

## 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

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

### 3 **26.1.2 Existing Mineral Resources in the Study Area**

4 In 2007, California ranked third in the nation for non-fuel mineral production, with a market value  
5 of \$4.3 billion for approximately 30 industrial minerals (Kohler 2007). California ranks number one  
6 in the nation in the production of sand and gravel, Portland cement, diatomite, and natural sodium  
7 sulfate; it ranks second in the nation for masonry cement. California was the country's only producer  
8 of boron and rare earth metals in 2007. Other minerals produced include gold and silver, common  
9 clay, bentonite clay (including hectorite), crushed stone, dimension stone, feldspar, fuller's earth,  
10 gemstones, gypsum, iron ore (used in cement manufacture), kaolin clay, lime, magnesium  
11 compounds, perlite, pumice, pumicite, salt, soda ash, and zeolites. In 2007, there were about 660  
12 active mines producing non-fuel minerals, employing about 10,000 people. California's leading  
13 industrial mineral is construction sand and gravel, with an estimated total value of \$1.37 billion for  
14 143.3 million tons produced in 2007 (Kohler 2007). Active mineral commodity producers in the  
15 study area are shown in Figure 26-1.

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

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

1 Of the four primary MRZ classifications, the MRZ-2 classification is perhaps the most important for  
 2 land use planning because of the high likelihood for occurrence of substantial mineral deposits in  
 3 such areas. SMGB may determine that some MRZ-2a or MRZ-2b areas contain mineral resources  
 4 with statewide or regional significance and initiate a public process for designation. Designated  
 5 areas are incorporated into state regulations (Title 14 California Code of Regulations [CCR], Division  
 6 2, Chapter 8, Subchapter 1, Article 2). Such designations require that a lead agency's land use  
 7 decisions involving these areas be made in accordance with its established mineral resource  
 8 management policies, and they require consideration of the importance of the designated mineral  
 9 resource to the market region or state as a whole, not just its importance to the lead agency's area of  
 10 jurisdiction (Section 2763 of Public Resources Code [PRC], Division 2, Chapter 9).

### 11 **26.1.2.1 Aggregate Resources**

12 CGS classification reports include an assessment of the quantity, quality, and extent of aggregate  
 13 deposits in a study area. Reports include aggregate resource classification and mapping, quantitative  
 14 calculations of permitted and nonpermitted aggregate resources, calculated 50-year demand for  
 15 aggregate resources, and an estimate of when the permitted resources will be depleted (Kohler  
 16 2006; Clinkenbeard 2012). Kohler (2006) indicates that the only factor that shows strong  
 17 correlation to historical aggregate use is population change. Consequently, the study reports  
 18 historical aggregate use on a per capita basis for each aggregate study area. Per capita demand  
 19 values are then used to project future aggregate demand based on population projections by the  
 20 California Department of Finance through 2050. Fifty-year demand and permitted aggregate  
 21 resources for areas in the Plan Area and the surrounding aggregate study areas are shown in Table  
 22 26-1 (Clinkenbeard 2012).

23 **Table 26-1. Comparison of 50-Year Demand to Permitted Aggregate Resources for Aggregate Study**  
 24 **Areas as of January 1, 2011<sup>a</sup>**

Aggregate Study Area <sup>b</sup>	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
<b>Sacramento County</b>	<b>670</b>	<b>42</b>	<b>6</b>
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.

<sup>a</sup> Study areas with less than 10 years of permitted resources are in **bold** type.

<sup>b</sup> 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.

25

1 Statewide aggregate demand has declined over the last few years because of the recession. Demand  
2 declined from 246 million tons in 2007 to 156.7 million tons in 2008 and to 127.5 million tons in  
3 2010, which is the most recent year for which data are available (Kohler 2007; Kohler 2008;  
4 Clinkenbeard and Smith 2010).

5 New aggregate sources are also in the process of being permitted and developed and others are  
6 being considered. For example, in 2009 Triangle Rock Products, Inc. received permission to expand  
7 its Sacramento area Florin Road facility (Clinkenbeard and Smith 2009). The expansion is for 10.7  
8 million tons of gravel over a 12-year life span or more than 890,000 tons per year. Teichert  
9 Aggregates has received permission from Sacramento County for a new quarry in the eastern county  
10 that will supply up to 7 million tons per year with a total volume of 135 million tons (County of  
11 Sacramento 2010). Similarly, Sacramento County certified the Final EIR for a quarry on the property  
12 adjacent to the Teichert site, and approved the project, Stoneridge Quarry, in December 2011. The  
13 Stoneridge Quarry will produce up to 6 million tons per year with 350 million tons available over its  
14 expected 100-year life (County of Sacramento 2011). For this quarry, the owners petitioned to have  
15 their lands reclassified from MRZ-3 (for Portland cement concrete [PCC] aggregate) to an upgraded  
16 MRZ-2 classification (Clinkenbeard 2010). That analysis resulted in a reclassification of 414 acres of  
17 the property as MRZ-2 for construction aggregate, which was subsequently approved. Similarly,  
18 revised mineral land classifications were completed for the proposed Riddle Surface Mine property  
19 in Stanislaus County and the Powerhouse Aggregate Project in Butte County, which reclassified 436  
20 acres and 460 acres, respectively, as MRZ-2 for construction aggregate (Smith and Clinkenbeard  
21 2010, 2011). Additionally, the hard-rock gold mine Lincoln Mine Project in Amador County is  
22 permitted and under construction. That gold mine can extract up to 150 tons per day and majority of  
23 the waste rock will be sold and hauled away for use as aggregate product consistent with the  
24 project's Conditional Use Permit (Tietz et al. 2011).

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

### 33 **26.1.2.2 Oil and Gas Resources**

34 In 2007, California produced 219 billion cubic feet of associated gas (i.e., gas that is found with oil)  
35 and 93 billion cubic feet of non-associated gas (i.e., gas that is not associated with oil). Most of the  
36 state's natural gas fields are located in the Sacramento Valley (Figure 26-2). The Rio Vista gas field,  
37 discovered in the Delta in 1936, is the largest field producing non-associated gas in the state,  
38 occupying portions of Sacramento, Solano, and Contra Costa Counties. In 2007, this gas field  
39 produced 19.8 billion cubic feet of natural gas. Since the 1940s, gas supply has been inadequate to  
40 meet state demand because of the tremendous growth in population and industry. By the early  
41 1980s, more than 80% of the gas used in California was from sources outside the state. Net natural  
42 gas production is declining in California; production dropped by approximately 3% in 2007 from  
43 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
<b>Total</b>	<b>393</b>	<b>702</b>	<b>867</b>	<b>954</b>	<b>523</b>	<b>3,439</b>

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).

## 1 **Sacramento County**

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

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

## 14 **San Joaquin County**

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

19 CGS classified MRZ areas in San Joaquin County in land classification Special Report 160 (California  
20 Department of Conservation, Division of Mines and Geology 1988b). MRZ-2 areas for sand and  
21 gravel in the Delta are located southwest of Manteca, south of Tracy, and southeast of Tracy near the  
22 Stanislaus County boundary. Sand and gravel extraction occurs in the southwestern portion of the  
23 county in the Corral Hollow Creek alluvial fan near Tracy and along the Mokelumne, Calaveras, and  
24 Stanislaus Rivers in the eastern portion of the county (San Joaquin County 1992). The Corral Hollow  
25 Creek sector is the primary construction aggregate production district in the county, with more than  
26 80% of the aggregate material used in the region produced here. The 1992 San Joaquin County  
27 General Plan states that existing aggregate reserves in the county represent 28% of the projected  
28 50-year demand and suggests that alternative sources of construction materials, including  
29 development of MRZ-3 areas, might be required when aggregate reserves are depleted.

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

## 40 **Solano County**

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

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

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

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

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

## 39 Sutter County

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

## 1 **Yolo County**

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

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

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

## 24 **26.2 Regulatory Setting**

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

### 27 **26.2.1 Federal Plans, Policies, and Regulations**

#### 28 **26.2.1.1 Buy America Act**

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

#### 33 **26.2.1.2 Surface Mining Control and Reclamation Act of 1977**

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



### 1    **26.2.1.3           Cosumnes River Preserve Management Plan**

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

## 4    **26.2.2           State Plans, Policies, and Regulations**

### 5    **26.2.2.1           Surface Mining and Reclamation Act of 1975**

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

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

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

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

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

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

### 3 **26.2.2.2 California Department of Conservation, Division of Oil, Gas, and** 4 **Geothermal Resources Construction-site Plan Review Program**

5 DOGGR regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal  
6 wells. As part of DOGGR's responsibilities for implementing PRC Section 3208.1, districts have  
7 developed the Construction-site Plan Review Program to assist local agencies in identifying and  
8 reviewing the status of oil or gas wells near proposed development. The program is aimed at  
9 addressing potentially dangerous issues associated with development near oil or gas wells. DOGGR  
10 serves in an advisory role to make relevant information available to local agencies. Section 3208.1 of  
11 the PRC states that if any property owner, developer, or local permitting agency either fails to obtain  
12 an opinion from DOGGR, or fails to follow the advice of DOGGR when development occurs near an oil  
13 or gas well, then the owner of the property on which the well is located may be responsible for re-  
14 abandonment costs should a future problem arise with the well. To use the DOGGR Well Review  
15 Program, the developer or property owner submits a completed Well Review Program Application  
16 to DOGGR (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources  
17 2007). Before issuing building or grading permits, local permitting agencies review and implement  
18 DOGGR's preconstruction well requirements. Interaction between local permitting agencies and  
19 DOGGR helps resolve land-use issues and allows for responsible development in oil and gas fields.

## 20 **26.2.3 Regional and Local Plans, Policies, and Regulations**

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

### 26 **26.2.3.1 Delta Protection Commission**

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

31 Utilities and Infrastructure:

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

### 1 26.2.3.2 Suisun Marsh Protection Plan

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

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

- 1 d. All buildings, tanks, “Christmas trees” or other facilities related to the production or storage  
2 of natural gas do not result in the permanent loss of water surface in the Marsh.
- 3 3. Construction and drilling in tidal marsh and managed wetland areas should occur only during  
4 the dry months of the years (generally May through August) when these activities would not  
5 disturb wintering waterfowl.
- 6 4. If gas wells are abandoned, they should be sealed in accordance with Division of Oil and Gas  
7 regulations; the drilling or production facilities should be removed; and the surface area should  
8 be revegetated with native vegetation within one growing season after abandonment.
- 9 5. Storage of natural gas in depleted gas reservoirs is a reasonable use of the resource and should  
10 be permitted. Storage facilities should meet all safety standards of the Division of Oil and Gas.
- 11 6. Because the Suisun Marsh offers both natural gas and depleted gas fields suitable for gas  
12 storage, and because it is close to the urban Bay Area and the proposed waterfront industrial  
13 area on the Sacramento River, gas will probably continue to be transported out of, into, and  
14 around the Marsh. All gas transportation into and out of the Marsh is now by underground  
15 pipeline systems. If other types of systems for the transport or storage of liquefied natural gas  
16 (LNG) are proposed for the Suisun Marsh area, a detailed investigation of the hazards and  
17 impacts of LNG facilities should be carried out prior to approval of the facilities.

### 18 **26.2.3.3 Alameda County Code and East County Area Plan**

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

### 24 **26.2.3.4 Contra Costa County General Plan**

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

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

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

### 22 **26.2.3.5           Contra Costa County Ordinance Code**

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

### 26 **26.2.3.6           City of Rio Vista Zoning Ordinance**

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

### 31 **26.2.3.7           Sacramento County General Plan**

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

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

- 1           • **Implementation Measure 1:** Continue to monitor implementation of use permit  
2 conditions approved for surface mining operations or regulation through the  
3 procedures of an existing special planning area zoning designation. (PLANNING)
- 4           • **Implementation Measure 2:** Maintain and update information pertaining to  
5 appropriate state-of-the-art techniques for erosion control, reclamation, nuisance  
6 prevention and environmental impact mitigation relative to surface mining operations.  
7 (PLANNING)
- 8           • **Implementation Measure 3:** Provide pertinent applications, plans and environmental  
9 documents to all agencies which may be involved with future reclamation uses,  
10 including service providers, parks agencies, and resource management agencies.  
11 (PLANNING)
- 12          • **Implementation Measure 4:** Prepare a comprehensive plan for hard rock mining that  
13 helps to guide a cohesive and logical pattern for future mining activities based on  
14 estimated mineral supply needs, evaluation of environmental impacts and minimizing  
15 effects on adjacent land uses (PLANNING).
- 16          • **Objective 4:** Sequential timing of mining of aggregate areas linked to the timing of urban  
17 development.
- 18           ○ **Policy CO-44:** Due to the predicted shortages of aggregates in Sacramento County, mining of  
19 mineral resources within the Urban Services Boundary (USB) is encouraged, where  
20 consistent with Habitat Conservation Plans or other County initiated conservation programs  
21 and where such mining does not preclude successful completion of these plans, to avoid the  
22 potential loss of these mineral resources as a result of potential urban development. This  
23 policy is not intended to preclude mining outside the USB.
- 24           • **Implementation Measure 1:** Develop a strategy for mining within the USB that is  
25 consistent with other land uses and the preservation strategies that are currently being  
26 developed for the South Sacramento Habitat Conservation Plan. (PLANNING)
- 27           • **Implementation Measure 2:** Develop a strategy for mining Mather AFB lands that is  
28 consistent with other land uses and the preservation strategies that are currently being  
29 developed for the South Sacramento Habitat Conservation Plan and the reuse needs for  
30 the Base. (PLANNING)
- 31          • **Objective 5:** Ten percent and twenty percent of demand for aggregates met by recycled or  
32 substitute materials by 2010 and 2020 respectively.
- 33           ○ **Policy CO-45:** To the maximum extent possible, all base material utilized in County and  
34 private road construction shall be composed of recycled asphalt concrete and roadway base  
35 material.
- 36           • **Implementation Measure 1:** Modify construction standards for County roads to utilize  
37 recycled products without altering the engineering properties per the Sacramento  
38 County Standard Construction Specifications, and upon approval of the Municipal  
39 Services Agency. (MSA-DOT)
- 40           • **Implementation Measure 2:** Develop appropriate conditions applicable to projects  
41 involving private roads. (MSA-PLANNING)

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

### 5    **26.2.3.8            Zoning Code of Sacramento County**

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

### 10   **26.2.3.9            San Joaquin County General Plan**

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

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

### 31   **26.2.3.10          Solano County General Plan**

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

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



- 1           ○ **Implementation Regulation RS.I-17:** Evaluate impacts related to extracting mineral  
 2 resources from new areas as part of the required permitting process to ensure that  
 3 remediation occurs after minerals are extracted. Comply with regulations found in SMARA.
- 4           ● **Suisun Marsh Policy Addendum to the 2008 General Plan:** Extraction and removal of  
 5 minerals or natural materials from existing quarries and borrow areas within the  
 6 Secondary Management Area of the Suisun Marsh should be allowed to continue where  
 7 not in conflict with protection of the marsh and in conformance with county codes. Sites  
 8 governed by the above provisions include: two on the Tule Vista Livestock Company  
 9 properties, of which one is located east of Scally Road and the other located northeast of  
 10 Beldon’s Landing; one on the Guy Stewart property 1,500 feet west of Shiloh Road; two  
 11 on the Barnes property 8,000 feet west of Shiloh Road in the Kirby Hills; and two on the  
 12 Wagent property 3,000 feet west of Shiloh Road. These are in addition to existing sites  
 13 under county land use permit.

#### 14 **26.2.3.11 Solano County Code**

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

#### 17 **26.2.3.12 Yolo County General Plan**

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

- 20 ● **Goal CO-3 Mineral Resources:** Protect mineral and natural gas resources to allow for their  
 21 continued use in the economy.
- 22 ○ **Action CO-A39:** Encourage the responsible development of aggregate deposits along Cache  
 23 Creek as significant both to the economy of Yolo County and the region (Policy CO-3.1).
- 24 ○ **Action CO-A40:** Encourage recycling of aggregate materials and products (Policy CO-3.1).
- 25 ○ **Action CO-A44:** Coordinate individual surface mining reclamation plans so that the  
 26 development of an expanded riparian corridor along Cache Creek may be achieved (Policy  
 27 CO-3.1).
- 28 ○ **Action CO-A47:** Ensure that mined areas are reclaimed to a usable condition that is readily  
 29 adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and  
 30 groundwater management facilities.
- 31 ● **Policy CO-3.2:** Ensure that mineral extraction and reclamation operations are  
 32 compatible with land uses both onsite and within the surrounding area, and are  
 33 performed in a manner that does not adversely affect the environment.
- 34 ○ **Action CO-A46:** Maintain standards and procedures for regulating surface mining and  
 35 reclamation operations so that potential hazards and adverse environmental effects are  
 36 reduced or eliminated (Policy CO-3.1, Policy CO-3.2).
- 37 ○ **Action CO-A52.2:** Implement the Cache Creek Area Plan (Policy CO-3.2).
- 38 ○ **Action CO-A49:** Consider the exploration, drilling, and extraction of natural gas as  
 39 compatible with agriculture and open space uses (Policy CO-3.3).

- 1           ○ **Action CO-A50:** Evaluate any impacts to identified natural gas fields as part of the  
2 development review process (Policy CO-3.3).
- 3           ○ **Action CO-A51:** Require that abandoned gas wells be sealed in accordance with DOC  
4 regulations and that all drilling or production facilities be removed. Further require that the  
5 disturbed surface area be reincorporated into adjoining agricultural operations or  
6 revegetated with native vegetation within one year after abandonment (Policy CO-3.3).
- 7           ● **Policy CO-3.4:** Within the Delta Primary Zone, ensure compatibility of permitted land  
8 use activities with applicable, natural gas policies of the Land Use and Resource  
9 Management Plan of the Delta Protection Commission.
- 10          ● **Policy CO-3.5:** Preserve and protect the County’s unique geologic and physical features,  
11 which include geologic or soil “type localities,” and formations or outcrops of special  
12 interest (DEIR MM GEO-1a).

### 13 **26.2.3.13           Yolo County Code**

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

## 20 **26.3   Environmental Consequences**

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

### 24 **26.3.1   Methods for Analysis**

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

#### 30 **26.3.1.1           Construction and Footprint Effects**

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

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

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

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

### 19 **26.3.1.2 Operational Effects**

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

### 26 **26.3.1.3 Restoration Effects**

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

## 33 **26.3.2 Determination of Effects**

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

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

- 1           ○ For aggregate resources, an effect is considered adverse when use of the resource would  
2           result in a substantial depletion (loss of availability) of construction-grade aggregate within  
3           the six aggregate production study areas (Table 26-1), which would cause remaining  
4           supplies to be inadequate for future development based on 50-year demand estimates, and  
5           thereby substantially contribute to the need for new aggregate development.
- 6           ● Loss of availability of a locally important mineral resource recovery site delineated by a local  
7           general plan, specific plan, or other land use plan.
- 8           ○ For purposes of this analysis, “locally important mineral resource recovery site delineated  
9           by a local general plan, specific plan, or other land use plan” refers to natural gas well(s),  
10          natural gas field(s), an aggregate mine site, or an MRZ.
- 11          ○ Any complete covering or permanent blockage of access to an aggregate resource (mines or  
12          MRZs) or natural gas field such that the resource cannot be recovered would be considered  
13          adverse.
- 14          ○ With respect to natural gas wells, substantial loss of existing production resulting from the  
15          need to abandon producing wells that cannot be replaced would be considered adverse.
- 16          ○ Any permanent elimination of a substantial portion of a county’s active natural gas wells  
17          would be considered adverse.
- 18          ○ Temporary obstructions or effects on relatively small areas would not be considered  
19          adverse. For the purposes of this analysis, temporary refers to activities occurring during  
20          the construction period.
- 21          ○ Some of the distribution lines that lead from individual natural gas wells to larger collection  
22          lines may need to be relocated due to project facilities, including roads and transmission  
23          lines. These distribution lines are very small diameter (approximately 2 inches) and  
24          shallowly buried (approximately 2–3 feet) and their relocation would not impact the  
25          production from their associated natural gas wells. Consequently, this impact is not  
26          considered adverse and is not discussed further.

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

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

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

## 1 Consistency with Local Plans and Policies

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

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

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

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

## 19 **26.3.3 Effects and Mitigation Approaches**

### 20 **26.3.3.1 No Action Alternative**

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

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

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

1 **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.

1

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

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



## 1      **Catastrophic Seismic Risks**

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

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

### 22     **26.3.3.2            Alternative 1A—Dual Conveyance with Pipeline/Tunnel and** 23     **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

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

#### 31     **Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 32     **Constructing the Water Conveyance Facilities**

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

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

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

8 **Table 26-4. Producing Natural Gas Wells Affected by the BDCP Action Alternatives<sup>a</sup>**

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 Material Work 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. <sup>b</sup>	
<b>Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1-5 (15,000 cfs; Operational Scenario A)</b>													
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	
<b>Alternative 1B—Dual Conveyance with East Alignment and Intakes 1-5 (15,000 cfs; Operational Scenario A)</b>													
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	
<b>Alternative 1C—Dual Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario A)</b>													
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	
<b>Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)</b>													
Same as Alternative 1A													
<b>Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)</b>													
Same as Alternative 1B													
<b>Alternative 2C—Dual Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario B)</b>													
Same As Alternative 1C													

County	2005–2009 Annual Average Natural Gas Production (Mcf)	Construction Permanent Impact Area (number of wells)				Construction Temporary Impact Area (number of wells)			Permanent + Temporary Impact Area			
		Tunnel (Subsurface)	Reusable Tunnel Material Work 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. <sup>b</sup>
<b>Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)</b>												
Same as Alternative 1A												
<b>Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)</b>												
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	—	—
<b>Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)</b>												
Same as Alternative 1A												
<b>Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario D)</b>												
Same as Alternative 1A												
<b>Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario D)</b>												
Same as Alternative 1B												
<b>Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario D)</b>												
Same as Alternative 1C												
<b>Alternative 7—Dual Conveyance with Pipeline/Tunnel and Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)</b>												
Same as Alternative 1A												
<b>Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)</b>												
Same as Alternative 1A												
<b>Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)</b>												
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.

<sup>a</sup> Identification of all producing wells is provided in Appendix 26A, *Natural Gas Wells*.

<sup>b</sup> Values rounded to the nearest percent.

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

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

### 13 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 14 **of Constructing the Water Conveyance Facilities**

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

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

Gas Field Name	Natural Gas Field Size (acres) <sup>a</sup>	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 <sup>b</sup>
<b>Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)</b>				
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
<b>Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)</b>				
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) <sup>a</sup>	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 <sup>b</sup>
<b>Alternative 1C—Dual Conveyance with West /Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario A)</b>				
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
<b>Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)</b>				
Same as Alternative 1A				
<b>Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)</b>				
Same as Alternative 1B				
<b>Alternative 2C—Dual Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario B)</b>				
Same as Alternative 1C				
<b>Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)</b>				
Same as Alternative 1A				
<b>Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3 and 5, (9,000 cfs; Operational Scenario H)</b>				
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
<b>Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)</b>				
Same as Alternative 1A				
<b>Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1-5 (15,000 cfs; Operational Scenario D)</b>				
Same as Alternative 1A				
<b>Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1-5 (15,000 cfs; Operational Scenario D)</b>				
Same as Alternative 1B				
<b>Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario D)</b>				
Same as Alternative 1C				
<b>Alternative 7—Dual Conveyance with Pipeline/Tunnel, and Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)</b>				
Same as Alternative 1A				
<b>Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)</b>				
Same as Alternative 1A				
<b>Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)</b>				
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.

<sup>a</sup> Gas field size is based on administrative boundaries reported by DOGGR.

<sup>b</sup> Values rounded to the nearest percent.

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

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

### 13 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 14 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

### 34 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 35 **Maintenance of the Water Conveyance Facilities**

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

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

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

### 12 **Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 13 **Implementing Conservation Measures 2–22**

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

26 **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.

27

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

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

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

#### 25 **Mitigation Measure MIN-5: Design Conservation Measures 4, 5, and 10 to Avoid** 26 **Displacement of Active Natural Gas Wells to the Extent Feasible**

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

#### 33 **Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 34 **of Implementing Conservation Measures 2–22**

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



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

5 **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) <sup>a</sup>	Total Natural Gas Field Area (acres)	Proportion of Natural Gas Field Area Underlying ROA (%) <sup>b</sup>
<b>Cache Slough</b>				
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
<b>Cosumnes/Mokelumne</b>				
Thornton Gas (abandoned)	ND	75	1,745	4
West Thornton-Walnut Grove Gas	358,307	2,149	3,852	56
<b>South Delta</b>				
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
<b>Suisun Marsh</b>				
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
<b>West Delta</b>				
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.

<sup>a</sup> Natural gas field areas are based on administrative boundaries.

<sup>b</sup> Values rounded to the nearest percent

6  
 7 **CEQA Conclusion:** The areal extent of lands overlying study area natural gas fields that would be  
 8 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would  
 9 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from  
 10 outside the inundated areas using either conventional or directional drilling, although feasibility of  
 11 access would depend on the exact configuration of inundation and the availability of adjacent  
 12 drilling sites. Although the overall extent of affected natural gas fields in the region is low to  
 13 moderate, there is potential for a locally significant impact on access to natural gas fields if they are

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

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

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

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

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

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

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

24 **NEPA Effects:** Alternative 1A would require large amounts of fill, aggregate, and cement for  
 25 construction of the numerous elements of the water conveyance facilities. The principal demands  
 26 for construction material would come from the five intakes with pumping plants and associated  
 27 facilities, the nearly 40 miles of concrete pipeline tunnels, and the forebays. Additional aggregate  
 28 would be required for construction of permanent and temporary roads and levees. An estimated  
 29 13,506,000 tons of aggregate would be required including about 5,149,000 tons of aggregate that  
 30 would be required for concrete including tunnels. This amount is equal to approximately 32% of the  
 31 permitted aggregate in Sacramento County or 6% of the permitted aggregate in the Stockton-Lodi P-  
 32 C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate in these two  
 33 areas. This aggregate would be used over an approximately 9-year construction period, spreading  
 34 the effect over time. Because the 50-year demand for aggregate already exceeds the existing  
 35 permitted supplies in many counties within which the conveyance facilities would be constructed,  
 36 there would likely be an effect on the availability of local aggregate supplies if the project were to  
 37 rely solely on local resources, (i.e., resources from one area, such as Sacramento County). However,  
 38 if aggregate was sourced from several local resources (such as Sacramento County, Stockton-Lodi,  
 39 and Yuba City-Marysville) there would not be a substantial depletion (loss of availability) of  
 40 aggregate to meet the regional 50-year demand. Sourcing from multiple locations is likely,  
 41 considering that the alternative extends many miles north-to-south and different portions of the  
 42 project would be closer to individual local resources (See Figure 26-1). Because there would not be a

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

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

15 Additionally, as described in Section 26.1.2.1, *Aggregate Resources*, some of the new aggregate  
16 resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge  
17 Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate,  
18 respectively. Although these sites may not provide materials to the project, their capacities do  
19 indicate that a single quarry could provide more than the required annual tonnage to the project and  
20 still have capacity for many decades. Although regional values are not available, the statewide  
21 decline in aggregate demand went from 246 million to 156.7 million and then to 127.5 million tons  
22 (2007, 2008, and 2010, respectively), indicating that some unused capacity exists because of the  
23 current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2010).

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

44 The amount of borrow material required for Alternative 1A would be 13,500,000 cubic yards or  
45 20,250,000 tons. Because there is limited excavation associated with this alternative, most of this

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

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

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

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

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

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

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

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

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

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

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

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

28 **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.

29  
 30 **CEQA Conclusion:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano  
 31 County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not  
 32 be affected by inundation associated with the conservation measures. An active mine on Decker  
 33 Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation  
 34 and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a  
 35 significant impact because it would eliminate the potential to recover aggregate resources.  
 36 Mitigation Measure MIN-11 is designed to reduce the impact to less than significant.

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

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

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

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

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

35          **26.3.3.3           Alternative 1B—Dual Conveyance with East Alignment and**  
 36          **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

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

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

#### 4 **Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 5 **Constructing the Water Conveyance Facilities**

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

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

21 Because there are relatively few (two) producing wells within the construction footprint, the loss of  
 22 these wells would not eliminate a substantial portion of the county's natural gas wells or natural gas  
 23 production, and therefore would not constitute an adverse effect. Both producing wells within the  
 24 construction footprint would be permanently abandoned in coordination with DOC, following  
 25 applicable state regulations and guidance. A summary of laws and regulations related to well  
 26 abandonment is provided in Chapter 24, *Hazards and Hazardous Materials*, Sections 24.2.2.11 and  
 27 24.2.2.12.

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

#### 36 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 37 **of Constructing the Water Conveyance Facilities**

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

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

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

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

### 15 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 16 **Operation and Maintenance of the Water Conveyance Facilities**

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

25 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
26 1B would not block access to natural gas wells, cause any wells to be abandoned, or reduce  
27 production. Accordingly, this impact would be less than significant. No mitigation is required.

### 28 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 29 **Maintenance of the Water Conveyance Facilities**

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

29 The amount of borrow material required for Alternative 1B would be 200,000,000 cubic yards, or  
 30 approximately 350,000,000 tons distributed over four segments of the route. For the first segment  
 31 of the route, the fill would be nearly balanced cut and fill, so no extra fill would be needed. The  
 32 remaining three segments would require about 138,000,000 cubic yards, or approximately  
 33 207,000,000 tons. The use of this borrow material would not have an adverse effect because borrow  
 34 is developed locally and regionally on an as-needed basis and is not considered an important  
 35 mineral resource in California.

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

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

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

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

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

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

#### 27 **Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation** 28 **and Maintenance of the Water Conveyance Facilities**

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

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

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

#### 8 **Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 9 **MRZs) as a Result of Implementing Conservation Measures 2-22**

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

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

#### 25 **Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP** 26 **Construction**

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

#### 28 **Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of** 29 **Implementing Conservation Measures 2-22**

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

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

### 9 **26.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and** 10 **Intakes W1–W5 (15,000 cfs; Operational Scenario A)**

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

#### 22 **Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 23 **Constructing the Water Conveyance Facilities**

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

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

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

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

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

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

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

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

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

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

38 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
39 1C would not block access to natural gas wells, cause any wells to be abandoned, or reduce  
40 production. Accordingly, there would be no impact. No mitigation is required.

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

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

10 *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative  
 11 1C would have no impact on access to underlying natural gas fields because operation primarily  
 12 involves movement of water in infrastructure constructed under this alternative. Maintenance  
 13 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.  
 14 Operation and maintenance activities would not obstruct access to natural gas fields and would not  
 15 interfere with recovering the resource. No mitigation is required.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

29 **NEPA Effects:** Alternative 1C would require large amounts of fill, aggregate, and cement for  
 30 construction of the numerous elements of the water conveyance facilities. The principal demands  
 31 for construction materials would come from construction of the five intakes with pumping plants  
 32 and associated facilities, the bridges, the 16 miles of canal, and the 17 miles of concrete-lined tunnel.  
 33 Additional aggregate would be required for access road and levee construction. An estimated  
 34 12,009,807 tons of aggregate would be required for this alternative including about 4,000,000 tons  
 35 for concrete including tunnels. This amount is equal to approximately 29% of the permitted  
 36 aggregate in Sacramento County, or approximately 5% of the permitted aggregate in the Stockton-  
 37 Lodi P-C Region (Table 26-1). This amount is less than 5% of the permitted aggregate in Sacramento  
 38 County and the Stockton-Lodi P-C Region combined. The amount of aggregate needed for  
 39 Alternative 1C would be about 11% less than that needed for Alternative 1A; and Alternative 1A was  
 40 judged to have no adverse effect on aggregate availability. Similarly, Alternative 1C would not  
 41 constitute an adverse effect on known aggregate resources or aggregate availability to meet the  
 42 regional 50-year demand.



1 The amount of borrow material required for Alternative 1C would be 200,000,000 cubic yards, or  
2 approximately 350,000,000 tons. However, for the first segment of the route the fill would be nearly  
3 balanced cut and fill, so only an estimated 10% of the needed fill on this segment, or approximately  
4 12,000,000 tons, would come from borrow sites away from the canal route. The second segment of  
5 this conveyance route is the tunnel; it would require very small amounts of borrow for road  
6 construction. In the third segment (the southernmost canal segment), excavated material would  
7 significantly exceed the borrow needs. In total, about 12,000,000 tons of borrow from outside the  
8 immediate alternative footprint would be required for this alternative. The use of this borrow  
9 material would not have an adverse effect because borrow is developed locally and regionally on an  
10 as-needed basis and is not considered a significant mineral resource in California.

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

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

#### 24 **Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 25 **MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

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

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

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

27 **NEPA Effects:** Implementation of conservation measures beyond CM1 would be the same for  
 28 Alternative 1C as they would be for Alternative 1A. Consequently, the effects of these conservation  
 29 measures would be the same. Table 26-8 lists two active mines in the ROAs. The upland mine in the  
 30 Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure  
 31 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this  
 32 aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this  
 33 effect.

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

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

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

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

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

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

23 **26.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**  
 24 **Intakes (15,000 cfs; Operational Scenario B)**

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

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

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

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

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

### 10 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 11 **of Constructing the Water Conveyance Facilities**

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

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

### 31 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 32 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

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

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

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

### 25 **Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 26 **Implementing Conservation Measures 2-22**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 25 **Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 26 **MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2A would include  
 4 moving water, both within infrastructure that would be constructed and natural channels. No  
 5 aggregate resources are required for operations so there would be no effect. Small amounts of  
 6 aggregate and riprap would be required for maintenance of structure foundations, levees, stream  
 7 banks, and access roads associated with major project features such as intakes, pumping plants, and  
 8 the head of Old River barrier. These small amounts could be readily supplied by quarries in the  
 9 region (Table 26-1) or those currently in the process of permitting and development (Section  
 10 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply  
 11 available for future development. Accordingly, operation and the use of a small amount of aggregate  
 12 material for the maintenance of the water conveyance facilities under Alternative 2A is not an  
 13 adverse effect.

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

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

25 **NEPA Effects:** Implementation of conservation measures beyond CM1 would be the same for  
 26 Alternative 2A as they would be for Alternative 1A. Consequently, the effects of these conservation  
 27 measures would be the same. Table 26-8 lists two active mines in the ROAs. The upland mine in the  
 28 Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure  
 29 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this  
 30 aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this  
 31 effect.

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

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

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



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

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

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

24 **26.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five**  
 25 **Intakes (15,000 cfs; Operational Scenario B)**

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

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

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

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

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

#### 14 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 15 **of Constructing the Water Conveyance Facilities**

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

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

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

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

#### 38 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 39 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

8 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
 9 2B would not block access to natural gas wells, cause any wells to be abandoned, or reduce  
 10 production. Accordingly, this impact would be less than significant. No mitigation is required.

#### 11 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 12 **Maintenance of the Water Conveyance Facilities**

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

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

#### 29 **Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 30 **Implementing Conservation Measures 2-22**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 7 **Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation** 8 **and Maintenance of the Water Conveyance Facilities**

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

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

### 26 **Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 27 **MRZs) as a Result of Implementing Conservation Measures 2-22**

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

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

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

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

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

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

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

27          **26.3.3.7           Alternative 2C—Dual Conveyance with West Alignment and**  
 28          **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

29          Alternative 2C is the same as Alternative 1C except for operational changes associated with water  
 30          management, and the construction of an operable barrier with boat lock at the head of Old River (at  
 31          its confluence with the San Joaquin River). The different operations would have no effect on access  
 32          to or availability of natural gas or aggregates. The operable barrier would require approximately  
 33          1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of riprap for slope protection  
 34          on levees and on the channel bottom, which would use aggregate resources.

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

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

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

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

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

### 13 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 14 **of Constructing the Water Conveyance Facilities**

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

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

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

### 37 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 38 **Operation and Maintenance of the Water Conveyance Facilities**

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



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

5 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
6 2C would not block access to natural gas wells, cause any wells to be abandoned, or  
7 reduce production. Accordingly, there would be no impact. No mitigation is required.

#### 8 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 9 **Maintenance of the Water Conveyance Facilities**

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

17 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
18 2C would have no impact on access to underlying natural gas fields because operation primarily  
19 involves movement of water in infrastructure constructed under this alternative. Maintenance  
20 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.  
21 Operation and maintenance activities would not obstruct access to natural gas fields and would not  
22 interfere with recovering the resource. No mitigation is required.

#### 23 **Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 24 **Implementing Conservation Measures 2–22**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 28 **Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 29 **MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

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

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

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

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

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

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

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

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

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

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

23 **26.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and**  
 24 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

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

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

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

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

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

#### 10 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 11 **of Constructing the Water Conveyance Facilities**

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

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

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

#### 34 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 35 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

23 **26.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel**  
 24 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

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

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

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

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

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

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

### 7 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 8 **of Constructing the Water Conveyance Facilities**

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

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

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

### 31 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 32 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

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

#### 10 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 11 **Maintenance of the Water Conveyance Facilities**

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

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

#### 32 **Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 33 **Implementing Conservation Measures 2-22**

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

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

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

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

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

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

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

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

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

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

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

#### 18 **Mitigation Measure MIN-6: Design Conservation Measures 4, 5, and 10 to Maintain** 19 **Drilling Access to Natural Gas Fields to the Extent Feasible**

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

#### 27 **Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 28 **MRZs) as a Result of Constructing the Water Conveyance Facilities**

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

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

#### 36 **Impact MIN-8: Loss of Availability of Known Aggregate Resources as a Result of Constructing** 37 **the Water Conveyance Facilities**

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

1 Up to an estimated 13,500,000 tons of aggregate would be required for Alternative 4, including the  
2 operable barrier at the head of Old River and including about 5,160,000 tons of aggregate that  
3 would be required for the water conveyance tunnels under this alternative. Under Alternative 4,  
4 Tunnel 1a would be a single-bore, 29-ft inside diameter (ID) tunnel that would carry water from  
5 Intakes 2 and 3 on the northern end of the project to the intermediate forebay. The segment of  
6 Tunnel 1a between Intake 2 and 3 would have a 20-foot ID. Tunnel 1b would be a single-bore 20-ft  
7 ID tunnel that would carry water from Intake 5 to the intermediate forebay. Two 40-foot ID tunnels  
8 (Tunnel 2) would carry water from an intermediate forebay to the proposed expanded Clifton Court  
9 Forebay on the southern end of the alignment. The total aggregate amount is equal to approximately  
10 32% of the permitted aggregate in Sacramento County or 6% of the permitted aggregate in the  
11 Stockton-Lodi P-C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate  
12 in these two areas. This aggregate would be used over an approximately 9-year construction period,  
13 spreading the effect over time. Because the 50-year demand for aggregate already exceeds the  
14 existing permitted supplies in many counties within which the conveyance facilities would be  
15 constructed, there would likely be an effect on the availability of local aggregate supplies if the  
16 project were to rely solely on local resources, (i.e., resources from one area, such as Sacramento  
17 County). However, if aggregate was sourced from several local resources (such as Sacramento  
18 County, Stockton-Lodi, and Yuba City-Marysville) there would not be a substantial depletion (loss of  
19 availability) of aggregate to meet the regional 50-year demand. Sourcing from multiple locations is  
20 likely, considering that the alternative extends many miles north-to-south and different portions of  
21 the project would be closer to individual local resources (See Figure 26-1). Because there would not  
22 be a substantial depletion of aggregate available to meet the regional 50-year demand, Alternative 4  
23 would not substantially contribute to the need for new aggregate resource development. Therefore,  
24 this effect would not be adverse.

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

36 Additionally, as described in Section 26.1.2.1, *Aggregate Resources*, some of the new aggregate  
37 resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge  
38 Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate,  
39 respectively. Although these sites may not provide materials to the project, their capacities do  
40 indicate that a single quarry could provide more than the required annual tonnage to the project and  
41 still have capacity for many decades. Although regional values are not available, the statewide  
42 decline in aggregate demand went from 246 million to 156.7 million and then to 133.5 million tons  
43 (2007, 2008, and 2009, respectively), indicating that some unused capacity exists because of the  
44 current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2009).

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



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

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

25 The amount of borrow material needed to construct Alternative 4 would be approximately  
26 13,500,000 cubic yards or 20,250,000 tons. Because there is limited excavation associated with this  
27 alternative, most of this borrow material would be developed from borrow pits adjacent to  
28 construction areas, nearby suitable locations, and some commercial sites. The use of this amount of  
29 borrow would not have an adverse effect because borrow is not defined as a mineral resource and it  
30 is developed locally and regionally on an as-needed basis.

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

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

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

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

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

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

22 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4 would include  
23 moving water, both within infrastructure that would be constructed and natural channels. No  
24 aggregate resources are required for operations so there would be no effect. Small amounts of  
25 aggregate and riprap would be required for maintenance of structure foundations, levees, stream  
26 banks, and access roads associated with major project features such as intakes, pumping plants, and  
27 the head of Old River barrier. These small amounts could be readily supplied by quarries in the  
28 region (Table 26-1) or those currently in the process of permitting and development (Section  
29 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply  
30 available for future development. Accordingly, operation and the use of a small amount of aggregate  
31 material for the maintenance of the water conveyance facilities under Alternative 4 is not an adverse  
32 effect.

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

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

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

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

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

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

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

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

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

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

### 11 **26.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and** 12 **Intake 1 (3,000 cfs; Operational Scenario C)**

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

#### 18 **Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 19 **Constructing the Water Conveyance Facilities**

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

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

#### 35 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 36 **of Constructing the Water Conveyance Facilities**

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

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

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

### 11 **Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 12 **Operation and Maintenance of the Water Conveyance Facilities**

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

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

### 26 **Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and** 27 **Maintenance of the Water Conveyance Facilities**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

19 **NEPA Effects:** The conservation measures associated with Alternative 5 are the same as Alternative  
 20 1A except that only up to 25,000 acres of tidal marsh restoration would occur rather than up to  
 21 65,000 acres as proposed for Alternative 1A. The effects would be similar to those described for  
 22 Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock  
 23 revetment construction and for erosion control and stability at levee breaches and toe drain  
 24 earthworks. The demand for levee and berm construction and armoring of levee breaches under  
 25 Alternative 5 would be smaller than under the other alternatives with much larger acreages of tidal  
 26 marsh creation. The amount of aggregate necessary for these activities cannot be calculated at this  
 27 time because of the programmatic nature and general design of the conservation measures.  
 28 However, the amount needed would be expected to be within the capacity of the available resources  
 29 in the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate*  
 30 *Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional  
 31 aggregate supplies substantial enough to cause remaining supplies to be inadequate for future  
 32 development or to require development of new aggregate sources to meet future demand.  
 33 Therefore, the use of available aggregate material for the conservation measures of Alternative 5  
 34 would not have an adverse effect.

35 **CEQA Conclusion:** The extent of conservation actions under Alternative 5 would be similar to but  
 36 smaller than those under Alternative 1A. CM2, CM4, CM5, and CM10 would use small amounts of  
 37 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap  
 38 for erosion control and stability at level breaches and toe drain earthworks. The amounts of  
 39 aggregate are unknown but would be within the available resources of the study area or adjacent  
 40 aggregate resource study areas listed in Table 26-1. Because implementing conservation measures  
 41 would not use an amount of aggregate that would cause remaining supplies to be inadequate to  
 42 meet future demands and require developing new sources, this impact would be less than  
 43 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

39 **CEQA Conclusion:** The operation and maintenance of Alternative 6A would have no impacts on the  
40 availability of aggregate resource sites because none exist within the areas affected by Alternative  
41 6A operation and maintenance; and operations and maintenance would not increase the  
42 alternative's footprint. No mitigation is required.

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

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

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

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

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

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

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

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

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

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

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

24 **26.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and**  
 25 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

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

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

32 **NEPA Effects:** The conveyance facilities associated with Alternative 6B would be the same as those  
 33 under Alternative 1B. The locations of producing natural gas wells within the Alternative 6B  
 34 construction footprint are shown in Figure 24-5. The two producing wells that would be affected by  
 35 Alternative 6B are in San Joaquin County (Table 26-4) and would be affected by the conveyance  
 36 canal and temporary construction work areas. Because there are relatively few (two) producing  
 37 wells within the construction footprint, the loss of these wells would not eliminate a substantial  
 38 portion of the county's natural gas wells or natural gas production, and therefore would not  
 39 constitute an adverse effect. Both producing wells within the construction footprint would be  
 40 permanently abandoned in coordination with DOC, following applicable state regulations and  
 41 guidance. A summary of laws and regulations related to well abandonment is provided in Chapter  
 42 24, *Hazards and Hazardous Materials*, Sections 24.2.2.11 and 24.2.2.12.

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

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

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

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

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

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

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

39 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
40 6B would not block access to natural gas wells, cause any wells to be abandoned, or reduce  
41 production. Accordingly, this impact would be less than significant. No mitigation is required.



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

37 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate  
 38 resources because operation involves moving water through the conveyance infrastructure and no  
 39 aggregate resources are required for operations. A small amount of aggregate material would be  
 40 used for maintenance of Alternative 6B. The small amount of aggregate used for maintenance would  
 41 not substantially deplete permitted aggregate resources in the six aggregate production study areas  
 42 (Table 26-1) or new resource areas currently in the permitting and development stage (Section  
 43 26.1.2.1, *Aggregate Resources*) in the region surrounding the study area. Operation and maintenance

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

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

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

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

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

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

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

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

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

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

### 4 **26.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and** 5 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

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

#### 9 **Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of** 10 **Constructing the Water Conveyance Facilities**

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

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

#### 26 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 27 **of Constructing the Water Conveyance Facilities**

28 **NEPA Effects:** The conveyance facilities associated with Alternative 6C are the same as those under  
 29 Alternative 1C. Therefore, the effect on natural gas fields would be the same. Construction of  
 30 Alternative 6C conveyance facilities would permanently reduce the land surface available for  
 31 vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas  
 32 field area underlying the Alternative 6C permanent construction footprint is small (approximately  
 33 5% of the natural gas fields intersected) relative to the areal extent of natural gas field areas (Table  
 34 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse  
 35 because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and  
 36 standard directional drilling techniques could enable access to gas fields from a distance. Therefore,  
 37 there would be no long-term substantial loss of extraction capability from construction of  
 38 Alternative 6C and there would be no adverse effect.

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

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

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

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

16 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
17 6C would not block access to natural gas wells, cause any wells to be abandoned, or  
18 reduce production. Accordingly there would be no impact. No mitigation is required.

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

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

28 **CEQA Conclusion:** Operation and maintenance of the water conveyance facilities under Alternative  
29 6C would have no impact on access to underlying natural gas fields because operation primarily  
30 involves movement of water in infrastructure constructed under this alternative. Maintenance  
31 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.  
32 Operation and maintenance activities would not obstruct access to natural gas fields and would not  
33 interfere with recovering the resource. No mitigation is required.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

### 11 **Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation** 12 **and Maintenance of the Water Conveyance Facilities**

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

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

### 33 **Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 34 **MRZs) as a Result of Implementing Conservation Measures 2-22**

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

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

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

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

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

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

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

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

32 **26.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**  
 33 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;**  
 34 **Operational Scenario E)**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

10 *NEPA Effects:* The demand for aggregate resources associated with Alternative 7 would be similar to  
11 those under Alternative 1A except for small reductions because of the reduced number of intakes  
12 and their associated pumping plants and piping. The amount of aggregate needed for construction  
13 would be approximately 13,258,000 tons, or approximately 5% of the combined permitted  
14 aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of  
15 Alternative 1A, demand for aggregate resources over the 9-year construction period under  
16 Alternative 7 would not require a substantial depletion of aggregate available to meet the regional  
17 50-year demand, and would not substantially contribute to the need for new aggregate resource  
18 development. Therefore, this effect would not be adverse.

19 The amount of borrow material needed to construct Alternative 7 is expected to be slightly smaller  
20 than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there  
21 would be no effect on the availability of mineral resources associated with its use.

22 *CEQA Conclusion:* The use of large amounts of construction-grade aggregate (estimated to be  
23 equivalent to approximately 5% of the permitted aggregate from Sacramento County and the  
24 Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial  
25 depletion (loss of availability) of construction-grade aggregate within the six regional aggregate  
26 production study areas within the study area (Table 26-1), would not cause remaining supplies to  
27 be inadequate for future development, and would not contribute to the need for the development of  
28 new aggregate resources. Consequently, although a substantial amount of available aggregate  
29 material may be used under Alternative 7, the impact would be less than significant. No mitigation is  
30 required.

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

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

36 *NEPA Effects:* The operational components of the water conveyance facilities under Alternative 7  
37 would include moving water both within infrastructure that would be constructed and natural  
38 channels. These operations would not cover or block access to existing mines or identified MRZs  
39 because there are no aggregate mines or MRZs in the area where the alternative would operate.  
40 Similarly, maintenance activities during the operational life of the facilities would not affect existing  
41 mines or identified MRZs. Additionally, operations and maintenance would not increase the existing  
42 project footprint so they could not have any effect even if aggregate mines or MRZs did exist.

1 Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 7  
2 would not have effects on the availability of aggregate resource sites.

3 **CEQA Conclusion:** The operation and maintenance of Alternative 7 would have no impacts on the  
4 availability of locally important aggregate resource sites because none exist within the areas  
5 affected by Alternative 7 operations, and maintenance; and operations and maintenance would not  
6 increase the alternative's footprint. No mitigation is required.

### 7 **Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation** 8 **and Maintenance of the Water Conveyance Facilities**

9 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 3 would include  
10 moving water, both within infrastructure that would be constructed and natural channels. No  
11 aggregate resources are required for operations so there would be no effect. The only use of  
12 aggregate resources would be small amounts of aggregate and riprap required for maintenance of  
13 levees, stream banks, access roads, and structure foundations. These small amounts could be readily  
14 supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and  
15 development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of  
16 aggregate or the supply available for future development. Accordingly, operation and the use of a  
17 small amount of aggregate material for the maintenance of the water conveyance facilities under  
18 Alternative 7 would not have an adverse effect.

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

### 29 **Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 30 **MRZs) as a Result of Implementing Conservation Measures 2-22**

31 **NEPA Effects:** Conservation actions beyond CM1 would be the same for Alternative 7 as they would  
32 be for Alternative 1A, except Alternative 7 would have twice as much channel margin restoration  
33 and seasonally inundated floodplain. Consequently, the effects of these conservation measures  
34 would be similar to those described for Alternative 1A. Table 26-8 lists two active mines in the ROAs  
35 and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be  
36 inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the  
37 West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse  
38 effect. Mitigation Measure MIN-11 is available to reduce this effect.

39 **CEQA Conclusion:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano  
40 County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not  
41 be affected by inundation associated with the conservation measures. An active mine on Decker  
42 Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation  
43 and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a

1 significant impact because it would eliminate the potential to recover aggregate resources.  
 2 Mitigation Measure MIN-11 is designed to reduce this impact to less than significant.

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

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

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

8 *NEPA Effects:* The conservation measures under Alternative 7 would be the same as those under  
 9 Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and  
 10 seasonally inundated floodplain. Consequently, the impacts would be similar to those described for  
 11 Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock  
 12 revetment construction and for erosion control and stability at levee breaches and toe drain  
 13 earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time  
 14 because of the programmatic nature and general design of the conservation measures. However, the  
 15 amount needed would be expected to be within the capacity of available resources of the study area  
 16 or adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and  
 17 identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate  
 18 supplies substantial enough to cause remaining supplies to be inadequate for future development or  
 19 to require development of new aggregate sources to meet future demand. Therefore, the use of  
 20 available aggregate material for the conservation measures of Alternative 7 would not have an  
 21 adverse effect.

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

30 **26.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**  
 31 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**  
 32 **Scenario F**

33 Alternative 8 is the same as Alternative 1A except for changes in the number of intake locations in  
 34 the north Delta and related changes in water movement through the Delta. While Alternative 1A  
 35 would use Intakes 1–5, Alternative 8 would use Intakes 2, 3, and 5. Alternative 8 would have a  
 36 different operational scenario than Alternative 1A, but this difference would not materially affect the  
 37 use or availability of mineral resources.

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

40 *NEPA Effects:* The conveyance facilities associated with Alternative 8 are the same as those under  
 41 Alternative 1A except that two fewer intakes would be constructed. The decreased construction



1 footprint associated with building intakes for Alternative 8 would not change the effect on natural  
2 gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by  
3 Alternative 8 construction (Sacramento and San Joaquin) represent a very minor percentage of  
4 those counties' average annual natural gas production. In the construction footprint, affected wells  
5 produce about 1% of the total annual natural gas production in Sacramento County. Because the  
6 relatively few (six) producing wells within the construction footprint account for only a small  
7 percentage of county annual production, the loss would not represent a substantial portion of the  
8 county's existing production. Accordingly, Alternative 8 would have no adverse effect on natural gas  
9 wells.

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

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

#### 19 **Impact MIN-2: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result** 20 **of Constructing the Water Conveyance Facilities**

21 **NEPA Effects:** Because the three intakes and associated facilities that would be constructed for  
22 Alternative 8 do not overlie known natural gas fields, the effect on potential extraction from natural  
23 gas fields would be the same as under Alternative 1A. The proportion of natural gas field area  
24 underlying the Alternative 8 permanent construction footprint is small (approximately 3% of the  
25 natural gas fields intersected) relative to the areal extent of natural gas field areas (Table 26-4). The  
26 reduction in unimproved land surfaces directly overlying gas fields would not be adverse because  
27 most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard  
28 directional drilling techniques could enable access to gas fields from a distance. Consequently,  
29 Alternative 8 would have no long-term adverse effect on the extraction potential from natural gas  
30 fields.

31 Alternative 8 temporary work areas also overlie natural gas fields. Any temporary reduction in  
32 ability to extract natural gas during construction of conveyance facilities is considered minor  
33 because the effect on natural gas extraction in Sacramento County would be small and temporary,  
34 and the presence of work areas would not prevent recovery of the resource. There would be no  
35 adverse effect.

36 **CEQA Conclusion:** Although the Alternative 8 conveyance facilities would reduce the land surface  
37 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas  
38 fields affected would be small (less than approximately 3% of the areal extent of natural gas field  
39 areas intersected). Additionally, there would be no substantial loss of existing production or  
40 permanent loss of access to the resource because the gas fields would continue to be accessible  
41 using conventional or directional drilling techniques. Accordingly, this impact would be less than  
42 significant. No mitigation is required.

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

3 **NEPA Effects:** As described under Alternative 1A, the operation of the water conveyance facilities  
4 under Alternative 8 is primarily associated with movement of water within infrastructure and  
5 maintenance of water conveyance facilities. These operations would not cause additional effects on  
6 natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of  
7 the water conveyance facilities would include routine activities (described under Alternative 1A)  
8 that would not affect natural gas wells or resource recovery. Therefore, the operation and  
9 maintenance associated with the water conveyance facilities under Alternative 8 would not have  
10 additional effects on access to or use of existing active wells, or accessing plugged inactive wells.  
11 Operation and maintenance would not result in permanent covering or blockage of any natural gas  
12 wells and no natural gas wells would be eliminated as a result of operation and maintenance.  
13 Accordingly, there would be no effect.

14 **CEQA Conclusion:** The operation and maintenance of the water conveyance facilities under  
15 Alternative 8 would have no impact on access to natural gas wells, either for operating and  
16 maintaining existing active wells, or modifying plugged inactive wells, because operation and  
17 routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce  
18 production. No mitigation is required.

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

21 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 8 would primarily  
22 involve movement of water in infrastructure constructed under this alternative. These water  
23 conveyance operations would not cause additional effects beyond those already addressed for water  
24 facilities construction. Similarly, maintenance activities would not affect natural gas fields and  
25 therefore would not cause effects that have not already been addressed related to construction of  
26 water conveyance facilities. Operation and maintenance activities associated with the water  
27 conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas.  
28 Accordingly, the operation and maintenance of Alternative 8 would not have an adverse effect on  
29 production or on access to (availability of) underlying natural gas fields.

30 **CEQA Conclusion:** The operation and maintenance of the water conveyance facilities under  
31 Alternative 8 would have no impact on availability of natural gas fields because operations primarily  
32 involve movement of water in infrastructure constructed under this alternative and would not  
33 interfere with recovering the resource. Routine maintenance would not obstruct access to natural  
34 gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

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

37 **NEPA Effects:** The conservation measures that would be implemented under Alternative 8 would be  
38 the same as those under Alternative 1A. While inundation for permanent wetland creation under  
39 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly  
40 affected would vary, depending on the specific lands inundated by these three conservation  
41 measures. In permanently flooded areas, the active wells could be replaced using conventional or  
42 directional drilling techniques at a location outside the inundation zone to maintain production. The  
43 likelihood of this replacement would depend on the availability of land for lease and the cost of the

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

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

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

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

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

15 **NEPA Effects:** The conservation measures that would be implemented under Alternative 8 would be  
 16 the same as those under Alternative 1A. Consequently, the impacts would also be the same as those  
 17 described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access  
 18 to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the  
 19 region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields  
 20 because the resource may be permanently covered (inundated) or otherwise become inaccessible to  
 21 recovery. Mitigation Measure MIN-6 is available to lessen this effect.

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

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

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

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

3 *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate  
 4 mines) and no identified MRZs in the Alternative 8 construction footprint of the water conveyance  
 5 facilities, there would be no effect on the availability of aggregate resources.

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

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

10 *NEPA Effects:* The demand for aggregate resources associated with Alternative 8 would be similar to  
 11 those under Alternative 1A except for small reductions because of the reduced number of intakes  
 12 and their associated pumping plants and piping. The amount of aggregate needed for construction  
 13 would be approximately 13,258,000 tons, or approximately 5% of the combined permitted  
 14 aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of  
 15 Alternative 1A, because there would not be a substantial depletion of aggregate available to meet the  
 16 regional 50-year demand, and Alternative 8 would not substantially contribute to the need for new  
 17 aggregate resource development, there would not be an adverse effect on the availability of known  
 18 aggregate resources over the 9-year construction period.

19 The amount of borrow material needed to construct Alternative 8 is expected to be slightly smaller  
 20 than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there  
 21 would be no effect on the availability of mineral resources associated with its use.

22 *CEQA Conclusion:* The use of large amounts of construction-grade aggregate (estimated to be  
 23 equivalent to approximately 5% of the permitted aggregate from Sacramento County and the  
 24 Stockton-Lodi P-C Region) over a 9-year construction period would not result in a substantial  
 25 depletion (loss of availability) of construction-grade aggregate within the six regional aggregate  
 26 production study areas in the study area, would not cause remaining supplies to be inadequate for  
 27 future development, and would not substantially contribute to the need for the development of new  
 28 aggregate resources. Consequently, although a substantial amount of available aggregate material  
 29 may be used under Alternative 8, the impact would be less than significant. No mitigation is  
 30 required.

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

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

36 *NEPA Effects:* The operation of the water conveyance facilities under Alternative 8 would include  
 37 moving water both within infrastructure that would be constructed and natural channels. These  
 38 operations would not cover or block access to existing mines or identified MRZs because there are  
 39 no aggregate mines or MRZs in the area where the alternative would operate. Similarly,  
 40 maintenance activities during the operational life of the facilities would not affect existing mines or  
 41 identified MRZs. Additionally, operations and maintenance would not increase the existing project  
 42 footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly,

1 the operation and maintenance of the water conveyance facilities under Alternative 8 would not  
2 have effects on the availability of aggregate resource sites.

3 **CEQA Conclusion:** The operation and maintenance of Alternative 8 would have no impacts on the  
4 availability of locally important aggregate resource sites because none exist within the areas  
5 affected by Alternative 8 operation and maintenance; and operations and maintenance would not  
6 increase the alternative's footprint. No mitigation is required.

### 7 **Impact MIN-10: Loss of Availability of Known Aggregate Resources as a Result of Operation** 8 **and Maintenance of the Water Conveyance Facilities**

9 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 8 would include  
10 moving water, both within infrastructure that would be constructed and natural channels. No  
11 aggregate resources are required for operations so there would be no effect. The only use of  
12 aggregate resources would be small amounts of aggregate and riprap required for maintenance of  
13 levees, stream banks, access roads, and structure foundations. These small amounts could be readily  
14 supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and  
15 development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of  
16 aggregate or the supply available for future development. Accordingly, operation and the use of a  
17 small amount of aggregate material for the maintenance of the water conveyance facilities under  
18 Alternative 8 would not have an adverse effect.

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

### 30 **Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and** 31 **MRZs) as a Result of Implementing Conservation Measures 2-22**

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

39 **CEQA Conclusion:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano  
40 County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not  
41 be affected by inundation associated with the conservation measures. An active mine on Decker  
42 Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation  
43 and loss of the Decker Island aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) would be a

1 significant impact because it would eliminate the potential to recover aggregate resources.  
 2 Mitigation Measure MIN-11 is designed to reduce this impact to a less-than-significant level.

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

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

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

8 **NEPA Effects:** The conservation measures under Alternative 8 would be the same as those under  
 9 Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A.  
 10 Small amounts of aggregate would be used for levee, access road, and rock revetment construction  
 11 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of  
 12 aggregate necessary for these activities cannot be calculated at this time because of the  
 13 programmatic nature and general design of the conservation measures. However, the amount  
 14 needed would be expected to be within the capacity of available resources the Planning Area or  
 15 adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and  
 16 identified within Table 26-1. There would be no depletion (loss of availability) of regional aggregate  
 17 supplies substantial enough to cause remaining supplies to be inadequate for future development or  
 18 to require development of new aggregate sources to meet future demand. Therefore, the use of  
 19 available aggregate material for the conservation measures of Alternative 8 would not have an  
 20 adverse effect.

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

29 **26.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**  
 30 **Operational Scenario G)**

31 Alternative 9 entails water transfer through existing Delta channels with certain channel  
 32 modifications. There would be two screened fish intakes at the Delta Cross Canal and Georgiana  
 33 Slough. Water would generally flow through existing channels except that two new canal segments  
 34 would be constructed and dredging would occur in certain existing channels.

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

37 **NEPA Effects:** This alternative primarily involves moving water through existing Delta channels  
 38 with a minimal physical construction footprint (Figure 26-2). Because there are no producing  
 39 natural gas wells within the permanent construction footprint, there would be no effect on gas  
 40 production or the availability of natural gas wells.

1 **CEQA Conclusion:** This alternative primarily involves moving water through the existing Delta  
2 channels with a minimal physical construction footprint. Because there are no producing natural gas  
3 wells within the permanent construction footprint, there would be no impact on gas production or  
4 the availability of natural gas wells. No mitigation is required.

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

7 **NEPA Effects:** This alternative primarily involves moving water through the existing Delta channels  
8 with a minimal physical construction footprint. The construction activity would not limit access to  
9 natural gas fields in the study area (Figure 26-2). Less than 1% of natural gas fields intersected  
10 would be affected by the construction footprint. The reduction in unimproved land surfaces directly  
11 overlying gas fields would not have an adverse effect because most of the affected fields could be  
12 accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques  
13 could enable access to gas fields from a distance. Because there would be no covering or blockage of  
14 access, Alternative 9 would have no long-term adverse effect on the extraction potential from  
15 natural gas fields.

16 **CEQA Conclusion:** This alternative primarily involves moving water through the existing Delta  
17 channels with a minimal physical construction footprint. Because less than 1% of natural gas fields  
18 intersected would be affected by the construction footprint, and there would be no permanent  
19 blockage of access to natural gas fields, there would be no impact on the availability of extraction  
20 potential from natural gas fields. No mitigation is required.

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

23 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 9 involves  
24 management of flows through the Delta channels. Periodic routine maintenance would include  
25 activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of  
26 erosion protection on the levees and embankments of water conveyance facilities within the study  
27 area. Because these activities would not encroach on important natural gas wells, there would be no  
28 effect on natural gas production.

29 **CEQA Conclusion:** Because the operation and maintenance of the water conveyance facilities under  
30 Alternative 9 would not encroach on natural gas wells, they would have no impact on natural gas  
31 production. No mitigation is required.

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

34 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 9 involves  
35 management of flows through the Delta channels. Periodic routine maintenance would include  
36 activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of  
37 erosion protection on the levees and embankments. Because these activities would not encroach on  
38 natural gas fields, there would be no effect on the potential for natural gas recovery.

39 **CEQA Conclusion:** Because the operation and maintenance of the water conveyance facilities under  
40 Alternative 9 would not encroach on natural gas fields, they would have no impact on the potential  
41 for natural gas recovery. No mitigation is required.

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

3 **NEPA Effects:** The conservation measures that would be implemented under Alternative 9 would be  
 4 the same as those under Alternative 1A. While inundation for permanent wetland creation under  
 5 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly  
 6 affected would vary, depending on the specific lands inundated by these three conservation  
 7 measures. In permanently flooded areas, the active wells could be replaced using conventional or  
 8 directional drilling techniques at a location outside the inundation zone to maintain production. The  
 9 likelihood of this replacement would depend on the availability of land for lease and the cost of the  
 10 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there  
 11 could be a locally adverse effect related to permanent elimination of a substantial portion of a  
 12 county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

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

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

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

24 **NEPA Effects:** The conservation measures that would be implemented under Alternative 9 would be  
 25 the same as those under Alternative 1A. Consequently, the impacts would also be the same as those  
 26 described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access  
 27 to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the  
 28 region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields  
 29 because the resource may be permanently covered (inundated) or otherwise become inaccessible to  
 30 recovery. Mitigation Measure MIN-6 is available to lessen this effect.

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



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

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

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

6           **NEPA Effects:** Because there are no permitted resource extraction mines (including aggregate  
 7           mines) and no identified MRZs in the Alternative 9 footprint, there would be no effect on the  
 8           availability of aggregate resources.

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

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

13          **NEPA Effects:** Alternative 9 would have a smaller demand for aggregate resources than alternatives  
 14          with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). Alternative 9 would  
 15          use aggregate for two short canal segments and several small components such as various operable  
 16          barriers, two pumping plants, and a boat lock and channel. The estimated amount of aggregate  
 17          needed for construction is approximately 5,470,000 tons—about 60% less than under Alternative  
 18          1A. This amount is about 13% of the Sacramento County permitted aggregate and somewhat more  
 19          than 2% of the Stockton-Lodi P-C Region permitted aggregate. It is about 2% of the combined  
 20          permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region. This amount of  
 21          aggregate could be supplied from local sources within the counties that surround the Delta (Table  
 22          26-1). Because the amount of aggregate material used under Alternative 9 would not result in a  
 23          substantial depletion (loss of availability) of aggregate resources needed for future development or  
 24          require new aggregate development, it would not constitute an adverse effect.

25          Alternative 9 would only require small amounts of borrow. Because there is limited excavation  
 26          associated with this alternative, most of the borrow material would be developed from borrow pits  
 27          adjacent to construction areas, from nearby suitable locations, and from some commercial sites. The  
 28          use of this amount of borrow (estimated at 4,000,000 tons) would not have an adverse effect  
 29          because borrow is not considered a mineral resource in California. It is usually extracted locally and  
 30          regionally on an as-needed basis.

31          **CEQA Conclusion:** Alternative 9 would have a small demand for aggregate resources compared to  
 32          alternatives with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). The  
 33          estimated amount of aggregate needed for construction is approximately 5,470,000 tons. The use of  
 34          moderate amounts of construction-grade aggregate (estimated to be equivalent to about 2% of the  
 35          combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over a 9-  
 36          year construction period would not result in a substantial depletion (loss of availability) of  
 37          construction-grade aggregate within the six regional aggregate production study areas surrounding  
 38          the study area (Table 26-1), would not cause remaining supplies to be inadequate for future  
 39          development, and would not contribute to the need for the development of new aggregate  
 40          resources. Consequently, the amount of aggregate material used under Alternative 9 would  
 41          constitute a less-than-significant impact on aggregate resources. No mitigation is required.

1 Alternative 9 would require small amounts of borrow. Borrow is not a defined mineral resource and  
2 is usually developed on an as-needed basis. Consequently, the amount of borrow required for this  
3 alternative would not be a significant impact. No mitigation is required.

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

6 **NEPA Effects:** Operation of the water conveyance facilities under Alternative 9 involves  
7 management of flows through the Delta channels. Adverse effects would only occur if operations  
8 prevented access to a locally important aggregate resource site; this is not expected to occur  
9 because there are no aggregate mines or MRZs in the area where the alternative would operate.  
10 Accordingly, operations would not cover or block access to existing mines or identified MRZs and  
11 there would be no effect. Similarly, routine maintenance activities such as cleaning, structure repair,  
12 landscape maintenance, road work, and periodic replacement of erosion protection on the levees  
13 and embankments would not cover or block access to existing mines or identified MRZs because  
14 there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally,  
15 operations and maintenance would not increase the existing project footprint so they could not have  
16 any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of  
17 the water conveyance facilities under Alternative 9 would not have effects on the availability of  
18 aggregate resource sites.

19 **CEQA Conclusion:** The operation and maintenance associated with Alternative 9 would not have an  
20 impact on the availability of locally important aggregate resource sites because none exist within the  
21 areas affected by Alternative 9 operations and operations and maintenance would not increase the  
22 alternative's footprint. No mitigation is required.

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

25 **NEPA Effects:** Operation of the water conveyance facilities under Alternative 9 involves  
26 management of flows through the Delta channels. No aggregate resources are required for  
27 operations so there would be no effect. The only use of aggregate resources associated with  
28 maintenance of the water conveyance facilities would be small amounts of aggregate and riprap  
29 required for maintenance of levees, stream banks, access roads, and structure foundations. These  
30 small amounts could be readily supplied by quarries in the region without affecting the overall  
31 availability of aggregate. Consequently, operation and the use of the small amount of aggregate  
32 material for the maintenance of the water conveyance facilities under Alternative 9 would not have  
33 an adverse effect.

34 **CEQA Conclusion:** No aggregate resources are required for operation of Alternative 9, so there  
35 would be no impact. A small amount of aggregate material would be used for maintenance of levees,  
36 stream banks, access roads, and structure foundations. The small amount of aggregate used for  
37 operational components would not substantially deplete permitted aggregate resources in the six  
38 aggregate study areas surrounding the study area and accordingly, would represent a less-than-  
39 significant reduction in the availability of aggregate resources. No mitigation is required.

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

3 **NEPA Effects:** Conservation actions beyond CM1 would be the same for Alternative 9 as they would  
 4 be for Alternative 1A. Consequently, the effects of these conservation measures would be the same  
 5 as described for Alternative 1A. Table 26-8 shows that there are two active mines in the ROAs and  
 6 there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated.  
 7 The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta  
 8 ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect.  
 9 Mitigation Measure MIN-11 is available to reduce this effect.

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

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

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

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

22 **NEPA Effects:** The conservation measures under Alternative 9 would be the same as those under  
 23 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A.  
 24 Small amounts of aggregate would be used for levee, access road, and rock revetment construction  
 25 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of  
 26 aggregate necessary for these activities cannot be calculated at this time because of the  
 27 programmatic nature and general design of the conservation measures. However, the amount  
 28 needed would be expected to be within the available resources of the study area or adjacent  
 29 aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in  
 30 Table 26-1. There would be no depletion of regional aggregate supplies substantial enough to cause  
 31 remaining supplies to be inadequate for future development or to require development of new  
 32 aggregate sources to meet future demand. Accordingly, the use of available aggregate material for  
 33 the conservation measures of Alternative 9 would not have an adverse effect.

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

### 1 26.3.3.17 Cumulative Analysis

2 The cumulative effects analysis for mineral resources addresses the potential for the BDCP  
 3 alternatives to act in combination with other past, present, and probable future projects or  
 4 programs to create a cumulatively significant impact on natural gas and aggregate resources.  
 5 Implementation of the BDCP and other local and regional projects as presented in Table 26-3, could  
 6 contribute to regional impacts and hazards associated with minerals. These programs and projects  
 7 have been drawn from a more substantial compilation of past, present, and reasonably foreseeable  
 8 programs and projects included in Appendix 3D, *Defining Existing Conditions, No Action Alternative,*  
 9 *No Project Alternative, and Cumulative Impact Conditions.* This analysis considers projects that could  
 10 affect mineral resources and, where relevant, on the same schedule as the project, resulting in a  
 11 cumulative impact.

12 **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.

1  
2 The geographic scope of the analysis for natural gas resources is the study area as defined in  
3 Chapter 1, *Introduction*, Section 1.5 (Figure 1-9). This geographic limit was established to coincide  
4 with the study area and to encompass the footprints of all construction and conservation-related  
5 ground-disturbing activity associated with the BDCP. The geographic scope of the aggregate  
6 cumulative analysis is centered on the counties and the designated aggregate resource production  
7 regions included in and adjacent to the study area (see Table 26-1). This geographic limit was  
8 established to coincide with the most likely sources of aggregate sought to support BDCP  
9 construction activities. It is unlikely, based on historic aggregate transportation patterns and costs,  
10 that a larger region within northern and central California would be drawn upon to supply  
11 aggregate resources to the BDCP and other Delta region projects. With the high cost of ground  
12 transportation, it is more likely that supplies from outside of the six local aggregate production  
13 study areas would arrive by boat and barge from the San Francisco Bay area (with sources outside  
14 of California) than from hard rock mines or large stream systems north of Sutter and Yuba Counties,  
15 east of Sacramento and Placer Counties, or south of San Joaquin County. If federal funding is  
16 provided to the project there might be restrictions on using aggregate from outside the country  
17 because of the Buy America Act (see Section 26.2.1.1).

## 1 **No Action Alternative**

2 The cumulative No Action Alternative scenario would include projects as listed in Table 26-9, and  
 3 would include projects that could have effects on natural gas resources and aggregate resources.  
 4 Generally, these other projects in the study area would have a minimal footprint and would not  
 5 require moving existing active natural gas wells. Even if certain plan actions block vertical access to  
 6 natural gas fields, directional drilling could provide access to these fields. A variety of smaller or  
 7 standard projects in the study area and the broader region will use aggregate resources. However,  
 8 projects in the cumulative No Action Alternative scenario are currently being supplied by the  
 9 permitted aggregate sources and similarly are within the available permitted regional aggregate  
 10 resource base (Table 26-1). Projects under the cumulative No Action Alternative scenario would  
 11 also have to undergo independent environmental analysis and would also be subject to existing  
 12 regulations over mineral resources which require identifying and conserving mineral resources.  
 13 Therefore, it is anticipated that there would be no adverse effect on mineral resources.

14 The Delta and vicinity are within a highly active seismic area, with a generally high potential for  
 15 major future earthquake events along nearby and/or regional faults, and with the probability for  
 16 such events increasing over time. Based on the location, extent and non-engineered nature of many  
 17 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these  
 18 structures during a major local seismic event is generally moderate to high. (See Appendix 3E,  
 19 *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies* for more detailed discussion.)  
 20 Reclaiming land or rebuilding levees after a catastrophic event due to climate change or a seismic  
 21 event would potentially obstruct access to natural gas wells during construction. In the instance of  
 22 levee failure causing flooding, inundation could also block access to natural gas wells. While similar  
 23 risks would occur under implementation of the action alternatives, these risks may be reduced by  
 24 BDCP-related levee improvements along with those projects identified for the purposes of flood  
 25 protection in Table 26-9.

## 26 **Impact MIN-13: Cumulative Loss of Natural Gas Production from Construction, Operation, and** 27 **Implementation of Conservation Measures 1–22 of Alternatives**

28 **NEPA Effects:** The elements of the BDCP alternatives that could contribute to a cumulative effect on  
 29 natural gas production are construction of the water conveyance facilities and implementation of  
 30 conservation measures that result in permanent flooding of study area lands. Construction activity  
 31 could displace between one and eleven active wells in the study area counties. The inundation  
 32 associated with CM4, CM5, and CM10 could displace up to 233 active wells in the counties that make  
 33 up the study area (Sacramento, Solano, Yolo, San Joaquin, Alameda, and Contra Costa). Although the  
 34 number of natural gas wells likely to be eliminated may be a small percentage of the total sites in the  
 35 study area, there is potential to affect a locally significant number of wells. Consequently, the  
 36 inundation losses are considered an adverse effect even with feasible mitigation.

37 A review of related projects in the study area indicates there are no large-scale construction projects  
 38 under consideration that are likely to displace active natural gas wells or reduce production or  
 39 access to natural gas resources. Because most of the construction projects—including DWR's Delta  
 40 Levees Flood Protection Program—have a minimal footprint, they would not require the  
 41 displacement or abandonment of active natural gas wells or block access to large areas with  
 42 underlying natural gas fields.

43 Various management plans being developed within the study area could have the potential to affect  
 44 active natural gas wells or to block access to underlying natural gas fields. These management plans

1 include the Lower Sherman Island Wildlife Area Land Management Plan (California Department of  
 2 Fish and Game) and the San Joaquin County Multi-Species Habitat Conservation and Open Space  
 3 Plan (San Joaquin Council of Governments). These plans could result in large acreages being  
 4 converted to habitat, including flooding for wetland habitat creation. These plans, however, do not  
 5 necessarily require removal of active natural gas wells. Also, habitat management and conservation  
 6 plans are prepared to provide mitigation procedures and identify conservation bank locations that  
 7 allow development to proceed. Even if some study area lands are modified such that direct vertical  
 8 access to natural gas fields is prevented, conventional or directional drilling from adjacent lands  
 9 could still provide access to some of these fields. Areas for habitat modification could also be  
 10 selected that do not require displacement of a substantial portion of active natural gas wells or  
 11 substantial loss of natural gas production. Consequently, the other projects are considered to have a  
 12 very minor effect on access to natural gas resources. However, because implementation of any of the  
 13 BDCP alternatives alone would cause adverse effects on natural gas wells or resources, the  
 14 incremental effects of the BDCP considered with the other regional projects would result in a  
 15 cumulative adverse effect. Mitigation Measures MIN-5 and MIN-6 would be available to reduce  
 16 BDCP-related effects.

17 **CEQA Conclusion:** The physical projects and programs under consideration in the study area would  
 18 have minimal to no impacts on natural gas resources. However, because implementation of any of  
 19 the BDCP alternatives alone would cause significant and unavoidable impacts on natural gas wells or  
 20 resources, implementing these projects in combination with any of BDCP Alternatives 1A through 9  
 21 would result in a significant cumulative impact and the incremental contribution to this impact of  
 22 any of BDCP Alternatives 1A through 9 would be cumulatively considerable. Implementation of  
 23 Mitigation Measures MIN-5 and MIN-6 would reduce the BDCP-related impact, but not to a less-  
 24 than-significant level. Because implementation of Mitigation Measure MIN-5 and MIN-6 cannot  
 25 assure that all or a substantial portion of a county's existing natural gas wells or fields will remain  
 26 accessible after implementation of BDCP action alternatives, this cumulative impact is significant  
 27 and unavoidable and the BDCP contribution is cumulatively considerable.

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

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

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

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

34 **Impact MIN-14: Cumulative Loss of Aggregate from Construction, Operation, and**  
 35 **Implementation of Conservation Measures 1-22 of Alternatives**

36 **NEPA Effects:** The elements of the action alternatives that could contribute to a cumulative effect on  
 37 aggregate resources include construction and maintenance of the water conveyance facilities;  
 38 implementation of conservation measures that result in permanent flooding of study area lands; and  
 39 maintenance of levees, berms, and structures constructed for conservation measures. The estimates  
 40 for aggregate use for construction activities range from 4,000,000 tons (Alternative 9) to 20,453,000  
 41 tons (Alternative 4) over the 9-year construction period. The areas of flooding associated with  
 42 conservation measures for all alternatives could inundate one existing mine, permanently blocking

1 access to the resource, and no identified MRZs. Mitigation Measure MIN-11 would address the effect  
2 on the inundated mine.

3 The cumulative effects analysis considered the range of projects in the study area and adjacent areas  
4 that might have effects on aggregate resources (Appendix 3D, *Defining Existing Conditions, the No*  
5 *Action/No Project Alternative, and Cumulative Impact Conditions*). A variety of smaller or standard  
6 projects in the study area and the broader region will use aggregate resources. These projects  
7 include highway and road improvement, housing development, levee improvements (e.g., the Delta  
8 Levees Flood Protection Program, the Sacramento Area Flood Control Agency Flood Management  
9 Program, 2012 Central Valley Flood Protection Plan [California Department of Water Resources  
10 2011]), and the Folsom Dam Safety and Flood Damage Reduction Project. As disclosed in the  
11 discussions of individual alternatives, the aggregate requirements of the BDCP alternatives would  
12 not have any adverse effects on the availability of aggregate resources. As discussed in Section 26.1  
13 and shown in Table 26-1, many areas in the study area, the broader region, and statewide only have  
14 small percentages of permitted aggregate resources available compared to the projected 50-year  
15 aggregate demand (Kohler 2006). However, projects of the scale described above are within the  
16 available permitted regional aggregate resource base listed in Table 26-1. Additionally, as described  
17 in Section 26.1.2.1 *Aggregate Resources*, new aggregate resources are being permitted and are not  
18 accounted for in Kohler (2006). Also, there is unused capacity because of the reduction in demand  
19 caused by the recession. Considering the level of permitted and available local and regional supplies,  
20 the ongoing aggregate needs, the added availability of materials from new permitted resources, and  
21 the additional aggregate demand from other projects in the region, none of the alternatives would  
22 be expected to substantially contribute to a cumulative effect on aggregate resources.

23 However, if larger projects with large, short-term aggregate requirements move forward on a  
24 schedule similar to the BDCP (particularly, any of Alternatives 1A through 8), there is potential to  
25 generate sufficient aggregate demand over the next decade so as to cause a cumulative effect on the  
26 availability of aggregate resources. As pointed out in the Delta Stewardship Council Draft Delta Plan  
27 EIR (Delta Stewardship Council 2011), the more or less simultaneous development of large projects  
28 with large aggregate demands has the potential to use a sufficient amount of the resource to reduce  
29 the amount available for future development. This cumulative effect would be more likely and more  
30 severe as the California economy recovers from the current downturn over the next several years.  
31 Given the large amount of aggregate needed for construction of the proposed conveyance facilities,  
32 the incremental contribution of a selected BDCP alternative to this cumulatively significant impact  
33 would be considered cumulatively considerable and adverse. Mitigation Measures MIN-11, MIN-13,  
34 and MIN-14 are available to address this cumulative effect.

35 **CEQA Conclusion:** A variety of smaller or standard projects in the study area and the broader Delta  
36 region—e.g., highway and road improvement, housing development, levee improvements, and the  
37 Folsom Dam Safety and Flood Damage Reduction Project—will use aggregate resources. Projects of  
38 this scale, including the BDCP alternatives, are within the available permitted aggregate resource  
39 base. While the aggregate requirements of any selected BDCP alternative would not have a project-  
40 specific significant impact on the availability of aggregate resources, many areas in the study area  
41 and the broader aggregate production region only have small percentages of permitted aggregate  
42 resources available compared with the projected 50-year aggregate demand (Kohler 2006). Taken  
43 together, ongoing aggregate needs, the additional aggregate demand from constructing a BDCP  
44 alternative, and other regional projects, considered with the added availability of materials from  
45 new resource sites, would not substantially contribute to a cumulative impact on aggregate  
46 resources.



1 However, if larger projects with large, short-term aggregate requirements move forward on a  
2 schedule similar to that of any of BDCP Alternatives 1A through 8, there is potential to generate  
3 sufficient aggregate demand over the next decade to cause a cumulative impact sufficient to reduce  
4 the availability of aggregate resources for future development. The likelihood and severity of this  
5 cumulative impact would increase as California's economy recovers from the current downturn over  
6 the next several years.

7 Implementing these projects in combination with any of BDCP Alternatives 1A through 8 would  
8 result in the loss of availability of locally or regionally important aggregate resource that would  
9 cause remaining supplies to be inadequate for future development. This would constitute a  
10 significant cumulative impact and the incremental contribution to this impact of any of BDCP  
11 Alternatives 1A through 8 would be cumulatively considerable. Implementation of Mitigation  
12 Measures MIN-11, MIN-13, and MIN-14 would reduce the severity of the BDCP contribution to this  
13 cumulative impact by reducing the need to use local sources of aggregate and by participating in  
14 processes to develop additional resources. Because these measures cannot assure the ongoing  
15 availability of aggregate resources for future development, this cumulative impact would be  
16 significant and unavoidable and the BDCP contribution to this impact would remain cumulatively  
17 considerable.

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

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

21 **Mitigation Measure MIN-13: Recycle BDCP-Derived Materials and Use Recycled Materials**  
22 **to the Extent Practicable During Construction**

23 During final project design and construction, the BDCP proponents will recycle or reuse  
24 materials from excavation or removal of existing features (e.g., excavated sand and gravel;  
25 riprap and aggregate in existing roads and levees) to the extent feasible in light of costs,  
26 logistics, and technological considerations, including the quality of the excavated or removed  
27 sand, gravel, and reusable aggregate. Also, the BDCP proponents will use commercially available  
28 recycled materials for project components when practicable, considering costs, technological  
29 considerations, quality and availability of recycled materials, and other considerations. The use  
30 of recycled material will reduce the impact by reducing the need to use local sources of  
31 aggregate.

32 **Mitigation Measure MIN-14: BDCP Proponents Will Participate in the Local and Regional**  
33 **Aggregate Evaluation and Permitting Process**

34 BDCP proponents will participate in the local and regional dialog that evaluates the  
35 development of new MRZ-2 lands and the permitting of new aggregate and quarry resources.  
36 BDCP proponents will participate in the public and agency involvement process to inform the  
37 public and local, regional, and state permitting agencies about BDCP aggregate requirements  
38 and the need to prevent cumulative impacts on aggregate resources that might cause remaining  
39 supplies to be inadequate for future development. Participation in these public processes will  
40 reduce the impact on aggregate because it will coordinate and integrate BDCP resource needs  
41 into land use decisions being made by other agencies as part of established mineral resource

1 management policies, and will contribute to the potential that these needed resources would be  
2 developed.

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