, the ongoing aggregate needs and the added availability of materials from ongoing permitting efforts in Sacramento County indicate that there would be no adverse effect on the availability of aggregate resources (Section 26.1.2.1, *Aggregate Resources*).

### Catastrophic Seismic Risks

The Delta and vicinity are within a highly active seismic area, with a generally high potential for major future earthquake events along nearby and/or regional faults, and with the probability for such events increasing over time. Based on the location, extent and non-engineered nature of many existing levee structures in the Delta area, the potential for significant damage to, or failure of, these structures during a major local seismic event is generally moderate to high. (See Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies* for more detailed discussion.) Reclaiming land or rebuilding levees after a catastrophic event due to climate change or a seismic event would potentially obstruct access to natural gas wells during construction. In the instance of levee failure causing flooding, inundation could also block access to natural gas wells.

***CEQA Conclusion*:** Under the No Action Alternative, there are projects under consideration in the study area that could reduce access to natural gas resources. Further, management plans and habitat conservation plans within the study area may require removal of active natural gas wells or block access to gas fields. However, mitigation procedures and conservation bank locations would be prepared prior to allowing development to proceed. Additionally, even if certain plan actions block vertical access to natural gas fields, directional drilling could provide access to these fields. Projects within the study area, including highway/road improvements, housing development, and levee improvements are being supplied by permitted aggregate source and are within the available permitted regional extraction sites in Sacramento County. As such, there would be no significant impacts on access to natural gas resources or on the availability of aggregate resources within the study area under the No Action Alternative.

## 26.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Alternative 1A includes changes to the SWP and CVP water conveyance infrastructure and operations as a result of five new north Delta intakes to be constructed and operated under CM1 and Operational Scenario A. Five intakes, up to 15 solids lagoons, and five sedimentation basins would be constructed and operated under Alternative 1A. Additionally, the remaining conservations measures (CM2–CM22) would create up to 65,000 acres of tidal habitat restoration and other habitat restoration and enhancement. Construction of facilities associated with this alternative could affect existing mineral resources. Such effects are discussed below.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

The locations of producing natural gas wells within the Alternative 1A construction footprint are shown in Figure 24-5. Numbers of active natural gas wells in the construction footprint and their total average annual production are identified in Table 26-4, and individual wells are identified in Appendix 26A, *Natural Gas Wells*. Producing wells in the study area are in Sacramento, San Joaquin, Yolo, Solano, and Contra Costa Counties. Producing wells within the construction footprint, however, are only in Sacramento County. These six wells are in areas that would be occupied by the tunnel conveyance facilities and reusable tunnel material (RTM) areas. There are no producing wells in proposed temporary construction work areas.

***NEPA Effects:*** Because wells within the construction footprint would be permanently abandoned, construction of Alternative 1A could result in reduced natural gas production in the study area. If

new wells are developed to replace those that would be abandoned, loss of production would likely be only temporary. Wells in the study area in Sacramento County represent a very minor percentage of the county's average annual natural gas production. Affected wells in the construction footprint produce about 1% of the total annual natural gas production in Sacramento County (Table 26-4). Even if all producing wells in the Alternative 1A construction footprint were abandoned and not replaced with new wells installed outside the construction footprint, the reduction in natural gas production would be minimal.

**Table 26-4. Producing Natural Gas Wells Affected by the BDCP Action Alternatives[a]**

| County | | Construction Permanent Impact Area (number of wells) | | | | | | Construction Temporary Impact Area (number of wells) | | | Permanent + Temporary Impact Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County Name | 2005–2009 Annual Average Natural Gas Production (Mcf) | Tunnel (Subsurface) | Reusable Tunnel MaterialWork Area | Potential Borrow then Spoil | Shaft Location | Canal (Surface) | Tunnel or Canal Work Area | Siphon Work Area | Fish Screen Work Area | Operable Work Area | 2005–2009 Annual Average Natural Gas Production (Mcf) | Project Impacts - % of County's 2005–2009 Ave. Annual Prod.[b] |
| **Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | | | | | | | | | |
| Sacramento | 16,342,002 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 165,142 | 1 |
| San Joaquin | 66,723,189 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 83,065,191 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 165,142 | 1 |
| **Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | | | | | | | | | |
| San Joaquin | 66,723,189 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 171,903 | <1 |
| Total | 66,723,189 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 171,903 | <1 |
| **Alternative 1C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario A)** | | | | | | | | | | | | |
| Sacramento | 16,342,002 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 931,495 | 6 |
| Solano | 14,596,981 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Yolo | 3,705,263 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Contra Costa | 13,688,028 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 48,332,274 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 931,495 | 6 |
| **Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | | | | | | | | | |
| Same as Alternative 1B | | | | | | | | | | | | |
| **Alternative 2C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario B)** | | | | | | | | | | | | |
| Same As Alternative 1C | | | | | | | | | | | | |

| County | | Construction Permanent Impact Area (number of wells) | | | | | | Construction Temporary Impact Area (number of wells) | | | Permanent + Temporary Impact Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| County Name | 2005–2009 Annual Average Natural Gas Production (Mcf) | Tunnel (Subsurface) | Reusable Tunnel MaterialWork Area | Potential Borrow then Spoil | Shaft Location | Canal (Surface) | Tunnel or Canal Work Area | Siphon Work Area | Fish Screen Work Area | Operable Work Area | 2005–2009 Annual Average Natural Gas Production (Mcf) | Project Impacts - % of County's 2005–2009 Ave. Annual Prod. [b] |
| **Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)** | | | | | | | | | | | | |
| Contra Costa | 13,688,028 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Sacramento | 16,342,002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| San Joaquin | 66,723,189 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Total | 96,753,219 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| **Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario D)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario D)** | | | | | | | | | | | | |
| Same as Alternative 1B | | | | | | | | | | | | |
| **Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario D)** | | | | | | | | | | | | |
| Same as Alternative 1C | | | | | | | | | | | | |
| **Alternative 7—Dual Conveyance with Pipeline/Tunnel and Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)** | | | | | | | | | | | | |
| Same as Alternative 1A | | | | | | | | | | | | |
| **Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)** | | | | | | | | | | | | |
| Contra Costa | 13,688,028 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |
| Sacramento | 16,342,002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 36,948 | <1 |
| Total | 30,030,030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | — | — |

Source: California Department of Conservation Division of Oil, Gas, and Geothermal Resources 2009.
Mcf = 1,000 cubic feet.

[a] Identification of all producing wells is provided in Appendix 26A, *Natural Gas Wells*.

[b] Values rounded to the nearest percent.

Because the relatively few (six) producing wells within the construction footprint account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production and effects on natural gas wells would not be adverse. All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Construction of Alternative 1A water conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 1A permanent construction footprint is small (less than approximately 3% of the areal extent of natural gas field areas intersected) (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term adverse loss of extraction potential from construction of Alternative 1A.

**Table 26-5. Natural Gas Fields Affected by Alternative**

| Gas Field Name | Natural Gas Field Size (acres)[a] | Annual Average Natural Gas Production 2005–2009 (Mcf) | Acres Of Non-Abandoned Natural Gas Field Affected | Percent of Non-Abandoned Natural Gas Field Affected by Project[b] |
|---|---|---|---|---|
| **Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | |
| Merritt Island Gas (abandoned) | 269 | ND | — | — |
| River Island Gas | 8,376 | 2,532,876 | 278 | 3 |
| Snodgrass Slough Gas | 168 | ND | 18 | <1 |
| Non-abandoned acres | 8,544 | | 296 | 3 |
| **Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | |
| East Island Gas | 684 | 1,502 | 248 | 4 |
| King Island Gas | 204 | 24,857 | 52 | <1 |
| Merritt Island Gas (Abandoned) | 269 | — | — | — |
| Robert Island Gas | 2,034 | ND | 484 | 7 |
| Snodgrass Slough Gas | 169 | ND | 39 | <1 |
| Thornton Gas (abandoned) | 1,752 | — | — | — |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 73 | <1 |
| Non-abandoned acres | 6,943 | | 924 | 13 |

| Gas Field Name | Natural Gas Field Size (acres)[a] | Annual Average Natural Gas Production 2005–2009 (Mcf) | Acres Of Non-Abandoned Natural Gas Field Affected | Percent of Non-Abandoned Natural Gas Field Affected by Project[b] |
|---|---|---|---|---|
| **Alternative 1C—Dual Conveyance with West /Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario A)** | | | | |
| Dutch Slough Gas | 3,635 | 1,668,346 | 92 | <1 |
| Elkhorn Slough Gas | 411 | 191,942 | 242 | 1 |
| Merritt Island Gas (abandoned) | 269 | — | — | — |
| Rio Vista Gas | 15,752 | 15,176,337 | 546 | 3 |
| Non-abandoned acres | 19,798 | | 880 | 5 |
| **Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1B | | | | |
| **Alternative 2C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1C | | | | |
| **Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3 and 5, (9,000 cfs; Operational Scenario H)** | | | | |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 165 | 4 |
| River Island | 8,376 | 2,532,876 | 87 | 2 |
| | 12,228 | 2,891,183 | 252 | 2 |
| **Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1-5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1-5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1B | | | | |
| **Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1C | | | | |
| **Alternative 7—Dual Conveyance with Pipeline/Tunnel, and Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)** | | | | |
| Rio Vista Gas | 15,753 | 15,176,337 | 23 | <1 |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 9 | <1 |
| Non-abandoned acres | 19,605 | | 32 | <1 |

Source: California Department of Conservation Division of Oil, Gas, and Geothermal Resources 2009

Note: Average annual natural gas production is not reported for abandoned natural gas fields. ND is stated where average annual gas production data are not available.

Mcf = 1,000 cubic feet.

[a] Gas field size is based on administrative boundaries reported by DOGGR.

[b] Values rounded to the nearest percent.

1

Alternative 1A temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource. There would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 1A conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1A would include moving water, both in infrastructure that would be constructed and in natural channels. These operations would not cause additional effects on natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of the water conveyance facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate pumping plants and other appurtenant structures; periodic replacement of erosion protection on the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape maintenance. These activities would not affect natural gas wells or resource recovery. Therefore, the operation and maintenance associated with the water conveyance facilities under Alternative 1A would not have additional effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** The operation and maintenance associated with the water conveyance facilities under Alternative 1A would have no impact on access to natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

### Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1A would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional effects beyond those already addressed for water facilities construction. Similarly, maintenance of the water conveyance facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate pumping plants and other appurtenant structures; periodic replacement of erosion protection on the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape maintenance. These activities would not affect natural gas fields and therefore would not cause

effects that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 1A would not have an adverse effect on production or on access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 1A would have no impact on access to underlying natural gas fields because operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Operations and access to natural gas wells would be affected where wells are located in restoration areas to be inundated under *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Natural gas wells can remain productive in flooded areas, but they require modification, which could include construction of a protective cage and platform above the well (Federal Emergency Management Agency n.d.). The few producing wells that are currently in inundated areas of the Delta are located where flooding is seasonal. With permanent inundation, modification and maintenance of wells may not be cost effective. It is likely that any producing wells in proposed permanent inundation areas in ROAs would need to be abandoned because modifications to these wells would not be feasible. There are approximately 233 active wells within ROAs (Table 26-6); an unknown percentage of these wells in inundation areas would likely be abandoned. Specific inundation areas have not been identified in association with Conservation Measures 2–22 of the BDCP at this time.

**Table 26-6. Natural Gas Wells in ROAs**

| ROA | County | Number of Wells | 2005–2009 Average Annual Production (Mcf) |
|---|---|---|---|
| Cache Slough | Solano | 73 | 3,278,616 |
| | Yolo | 5 | 339,608 |
| | Total | 78 | 3,618,224 |
| Cosumnes/ Mokelumne | San Joaquin | 2 | 31,063 |
| | Total | 2 | 31,063 |
| South Delta | San Joaquin | 62 | 10,075,898 |
| | Total | 62 | 10,075,898 |
| Suisun Marsh | Solano | 40 | 1,401,746 |
| | Total | 40 | 1,401,746 |
| West Delta | Contra Costa | 5 | 87,235 |
| | Sacramento | 46 | 2,958,033 |
| | Total | 51 | 3,045,268 |

Source: California Department of Conservation Division of Oil, Gas, and Geothermal Resources 2009.
Mcf = 1,000 cubic feet.

The inundation that would occur under CM4, CM5, and CM10 could take place in the Cache Slough, Cosumnes/Mokelumne, South Delta, Suisun Marsh, and West Delta ROAs, which lie in Solano, Yolo, San Joaquin, Contra Costa, and Sacramento Counties (Figure 24-5 and Table 26-6). The number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. The active wells that would be affected could be maintained in place if they were in seasonally inundated locations. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be redrilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

Natural gas wells in areas that would remain uplands could remain operational and unaffected if they are avoided when restoration activities are implemented and access to the gas well can be maintained. Maintaining access to an oil or gas well is defined by DOC as (1) maintaining rig access to the well, and (2) not building over, or in close proximity to, the well (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2007).

***CEQA Conclusion*:** The number of natural gas wells likely to be affected would be smaller than the potential maximum number in the study area because some wells may be relocated using conventional or directional drilling; however, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

During final design of Conservation Measures 4, 5, and 10, the BDCP proponents will avoid permanent inundation of or construction over active natural gas well sites where feasible taking into consideration costs, logistics and project objectives in order to minimize the need for well abandonment or relocation. This mitigation applies to three conservation measures: *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Direct, overlying access to natural gas fields would be lost in areas where some conservation measures would permanently inundate new areas to create wetlands. Three of the conservation measures—*CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*—would inundate land overlying natural gas fields. Table 26-7 shows the proportion of the individual gas fields underlying individual ROAs that would be inundated; these depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent

drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

**Table 26-7. Natural Gas Field Areas Underlying ROAs**

| ROA/Natural Gas Field Name | 2005–2009 Average Annual Natural Gas Production (Mcf) | Natural Gas Field Area Underlying ROA (acres)[a] | Total Natural Gas Field Area (acres) | Proportion of Natural Gas Field Area Underlying ROA (%)[b] |
|---|---|---|---|---|
| **Cache Slough** | | | | |
| Cache Slough Gas | ND | 476 | 952 | 50 |
| Liberty Cut Gas (abandoned) | ND | 481 | 671 | 71 |
| Liberty Island Gas (abandoned) | ND | 801 | 801 | 100 |
| Lindsey Slough Gas | 2,365,586 | 4,583 | 9,167 | 50 |
| Maine Prairie Gas | 332,478 | 3,384 | 4,785 | 71 |
| Millar Gas | 708,471 | 1,986 | 4,556 | 43 |
| Rio Vista Gas | 11,233,854 | 770 | 15,752 | 5 |
| **Cosumnes/Mokelumne** | | | | |
| Thornton Gas (abandoned) | ND | 75 | 1,745 | 4 |
| West Thornton-Walnut Grove Gas | 358,307 | 2,149 | 3,852 | 56 |
| **South Delta** | | | | |
| Lathrop Gas | 998,715 | 2,252 | 2,583 | 87 |
| Roberts Island Gas | 164,981 | 189 | 2,160 | 9 |
| Union Island Gas | 1,347,713 | 2,736 | 2,736 | 100 |
| **Suisun Marsh** | | | | |
| Honker Gas (abandoned) | ND | 113 | 256 | 44 |
| Kirby Hill Gas | 1,719,786 | 1,082 | 1,082 | 100 |
| North Kirby Hill Gas (abandoned) | ND | 291 | 291 | 100 |
| Potrero Hills Gas (abandoned) | ND | 75 | 75 | 100 |
| Suisun Bay Gas | 79,931 | 373 | 415 | 90 |
| Van Sickle Island Gas | 2,223,971 | 334 | 356 | 94 |
| **West Delta** | | | | |
| Dutch Slough Gas | 1,668,346 | 616 | 3,635 | 17 |
| Rio Vista Gas | 11,233,854 | 2,020 | 15,752 | 13 |
| River Break Gas | 16,202 | 1 | 1,247 | <1 |

Source: California Department of Conservation Division of Oil, Gas, and Geothermal Resources 2009.
Mcf = 1,000 cubic feet. ND is stated where data are not available.

[a] Natural gas field areas are based on administrative boundaries.

[b] Values rounded to the nearest percent

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are

permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

During final design of Conservation Measures 4, 5, and 10, the BDCP proponents will consider the location and amount of inundation of natural gas fields and will identify means to maintain feasible drilling access to them. These measures could include maintaining non-inundated locales overlying or near individual gas fields and ensuring that inundation zone design provides feasible access to natural gas fields from adjacent and nearby non-inundated lands. This mitigation applies to CM4, CM5, and CM10. This mitigation measure will ensure that drilling access to natural gas fields is maintained to the greatest extent practicable.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 1A construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Alternative 1A would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. The principal demands for construction material would come from the five intakes with pumping plants and associated facilities, the nearly 40 miles of concrete pipeline tunnels, and the forebays. Additional aggregate would be required for construction of permanent and temporary roads and levees. An estimated 13,506,000 tons of aggregate would be required including about 5,149,000 tons of aggregate that would be required for concrete including tunnels. This amount is equal to approximately 32% of the permitted aggregate in Sacramento County or 6% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate in these two areas. This aggregate would be used over an approximately 9-year construction period, spreading the effect over time. Because the 50-year demand for aggregate already exceeds the existing permitted supplies in many counties within which the conveyance facilities would be constructed, there would likely be an effect on the availability of local aggregate supplies if the project were to rely solely on local resources, (i.e., resources from one area, such as Sacramento County). However, if aggregate was sourced from several local resources (such as Sacramento County, Stockton-Lodi, and Yuba City-Marysville) there would not be a substantial depletion (loss of availability) of aggregate to meet the regional 50-year demand. Sourcing from multiple locations is likely, considering that the alternative extends many miles north-to-south and different portions of the project would be closer to individual local resources (See Figure 26-1). Because there would not be a

substantial depletion of aggregate available to meet the regional 50-year demand, Alternative 1A would not substantially contribute to the need for new aggregate resource development. Therefore, this effect would not be adverse.

Use of local material only would constitute an indirect effect in that it might reduce the life expectancy of existing quarries, contribute to the need for new quarries to be permitted, and reduce the availability of these building materials for other projects on a local basis. New aggregate resources may be identified within existing MRZ-3 areas with additional study; identification of new resources could expand the resource base during the construction period of the water conveyance facilities. CGS estimates that there are 74 billion tons of non-permitted construction aggregate resources in 31 aggregate study areas in the state (Clinkenbeard 2012). While not all these resources may be mined because of social, environmental, or economic factors (e.g., resources may be located near urban or environmentally sensitive areas, precluding their extraction), CGS states that non-permitted aggregate resources are likely to be the primary resources that will meet California's continuing demand (Clinkenbeard 2012).

Additionally, as described in Section 26.1.2.1, *Aggregate Resources*, some of the new aggregate resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate, respectively. Although these sites may not provide materials to the project, their capacities do indicate that a single quarry could provide more than the required annual tonnage to the project and still have capacity for many decades. Although regional values are not available, the statewide decline in aggregate demand went from 246 million to 156.7 million and then to 127.5 million tons (2007, 2008, and 2010, respectively), indicating that some unused capacity exists because of the current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2010).

Alternatively, some sources outside the study area may be used to supply aggregate needs for BDCP water conveyance facilities. Clinkenbeard (2012) notes that Yuba County exports about 70% of its available aggregate to points outside its production region. Additionally, aggregate delivery by barge from the San Francisco Bay is possible. The California State Lands Commission (2010:2–19) notes several existing waterfront facilities in San Francisco Bay, San Pablo Bay, and Suisun Bay that could deliver aggregate from that area to the study area. These areas provide additional aggregate capacity over that of the immediate region and further reduce the project's impact on local and regional aggregate resources. Also, as noted in Section 26.1, *Environmental Setting/Affected Environment*, California imports large volumes of aggregate from Canada and Mexico, and a terminal was recently constructed at the Port of Richmond to receive and distribute aggregate shipments. It may be necessary or financially advantageous to purchase some of this imported aggregate if specific aggregate supplies are insufficient at the local or regional level, although the analysis above indicates that regional supply is sufficient. The Canadian and Mexican sites that are currently providing the aggregate and rock are already permitted under their respective jurisdictions. Consequently, no unanticipated environmental impacts would be generated by purchasing materials that are already being mined and imported from these existing sites. Considering the level of local and regional supplies available, the additional aggregate and rock demand of the BDCP would not be sufficient to be substantially responsible for the development of new mines in Mexico or Canada. Additionally, if federal funding is provided to the project, there might be restrictions on using aggregate from outside the country because of the Buy America Act (see Section 26.2.1.1).

The amount of borrow material required for Alternative 1A would be 13,500,000 cubic yards or 20,250,000 tons. Because there is limited excavation associated with this alternative, most of this

borrow material would be developed from borrow pits adjacent to construction areas, nearby suitable locations, and some commercial sites. The use of this amount of borrow would not have an adverse effect because borrow is not defined as a mineral resource and it is developed locally and regionally on an as-needed basis.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 1A, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1A would include moving water, both within infrastructure that would be constructed and within natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 1A would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 1A would not have an impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 1A operations and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1A would include moving water, within infrastructure that would be constructed and within natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of structure foundations, levees, stream banks, and access roads associated with major project features such as intakes and pumping plants. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those

currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 1A is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 1A. The material would be used for maintenance of structure foundations, levees, stream banks and access roads associated with major project features. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 that would have the potential to affect important aggregate resource sites are those that would inundate large areas of land. Three of the conservation measures would inundate large areas: *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Table 26-8 lists two active mines in the ROAs. The mine in the Suisun Marsh ROA, however, is at the north end of the ROA in an upland area that would not be affected by inundation. One aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

**Table 26-8. Active Mines in ROAs**

| ROA | County | Name of Operator / Mine | Acreage Permitted | Disturbed Acreage |
|---|---|---|---|---|
| Suisun Marsh | Solano | Tule Vista Livestock Company | 12 | 3 |
| West Delta | Solano | Business to Business International / Decker Island | 473 | 70 |

Source: California Department of Conservation Office of Mine Reclamation 2007.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

The BDCP proponents will purchase the permitted aggregate volume of affected mines for construction use so that the available aggregate will not be lost. The resulting mined site(s) should be considered for integration into the restoration design of any conservation measure that affects the site(s). For example, the mined site(s) could be reshaped to provide aquatic or intertidal habitat of varying depths and configurations. This mitigation applies to CM4, CM5, and CM10.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Conservation Measures 2–22 that have the potential to reduce the availability of important aggregate resources are those that would use aggregate resources in construction or maintenance. Four of the conservation measures listed in Table 3-3 have this potential: *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Community Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Aggregate and riprap would be used for levee, berm, access road, and rock revetment construction, and rock would be placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts of aggregate and riprap necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be used over a period of years and would be expected to be within the capacity of available resources of the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 1A would not have an adverse effect.

***CEQA Conclusion:*** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Alternative 1B would be similar to Alternative 1A except that the water routed from the north Delta to the south Delta would be conveyed primarily through a canal along the east side of the Delta instead of through pipelines/tunnels, and there would be no intermediate forebay. From an intermediate pumping plant, water would be raised to an elevation allowing gravity to carry it through a continuing canal to the new Byron Tract Forebay, adjacent to and south of Clifton Court Forebay. Along the way, diverted water would travel under existing watercourses through culvert siphons or tunnel siphons. CM2–CM22 would also be implemented under this alternative, and their

effects would be the same as under Alternative 1A. A detailed description of the alternative is provided in Chapter 3, *Description of the Alternatives* (Section 3.5.3); a detailed depiction is provided in Figure M3-2 in the Mapbook Volume.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The locations of producing natural gas wells within the Alternative 1B water conveyance facilities construction footprint are shown in Figure 24-5. Numbers of natural gas wells in the construction footprint and their total average annual production are identified in Table 26-4, and individual wells are identified in Appendix 26A, *Natural Gas Wells*. Producing wells in the study area are in Sacramento, San Joaquin, Yolo, Solano and Contra Costa Counties. Two producing wells that would be affected by Alternative 1B are in San Joaquin County. In the construction footprint, producing wells are associated with the conveyance canal and temporary construction work areas.

Because the two wells within the canal alignment would be permanently abandoned, construction of Alternative 1B could result in reduced natural gas production in the study area. If new wells are developed to replace those that are abandoned, loss of production would likely be only temporary. Wells in the San Joaquin County portion of the study area represent a very minor percentage of the county's average annual natural gas production. Affected wells in the construction footprint produce less than 1% of the county's total annual natural gas production (Table 26-4). Even if both producing wells in the Alternative 1B construction footprint were abandoned and not replaced with new wells, the reduction in natural gas production would be minimal.

Because there are relatively few (two) producing wells within the construction footprint, the loss of these wells would not eliminate a substantial portion of the county's natural gas wells or natural gas production, and therefore would not constitute an adverse effect. Both producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Although two natural gas wells within the canal alignment would be permanently abandoned, new wells could be developed to replace them and the loss would be temporary. Additionally, wells in the study area of San Joaquin County produce a very minor percentage of the county's average annual natural gas production. Even if both producing wells in the Alternative 1B construction footprint were abandoned and not replaced, the lost natural gas production would be less than 1% of county natural gas production. Because this does not represent a substantial portion of the county's natural gas wells or natural gas production, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Construction of Alternative 1B conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 1B permanent construction footprint is small (approximately 13% of individual gas fields intersected) relative to the areal extent of natural gas fields (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other

overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. There would be no permanent blockage of access to natural gas fields. Therefore, there would be no long-term adverse effect on extraction capability from construction of Alternative 1B.

Alternative 1B temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction would be small and temporary and there would be no permanent blockage of access to natural gas fields. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 1B conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (approximately 13%). Additionally, the gas fields would continue to be accessible using standard directional drilling techniques, so there would be no permanent blockage of access to natural gas fields. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1B would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees would be needed for Alternative 1B. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operating the facilities. Similarly, as described under Alternative 1A, maintenance of the water conveyance facilities would include routine activities that would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 1B would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1B would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees would be needed under Alternative 1B. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 1B would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 1B would not would not eliminate natural gas fields or block access to supplies of natural gas because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not

obstruct access to natural gas fields and would not interfere with recovering the resource. Accordingly, there would be no impact. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 1B would be the same as those under Alternative 1A. While inundation for permanent wetland creation under *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration* could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion*:** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 1B would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because

implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 1B construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint for the water conveyance facilities, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Alternative 1B would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. The principal demands for construction materials would come from construction of the five intakes with pumping plants and associated facilities, 19 bridges, and the 49 miles of canal. Additional aggregate would be required for access road and levee construction. An estimated 8,473,470 tons of aggregate would be required for this alternative including about 2,580,000 tons of aggregate for concrete including tunnels. This amount is equal to approximately 2% of the permitted aggregate in Sacramento County, or 4% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to about 3% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region. The amount of aggregate needed for Alternative 1B is about 37% less than needed for Alternative 1A; and Alternative 1A was judged to have no adverse effect on aggregate availability. Similarly, Alternative 1B would not constitute an adverse effect on known aggregate resources or aggregate availability to meet the regional 50-year demand.

The amount of borrow material required for Alternative 1B would be 200,000,000 cubic yards, or approximately 350,000,000 tons distributed over four segments of the route. For the first segment of the route, the fill would be nearly balanced cut and fill, so no extra fill would be needed. The remaining three segments would require about 138,000,000 cubic yards, or approximately 207,000,000 tons. The use of this borrow material would not have an adverse effect because borrow is developed locally and regionally on an as-needed basis and is not considered an important mineral resource in California.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to 3% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period, would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of

new aggregate resources. Additionally, the amount of aggregate needed for Alternative 1B would be about 37% less than that needed for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate availability. Accordingly, the impact of Alternative 1B would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1B would include moving water, within infrastructure that would be constructed and within natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the alternative's footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 1B would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 1B would not have impacts on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 1B operations, and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1B would include moving water, within infrastructure that would be constructed and within natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of structure foundations, levees, stream banks, and access roads associated with major project features such as intake and intermediate pumping plants. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 1B is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 1B. The material would be used for maintenance of structure foundations, levees, stream banks and access roads associated with major project features. The

small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

**Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 1B as under Alternative 1A. Consequently, the effects of inundation under CM4, CM5, and CM10 would be the same. There are no MRZs in the inundation footprints so there would be no effect on them. Table 26-8 shows that there are two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 1B would be the same as those under Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of the available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 1B would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario A)

The water supply facilities under Alternative 1C would be similar to those described for 1A with the exception that the five intakes would be located on the west bank of the Sacramento River between Clarksburg and Walnut Grove, rather than the east bank; the water would be conveyed from intakes to the intermediate pumping plant via a canal on the western side of the Delta rather than a pipeline/tunnel. There would be no intermediate forebay under this alternative. Water would be carried south along the western side of the Delta to an intermediate pumping plant, then pumped through a dual-bore tunnel to a continuing canal to the proposed Byron Tract Forebay immediately northwest of Clifton Court Forebay. Along the conveyance route, diverted water would travel under existing watercourses and one rail crossing through culvert siphons. A detailed description of the alternative is provided in Chapter 3, *Description of the Alternatives* (Section 3.5.4); a depiction of the physical components is provided in Figure M3-3 in the Mapbook Volume.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The locations of producing natural gas wells within the Alternative 1C construction footprint are shown in Figure 24-5. Numbers of active natural gas wells within this footprint and their total average annual production are identified in Table 26-4, and individual wells are identified in Appendix 26A, *Natural Gas Wells*. In the study area, producing wells are found in Sacramento, Solano, San Joaquin, Yolo and Contra Costa Counties. In the construction footprint of Alternative 1C, four producing wells in Sacramento County would be affected.

Because the four wells within the canal alignment would be permanently abandoned, construction of Alternative 1C could result in reduced natural gas production in the study area. If new wells were developed to replace those that were abandoned, loss of production would be temporary. Wells in the construction footprint in Sacramento County produce approximately 6% of the county's annual natural gas production. Even if all producing wells in the construction footprint were abandoned and not replaced with new wells, the lost natural gas production would not represent a substantial portion of county, regional, or statewide natural gas production or eliminate a substantial portion of the county's natural gas wells. There would be no wells affected by temporary construction work areas. Accordingly, there would not be an adverse effect.

Abandonment and avoidance measures would be implemented in accordance with state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Even if all natural gas wells within the physical footprint of Alternative 1C had to be abandoned, the resultant loss would amount to approximately 6% of Sacramento County's annual natural gas production. Because this amount is not a substantial proportion of natural gas production on a county, regional, or statewide basis, and a substantial portion of the county's natural gas wells would not be eliminated, this impact would be less than significant. No mitigation is required.

### Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Construction of Alternative 1C conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 1C permanent construction footprint is small (approximately 5% of the gas fields intersected) relative to the areal extent of natural gas field areas (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term substantial loss of availability of extraction potential from construction of Alternative 1C, and there would be no adverse effect.

Alternative 1C temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor. Because the effect on natural gas extraction would be small and temporary and would not prevent recovery of the resource, there would not be an adverse effect.

***CEQA Conclusion*:** Although the Alternative 1C conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (approximately 5%). Additionally, the gas fields would continue to be accessible using conventional or directional drilling techniques. There would be no substantial loss of existing production or permanent loss of access to the resource. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operational of the water conveyance facilities under Alternative 1C would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees would be needed for Alternative 1C. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operations. Similarly, as described under Alternative 1A, maintenance of the water conveyance facilities would include routine activities that would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 1C would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1C would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees along the two canal segments would be needed for Alternative 1C. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 1C would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 1C would have no impact on access to underlying natural gas fields because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not obstruct access to natural gas fields and would not interfere with recovering the resource. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 1C would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 1C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate

access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

### Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 1C construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint of the water conveyance facilities, there would be no impact. No mitigation is required.

### Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Alternative 1C would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. The principal demands for construction materials would come from construction of the five intakes with pumping plants and associated facilities, the bridges, the 16 miles of canal, and the 17 miles of concrete-lined tunnel. Additional aggregate would be required for access road and levee construction. An estimated 12,009,807 tons of aggregate would be required for this alternative including about 4,000,000 tons for concrete including tunnels. This amount is equal to approximately 29% of the permitted aggregate in Sacramento County, or approximately 5% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). This amount is less than 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region combined. The amount of aggregate needed for Alternative 1C would be about 11% less than that needed for Alternative 1A; and Alternative 1A was judged to have no adverse effect on aggregate availability. Similarly, Alternative 1C would not constitute an adverse effect on known aggregate resources or aggregate availability to meet the regional 50-year demand.

The amount of borrow material required for Alternative 1C would be 200,000,000 cubic yards, or approximately 350,000,000 tons. However, for the first segment of the route the fill would be nearly balanced cut and fill, so only an estimated 10% of the needed fill on this segment, or approximately 12,000,000 tons, would come from borrow sites away from the canal route. The second segment of this conveyance route is the tunnel; it would require very small amounts of borrow for road construction. In the third segment (the southernmost canal segment), excavated material would significantly exceed the borrow needs. In total, about 12,000,000 tons of borrow from outside the immediate alternative footprint would be required for this alternative. The use of this borrow material would not have an adverse effect because borrow is developed locally and regionally on an as-needed basis and is not considered a significant mineral resource in California.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be less than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for development of new aggregate resources. The amount of aggregate use in Alternative 1C would be about 11% less than that needed for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate availability. Consequently, the impact of Alternative 1C would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1C would include moving water, within infrastructure that would be constructed and natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the alternative's footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 1C would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 1C would have no impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 1C operations, and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1C would include moving water, within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of structure foundations, levees, stream banks, and access roads associated with major project features such as intake and intermediate pumping plants. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 1C is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 1C. The material would be used for maintenance of structure foundations, levees, stream banks and access roads associated with major project features. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 1C as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. Table 26-8 lists two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-1), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 would reduce this impact to a less-than-significant level.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 1C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be used over a period of years and would be expected to be within the available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate materials for the conservation measures of Alternative 1C would not cause an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)

Alternative 2A is the same as Alternative 1A except for operational changes associated with water management and possible changes in the locations of two intake structures and associated pumping plants and pipelines. The operational differences would have no effect on access to or availability of natural gas or aggregates. Additionally, under Alternative 2A, an operable barrier with boat lock would be built at the head of Old River (at its confluence with the San Joaquin River), and would require approximately 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of riprap for slope protection on levees and on the channel bottom, which would use aggregate resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 2A are the same as those under Alternative 1A except for possible changes in intake locations and associated pumping plant and pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 and 7 are selected, some of the conveyance pipelines and the initial tunnel between the intake pumping plants and the intermediate forebay would be adjusted. However, the alternate intake locations would not change the effects on natural gas wells. Because of the relatively few (six) producing wells within the Alternative 2A construction footprint, which account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production and effects on natural gas wells would not be adverse. All producing

wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** The conveyance facilities associated with Alternative 2A are the same as those under Alternative 1A except for changes in intake locations and pumping plant locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 and 7 are selected, some of the conveyance pipelines and the initial tunnel between the intake pumping plants and the intermediate forebay would be adjusted. However, the alternate intake locations would not change the effects on extraction potential from natural gas fields. The reduction in unimproved land surfaces directly overlying gas fields would not be an adverse effect because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, as in the discussion of Alternative 1A above, Alternative 2A would have no long-term adverse effects on the extraction potential from natural gas fields because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource.

***CEQA Conclusion*:** Although the Alternative 2A conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** As under Alternative 1A, the operation of the water conveyance facilities under Alternative 2A is primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. Routine maintenance activities would not affect natural gas wells or resource recovery. Operation and maintenance would not have effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no effect.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 2A would have no impact on access to locally important natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance such as painting, cleaning, repairs, levee and landscape

maintenance and similar activities would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2A would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water facilities construction. Similarly, maintenance of the water conveyance facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate pumping plants and other appurtenant structures; periodic replacement of erosion protection on the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape maintenance. These activities would not affect natural gas fields and therefore would not cause impacts that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance of Alternative 2A would not have an adverse effect on production or access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** Operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would also have no impact on access to underlying natural gas fields. The operation and maintenance of the water conveyance facilities under Alternative 2A would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2A would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2A would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 2A construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 2A would be the same as that under Alternative 1A except for potential minor changes associated with construction of piping for Intakes 6 and 7 rather than 4 and 5. The piping for Intakes 6 and 7 would be slightly longer than the piping for Intakes 4 and 5, so there would be a slightly higher demand for aggregate.

The construction of an operable barrier at the head of Old River would also require a minor additional amount of aggregate, but not enough to substantially increase demand. The amount of aggregate needed for construction would be approximately 13,506,000 tons, or approximately 5% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, demand for aggregate resources over the 9-year construction period under Alternative 2A would not require a substantial depletion of aggregate available to meet the regional 50-year demand, and would not substantially contribute to the need for new aggregate resource development. Therefore, this effect would not be adverse.

The amount of borrow material needed to construct Alternative 2A is expected to be similar to that for Alternative 1A. Because borrow is developed locally and regionally on an as-needed basis and is not considered an important mineral resource in California, there would be no effect associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region combined) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas within the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 2A, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2A would include moving water, both within infrastructure that would be constructed and within natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 2A would not have effects on the availability of aggregate resource sites

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 2A would have no impact on the availability of locally important aggregate resource sites because none exists within the areas affected by Alternative 2A operations; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2A would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of structure foundations, levees, stream banks, and access roads associated with major project features such as intakes, pumping plants, and the head of Old River barrier. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 2A is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of the water conveyance facilities under Alternative 2A. The material would be used for maintenance of levees, stream banks, access roads associated with major project features, and structure foundations. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 2A as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. Table 26-8 lists two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to a less-than-significant level.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 2A would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the available resources of the study area or adjacent aggregate resource study areas as discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate materials for the conservation measures of Alternative 2A would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)

Alternative 2B is the same as Alternative 1B except for operational changes associated with water management and possible changes in the locations of two intake structures and associated pumping plants and pipelines. The changed water management would have no effect on access to or availability of natural gas or aggregates. Under Alternative 2B, an operable barrier with boat lock would be built at the head of Old River (at its confluence with the San Joaquin River), and would require approximately 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of riprap for slope protection on levees and on the channel bottom, which would use aggregate resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The water conveyance facilities (primarily canals) associated with Alternative 2B are the same as those under Alternative 1B except for possible changes in intake locations and associated pumping plant and pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 and 7 are selected, some of the conveyance pipelines and the initial canal between the intake pumping plants and the intermediate pumping plant would be adjusted. However, the alternate intake locations would not change the effects on natural gas wells. Two producing wells in San Joaquin County would be affected by the conveyance canal and temporary construction work areas. Because there are relatively few (two) producing wells within the

construction footprint, the loss of these wells would not eliminate a substantial portion of the county's natural gas wells or natural gas production, and therefore would not constitute an adverse effect. Both producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Although two natural gas wells within the canal alignment would be permanently abandoned, new wells could be developed to replace them and the loss would be temporary. Additionally, wells in the San Joaquin County portion of the study area produce less than 1% of the county's average annual natural gas production. Even if both producing wells in the Alternative 2B construction footprint were abandoned and not replaced, the lost natural gas production would not represent a substantial portion of the county's natural gas wells or natural gas production. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 2B are the same as those under Alternative 1B except for possible changes in intake locations and associated pumping plant and pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 and 7 are selected, some of the conveyance pipelines and the initial canal between the intake pumping plants and the intermediate pumping plant would be adjusted. However, the alternate intake locations would not change the effects on extraction potential from natural gas fields. The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance.

Alternative 2B temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction would be small and temporary and there would be no permanent blockage of access to natural gas fields.

Therefore, construction of Alternative 2B would have no long-term adverse effect on the potential for extraction from natural gas fields because only a small area would be overlain by new water conveyance facilities (approximately 13% of the natural gas fields intersected), and there would be no permanent blockage of access to natural gas fields. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 2B conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small. Additionally, the gas fields would continue to be accessible using standard directional drilling techniques, so there would be no permanent blockage of access to natural gas fields. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2B would be similar to that under Alternative 2A and would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not

cause additional effects beyond those already addressed for water facilities construction. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operating the facilities. The facilities maintenance activities needed for Alternative 2B would also be similar to Alternative 1B. Routine maintenance of the water conveyance facilities and periodic maintenance of canal levees would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 2B would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2B would be similar to Alternative 2A and primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional effects beyond those already addressed for water facilities construction. Similarly, maintenance activities would not cause effects that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 2B would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance associated with the water conveyance facilities under Alternative 2B not would not eliminate natural gas fields or block access to supplies of natural gas because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not obstruct access to natural gas fields and would not interfere with recovering the resource. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2B would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot

assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2B would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 2B construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint for the water conveyance facilities, there would be no impact. No mitigation is required.

### Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 2B would be the same as under Alternative 1B except for potential minor changes associated with construction of piping for Intakes 6 and 7 rather than Intakes 4 and 5. The piping for Intakes 6 and 7 would be slightly longer than the piping for Intakes 4 and 5, so there would be a higher demand for aggregate. The construction of the operable barrier at the head of Old River would also require a minor additional amount of aggregate, but not enough to meaningfully increase demand. The amount of aggregate needed for construction would exceed 8,473,470 tons, which would represent approximately 3% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1B, the amount of aggregate needed is less than that needed for Alternative 1A, and Alternative 1A was judged to have no adverse effect on aggregate availability. Similarly, Alternative 2B demand would not be considered an adverse effect on the availability of known aggregate resources over the 9-year construction period, or aggregate availability to meet the regional 50-year demand.

The amount of borrow material needed to construct Alternative 2B is expected to be similar to that for Alternative 1B. Because borrow is not defined as a mineral resource, there would be no effect associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 3% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area, would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Accordingly, although a substantial amount of available aggregate material may be used under Alternative 2B, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

### Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2B would include moving water, both within infrastructure that would be constructed and natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the alternative's footprint so they could not have any effect even if aggregate mines or

MRZs did exist. Accordingly, the operational components of the water conveyance facilities under Alternative 2B would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 2B would not have impacts on the availability of aggregate resource sites because none exist within the areas affected by Alternative 2B operation and maintenance; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The only use of aggregate resources associated with operation and maintenance of the water conveyance facilities under Alternative 2B would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, structure foundations and the head of Old River barrier. These small amounts could be readily supplied by quarries in the region without affecting the overall availability of aggregate. Consequently, the use of the small amount of aggregate material for the operational components of the water conveyance facilities under Alternative 2B is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of the water conveyance facilities under Alternative 2B. The material would be used for maintenance of levees, stream banks, access roads, structure foundations, and the head of Old River barrier. The small amount of aggregate used for maintenance of operational components would not substantially deplete permitted aggregate resources in the six aggregate production study areas surrounding the study area, would not cause loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 2B as under Alternative 1A. Consequently, the effects of inundation under CM4, CM5, and CM10 would be the same. Table 26-8 shows that there are two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 2B would be the same as those under Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate materials for the conservation measures of Alternative 2B would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario B)

Alternative 2C is the same as Alternative 1C except for operational changes associated with water management, and the construction of an operable barrier with boat lock at the head of Old River (at its confluence with the San Joaquin River). The different operations would have no effect on access to or availability of natural gas or aggregates. The operable barrier would require approximately 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of riprap for slope protection on levees and on the channel bottom, which would use aggregate resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 2C are the same as those under Alternative 1C (Figure 24-5; Table 26-4). Therefore, the effect on natural gas wells would be the same. Four active wells in Sacramento County would be permanently abandoned because they would be displaced by permanent facility sites. Wells in the construction footprint in Sacramento County produce approximately 6% of that county's annual natural gas production. Even if all producing wells in the construction footprint were abandoned and not replaced with new wells, the

effects associated with lost natural gas production would not be adverse because the loss would not represent a substantial portion of county, regional, or statewide natural gas production or eliminate a substantial portion of the county's natural gas wells. There would be no wells affected by temporary construction work areas. Accordingly, there would not be an adverse effect.

Abandonment and avoidance measures would be implemented in accordance with state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Even if all natural gas wells under the physical footprint of Alternative 2C had to be abandoned, it would amount to approximately 6% of Sacramento County's annual natural gas production. Because this amount is not a substantial proportion of natural gas production on a county, regional, or statewide basis, and a substantial portion of the county's natural gas wells would not be eliminated, this impact would be less than significant. No mitigation is required.

### Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** The conveyance facilities associated with Alternative 2C are the same as those under Alternative 1C. Therefore, the effect on natural gas fields would be the same. Construction of Alternative 2C conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of study area natural gas field area underlying the Alternative 2C permanent construction footprint is small (approximately 3%) relative to the areal extent of natural gas field areas (approximately 5% of the natural gas fields intersected; Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be an adverse effect because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore there would be no long-term substantial loss of extraction potential from construction of Alternative 2C, and there would be no adverse effect.

Alternative 2C temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor. Because the effect on natural gas extraction would be small and temporary, and would not prevent recovery of the resource, there would not be an adverse effect.

***CEQA Conclusion*:** Although the Alternative 2C conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (approximately 5%). Additionally, the gas fields would continue to be accessible using conventional or directional drilling techniques. There would be no substantial loss of existing production or permanent loss of access to the resource. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** Like those of Alternative 1C, the operation and maintenance of the water conveyance facilities under Alternative 2C are primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a

result of operations. Similarly, as described under Alternative 1A, maintenance of the water conveyance facilities would include routine activities that would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion:*** Operation and maintenance of the water conveyance facilities under Alternative 2C would not would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1C would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees along the two canal segments would be needed for Alternative 2C. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 2C would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 2C would have no impact on access to underlying natural gas fields because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not obstruct access to natural gas fields and would not interfere with recovering the resource. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2C would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 2C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 2C construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint of Alternative 2C, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 2C are the same as those under Alternative 1C. Therefore, the effects would be the same. Alternative 2C would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. An estimated 12,009,807 tons of aggregate would be required for this

alternative. This amount is estimated to be less than 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region combined (Table 26-1). The amount of aggregate needed for Alternative 2C is about 11% less than that needed for Alternative 1A; and Alternative 1A was judged to have no adverse effect on aggregate availability. The construction of the operable barrier at the head of Old River would require a minor amount of additional aggregate, but not enough to substantially affect demand. As disclosed in the discussion of Alternative 1A, and even with the additional material required for the operable barrier, aggregate use would not produce an adverse effect on aggregate availability to meet the regional 50-year demand, and would not produce an adverse effect on known aggregate resources.

The amount of borrow material required for Alternative 2C would be 200,000,000 cubic yards or approximately 350,000,000 tons. The majority of this material would be used to construct levees for the two canal segments of Alternative 2C. However, the use of this borrow material would not have an adverse effect because borrow is developed locally and regionally on an as-needed basis and is not considered a significant mineral resource in California.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be less than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for the development of new aggregate resources. The amount of aggregate use in Alternative 1C is about 11% less than that needed for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate availability. Consequently, the impact of Alternative 1C would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 2C would include moving water, both within infrastructure that would be constructed and natural channels. As explained under Alternative 1C, these operations would not affect existing mines or identified MRZs because there are none in the area where the alternative would operate. For the same reason, maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Operation and maintenance would not increase the footprint of the alternative. Accordingly, operation and maintenance of the water conveyance facilities under Alternative 2C would not cover or block access to existing mines or identified MRZs and there would be no effect on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 2C would have no impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 2C operations; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The only use of aggregate resources associated with operation and maintenance of the water conveyance facilities would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, structure foundations, and the head of Old River barrier. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 2C is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 2C. The material would be used for maintenance of features such as levees, stream banks, access roads, structure foundations and the head of Old River barrier. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 2C as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. There are no identified MRZs in the inundation footprints. Table 26-8 shows that there are two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-1), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 would reduce this impact to a less-than-significant level.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 2C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate materials for the conservation measures of Alternative 2C would not cause an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)

Alternative 3 is the same as Alternative 1A except for changes in the number of intake locations in the north Delta and related changes in water movement through the Delta. While Alternative 1A uses Intakes 1–5, Alternative 3 only uses Intakes 1 and 2. The decrease in intake locations would not change the effects of the operational or conservation measures of the BDCP. There would be a relatively small decrease in demand for aggregate during construction because three fewer intakes and associated facilities would be built.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 3 are the same as those under Alternative 1A except that three fewer intakes would be constructed. The decreased construction footprint associated with building intakes for Alternative 3 would not change the effect on natural gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by Alternative 3 construction (Sacramento and San Joaquin Counties) represent a very minor percentage of those counties' average annual natural gas production. In the construction footprint, affected wells produce about 1% of the total annual natural gas production in Sacramento County (Table 26-4). Because the relatively few (six) producing wells within the construction footprint account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production. Accordingly, Alternative 3 would have no adverse effect on natural gas wells.

All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because the two intakes and associated facilities that would be constructed for Alternative 3 do not overlie known natural gas fields, the effect on potential extraction from natural gas fields would be the same as under Alternative 1A. The proportion of natural gas field area underlying the Alternative 3 permanent construction footprint is small (approximately 3% of the natural gas field intersected) relative to the areal extent of natural gas field areas (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Consequently, Alternative 3 would have no long-term adverse effect on the extraction potential from natural gas fields.

Alternative 3 temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource. There would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 3 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** Like those of Alternative 1A, the operation of the water conveyance facilities under Alternative 3 is primarily associated with movement of water within infrastructure. These operations would not cause additional effects on natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of the water conveyance facilities would include routine activities (described under Alternative 1A) that would not affect natural gas wells or resource recovery. Therefore, the operation and maintenance associated with the water conveyance facilities under Alternative 3 would not have additional effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in

permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion:*** The operation and maintenance of the water conveyance facilities under Alternative 3 would have no impact on access to natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 3 would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional effects beyond those already addressed for water facilities construction. Similarly, maintenance activities would not affect natural gas fields and therefore would not cause effects that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance of Alternative 3 would not have an adverse effect on production or on access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 3 would have no impact on access to underlying natural gas fields because operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 3 would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot

assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 3 would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 3 construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 3 would be similar to those under Alternative 1A except for small reductions because of the reduced number of intakes and their associated pumping plants and piping. The amount of aggregate needed for construction would be approximately 12,80,000 tons, or approximately 5% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, because there would not be a substantial depletion of aggregate available to meet the regional 50-year demand, and Alternative 3 would not substantially contribute to the need for new aggregate resource development, there would not be an adverse effect on the availability of known aggregate resources over the 9-year construction period.

The amount of borrow material needed to construct Alternative 3 is expected to be slightly smaller than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there would be no effect on the availability of mineral resources associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be approximately 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 3, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 3 would include moving water both within infrastructure that would be constructed and natural channels. These operations would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Similarly, maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 3 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 3 would have no impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 3 operation and maintenance; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 3 would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 3 would not be an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of levees, stream banks, access roads, and structure foundations. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability of aggregate resources, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 3 as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. Table 26-8 shows that there are two active mines in the ROAs and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce this impact to a less-than-significant level.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 3 would be the same as those under Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of available resources within the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 3 would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

Alternative 4 would involve construction and operation of three intakes (Intakes 2, 3, and 5), up to nine solids lagoons, three sedimentation basins, and a 120-acre inundation area adjacent to the intermediate forebay on Glannvale Tract. A map and a schematic diagram depicting the conveyance facilities associated with Alternative 4 are provided in Figures 3-9 and 3-10. Figure 3-9 shows the major construction features (including work and borrow/spoil areas) associated with this proposed water conveyance facility alignment; a detailed depiction is provided in Figure M3-4 in the mapbook volume.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The locations of producing natural gas wells within the Alternative 4 construction footprint are shown in Figure 24-5. Numbers of active natural gas wells in the construction footprint and their total average annual production are identified in Table 26-4, and individual wells are identified in Appendix 26A, *Natural Gas Wells*. Producing wells in the study area are in Sacramento, San Joaquin, Yolo, Solano, and Contra Costa Counties. There are no producing wells, however, within the construction footprint. There are no producing wells in proposed temporary construction work areas or in the footprint of the east-west transmission line alignment option.

Because no producing wells within the construction footprint would be permanently abandoned, construction of Alternative 4 would not result in reduced natural gas production in the study area.

Alternative 4 would not affect any locally important natural gas wells or result in the loss of any portion of the area's natural gas production and the effects would not be adverse.

***CEQA Conclusion*:** Because no natural gas wells would occur in the construction footprint there would not any substantial decrease (lose availability of) natural gas production, nor elimination a substantial portion of the county's active natural gas wells. Accordingly, there would be no impact. No mitigation is required.

### Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Construction of Alternative 4 water conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 4 permanent construction footprint is small (less than approximately 2% of the areal extent of natural gas field areas intersected) (Table 26-5). No gas fields underlie the proposed east-west transmission line alignment option (within the Areas of Additional Analysis) for this alternative. The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term adverse loss of extraction potential from construction of Alternative 4.

Alternative 4 temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource. There would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 4 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 2% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 4 would include moving water, both in infrastructure that would be constructed under this alternative and in the natural channels. These operations would not cause additional effects on natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of the water conveyance facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake pumping plants and other appurtenant structures; periodic replacement of erosion protection on the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape maintenance. These activities would not affect natural gas wells or resource recovery. Accordingly, the operation and maintenance associated with the water conveyance facilities under Alternative 4 would not have additional effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent

covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** The operation and maintenance associated with the water conveyance facilities under Alternative 4 would have no impact on access to natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

### Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 4 would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water conveyance facilities construction. Similarly, maintenance of the water conveyance facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake pumping plants, and other appurtenant structures; periodic replacement of erosion protection on the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape maintenance. These activities would not affect natural gas fields and therefore would not cause impacts that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 4 would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance associated with the water conveyance facilities under Alternative 4 would have no impact on access to underlying natural gas fields because operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Operations and access to natural gas wells would be affected where wells are located in restoration areas to be inundated under *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Natural gas wells can remain productive in flooded areas, but they require modification, which could include construction of a protective cage and platform above the well (Federal Emergency Management Agency n.d.). The few producing wells that are currently in inundated areas of the Delta are located where flooding is seasonal. With permanent inundation, modification and maintenance of wells may not be cost effective. It is likely that any producing wells in proposed permanent inundation areas in ROAs would need to be abandoned because modifications to these wells would not be feasible. There are approximately 233 active wells within ROAs (Table 26-6); an unknown percentage of

these wells in inundation areas would likely be abandoned. Specific inundation areas have not been identified in association with conservation measures of the BDCP at this time.

The inundation that would occur under CM4, CM5, and CM10 could take place in the Cache Slough, Cosumnes/Mokelumne, South Delta, Suisun Marsh, and West Delta ROAs, which lie in Solano, Yolo, San Joaquin, Contra Costa, and Sacramento Counties (Figure 24-5 and Table 26-6). The number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. The active wells that would be affected could be maintained in place if they were in seasonally inundated locations. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be redrilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

Natural gas wells in areas that would remain uplands could remain operational and unaffected if they are avoided when restoration activities are implemented and access to the gas well can be maintained. Maintaining access to an oil or gas well is defined by DOC as (1) maintaining rig access to the well, and (2) not building over, or in close proximity to, the well (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2007).

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a significant number of locally important gas wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

During final design of Conservation Measures 4, 5, and 10, the BDCP proponents will avoid permanent inundation of or construction over active natural gas well sites where feasible to minimize the need for well abandonment or relocation. This mitigation applies to three conservation measures: *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Direct, overlying access to natural gas fields would be lost in areas where some conservation measures would permanently inundate new areas to create wetlands. Three of the conservation measures—*CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*—would inundate land overlying natural gas fields. Table 26-7 shows the proportion of the individual gas fields underlying individual ROAs that would be inundated; these depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of

access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

During final design of Conservation Measures 4, 5, and 10, the BDCP proponents will consider the location and amount of inundation of natural gas fields and will identify means to maintain feasible drilling access to them. These measures could include maintaining non-inundated locales overlying or near individual gas fields and ensuring that inundation zone design provides feasible access to natural gas fields from adjacent and nearby non-inundated lands. This mitigation applies to CM4, CM5, and CM10. This mitigation measure will ensure that drilling access to natural gas fields is maintained to the greatest extent practicable.

### Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 4 footprint, including within the footprint for the east-west transmission line alignment option, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint for Alternative 4, including within the footprint for the east-west transmission line alignment option, there would be no impact. No mitigation is required.

### Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Alternative 4 would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. The principal demands for construction material would come from the three intakes with pumping plants and associated facilities, the nearly 40 miles of concrete pipeline tunnels, and the forebays. Additional aggregate would be required for construction of permanent and temporary roads and levees.

Up to an estimated 13,500,000 tons of aggregate would be required for Alternative 4, including the operable barrier at the head of Old River and including about 5,160,000 tons of aggregate that would be required for the water conveyance tunnels under this alternative. Under Alternative 4, Tunnel 1a would be a single-bore, 29-ft inside diameter (ID) tunnel that would carry water from Intakes 2 and 3 on the northern end of the project to the intermediate forebay. The segment of Tunnel 1a between Intake 2 and 3 would have a 20-foot ID. Tunnel 1b would be a single-bore 20-ft ID tunnel that would carry water from Intake 5 to the intermediate forebay. Two 40-foot ID tunnels (Tunnel 2) would carry water from an intermediate forebay to the proposed expanded Clifton Court Forebay on the southern end of the alignment. The total aggregate amount is equal to approximately 32% of the permitted aggregate in Sacramento County or 6% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate in these two areas. This aggregate would be used over an approximately 9-year construction period, spreading the effect over time. Because the 50-year demand for aggregate already exceeds the existing permitted supplies in many counties within which the conveyance facilities would be constructed, there would likely be an effect on the availability of local aggregate supplies if the project were to rely solely on local resources, (i.e., resources from one area, such as Sacramento County). However, if aggregate was sourced from several local resources (such as Sacramento County, Stockton-Lodi, and Yuba City-Marysville) there would not be a substantial depletion (loss of availability) of aggregate to meet the regional 50-year demand. Sourcing from multiple locations is likely, considering that the alternative extends many miles north-to-south and different portions of the project would be closer to individual local resources (See Figure 26-1). Because there would not be a substantial depletion of aggregate available to meet the regional 50-year demand, Alternative 4 would not substantially contribute to the need for new aggregate resource development. Therefore, this effect would not be adverse.

Use of local material only would constitute an indirect effect in that it might reduce the life expectancy of existing quarries, contribute to the need for new quarries to be permitted, and reduce the availability of these building materials for other projects on a local basis. New aggregate resources may be identified within existing MRZ-3 areas with additional study; identification of new resources could expand the resource base during the construction period of the water conveyance facilities. CGS estimates that there are 74 billion tons of non-permitted construction aggregate resources in 31 aggregate study areas in the state (Clinkenbeard 2012). While not all these resources may be mined because of social, environmental, or economic factors (e.g., resources may be located near urban or environmentally sensitive areas, precluding their extraction), CGS states that non-permitted aggregate resources are likely to be the primary resources that will meet California's continuing demand (Clinkenbeard 2013).

Additionally, as described in Section 26.1.2.1, *Aggregate Resources*, some of the new aggregate resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate, respectively. Although these sites may not provide materials to the project, their capacities do indicate that a single quarry could provide more than the required annual tonnage to the project and still have capacity for many decades. Although regional values are not available, the statewide decline in aggregate demand went from 246 million to 156.7 million and then to 133.5 million tons (2007, 2008, and 2009, respectively), indicating that some unused capacity exists because of the current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2009).

Alternatively, some sources outside the study area may be used to supply aggregate needs for BDCP water conveyance facilities. Kohler (2006) notes that Yuba County exports a significant portion of its

available aggregate to points outside its production region. Additionally, aggregate delivery by barge from the San Francisco Bay is possible. The California State Lands Commission (2010:2–19) notes several existing waterfront facilities in San Francisco Bay, San Pablo Bay, and Suisun Bay that could deliver aggregate from that area to the study area. These areas provide additional aggregate capacity over that of the immediate region and further reduce the project's impact on local and regional aggregate resources. Also, as noted in Section 26.1, *Environmental Setting/Affected Environment*, California imports large volumes of aggregate from Canada and Mexico, and a terminal was recently constructed at the Port of Richmond to receive and distribute aggregate shipments. It may be necessary or financially advantageous to purchase some of this imported aggregate if specific aggregate supplies are insufficient at the local or regional level, although the analysis above indicates that regional supply is sufficient. The Canadian and Mexican sites that are currently providing the aggregate and rock are already permitted under their respective jurisdictions. Consequently, no unanticipated environmental impacts would be generated by purchasing materials that are already being imported from these existing sites. Considering the level of local and regional supplies available, the additional aggregate and rock demand of the BDCP would not be sufficient to be substantially responsible for the development of new mines in Mexico or Canada. Additionally, if federal funding is provided to the project, there might be restrictions on using aggregate from outside the country because of the Buy America Act (see Section 26.2.1.1).

Alternative 4 demand would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Accordingly, it would not have an adverse effect on the availability of known aggregate resources over the 9-year construction period.

The amount of borrow material needed to construct Alternative 4 would be approximately 13,500,000 cubic yards or 20,250,000 tons. Because there is limited excavation associated with this alternative, most of this borrow material would be developed from borrow pits adjacent to construction areas, nearby suitable locations, and some commercial sites. The use of this amount of borrow would not have an adverse effect because borrow is not defined as a mineral resource and it is developed locally and regionally on an as-needed basis.

***CEQA Conclusion:*** The use of large amounts of construction aggregate (estimated to be approximately 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area, would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for development of new aggregate sources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 4, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 4 would include moving water, both within infrastructure that would be constructed and the natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 4 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 4 would have no impact on the availability of aggregate resource sites because none exist within the areas affected by Alternative 4 operations and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 4 would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of structure foundations, levees, stream banks, and access roads associated with major project features such as intakes, pumping plants, and the head of Old River barrier. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 4 is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 4. The material would be used for maintenance of structure foundations, levees, stream banks and access roads associated with major project features. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Implementation of conservation measures beyond CM1 that would have the potential to affect important aggregate resource sites are those that would inundate large areas of land. Three of the conservation measures would inundate large areas: *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Table 26-8 lists two active mines in the ROAs. The mine in the Suisun Marsh ROA, however, is at the north end of the ROA in an upland area that would not be affected by inundation. One aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

The BDCP proponents will purchase the permitted aggregate volume of affected mines for construction use so that the available aggregate will not be lost. The resulting mined site(s) should be considered for integration into the restoration design of any conservation measure that affects the site(s). For example, the mined site(s) could be reshaped to provide aquatic or intertidal habitat of varying depths and configurations. This mitigation applies to CM4, CM5, and CM10.

### Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Conservation Measures 2–22 that have the potential to reduce the availability of important aggregate resources are those that would use aggregate resources in construction or maintenance. Four of the conservation measures listed in Table 3-3 have this potential: *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Community Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Aggregate and riprap would be used for levee, berm, access road, and rock revetment construction, and rock would be placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts of aggregate and riprap necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be used over a period of years and would be expected to be within the available resources of the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of

available aggregate material for the conservation measures of Alternative 4 would not cause an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)

Alternative 5 is the same as Alternative 1A except for changes in intakes (Intake 1 rather than Intakes 1–5), one tunnel bore instead of dual bores, and the number of acres of tidal marsh restoration under *CM4 Tidal Natural Communities Restoration*. Alternative 5 specifies up to 25,000 acres of tidal marsh restoration while all other action alternatives would have up to 65,000 acres of tidal marsh restoration.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 5 are the same as those under Alternative 1A except for the reduction in intakes. The six natural gas wells affected by Alternative 5 (in Sacramento County) produce about 1% of the total annual natural gas production in Sacramento County (Table 26-4). Because of the relatively few (six) producing wells within the construction footprint, which account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production and effects on natural gas wells would not be adverse. All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 5 are the same as those under Alternative 1A except for the reduction in intakes. However, the reduced intake locations would not change the effects on extraction potential from natural gas fields. The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. The effect on natural gas extraction in Sacramento

County would be small and temporary, and the presence of work areas would not prevent recovery of the resource. Consequently, Alternative 5 would have no long-term adverse effect on the extraction potential from natural gas fields.

***CEQA Conclusion*:** Although the Alternative 5 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** Like those of Alternative 1A, the operational components of the water conveyance facilities under Alternative 5 are primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. Routine maintenance activities would not affect natural gas wells or resource recovery. Operation and maintenance would not have effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 5 would have no impact on access to locally important natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 5 would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water facilities construction. Similarly, maintenance activities would not cause impacts that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 5 would not have an adverse effect on production or access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 5 would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. Accordingly, there would be no impact on extraction potential from natural gas fields from operation and maintenance. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 5 would be the same as those under Alternative 1A except that only up to 25,000 acres of tidal marsh would be restored rather than up to 65,000 acres as proposed for Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 5 would be the same as those under Alternative 1A except that only up to 25,000 acres of tidal marsh would be restored rather than up to 65,000 acres as proposed for Alternative 1A. The impacts under Alternative 5 would be similar to those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. This

impact would be significant and unavoidable. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 5 construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 5 would be the less than under Alternative 1A because of small reductions due to construction of fewer intakes and their associated pumping plants and piping, and particularly the use of smaller (23-ft ID), single-bore tunnels for both Tunnel 1 and Tunnel 2. The amount of aggregate needed for construction would exceed be approximately 10,257,000 tons including about 1,900,000 tons for concrete including the tunnels, or approximately 4% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, the Alternative 5 demand would not be considered an adverse effect on the availability of known aggregate resources over the 9-year construction period because there would not be a substantial depletion of aggregate available to meet the regional 50-year demand, and it would not contribute to the need for new aggregate resource development.

The amount of borrow material needed to construct Alternative 5 is expected to be similar to that for Alternative 1A. Because borrow is developed locally and regionally on an as-needed basis and is not considered an important mineral resource in California, there would be no effect associated with its use.

***CEQA Conclusion:*** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 4% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 5, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 5 would include moving water, both within infrastructure that would be constructed and natural channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Routine facilities maintenance would not cover or block access to existing mines or identified MRZs for the same reason. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Because operations and maintenance would not cover or block access to existing mines or identified MRZs, the operational components of the water conveyance facilities under Alternative 5 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 5 would have no impacts on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 5 and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** No aggregate resources are required for operations so there would be no effect. Maintenance of the water conveyance facilities would require small amounts of aggregate and riprap for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 5 is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of the water conveyance facilities under Alternative 5. The material would be used for maintenance of levees, stream banks, access roads, and structure foundations. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

**Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Implementation of conservation measures beyond CM1 would be the same for Alternative 5 as they would be for Alternative 1A except that only up to 25,000 acres of tidal marsh would be restored rather than up to 65,000 acres as proposed for Alternative 1A. The effects of

implementing these conservation measures would be similar to those described for Alternative 1A. Table 26-8 shows that there are two active mines in the ROAs and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of this aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce this impact to less than significant.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

### Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures associated with Alternative 5 are the same as Alternative 1A except that only up to 25,000 acres of tidal marsh restoration would occur rather than up to 65,000 acres as proposed for Alternative 1A. The effects would be similar to those described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The demand for levee and berm construction and armoring of levee breaches under Alternative 5 would be smaller than under the other alternatives with much larger acreages of tidal marsh creation. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of the available resources in the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 5 would not have an adverse effect.

***CEQA Conclusion*:** The extent of conservation actions under Alternative 5 would be similar to but smaller than those under Alternative 1A. CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario D)

Alternative 6A is the same as Alternative 1A except for operational changes associated with water management. There are no differences in construction footprints, construction demand for aggregate, maintenance demand for aggregate, or the effects of conservation measures on mineral resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The impacts associated with Alternative 6A are the same as those described for Alternative 1A. Approximately six active wells would be displaced by construction, all in Sacramento County. This represents about 1% of the natural gas production in Sacramento County. Because of the relatively few (six) producing wells within the construction footprint, which account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production and effects on natural gas wells would not be adverse. All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The impacts on natural gas fields associated with Alternative 6A are the same as those described for Alternative 1A. The proportion of natural gas field area underlying the Alternative 6A permanent construction footprint is small (approximately 3% of the natural gas field intersected) relative to the areal extent of natural gas field areas (Table 26-5).The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term adverse effect on extraction capability from the construction of Alternative 6A because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource.

***CEQA Conclusion*:** Although the Alternative 6A conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** As under Alternative 1A, the operation and maintenance of the water conveyance facilities under Alternative 6A are primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. Routine maintenance activities would not affect natural gas wells or resource recovery. Operation and maintenance would not have effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 6A would have no impact on access to locally important natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6A would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water facilities construction. Similarly, maintenance activities would not affect natural gas fields and therefore would not cause impacts that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance of Alternative 6A would not have an adverse effect on production or access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** Operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance would also have no impact on access to underlying natural gas fields. The operation and maintenance of the water conveyance facilities under Alternative 2A would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6A would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there

could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6A would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas recovery fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 6A construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

### Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 6A would be the same as that under Alternative 1A (an estimated 13,505,816 tons). This amount is equal to approximately 5% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region. The use of 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region over a 9-year construction period would not require a substantial depletion of aggregate available to meet the regional 50-year demand, and would not substantially contribute to the need for new aggregate resource development. Therefore, this effect would not be adverse.

The amount of borrow material needed to construct Alternative 6A is expected to be similar to that for Alternative 1A. Because borrow is developed locally and regionally on an as-needed basis and is not considered an important mineral resource in California, there would be no effect associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six aggregate production study areas within the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 6A, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

### Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6A would include moving water, both within infrastructure that would be constructed and natural channels. These operations would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Similarly, routing maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 6A would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 6A would have no impacts on the availability of aggregate resource sites because none exist within the areas affected by Alternative 6A operation and maintenance; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6A would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 6A is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of levees, stream banks, access roads, and structure foundations. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Conservation actions beyond CM1 would be the same for Alternative 6A as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. Table 26-8 lists two active mines in the ROAs and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce this impact to a less-than-significant level.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 6A would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 6A would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario D)

Alternative 6B is the same as Alternative 1B except for operational changes associated with water management. There are no differences in construction footprints, construction demand for aggregate, maintenance demand for aggregate, or effects of conservation measures on mineral resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 6B would be the same as those under Alternative 1B. The locations of producing natural gas wells within the Alternative 6B construction footprint are shown in Figure 24-5. The two producing wells that would be affected by Alternative 6B are in San Joaquin County (Table 26-4) and would be affected by the conveyance canal and temporary construction work areas. Because there are relatively few (two) producing wells within the construction footprint, the loss of these wells would not eliminate a substantial portion of the county's natural gas wells or natural gas production, and therefore would not constitute an adverse effect. Both producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Although two natural gas wells within the canal alignment would be permanently abandoned, new wells could be developed to replace them and the loss would be temporary. Additionally, wells in the study area of San Joaquin County produce a less than 1% of the county's average annual natural gas production. Even if both producing wells in the Alternative 6B construction footprint were abandoned and not replaced, the lost natural gas production would production would not represent a substantial portion of the county's natural gas wells or natural gas production. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 6B are the same as those under Alternative 1B. Construction of Alternative 6B conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields by approximately 13% of the natural gas fields intersected (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to fields from a distance. There would be no permanent blockage of access to natural gas fields. Therefore, there would be no long-term adverse effect on extraction capability from construction of Alternative 6B.

Alternative 6B temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction would be small and temporary and there would be no permanent blockage of access to natural gas fields. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 6B conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (13%). Additionally, the gas fields would continue to be accessible using standard directional drilling techniques, so there would be no permanent blockage of access to natural gas fields. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6B would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water facilities construction under Alternative 1B. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operating the facilities. Similarly, maintenance of the water conveyance facilities would include routine activities and periodic maintenance of canal levees that would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 6B would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The effects associated with Alternative 6B are the same as those described for Alternative 1B. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 6B would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 6B would not would not eliminate natural gas fields or block access to supplies of natural gas because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not obstruct access to natural gas fields and would not interfere with recovering the resource. Accordingly, there would be no impact. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6B would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6B would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas

fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

### Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 6B construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint for the water conveyance facilities, there would be no impact. No mitigation is required.

### Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities

***NEPA Effects:*** The impacts associated with Alternative 6B are the same as those described for Alternative 1B. Aggregate would be needed to construct the large water conveyance facilities associated with this alternative (an estimated 8,473,470 tons). This amount of aggregate represents approximately 3% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1B above, the Alternative 6B demand over the 9-year construction period would not be considered an adverse effect on the availability of known aggregate resources or aggregate availability to meet the regional 50-year demand.

The amount of borrow material needed to construct Alternative 6B is expected to be similar to that for Alternative 1B. Because borrow is not defined as a mineral resource, there would be no effect associated with its use.

***CEQA Conclusion:*** The use large amounts of construction-grade aggregate (estimated to be equivalent to approximately 3% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate

production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Accordingly, although a substantial amount of available aggregate material may be used under Alternative 6B, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not have a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operational components of the water conveyance facilities under Alternative 6B would include moving water, both within infrastructure that would be constructed and natural channels. There are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, maintenance activities during the operational life of the facilities would not would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the alternative's footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 1B would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 6B would not have impacts on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 6B operations, and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 1B would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. Small amounts of aggregate and riprap would be required for maintenance of facilities. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 6B is not an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 6B. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance

would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Conservation actions beyond CM1 would be the same for Alternative 6B as under Alternative 1A. Consequently, the effects of inundation under CM4, CM5, and CM10 would be the same. Table 26-8 shows that there are two active mines in the ROAs and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

### Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures under Alternative 6B would be the same as those under Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified within Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 6B would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of

aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario D)

Alternative 6C is the same as Alternative 1C except for operational changes associated with water management. The changed operations would have no effect on access to or availability of natural gas or aggregates.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 6C are the same as those under Alternative 1C (Figure 24-5; Table 26-4). Therefore, the effect on natural gas wells would be the same. Four active wells would be permanently abandoned because they would be displaced by permanent facility sites. Wells in the construction footprint in Sacramento County produce approximately 6% of that county's annual natural gas production. Even if all producing wells in the construction footprint were abandoned and not replaced with new wells, the effects associated with lost natural gas production would not be an adverse effect because the loss would not represent a substantial portion of county, regional, or statewide natural gas production or eliminate a substantial portion of the county's natural gas wells. There would be no wells affected by temporary construction work areas. Accordingly, there would not be an adverse effect.

***CEQA Conclusion*:** Even if all natural gas wells under the physical footprint of Alternative 6C had to be abandoned, it would amount to approximately 6% of Sacramento County's annual natural gas production. Because this amount is not a substantial proportion of natural gas production on a county, regional, or statewide basis, and a substantial portion of the county's natural gas wells would not be eliminated, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 6C are the same as those under Alternative 1C. Therefore, the effect on natural gas fields would be the same. Construction of Alternative 6C conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 6C permanent construction footprint is small (approximately 5% of the natural gas fields intersected) relative to the areal extent of natural gas field areas (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term substantial loss of extraction capability from construction of Alternative 6C and there would be no adverse effect.

Alternative 6C temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction would be small and temporary, and would not prevent recovery of the resource, there would not be an adverse effect.

***CEQA Conclusion*:** Although the Alternative 6C conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (approximately 5%. Additionally, the gas fields would continue to be accessible using conventional or directional drilling techniques. There would be no substantial loss of existing production or permanent loss of access to the resource. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** Like those of Alternative 1C, the operation of the water conveyance facilities under Alternative 6C are primarily associated with movement of water within infrastructure. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operations. Similarly, as described under Alternative 1A, maintenance of the water conveyance facilities would include routine activities that would not affect use of or access to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from operation and maintenance.

***CEQA Conclusion:*** Operation and maintenance of the water conveyance facilities under Alternative 6C would not would not block access to natural gas wells, cause any wells to be abandoned, or reduce production. Accordingly there would be no impact. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6C would be similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except that periodic maintenance of canal levees along the two canal segments would be needed for Alternative 6C. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance associated with Alternative 6C would not have an adverse effect on production or access to underlying natural gas fields.

***CEQA Conclusion*:** Operation and maintenance of the water conveyance facilities under Alternative 6C would have no impact on access to underlying natural gas fields because operation primarily involves movement of water in infrastructure constructed under this alternative. Maintenance activities similarly would not eliminate natural gas fields or block access to supplies of natural gas. Operation and maintenance activities would not obstruct access to natural gas fields and would not interfere with recovering the resource. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6C would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the

new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 6C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 6C construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 6C are the same as those under Alternative 1C. Therefore, the effects would be the same. Alternative 6C would require large amounts of fill, aggregate, and cement for construction of the numerous elements of the water conveyance facilities. An estimated 12,009,807 tons of aggregate would be required for this alternative. This amount is less than 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region combined (see Table 26-1). The amount of aggregate needed for Alternative 6C is about 11% less than that needed for Alternative 1A; and Alternative 1A was judged to have no adverse effect on aggregate availability. Alternative 6C aggregate use would not produce an adverse effect on aggregate availability to meet the regional 50-year demand, and would not produce an adverse effect on known aggregate resources.

The amount of borrow material required for Alternative 6C would be 200,000,000 cubic yards or approximately 350,000,000 tons. The majority of this material would be used to construct levees for the two canal segments of Alternative 6C. However, the use of this borrow material would not have an adverse effect because borrow is developed locally and regionally on an as-needed basis and is not a considered a significant mineral resource in California.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be less than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for development of new aggregate resources. The amount of aggregate use in Alternative 6C would be about 11% less than that needed for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate availability. Consequently, the impact of Alternative 6C would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 6C would include moving water, both within infrastructure that would be constructed and natural channels. As explained under Alternative 1C, these operations would not affect existing mines or identified MRZs

because there are none in the area where the alternative would operate. For the same reason, maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Operation and maintenance would not increase the footprint of the alternative. Accordingly, operation and maintenance of the water conveyance facilities under Alternative 6C would not cover or block access to existing mines or identified MRZs and there would be no effect on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 6C would have no impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 6C operations; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The only use of aggregate resources associated with operation and maintenance of the water conveyance facilities would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 6C would not have an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of Alternative 6C. The material would be used for maintenance of levees, stream banks, access roads, and structure foundations. The small amount of aggregate used for operational components would not substantially deplete permitted aggregate resources in the six aggregate production study areas surrounding the study area (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Therefore this impact would be less than significant. No mitigation is required.

**Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** Conservation actions beyond CM1 would be the same for Alternative 6C as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same. There are no identified MRZs in the inundation footprints. Table 26-8 shows that there are two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-1), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not

be affected by inundation associated with the conservation measures. An active mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 would reduce this impact to a less-than-significant level.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 6C would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the available resources the Planning Area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified within Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate materials for the conservation measures of Alternative 6C would not cause an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)

Alternative 7 is the same as Alternative 1A except for changes in the number and location of intakes in the north Delta and related changes in water movement through the Delta. While Alternative 1A would use Intakes 1–5, Alternative 7 would use Intakes 2, 3, and 5. Additionally, the conservation measures under Alternative 7 would create 40 miles of channel margin restoration and up to 20,000 acres of seasonally inundated floodplain—double the amounts under Alternative 1A. Alternative 7 would have a different operational scenario than Alternative 1A, but this difference would not materially affect the use or availability of mineral resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 7 are the same as those under Alternative 1A except that two fewer intakes would be constructed. The decreased construction footprint associated with building intakes for Alternative 7 would not change the effect on natural gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by Alternative 7 construction (Sacramento and San Joaquin) represent a very minor percentage of those counties' average annual natural gas production. In the construction footprint, the affected wells produce about 1% of the total annual natural gas production in Sacramento County (Table 264). Because of the relatively few (six) producing wells within the construction footprint, and their small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production and effects on natural gas wells would not be adverse. All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because the three intakes and associated facilities that would not be constructed for Alternative 7 do not overlie known natural gas fields, the effect on potential extraction from natural gas fields would be the same as under Alternative 1A. The proportion of natural gas field area underlying the Alternative 7 permanent construction footprint is small (approximately 3% of the natural gas field intersected) relative to the areal extent of natural gas field areas (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be an adverse effect because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Consequently, Alternative 7 would have no long-term adverse effect on the extraction potential from natural gas fields because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource.

***CEQA Conclusion*:** Although the Alternative 7 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small(less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** As under Alternative 1A, the operation of the water conveyance facilities under Alternative 7 is primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. Routine maintenance activities would not affect natural gas wells or resource recovery. Operation and maintenance would not have effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no effect.

***CEQA Conclusion:*** The operation and maintenance of the water conveyance facilities under Alternative 7 would have no impact on access to locally important natural gas wells, either for operating and maintaining existing active wells or modifying plugged inactive wells, because operation and routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 7 would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional impacts beyond those already addressed for water facilities construction. Similarly, maintenance activities would not affect natural gas fields and therefore would not cause impacts that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance of Alternative 7 would not have an adverse effect on production or access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** Operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would also have no impact on access to underlying natural gas fields. The operation and maintenance of the water conveyance facilities under Alternative 7 would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. Accordingly, there would be no impact. No mitigation is required.

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 7 would be the same as those under Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and seasonally inundated floodplain. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-

drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 7 would be the same as those under Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and seasonally inundated floodplain. Consequently, the impacts would be similar to those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 7 construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 7 would be similar to those under Alternative 1A except for small reductions because of the reduced number of intakes and their associated pumping plants and piping. The amount of aggregate needed for construction would be approximately 13,258,000 tons, or approximately 5% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, demand for aggregate resources over the 9-year construction period under Alternative 7 would not require a substantial depletion of aggregate available to meet the regional 50-year demand, and would not substantially contribute to the need for new aggregate resource development. Therefore, this effect would not be adverse.

The amount of borrow material needed to construct Alternative 7 is expected to be slightly smaller than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there would be no effect on the availability of mineral resources associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas within the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for the development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 7, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operational components of the water conveyance facilities under Alternative 7 would include moving water both within infrastructure that would be constructed and natural channels. These operations would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Similarly, maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist.

Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 7 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 7 would have no impacts on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 7 operations, and maintenance; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 3 would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 7 would not have an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability of aggregate resources, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Conservation actions beyond CM1 would be the same for Alternative 7 as they would be for Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and seasonally inundated floodplain. Consequently, the effects of these conservation measures would be similar to those described for Alternative 1A. Table 26-8 lists two active mines in the ROAs and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a

significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce this impact to less than significant.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 7 would be the same as those under Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and seasonally inundated floodplain. Consequently, the impacts would be similar to those described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 7 would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F

Alternative 8 is the same as Alternative 1A except for changes in the number of intake locations in the north Delta and related changes in water movement through the Delta. While Alternative 1A would use Intakes 1–5, Alternative 8 would use Intakes 2, 3, and 5. Alternative 8 would have a different operational scenario than Alternative 1A, but this difference would not materially affect the use or availability of mineral resources.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The conveyance facilities associated with Alternative 8 are the same as those under Alternative 1A except that two fewer intakes would be constructed. The decreased construction

footprint associated with building intakes for Alternative 8 would not change the effect on natural gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by Alternative 8 construction (Sacramento and San Joaquin) represent a very minor percentage of those counties' average annual natural gas production. In the construction footprint, affected wells produce about 1% of the total annual natural gas production in Sacramento County. Because the relatively few (six) producing wells within the construction footprint account for only a small percentage of county annual production, the loss would not represent a substantial portion of the county's existing production. Accordingly, Alternative 8 would have no adverse effect on natural gas wells.

All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous Materials,* Sections 24.2.2.11 and 24.2.2.12.

***CEQA Conclusion*:** Because natural gas wells in the construction footprint represent only about 1% of the total annual gas production in Sacramento County, abandoning these wells would not substantially decrease (lose availability of) natural gas production, nor eliminate a substantial portion of the county's active natural gas wells. Accordingly, this impact would be less than significant. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because the three intakes and associated facilities that would be constructed for Alternative 8 do not overlie known natural gas fields, the effect on potential extraction from natural gas fields would be the same as under Alternative 1A. The proportion of natural gas field area underlying the Alternative 8 permanent construction footprint is small (approximately 3% of the natural gas fields intersected) relative to the areal extent of natural gas field areas (Table 26-4). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Consequently, Alternative 8 would have no long-term adverse effect on the extraction potential from natural gas fields.

Alternative 8 temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction in Sacramento County would be small and temporary, and the presence of work areas would not prevent recovery of the resource. There would be no adverse effect.

***CEQA Conclusion*:** Although the Alternative 8 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** As described under Alternative 1A, the operation of the water conveyance facilities under Alternative 8 is primarily associated with movement of water within infrastructure and maintenance of water conveyance facilities. These operations would not cause additional effects on natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of the water conveyance facilities would include routine activities (described under Alternative 1A) that would not affect natural gas wells or resource recovery. Therefore, the operation and maintenance associated with the water conveyance facilities under Alternative 8 would not have additional effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would not result in permanent covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no effect.

***CEQA Conclusion:*** The operation and maintenance of the water conveyance facilities under Alternative 8 would have no impact on access to natural gas wells, either for operating and maintaining existing active wells, or modifying plugged inactive wells, because operation and routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce production. No mitigation is required.

### Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 8 would primarily involve movement of water in infrastructure constructed under this alternative. These water conveyance operations would not cause additional effects beyond those already addressed for water facilities construction. Similarly, maintenance activities would not affect natural gas fields and therefore would not cause effects that have not already been addressed related to construction of water conveyance facilities. Operation and maintenance activities associated with the water conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance of Alternative 8 would not have an adverse effect on production or on access to (availability of) underlying natural gas fields.

***CEQA Conclusion*:** The operation and maintenance of the water conveyance facilities under Alternative 8 would have no impact on availability of natural gas fields because operations primarily involve movement of water in infrastructure constructed under this alternative and would not interfere with recovering the resource. Routine maintenance would not obstruct access to natural gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 8 would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the

new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion:*** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 8 would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 8 construction footprint of the water conveyance facilities, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** The demand for aggregate resources associated with Alternative 8 would be similar to those under Alternative 1A except for small reductions because of the reduced number of intakes and their associated pumping plants and piping. The amount of aggregate needed for construction would be approximately 13,258,000 tons, or approximately 5% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, because there would not be a substantial depletion of aggregate available to meet the regional 50-year demand, and Alternative 8 would not substantially contribute to the need for new aggregate resource development, there would not be an adverse effect on the availability of known aggregate resources over the 9-year construction period.

The amount of borrow material needed to construct Alternative 8 is expected to be slightly smaller than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there would be no effect on the availability of mineral resources associated with its use.

***CEQA Conclusion*:** The use of large amounts of construction-grade aggregate (estimated to be equivalent to approximately 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas in the study area, would not cause remaining supplies to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Consequently, although a substantial amount of available aggregate material may be used under Alternative 8, the impact would be less than significant. No mitigation is required.

Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 8 would include moving water both within infrastructure that would be constructed and natural channels. These operations would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Similarly, maintenance activities during the operational life of the facilities would not affect existing mines or identified MRZs. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly,

the operation and maintenance of the water conveyance facilities under Alternative 8 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance of Alternative 8 would have no impacts on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 8 operation and maintenance; and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

### Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 8 would include moving water, both within infrastructure that would be constructed and natural channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 8 would not have an adverse effect.

***CEQA Conclusion*:** Operation of the water conveyance facilities would not affect any aggregate resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be used for maintenance of levees, stream banks, access roads, and structure foundations. The small amount of aggregate used for maintenance would not substantially deplete permitted aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas currently in the permitting and development stage (Section 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance would not cause substantial depletion or loss of availability of aggregate resources, and would not cause remaining supplies to be inadequate to meet future demands and require developing new sources. Accordingly, this impact would be less than significant. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

Conservation actions beyond CM1 would be the same for Alternative 8 as they would be for ***NEPA Effects:*** Alternative 1A. Consequently, the effects of these conservation measures would be the same. Table 26-8 shows that there are two active mines in the ROAs and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a

significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce this impact to a less-than-significant level.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22**

***NEPA Effects:*** The conservation measures under Alternative 8 would be the same as those under Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the capacity of available resources the Planning Area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified within Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 8 would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource study areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)

Alternative 9 entails water transfer through existing Delta channels with certain channel modifications. There would be two screened fish intakes at the Delta Cross Canal and Georgiana Slough. Water would generally flow through existing channels except that two new canal segments would be constructed and dredging would occur in certain existing channels.

**Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** This alternative primarily involves moving water through existing Delta channels with a minimal physical construction footprint (Figure 26-2). Because there are no producing natural gas wells within the permanent construction footprint, there would be no effect on gas production or the availability of natural gas wells.

***CEQA Conclusion*:** This alternative primarily involves moving water through the existing Delta channels with a minimal physical construction footprint. Because there are no producing natural gas wells within the permanent construction footprint, there would be no impact on gas production or the availability of natural gas wells. No mitigation is required.

**Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** This alternative primarily involves moving water through the existing Delta channels with a minimal physical construction footprint. The construction activity would not limit access to natural gas fields in the study area (Figure 26-2). Less than 1% of natural gas fields intersected would be affected by the construction footprint. The reduction in unimproved land surfaces directly overlying gas fields would not have an adverse effect because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Because there would be no covering or blockage of access, Alternative 9 would have no long-term adverse effect on the extraction potential from natural gas fields.

***CEQA Conclusion*:** This alternative primarily involves moving water through the existing Delta channels with a minimal physical construction footprint. Because less than 1% of natural gas fields intersected would be affected by the construction footprint, and there would be no permanent blockage of access to natural gas fields, there would be no impact on the availability of extraction potential from natural gas fields. No mitigation is required.

**Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 9 involves management of flows through the Delta channels. Periodic routine maintenance would include activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of erosion protection on the levees and embankments of water conveyance facilities within the study area. Because these activities would not encroach on important natural gas wells, there would be no effect on natural gas production.

***CEQA Conclusion*:** Because the operation and maintenance of the water conveyance facilities under Alternative 9 would not encroach on natural gas wells, they would have no impact on natural gas production. No mitigation is required.

**Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** The operation of the water conveyance facilities under Alternative 9 involves management of flows through the Delta channels. Periodic routine maintenance would include activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of erosion protection on the levees and embankments. Because these activities would not encroach on natural gas fields, there would be no effect on the potential for natural gas recovery.

***CEQA Conclusion*:** Because the operation and maintenance of the water conveyance facilities under Alternative 9 would not encroach on natural gas fields, they would have no impact on the potential for natural gas recovery. No mitigation is required.

### Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 9 would be the same as those under Alternative 1A. While inundation for permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly affected would vary, depending on the specific lands inundated by these three conservation measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

***CEQA Conclusion*:** Although the number of natural gas wells likely to be affected may be a small percentage of the total wells in the study area, and some wells may be relocated using conventional or directional drilling, there is potential to affect a locally significant number of wells. Consequently, this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

#### Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

### Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures that would be implemented under Alternative 9 would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

***CEQA Conclusion*:** The areal extent of lands overlying study area natural gas fields that would be inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of access would depend on the exact configuration of inundation and the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally significant impact on access to natural gas fields if they are permanently covered (inundated) such that the resource cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas fields will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

**Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Because there are no permitted resource extraction mines (including aggregate mines) and no identified MRZs in the Alternative 9 footprint, there would be no effect on the availability of aggregate resources.

***CEQA Conclusion*:** Because there are no permitted mines or MRZs in the construction footprint, there would be no impact. No mitigation is required.

**Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing the Water Conveyance Facilities**

***NEPA Effects:*** Alternative 9 would have a smaller demand for aggregate resources than alternatives with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). Alternative 9 would use aggregate for two short canal segments and several small components such as various operable barriers, two pumping plants, and a boat lock and channel. The estimated amount of aggregate needed for construction is approximately 5,470,000 tons—about 60% less than under Alternative 1A. This amount is about 13% of the Sacramento County permitted aggregate and somewhat more than 2% of the Stockton-Lodi P-C Region permitted aggregate. It is about 2% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region. This amount of aggregate could be supplied from local sources within the counties that surround the Delta (Table 26-1). Because the amount of aggregate material used under Alternative 9 would not result in a substantial depletion (loss of availability) of aggregate resources needed for future development or require new aggregate development, it would not constitute an adverse effect.

Alternative 9 would only require small amounts of borrow. Because there is limited excavation associated with this alternative, most of the borrow material would be developed from borrow pits adjacent to construction areas, from nearby suitable locations, and from some commercial sites. The use of this amount of borrow (estimated at 4,000,000 tons) would not have an adverse effect because borrow is not considered a mineral resource in California. It is usually extracted locally and regionally on an as-needed basis.

***CEQA Conclusion*:** Alternative 9 would have a small demand for aggregate resources compared to alternatives with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). The estimated amount of aggregate needed for construction is approximately 5,470,000 tons. The use of moderate amounts of construction-grade aggregate (estimated to be equivalent to about 2% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial depletion (loss of availability) of construction-grade aggregate within the six regional aggregate production study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for future development, and would not contribute to the need for the development of new aggregate resources. Consequently, the amount of aggregate material used under Alternative 9 would constitute a less-than-significant impact on aggregate resources. No mitigation is required.

Alternative 9 would require small amounts of borrow. Borrow is not a defined mineral resource and is usually developed on an as-needed basis. Consequently, the amount of borrow required for this alternative would not be a significant impact. No mitigation is required.

**Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** Operation of the water conveyance facilities under Alternative 9 involves management of flows through the Delta channels. Adverse effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where the alternative would operate. Accordingly, operations would not cover or block access to existing mines or identified MRZs and there would be no effect. Similarly, routine maintenance activities such as cleaning, structure repair, landscape maintenance, road work, and periodic replacement of erosion protection on the levees and embankments would not cover or block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations and maintenance would not increase the existing project footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 9 would not have effects on the availability of aggregate resource sites.

***CEQA Conclusion*:** The operation and maintenance associated with Alternative 9 would not have an impact on the availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 9 operations and operations and maintenance would not increase the alternative's footprint. No mitigation is required.

**Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation and Maintenance of the Water Conveyance Facilities**

***NEPA Effects:*** Operation of the water conveyance facilities under Alternative 9 involves management of flows through the Delta channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources associated with maintenance of the water conveyance facilities would be small amounts of aggregate and riprap required for maintenance of levees, stream banks, access roads, and structure foundations. These small amounts could be readily supplied by quarries in the region without affecting the overall availability of aggregate. Consequently, operation and the use of the small amount of aggregate material for the maintenance of the water conveyance facilities under Alternative 9 would not have an adverse effect.

***CEQA Conclusion*:** No aggregate resources are required for operation of Alternative 9, so there would be no impact. A small amount of aggregate material would be used for maintenance of levees, stream banks, access roads, and structure foundations. The small amount of aggregate used for operational components would not substantially deplete permitted aggregate resources in the six aggregate study areas surrounding the study area and accordingly, would represent a less-than-significant reduction in the availability of aggregate resources. No mitigation is required.

### Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** Conservation actions beyond CM1 would be the same for Alternative 9 as they would be for Alternative 1A. Consequently, the effects of these conservation measures would be the same as described for Alternative 1A. Table 26-8 shows that there are two active mines in the ROAs and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

***CEQA Conclusion*:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not be affected by inundation associated with the conservation measures. An active mine on Decker Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a significant impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

#### Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

### Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22

***NEPA Effects:*** The conservation measures under Alternative 9 would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock revetment construction and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be expected to be within the available resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Accordingly, the use of available aggregate material for the conservation measures of Alternative 9 would not have an adverse effect.

***CEQA Conclusion*:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap for erosion control and stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but would be within the available resources of the study area or adjacent aggregate resource areas listed in Table 26-1. Because implementing conservation measures would not use an amount of aggregate that would cause remaining supplies to be inadequate to meet future demands and require developing new sources, this impact would be less than significant. No mitigation is required.

### 26.3.3.17 Cumulative Analysis

The cumulative effects analysis for mineral resources addresses the potential for the BDCP alternatives to act in combination with other past, present, and probable future projects or programs to create a cumulatively significant impact on natural gas and aggregate resources. Implementation of the BDCP and other local and regional projects as presented in Table 26-3, could contribute to regional impacts and hazards associated with minerals. These programs and projects have been drawn from a more substantial compilation of past, present, and reasonably foreseeable programs and projects included in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*. This analysis considers projects that could affect mineral resources and, where relevant, on the same schedule as the project, resulting in a cumulative impact.

**Table 26-9. Plans, Policies, and Programs Considered in the Minerals Cumulative Analysis**

| Agency | Program/Project | Status | Description of Program/Project | Effects on Mineral Resources |
|---|---|---|---|---|
| California Department of Fish and Wildlife | Yolo Bypass Wildlife Area Land Management Plan | | The Yolo Bypass Wildlife Area comprises approximately 16,770 acres of managed wildlife habitat and agricultural land within the Yolo Bypass. | This program could, but is unlikely to reduce access to natural gas wells as well as aggregate resources. |
| California Department of Water Resources | Mayberry Farms Subsidence Reversal and Carbon Sequestration Project | Completed October 2010 | Permanently flood 308-acre parcel of DWR owned land (Hunting Club leased) and restore 274 acres of palustrine emergent wetlands within Sherman Island to create permanent wetlands and to monitor waterfowl, water quality, and greenhouse gases. | This project is approximately 274 acres and could reduce access to natural gas wells as well as aggregate resources. |
| California Department of Fish and Wildlife | Lower Sherman Island Wildlife Area (LSIWA) Land Management Plan (LMP) | | The Lower Sherman Island Wildlife Area occupies roughly 3,100 acres, primarily marsh and open water, at the confluence of the Sacramento and San Joaquin Rivers in the western Sacramento–San Joaquin River Delta (Delta). | This program could, but is unlikely to reduce access to natural gas wells as well as aggregate resources. |
| Freeport Regional Water Authority and Bureau of Reclamation | Freeport Regional Water Project | Project was completed late 2010. | Project includes an intake/pumping plant near Freeport on the Sacramento River and a conveyance structure to transport water through Sacramento County to the Folsom South Canal. | This project is approximately 50-70 acres and could reduce access to natural gas wells as well as aggregate resources. |

| Agency | Program/Project | Status | Description of Program/Project | Effects on Mineral Resources |
|---|---|---|---|---|
| Reclamation District 2093 | Liberty Island Conservation Bank | | This project includes the restoration of inaccessible, flood prone land, zoned as agriculture but not actively farmed, to area enhancement of wildlife resources. | This project is approximately 186 acres and could reduce access to natural gas wells as well as aggregate resources. |
| DWR | Dutch Slough Tidal Marsh Restoration Project | Planning phase | Wetland and upland habitat restoration in area used for agriculture. | Inundation and covering over much of 1,166-acre site could reduce access to natural gas wells as well as aggregate resources. |
| City of Stockton | Delta Water Supply Project (Phase 1) | Currently under construction | This project consists of a new intake structure and pumping station adjacent to the San Joaquin River; a water treatment plant along Lower Sacramento Road; and water pipelines along Eight Mile, Davis, and Lower Sacramento Roads. | This project is approximately 106 acres and could reduce access to natural gas wells as well as aggregate resources. |
| DWR | Delta Levees Flood Protection Program | Ongoing | Levee rehabilitation projects in the Delta. | This project could utilize limited aggregate resources. |
| SAFCA, Central Valley Flood Protection Board, USACE | Flood Management Program | Ongoing | South Sacramento Streams Project component consists of levee, floodwall, and channel improvements. | This project could utilize limited aggregate resources. |

The geographic scope of the analysis for natural gas resources is the study area as defined in Chapter 1, *Introduction*, Section 1.5 (Figure 1-9). This geographic limit was established to coincide with the study area and to encompass the footprints of all construction and conservation-related ground-disturbing activity associated with the BDCP. The geographic scope of the aggregate cumulative analysis is centered on the counties and the designated aggregate resource production regions included in and adjacent to the study area (see Table 26-1). This geographic limit was established to coincide with the most likely sources of aggregate sought to support BDCP construction activities. It is unlikely, based on historic aggregate transportation patterns and costs, that a larger region within northern and central California would be drawn upon to supply aggregate resources to the BDCP and other Delta region projects. With the high cost of ground transportation, it is more likely that supplies from outside of the six local aggregate production study areas would arrive by boat and barge from the San Francisco Bay area (with sources outside of California) than from hard rock mines or large stream systems north of Sutter and Yuba Counties, east of Sacramento and Placer Counties, or south of San Joaquin County. If federal funding is provided to the project there might be restrictions on using aggregate from outside the country because of the Buy America Act (see Section 26.2.1.1).

***No Action Alternative***

The cumulative No Action Alternative scenario would include projects as listed in Table 26-9, and would include projects that could have effects on natural gas resources and aggregate resources. Generally, these other projects in the study area would have a minimal footprint and would not require moving existing active natural gas wells. Even if certain plan actions block vertical access to natural gas fields, directional drilling could provide access to these fields. A variety of smaller or standard projects in the study area and the broader region will use aggregate resources. However, projects in the cumulative No Action Alternative scenario are currently being supplied by the permitted aggregate sources and similarly are within the available permitted regional aggregate resource base (Table 26-1). Projects under the cumulative No Action Alternative scenario would also have to undergo independent environmental analysis and would also be subject to existing regulations over mineral resources which require identifying and conserving mineral resources. Therefore, it is anticipated that there would be no adverse effect on mineral resources.

The Delta and vicinity are within a highly active seismic area, with a generally high potential for major future earthquake events along nearby and/or regional faults, and with the probability for such events increasing over time. Based on the location, extent and non-engineered nature of many existing levee structures in the Delta area, the potential for significant damage to, or failure of, these structures during a major local seismic event is generally moderate to high. (See Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies* for more detailed discussion.) Reclaiming land or rebuilding levees after a catastrophic event due to climate change or a seismic event would potentially obstruct access to natural gas wells during construction. In the instance of levee failure causing flooding, inundation could also block access to natural gas wells. While similar risks would occur under implementation of the action alternatives, these risks may be reduced by BDCP-related levee improvements along with those projects identified for the purposes of flood protection in Table 26-9.

**Impact MIN-13: Cumulative Loss of Natural Gas Production from Construction, Operation, and Implementation of Conservation Measures 1–22 of Alternatives**

***NEPA Effects:*** The elements of the BDCP alternatives that could contribute to a cumulative effect on natural gas production are construction of the water conveyance facilities and implementation of conservation measures that result in permanent flooding of study area lands. Construction activity could displace between one and eleven active wells in the study area counties. The inundation associated with CM4, CM5, and CM10 could displace up to 233 active wells in the counties that make up the study area (Sacramento, Solano, Yolo, San Joaquin, Alameda, and Contra Costa). Although the number of natural gas wells likely to be eliminated may be a small percentage of the total sites in the study area, there is potential to affect a locally significant number of wells. Consequently, the inundation losses are considered an adverse effect even with feasible mitigation.

A review of related projects in the study area indicates there are no large-scale construction projects under consideration that are likely to displace active natural gas wells or reduce production or access to natural gas resources. Because most of the construction projects—including DWR's Delta Levees Flood Protection Program—have a minimal footprint, they would not require the displacement or abandonment of active natural gas wells or block access to large areas with underlying natural gas fields.

Various management plans being developed within the study area could have the potential to affect active natural gas wells or to block access to underlying natural gas fields. These management plans

include the Lower Sherman Island Wildlife Area Land Management Plan (California Department of Fish and Game) and the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (San Joaquin Council of Governments). These plans could result in large acreages being converted to habitat, including flooding for wetland habitat creation. These plans, however, do not necessarily require removal of active natural gas wells. Also, habitat management and conservation plans are prepared to provide mitigation procedures and identify conservation bank locations that allow development to proceed. Even if some study area lands are modified such that direct vertical access to natural gas fields is prevented, conventional or directional drilling from adjacent lands could still provide access to some of these fields. Areas for habitat modification could also be selected that do not require displacement of a substantial portion of active natural gas wells or substantial loss of natural gas production. Consequently, the other projects are considered to have a very minor effect on access to natural gas resources. However, because implementation of any of the BDCP alternatives alone would cause adverse effects on natural gas wells or resources, the incremental effects of the BDCP considered with the other regional projects would result in a cumulative adverse effect. Mitigation Measures MIN-5 and MIN-6 would be available to reduce BDCP-related effects.

***CEQA Conclusion*:** The physical projects and programs under consideration in the study area would have minimal to no impacts on natural gas resources. However, because implementation of any of the BDCP alternatives alone would cause significant and unavoidable impacts on natural gas wells or resources, implementing these projects in combination with any of BDCP Alternatives 1A through 9 would result in a significant cumulative impact and the incremental contribution to this impact of any of BDCP Alternatives 1A through 9 would be cumulatively considerable. Implementation of Mitigation Measures MIN-5 and MIN-6 would reduce the BDCP-related impact, but not to a less-than-significant level. Because implementation of Mitigation Measure MIN-5 and MIN-6 cannot assure that all or a substantial portion of a county's existing natural gas wells or fields will remain accessible after implementation of BDCP action alternatives, this cumulative impact is significant and unavoidable and the BDCP contribution is cumulatively considerable.

**Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

**Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

### Impact MIN-14: Cumulative Loss of Aggregate from Construction, Operation, and Implementation of Conservation Measures 1-22 of Alternatives

***NEPA Effects:*** The elements of the action alternatives that could contribute to a cumulative effect on aggregate resources include construction and maintenance of the water conveyance facilities; implementation of conservation measures that result in permanent flooding of study area lands; and maintenance of levees, berms, and structures constructed for conservation measures. The estimates for aggregate use for construction activities range from 4,000,000 tons (Alternative 9) to 20,453,000 tons (Alternative 4) over the 9-year construction period. The areas of flooding associated with conservation measures for all alternatives could inundate one existing mine, permanently blocking

access to the resource, and no identified MRZs. Mitigation Measure MIN-11 would address the effect on the inundated mine.

The cumulative effects analysis considered the range of projects in the study area and adjacent areas that might have effects on aggregate resources (Appendix 3D, *Defining Existing Conditions, the No Action/No Project Alternative, and Cumulative Impact Conditions*). A variety of smaller or standard projects in the study area and the broader region will use aggregate resources. These projects include highway and road improvement, housing development, levee improvements (e.g., the Delta Levees Flood Protection Program, the Sacramento Area Flood Control Agency Flood Management Program, 2012 Central Valley Flood Protection Plan [California Department of Water Resources 2011]), and the Folsom Dam Safety and Flood Damage Reduction Project. As disclosed in the discussions of individual alternatives, the aggregate requirements of the BDCP alternatives would not have any adverse effects on the availability of aggregate resources. As discussed in Section 26.1 and shown in Table 26-1, many areas in the study area, the broader region, and statewide only have small percentages of permitted aggregate resources available compared to the projected 50-year aggregate demand (Kohler 2006). However, projects of the scale described above are within the available permitted regional aggregate resource base listed in Table 26-1. Additionally, as described in Section 26.1.2.1 *Aggregate Resources*, new aggregate resources are being permitted and are not accounted for in Kohler (2006). Also, there is unused capacity because of the reduction in demand caused by the recession. Considering the level of permitted and available local and regional supplies, the ongoing aggregate needs, the added availability of materials from new permitted resources, and the additional aggregate demand from other projects in the region, none of the alternatives would be expected to substantially contribute to a cumulative effect on aggregate resources.

However, if larger projects with large, short-term aggregate requirements move forward on a schedule similar to the BDCP (particularly, any of Alternatives 1A through 8), there is potential to generate sufficient aggregate demand over the next decade so as to cause a cumulative effect on the availability of aggregate resources. As pointed out in the Delta Stewardship Council Draft Delta Plan EIR (Delta Stewardship Council 2011), the more or less simultaneous development of large projects with large aggregate demands has the potential to use a sufficient amount of the resource to reduce the amount available for future development. This cumulative effect would be more likely and more severe as the California economy recovers from the current downturn over the next several years. Given the large amount of aggregate needed for construction of the proposed conveyance facilities, the incremental contribution of a selected BDCP alternative to this cumulatively significant impact would be considered cumulatively considerable and adverse. Mitigation Measures MIN-11, MIN-13, and MIN-14 are available to address this cumulative effect.

***CEQA Conclusion*:** A variety of smaller or standard projects in the study area and the broader Delta region—e.g., highway and road improvement, housing development, levee improvements, and the Folsom Dam Safety and Flood Damage Reduction Project—will use aggregate resources. Projects of this scale, including the BDCP alternatives, are within the available permitted aggregate resource base. While the aggregate requirements of any selected BDCP alternative would not have a project-specific significant impact on the availability of aggregate resources, many areas in the study area and the broader aggregate production region only have small percentages of permitted aggregate resources available compared with the projected 50-year aggregate demand (Kohler 2006). Taken together, ongoing aggregate needs, the additional aggregate demand from constructing a BDCP alternative, and other regional projects, considered with the added availability of materials from new resource sites, would not substantially contribute to a cumulative impact on aggregate resources.

However, if larger projects with large, short-term aggregate requirements move forward on a schedule similar to that of any of BDCP Alternatives 1A through 8, there is potential to generate sufficient aggregate demand over the next decade to cause a cumulative impact sufficient to reduce the availability of aggregate resources for future development. The likelihood and severity of this cumulative impact would increase as California's economy recovers from the current downturn over the next several years.

Implementing these projects in combination with any of BDCP Alternatives 1A through 8 would result in the loss of availability of locally or regionally important aggregate resource that would cause remaining supplies to be inadequate for future development. This would constitute a significant cumulative impact and the incremental contribution to this impact of any of BDCP Alternatives 1A through 8 would be cumulatively considerable. Implementation of Mitigation Measures MIN-11, MIN-13, and MIN-14 would reduce the severity of the BDCP contribution to this cumulative impact by reducing the need to use local sources of aggregate and by participating in processes to develop additional resources. Because these measures cannot assure the ongoing availability of aggregate resources for future development, this cumulative impact would be significant and unavoidable and the BDCP contribution to this impact would remain cumulatively considerable.

**Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP Construction**

Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

**Mitigation Measure MIN-13: Recycle BDCP-Derived Materials and Use Recycled Materials to the Extent Practicable During Construction**

During final project design and construction, the BDCP proponents will recycle or reuse materials from excavation or removal of existing features (e.g., excavated sand and gravel; riprap and aggregate in existing roads and levees) to the extent feasible in light of costs, logistics, and technological considerations, including the quality of the excavated or removed sand, gravel, and reusable aggregate. Also, the BDCP proponents will use commercially available recycled materials for project components when practicable, considering costs, technological considerations, quality and availability of recycled materials, and other considerations. The use of recycled material will reduce the impact by reducing the need to use local sources of aggregate.

**Mitigation Measure MIN-14: BDCP Proponents Will Participate in the Local and Regional Aggregate Evaluation and Permitting Process**

BDCP proponents will participate in the local and regional dialog that evaluates the development of new MRZ-2 lands and the permitting of new aggregate and quarry resources. BDCP proponents will participate in the public and agency involvement process to inform the public and local, regional, and state permitting agencies about BDCP aggregate requirements and the need to prevent cumulative impacts on aggregate resources that might cause remaining supplies to be inadequate for future development. Participation in these public processes will reduce the impact on aggregate because it will coordinate and integrate BDCP resource needs into land use decisions being made by other agencies as part of established mineral resource

management policies, and will contribute to the potential that these needed resources would be developed.

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