3 26.0 Summary Comparison of Alternatives

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A summary comparison of a number of important mineral resource impacts is provided in Figure
26-0. This figure provides information on the magnitude of the most pertinent and quantifiable
impact on mineral resources that is expected to result from all alternatives. This impact to consider
is the loss of availability of extraction potential from natural gas fields as a result of constructing the
water conveyance facilities.

As depicted in Figure 26-0, construction of the water conveyance facilities would reduce availability
of extraction potential from natural gas fields in the Plan Area. Each alternative, with the exception
of the No Action Alternative, would result in such a reduction. Of the action alternatives, Alternatives
18, 2B, and 6B would have the greatest impact on natural gas fields by eliminating access to 924
acres. Alternative 9 would have the smallest impact on natural gas fields by reducing access by only
32 acres. Alternatives 4, 4A, 2D, and 5A would result in the loss of access to 352 acres of natural gas
fields.

16 Table ES-8 in the Executive Summary provides a summary of all impacts disclosed in this chapter.

17 26.1 Environmental Setting/Affected Environment

18 This section describes existing mineral resources (natural gas and aggregate resources) within the 19 mineral resources study area that could be affected by construction and operation of the action 20 alternatives. The study area (the area in which impacts may occur) for natural gas resources 21 includes the Plan Area (the area covered by the BDCP) and Areas of Additional Analysis (see Chapter 22 3, *Description of Alternatives*, Section 3.3.1) because the potential to affect natural gas production 23 does not extend beyond the water conveyance construction and restoration implementation areas. 24 The study area for aggregate resources includes the Plan Area, the six aggregate production study 25 areas listed in Table 26-1, as well as the Areas of Additional Analysis, because aggregate may be 26 purchased within this broader region. The information in this chapter has been extracted from 27 publications by the California Department of Conservation (DOC); California Geological Survey (CGS) 28 (formerly the California Division of Mines and Geology); the DOC Division of Oil, Gas, and 29 Geothermal Resources (DOGGR); United States Geological Survey (USGS); and the general plans for 30 counties that have land within the study area that could be affected by the alternatives. Certain 31 topics discussed in this section are related to topics discussed in other sections of this 32 Environmental Impact Report/Environmental Impact Statement (EIR/EIS). Chapter 24, Hazards and 33 Hazardous Materials, Impact HAZ-1, discusses the potential health risks of relocating or capping 34 natural gas wells that are within the proposed construction footprint of alternatives. This section 35 does not describe the mineral resource setting or potential alternative effects upstream of the Plan 36 Area (the Upstream of the Delta Region) or within the State Water Project (SWP) and Central Valley 37 Project (CVP) Export Service Areas (Export Service Areas). Action alternative effects in the Export 38 Service Areas are addressed in Chapter 30, Growth Inducement and Other Indirect Effects, and 39 changes in operation of upstream reservoirs are not expected to affect mineral resources.

26.1.1 Potential Environmental Effects Area

2 The study area evaluated for potential effects on mineral resources is primarily the Plan Area and 3 Areas of Additional Analysis, as defined in Chapter 1, Introduction, Section 1.5, comprising portions 4 of the counties containing the statutory Delta, Suisun Marsh, and Yolo Bypass: Yolo, Solano, Contra 5 Costa, San Joaquin, Sacramento, and Alameda (Figure 1-9 in Chapter 1). Because the Delta region 6 proper produces almost no aggregate and contains no Mineral Resource Zones (MRZs), the study 7 area includes all land within the six aggregate production areas listed in Table 26-1 where aggregate 8 is produced and that contain MRZs (Section 26.1.2.1, Aggregate Resources). For effects on aggregate 9 resource demand, the broader region that is a potential source of aggregate resources for 10 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. 11 12 Transmission lines in these areas of additional analysis are not expected to have any effects on 13 natural gas wells, natural gas fields, natural gas distribution pipelines, or aggregate resources, 14 because if any of these resource features occurred in these transmission line alignment areas, they 15 could easily be avoided or accommodated (see Section 26.3.1.1, Construction and Footprint Effects), 16 such that there would be no interference with accessing them. Accordingly, impacts related to these 17 resources as a result of constructing or operating and maintaining these proposed transmission 18 corridors are not discussed further.

19 26.1.2 Existing Mineral Resources in the Study Area

20 In 2007, California ranked third in the nation for non-fuel mineral production, with a market value 21 of \$4.3 billion for approximately 30 industrial minerals (Kohler 2007). California ranks number one 22 in the nation in the production of sand and gravel, Portland cement, diatomite, and natural sodium 23 sulfate; it ranks second in the nation for masonry cement. California was the country's only producer 24 of boron and rare earth metals in 2007. Other minerals produced include gold and silver, common 25 clay, bentonite clay (including hectorite), crushed stone, dimension stone, feldspar, fuller's earth, 26 gemstones, gypsum, iron ore (used in cement manufacture), kaolin clay, lime, magnesium 27 compounds, perlite, pumice, pumicite, salt, soda ash, and zeolites. In 2007, there were about 660 28 active mines producing non-fuel minerals, employing about 10,000 people. California's leading 29 industrial mineral is construction sand and gravel, with an estimated total value of \$1.37 billion for 30 143.3 million tons produced in 2007 (Kohler 2007). Active mineral commodity producers in the 31 study area are shown in Figure 26-1.

32 Mineral resources in the state are identified and classified by CGS, which implements the state's 33 Mineral Land Classification Project in compliance with the Surface Mining and Reclamation Act 34 (SMARA). The State Mining and Geology Board (SMGB) prioritizes areas for classification and 35 designation through this program. CGS identifies and maps the lands containing significant mineral 36 deposits, and classifies the areas into MRZs based on their mineral resource potential. Classification 37 is based on geologic and economic factors without regard to existing land use or land ownership; 38 mineral resource significance is based on whether the land is actively mined under a valid permit or 39 meets established criteria of marketability and threshold value. Because aggregate is California's 40 most important mineral resource, it was the first commodity in the state to be classified by CGS into 41 MRZs. Four MRZ primary categories are used in classifying mineral resources (California 42 Department of Conservation, State Mining and Geology Board 2009).

MRZ-1. Available information indicates that significant mineral resources are not present or
 little likelihood exists for their presence.

	Alternative																			
Chapter 26 – Mineral Resources	Existing Condition	No Action	1A	1B	1C	2A	2B	2C	3	4	5	6A	6B	6C	7	8	9	4A	2D	5A
MIN-2: Loss of availability of extraction potential from natural gas fields as a result of constructing the water conveyance acilities (Number of acres of non-abandoned natural gas field affected)	n/a	0	296	924	880	296	924	880	296	352	296	296	924	880	296	296	32	352	352	35
	n/a	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/NA	LTS/
Κ	29																			
(Q	ey vel of significa uantity of imp res, etc. affecte	act: number					In	acreasing 1	level of sig	Inificance	→		n/a > ≈	greate less th	pplicabl er than an equal t					

- MRZ-2a. Geologic data indicate that significant mineral resources underlie the area. Lands
 included in this category are of prime importance because they contain known economic
 mineral deposits.
- MRZ-2b. Geologic data indicate that significant mineral resources underlie the area. The area
 has discovered deposits that are either inferred reserves or deposits that are presently
 subeconomic as determined by limited sample analysis, exposure, and past mining history. With
 future advances in technology or changes in economics, the area could be upgraded to MRZ-2a.
- MRZ-3a. The area is considered to have a moderate potential for the discovery of economic mineral deposits. Further exploration work could result in the reclassification of specific localities into the MRZ-2a or MRZ-2b categories.
- MRZ-3b. The geologic evidence leads to the plausible conclusion that economic mineral deposits are present in the area and that it is in a geologic setting that appears to be a favorable environment for the occurrence of specific mineral deposits.
- **MRZ-4.** There is a lack of knowledge of the area regarding mineral occurrence.

15 Of the four primary MRZ classifications, the MRZ-2 classification is perhaps the most important for 16 land use planning because of the high likelihood for occurrence of substantial mineral deposits in 17 such areas. SMGB may determine that some MRZ-2a or MRZ-2b areas contain mineral resources 18 with statewide or regional significance and initiate a public process for designation. Designated 19 areas are incorporated into state regulations (Title 14 California Code of Regulations [CCR], Division 20 2, Chapter 8, Subchapter 1, Article 2). Such designations require that a lead agency's land use 21 decisions involving these areas be made in accordance with its established mineral resource 22 management policies, and they require consideration of the importance of the designated mineral 23 resource to the market region or state as a whole, not just its importance to the lead agency's area of 24 jurisdiction (Section 2763 of Public Resources Code [PRC], Division 2, Chapter 9).

25 26.1.2.1 Aggregate Resources

26 CGS classification reports include an assessment of the quantity, quality, and extent of aggregate 27 deposits in a study area. Reports include aggregate resource classification and mapping, quantitative 28 calculations of permitted and nonpermitted aggregate resources, calculated 50-year demand for 29 aggregate resources, and an estimate of when the permitted resources will be depleted (Kohler 30 2006; Clinkenbeard 2012). Kohler (2006) indicates that the only factor that shows strong 31 correlation to historical aggregate use is population change. Consequently, the study reports 32 historical aggregate use on a per capita basis for each aggregate study area. Per capita demand 33 values are then used to project future aggregate demand based on population projections by the 34 California Department of Finance through 2050. Fifty-year demand and permitted aggregate 35 resources for areas in the Plan Area and the surrounding aggregate study areas are shown in Table 36 26-1 (Clinkenbeard 2012).

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

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

Source: Clinkenbeard 2012.

P-C region = production-consumption region.

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

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

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

8 New aggregate sources are also in the process of being permitted and developed and others are 9 being considered. For example, in 2009 Triangle Rock Products, Inc. received permission to expand 10 its Sacramento area Florin Road facility (Clinkenbeard and Smith 2009). The expansion is for 10.7 million tons of gravel over a 12-year life span or more than 890,000 tons per year. Teichert 11 12 Aggregates has received permission from Sacramento County for a new quarry in the eastern county 13 that will supply up to 7 million tons per year with a total volume of 135 million tons (County of 14 Sacramento 2010). Similarly, Sacramento County certified the Final EIR for a quarry on the property 15 adjacent to the Teichert site, and approved the project, Stoneridge Quarry, in December 2011. The 16 Stoneridge Quarry will produce up to 6 million tons per year with 350 million tons available over its 17 expected 100-year life (County of Sacramento 2011). For this quarry, the owners petitioned to have 18 their lands reclassified from MRZ-3 (for Portland cement concrete [PCC] aggregate) to an upgraded 19 MRZ-2 classification (Clinkenbeard 2010). That analysis resulted in a reclassification of 414 acres of 20 the property as MRZ-2 for construction aggregate, which was subsequently approved. Similarly, 21 revised mineral land classifications were completed for the proposed Riddle Surface Mine property 22 in Stanislaus County and the Powerhouse Aggregate Project in Butte County, which reclassified 436 23 acres and 460 acres, respectively, as MRZ-2 for construction aggregate (Smith and Clinkenbeard 24 2010, 2011). Additionally, the hard-rock gold mine Lincoln Mine Project in Amador County is 25 permitted and under construction. That gold mine can extract up to 150 tons per day and majority of 26 the waste rock will be sold and hauled away for use as aggregate product consistent with the 27 project's Conditional Use Permit (Tietz et al. 2011).

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

26.1.2.2 9 Oil and Gas Resources

10 In 2007, California produced 219 billion cubic feet of associated gas (i.e., gas that is found with oil) and 93 billion cubic feet of non-associated gas (i.e., gas that is not associated with oil). Most of the 11 12 state's natural gas fields are located in the Sacramento Valley (Figure 26-2). The Rio Vista gas field, 13 discovered in the Delta in 1936, is the largest field producing non-associated gas in the state, 14 occupying portions of Sacramento, Solano, and Contra Costa Counties. In 2007, this gas field 15 produced 19.8 billion cubic feet of natural gas. Since the 1940s, gas supply has been inadequate to 16 meet state demand because of the tremendous growth in population and industry. By the early 17 1980s, more than 80% of the gas used in California was from sources outside the state. Net natural 18 gas production is declining in California; production dropped by approximately 3% in 2007 from 19 2006 levels (California Department of Conservation 2008).

- 20 California ranks fourth among the oil-producing states. As of 2007, statewide oil production had 21 declined to 1942 levels (California Department of Conservation, Division of Oil, Gas, and Geothermal 22 Resources 2008). California's overall oil production rate fell slightly in 2007 compared to the 23 previous year, averaging about 666,300 barrels per day. Although it is an important resource in 24 California, oil extraction is not widespread in the study area.
- 25 DOGGR places oil and gas wells into one of six categories: plugged, active injector, active producer, 26 canceled, dual, and new. The number of oil and gas wells in each category in the study area is shown 27 in Table 26-2.
 - Yolo Contra Costa Sacramento San Joaquin Solano Well Category County County County County County Total 348 473 661 799 2,770 Plugged 489 3 Active injector 2 2 7 114 Active producer 206 124 29 516 43 Canceled drill 9 2 12 5 5 33 (not shown on map) 0 0 81 0 96 Dual 15 8 New 0 4 5 0 17 393 702 954 Total 867 523 3,439

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

Source: California Department of Conservation 2010

Note: There are no oil and gas wells within the study area in Alameda and Sutter Counties.

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

3 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.

7 Contra Costa County

8 An important geologic deposit of Domegine sandstone is in the southeastern portion of Contra Costa 9 County near the Delta. This deposit has been valuable for use in the manufacture of heat-resistant 10 glass for the United States space program as well as local trench backfill (Contra Costa County 11 2005). Active mineral production operations in the Contra Costa County in the study area include 12 stone, sand, and gravel mining near Antioch (Figure 26-1).

- 13 The most productive oil and gas fields in Contra Costa County in the study area are Brentwood,
- 14 Oakley, East Brentwood, Dutch Slough, and a portion of Rio Vista (Figure 26-2). These fields are
- 15 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
- 17 April 2009 (California Department of Conservation, Division of Oil, Gas and Geothermal
- 18 Resources 2009) (Figure 24-5 in Chapter 24, *Hazards and Hazardous Materials*). There are 393 oil
 19 and gas wells (including all well types) in Contra Costa County within the study area (Table 26-2 and
 20 Figure 24-5).

21 Sacramento County

22 The northern and central parts of the study area encompass a portion of Sacramento County, 23 including the City of Sacramento. According to the Sacramento County General Plan (Sacramento 24 County 2011), mineral resources in the county include sand and gravel, clay, gold, silver, peat, topsoil, lignite, natural gas, and petroleum. Resources within the study area include oil and gas. The 25 26 county's natural gas production area is mostly within the Rio Vista gas field (Figure 26-2). In 2008, 27 Sacramento County produced more than 14 billion cubic feet of natural gas, and in April 2009, there 28 were 206 producing wells (California Department of Conservation, Division of Oil, Gas and 29 Geothermal Resources 2009). There are 702 wells in Sacramento County within the study area (Figure 24-5 in Chapter 24, Hazards and Hazardous Materials). 30

- 31There are no MRZ-2 areas or active mineral production in Sacramento County within the Delta. An32MRZ-2 area for Portland cement concrete grade aggregate has been designated in an area east of the
- 33 Delta (California Department of Conservation, Division of Mines and Geology 1988a).

34 San Joaquin County

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

CGS classified MRZ areas in San Joaquin County in land classification Special Report 160 (California
 Department of Conservation, Division of Mines and Geology 1988b). MRZ-2 areas for sand and

- 1 gravel in the Delta are located southwest of Manteca, south of Tracy, and southeast of Tracy near the
- 2 Stanislaus County boundary. Sand and gravel extraction occurs in the southwestern portion of the
- 3 county in the Corral Hollow Creek alluvial fan near Tracy and along the Mokelumne, Calaveras, and
- 4 Stanislaus Rivers in the eastern portion of the county (San Joaquin County 1992). The Corral Hollow
- 5 Creek sector is the primary construction aggregate production district in the county, with more than
- 80% of the aggregate material used in the region produced here. The 1992 San Joaquin County
 General Plan states that existing aggregate reserves in the county represent 28% of the projected
- General Plan states that existing aggregate reserves in the county represent 28% of the projected
 50-year demand and suggests that alternative sources of construction materials, including
- 9 development of MRZ-3 areas, might be required when aggregate reserves are depleted.
- 10 Natural gas has been extracted from San Joaquin County since 1854, with the highest levels of 11 extraction occurring in the Delta vicinity (San Joaquin County 1992) (Figure 24-5 in Chapter 24, 12 Hazards and Hazardous Materials). The Lathrop, McDonald Island, and Union Island gas fields 13 account for most of the extracted natural gas, and there are 21 natural gas fields within the county 14 that either are or have been active (Figure 26-2). Additionally, according to the 1992 General Plan, 15 Pacific Gas and Electric Company has operated a gas storage project on McDonald Island since 1959. 16 In 2008, San Joaquin County produced 73 billion cubic feet of natural gas, and there were 17 114 producing wells in April 2009 (California Department of Conservation, Division of Oil, Gas and 18 Geothermal Resources 2009) (Figure 24-5). There are approximately 867 oil and gas wells 19 (producing and nonproducing) in San Joaquin County within the study area (Table 26-2) and (Figure
- 20 24-5).

21 Solano County

22 The west and central Delta encompass portions of Solano County, including the City of Rio Vista and 23 Suisun Marsh. Non-fuel mineral resources mined or produced in Solano County include mercury, 24 sand and gravel, clay, stone products, calcium, and sulfur (Solano County 2008). Active production of 25 calcium, stone, and sand and gravel takes place in Suisun Marsh and the portion of Solano County 26 within the Delta (Figure 26-1). Historic mercury mines are located west of Suisun Marsh in Solano 27 County. Solano County MRZs are described in SMARA Land Classification Report 146 Parts I and III 28 (California Department of Conservation, Division of Mines and Geology 1986, 1987) and in Special 29 Report 156 (California Department of Conservation, Division of Mines and Geology 1988a). There 30 are no MRZ-2 classified lands in the portion of Solano County located within the study area.

31 Natural gas production fields in the county are in Lindsey Slough, Van Sickle Island, Elkhorn Slough, 32 Millar, Cache Slough, Sherman Island, Winters, Ryer Island, Rio Vista, and Suisun Bay, among others 33 (Solano County 2008). Figure 26-2 shows their locations. In 2008, Solano County produced more 34 than 20,000 barrels of oil and more than 18 billion cubic feet of natural gas, and there were 124 35 producing wells in the county in April 2009 (California Department of Conservation, Division of Oil, 36 Gas and Geothermal Resources 2009). There are 954 oil and gas wells (including all well types) in 37 Solano County within the study area (Table 26-2); their locations are shown in Figure 24-5 in 38 Chapter 24, Hazards and Hazardous Materials. The Rio Vista gas field is the largest producer of 39 natural gas, and Lindsey Slough production ranks third in DOGGR District 6, with 2.6 billion cubic 40 feet in 2008 (Solano County 2008; California Department of Conservation, Division of Oil, Gas and Geothermal Resources 2009). 41

- 42 MRZ-3 areas are present in Suisun Marsh (Solano County 2008), but there are no lands classified as
- 43 MRZ-2 within Suisun Marsh. Geologic formations underlying Suisun Marsh contain accumulations of
- 44 natural gas; these formations and the accumulated gas within them constitute the Suisun Marsh gas

- 1 fields. Gas has been extracted from the Suisun Marsh fields since their discovery in 1938. According
- 2 to the Suisun Marsh Protection Plan (Protection Plan) (San Francisco Bay Conservation and
- 3 Development Commission 1976), four of the seven known gas fields in the Suisun Marsh were used
- 4 for gas production in the 1970s; these were on Grizzly Island, Ryer Island, Van Sickle Island, and
- 5 Kirby Hill. In 1972, 27 producing wells operated in these fields. The Suisun Marsh gas fields yield
- 6 relatively high-quality natural gas made up almost entirely of hydrocarbons such as methane,
- 7 ethane, butane, and propane, with few impurities (San Francisco Bay Conservation and
- 8 Development Commission 1976).
- 9 Facilities for the long-term storage of natural gas are necessary because of the seasonal variation in 10 gas supply and demand. The most common storage method involves the injection and storage of
- 11 natural gas in naturally occurring underground geologic reservoir formations. The best geologic
- 12 formation for this purpose is an *anticline trap*, which consists of highly permeable reservoir rock
- 13 and thick impermeable cap rock sealing the reservoir—these formations are found beneath the
- 14Suisun Marsh fields (San Francisco Bay Conservation and Development Commission 1976). Because
- 15 of high demand for natural gas as a fuel and the finite reserves of the resource, the fields are
- 16 expected to be completely depleted at some point in the future. After depletion, the remaining
- 17 geologic formations may be suitable for the underground storage of natural gas extracted from other
- 18 fields and transported to the San Francisco Bay Area by pipeline or tanker (Solano County 2008).

19Sutter County

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

22 Yolo County

23 The northern Delta encompasses a portion of Yolo County, including the City of West Sacramento. 24 According to the 2030 Countywide General Plan (County of Yolo 2009), mined aggregate and natural 25 gas are the two primary mineral resources produced here. Numerous gas fields are located in the 26 Delta, primarily in the Yolo Bypass; their locations are shown in Figure 26-2 (County of Yolo 2009). 27 Deep onshore gas wells, reaching a depth of nearly 2 miles, are located near Clarksburg, and 28 producing wells are also located on Merritt Island (Figure 24-5 in Chapter 24, Hazards and 29 Hazardous Materials). In 2008, Yolo County produced more than 3 billion cubic feet of natural gas 30 and 68 barrels of oil; there were 29 producing wells in April 2009 (California Department of 31 Conservation, Division of Oil, Gas and Geothermal Resources 2009). There are 523 oil and gas wells 32 (including producing and nonproducing wells) in Yolo County within the study area (Table 26-2 and 33 Figure 24-5). One small gas field is located within the jurisdiction of the City of West Sacramento, 34 where there are 24 inactive wells. Of these wells, only two were formerly productive. No MRZ-2 35 areas are within the city's sphere of influence (City of West Sacramento 2000).

- Mercury mining took place in the Cache Creek watershed in Lake County from the 1800s through
 the mid-1900s; however, no active or historical mercury mines are present in Yolo County within
 the study area.
- 39 Aggregate mining occurs in the Cache Creek MRZ-2 area outside the Delta (California Department of
- 40 Conservation, Division of Mines and Geology 1988a). The Cache Creek MRZ-2 area is a significant
- 41 high-grade aggregate deposit known to contain more than 900 million tons of sand and gravel
- 42 (County of Yolo 2009). No MRZ-2 areas are located within the Delta in Yolo County (California

- 1 Department of Conservation, Division of Mines and Geology 1988a; City of West Sacramento 2000;
- 2 County of Yolo 2009).

3 26.2 Regulatory Setting

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

6 26.2.1 Federal Plans, Policies, and Regulations

7 **26.2.1.1 Buy America Act**

- 8 The Buy America Act was passed by Congress and signed by the President in 1933. All federal
- 9 construction projects or funded projects must have at least 50% American manufactured or non-
- 10 manufactured materials. These restrictions apply unless it is impracticable, or materials are non-11 available or too costly.

12 26.2.1.2 Surface Mining Control and Reclamation Act of 1977

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

15 **26.2.1.3 Cosumnes River Preserve Management Plan**

16 The Cosumnes River Preserve is managed by the Cosumnes River Preserve Partners, which includes17 the U.S. Bureau of Land Management.

18 **26.2.2** State Plans, Policies, and Regulations

1926.2.2.1Surface Mining and Reclamation Act of 1975

20 Mining activities are regulated in California by SMARA (PRC Section 2710 et seq.). This law's 21 purpose is to create and maintain an effective and comprehensive surface mining and reclamation 22 policy with regulation of surface mining operations to ensure that adverse environmental effects are 23 prevented or minimized and that mined lands are reclaimed to a usable condition that is readily 24 adaptable for alternative land uses. Production and conservation of minerals are encouraged, and 25 consideration is given to values relating to recreation, wildlife, range and forage, and aesthetic 26 enjoyment, while eliminating residual hazards to public health and safety. These goals are achieved 27 through land use planning by allowing jurisdictions to balance the economic benefits of resource 28 extraction with the need to provide other land uses.

- 29 Sections 2761(a) and (b) and Section 2790 of SMARA provide for a mineral lands inventory process
- 30 known as *classification-designation*, which is administered by CGS and SMGB. *Classification* is the
- 31 process of identifying lands containing significant mineral deposits. *Designation* is the formal
- 32 recognition by SMGB of areas containing mineral deposits of regional or statewide significance,
- 33 following a public participation process. The objective of classification and designation processes is
- 34 to ensure, through appropriate lead agency policies and procedures, that mineral deposits of

- statewide or of regional significance are available when needed (California Department of
 Conservation, State Mining and Geology Board 2009).
- It is also the intent of this process, through the adoption of local mineral resource management
 policies, that significant mineral resources be considered in future local land-use planning decisions
 (PRC Section 2762). PRC Section 2762 directs that if a use is proposed that might threaten the
 potential recovery of minerals from an area that has been classified MRZ-2, the county (or city) must
 specify its reasons for permitting use, provide public notice of those reasons, and forward a copy of
 its statement of reasons to the State Geologist and SMGB.
- SMARA defines activities that constitute *surface mining* (for example, open-pit mining of naturally
 exposed minerals); activities such as borrow pitting also constitute surface mining activities as
 defined by SMARA. Activities that are excluded from the SMARA regulations are identified in PRC
 Section 2714. Exclusions include mining operations conducted by the California Department of
 Water Resources (DWR) for state water resources projects; however, a management plan is still
 required, as described in PRC Section 2714(i)(1).
- 15 Surface mining operations conducted on lands owned or leased, or upon which easements or rights-16 of-way have been obtained, by the Department of Water Resources for the purpose of the State Water 17 Resources Development System or flood control, and surface mining operations on lands owned or 18 leased, or upon which easements or rights-of-way have been obtained, by the Reclamation Board for 19 the purpose of flood control, if the Department of Water Resources adopts, after submission to and 20 consultation with, the Department of Conservation, a reclamation plan for lands affected by these 21 activities, and those lands are reclaimed in conformance with the standards specified in regulations 22 of the board adopted pursuant to this chapter. The Department of Water Resources shall provide an 23 annual report to the Department of Conservation by the date specified by the Department of 24 Conservation on these mining activities.

2526.2.2.2California Department of Conservation, Division of Oil, Gas, and26Geothermal Resources Construction-site Plan Review Program

27 DOGGR regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal 28 wells. As part of DOGGR's responsibilities for implementing PRC Section 3208.1, districts have 29 developed the Construction-site Plan Review Program to assist local agencies in identifying and 30 reviewing the status of oil or gas wells near proposed development. The program is aimed at 31 addressing potentially dangerous issues associated with development near oil or gas wells. DOGGR 32 serves in an advisory role to make relevant information available to local agencies. Section 3208.1 of 33 the PRC states that if any property owner, developer, or local permitting agency either fails to obtain 34 an opinion from DOGGR, or fails to follow the advice of DOGGR when development occurs near an oil 35 or gas well, then the owner of the property on which the well is located may be responsible for re-36 abandonment costs should a future problem arise with the well. To use the DOGGR Well Review 37 Program, the developer or property owner submits a completed Well Review Program Application 38 to DOGGR (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 39 2007). Before issuing building or grading permits, local permitting agencies review and implement 40 DOGGR's preconstruction well requirements. Interaction between local permitting agencies and 41 DOGGR helps resolve land-use issues and allows for responsible development in oil and gas fields.

42 26.2.3 Regional and Local Plans, Policies, and Regulations

In general, local governments have adopted general plans, codes, and ordinances to incorporate
 provisions of SMARA that protect significant mineral resources from incompatible land uses and

1 regulate mining operations and reclamation. These, as well as other mineral-related regulations,

- 2 policies, and plans, are summarized below, and include measures that would be relevant to borrow
- 3 sites, if not covered under a statutory exclusion (see discussion of SMARA in the previous section).

4 **26.2.3.1** Delta Protection Commission

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

o i i otection commission 2010) addresses natural gas wens an

9 Utilities and Infrastructure:

10 **P-1.** Impacts associated with construction of transmission lines and utilities can be mitigated by 11 locating new construction in existing utility or transportation corridors, or along property 12 lines, and by minimizing construction impacts. Before new transmission lines are constructed. 13 the utility should determine if an existing line has available capacity. To minimize impacts on 14 agricultural practices, utility lines shall follow edges of fields. Pipelines in utility corridors or 15 existing rights-of-way shall be buried deep to avoid adverse impacts to terrestrial wildlife. 16 Pipelines crossing agricultural areas shall be buried deep enough to avoid conflicts with 17 normal agricultural or construction activities. Utilities shall be designed and constructed to 18 minimize any detrimental effect on levee integrity or maintenance, agricultural uses and 19 wildlife within the Delta. Utilities shall consult with communities early in the planning process 20 for the purpose of creating an appropriate buffer from residences, schools, churches, public 21 facilities and inhabited marinas.

22 26.2.3.2 Suisun Marsh Protection Plan

- The Protection Plan (San Francisco Bay Conservation and Development Commission 1976)
 addresses the presence of and access to natural gas resources in Suisun Marsh. The plan includes the
 following policies.
- Transportation of natural gas by underground pipeline is the most economical and safe method
 of gas transportation in the Suisun Marsh area. Future gas pipelines should be permitted if they
 are consistent with the Protection Plan and if the design and construction meet the following
 standards:
- 30 a. Existing pipeline systems are utilized to the maximum extent feasible.
- b. The pipeline design meets all applicable safety standards of the Office of Pipeline Safety
 Operations (OPSO) and other regulatory agencies.
- 33 c. The pipeline route avoids tidal marshes and managed wetlands wherever possible and, if
 34 that is not possible, the route crosses as little marsh or managed wetland as possible.
- 35 d. Wide track or amphibious construction equipment is used in tidal marsh or managed
 36 wetland areas. Pads or mats are used as needed to prevent any construction equipment
 37 from sinking into the soft marsh muds and damaging the marsh plants.
- 88 e. The "trench and push" construction method is used in all tidal marsh and managed wetland
 39 areas where feasible, so that the construction zone is kept as small as possible and the
 40 minimum amount of heavy equipment passes through the marsh or wetland area.
- 41 f. Prior to any pipeline construction or related activities in the Marsh, the contractors consult
 42 with the Department of Fish and Game to determine at what time such construction or

1 2			related activities should be conducted so as to create the least possible adverse impact on breeding, migration, or other fish and wildlife activities.
3 4 5 6		g.	Prior to any underground pipeline construction in the Marsh, the contractors consult with the Solano County Mosquito Abatement District to ensure existing recirculation water ditches are not blocked and levees are adequately repaired after pipeline construction, or that effective mosquito control measures are maintained.
7 8 9		h.	At slough, mudflat and bay crossings of gas pipelines, the trench is dredged in a manner that minimizes turbidity and prevents interference of the dredging operation with fish or wildlife.
10 11		i.	A regular surface and aerial inspection of the pipeline route is carried out as required by OPSO.
12 13	2.		dditional gas wells or ancillary facilities are required for gas exploration, production, or ection, the drilling should be accomplished with the following safeguards:
14 15		a.	Drilling operations conform to the regulations of the California Division of Oil and Gas designed to prevent damage to natural resources.
16 17		b.	The drilling operation is confined to as small an area as possible and does not irreversibly damage unique vegetation or fish and wildlife habitats.
18 19		C.	After drilling is complete, all drilling muds, water waste, and any other fluids are removed entirely from the site and disposed of in a manner that does not adversely affect the Marsh.
20 21		d.	All buildings, tanks, "Christmas trees" or other facilities related to the production or storage of natural gas do not result in the permanent loss of water surface in the Marsh.
22 23 24	3.	the	nstruction and drilling in tidal marsh and managed wetland areas should occur only during dry months of the years (generally May through August) when these activities would not turb wintering waterfowl.
25 26 27	4.	reg	as wells are abandoned, they should be sealed in accordance with Division of Oil and Gas ulations; the drilling or production facilities should be removed; and the surface area should revegetated with native vegetation within one growing season after abandonment.
28 29	5.		rage of natural gas in depleted gas reservoirs is a reasonable use of the resource and should permitted. Storage facilities should meet all safety standards of the Division of Oil and Gas.
30 31 32 33 34 35 36	6.	stor are aro pip (LN	cause the Suisun Marsh offers both natural gas and depleted gas fields suitable for gas rage, and because it is close to the urban Bay Area and the proposed waterfront industrial a on the Sacramento River, gas will probably continue to be transported out of, into, and und the Marsh. All gas transportation into and out of the Marsh is now by underground eline systems. If other types of systems for the transport or storage of liquefied natural gas IG) are proposed for the Suisun Marsh area, a detailed investigation of the hazards and pacts of LNG facilities should be carried out prior to approval of the facilities.
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37 26.2.3.3 Alameda County Code and East County Area Plan

The Alameda County Code encourages mine development in compatible areas before encroachment
 of conflicting uses. Mineral resource areas that have been classified by CGS or designated by SMGB
 are to be protected from intrusion by incompatible land uses that may impede or preclude mineral

- 1 extraction or processing to the extent possible for consistency with the county's General Plan
- 2 (Alameda County 2000).

to the county's economy.

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3 26.2.3.4 Contra Costa County General Plan

- 4 Relevant goals and policies of the Contra Costa County General Plan (Contra Costa County 2005) are
 5 listed below.
 6 Goal 8-M: To ensure the continued viability of mineral extraction operations that are important
- 6 Goal 8-N: To protect areas of identified valuable mineral resources from incompatible nearby
 9 land uses through zoning and other land use regulations.
- Goal 8-0: To minimize and buffer the impact of surface mining activities on the surrounding
 land uses and the natural environment.
- Policy 8-54: Mining and quarrying shall be a permitted use in certain privately owned areas
 that are in an open space designation in the General Plan and that contain known mineral
 deposits with potential commercial value.
- Policy 8-56: Incompatible land uses shall not be permitted within the mineral resource
 impact areas identified as containing significant sand and gravel deposits.
- Policy 8-61: Reclamation plans prepared for the closure of quarries shall include conditions
 addressing the future use of the property, and a condition of the reclamation shall assure
 that future use.
 - **Implementation Measure 8-bu:** Establish a buffer zone around designated resource areas that will be rezoned to restrictive agricultural zones of A-20, A-40, or A-80.
 - **Implementation Measure 8-bx:** Require the posting of bonds for all new mining and quarrying permits to guarantee timely and faithful performance of reclamation and mining plans.
- Implementation Measure 8-by: In analyzing the environmental effects of mining
 operations, the county shall consider, at a minimum, the following concepts in granting a
 new permit:
- 28 o Natural vegetation for buffering
 - Adequate setbacks
 - Central location of processing equipment and equipment storage
- 31 o Dust control
 - Adequate access roads
- 33 o Erosion control
 - Revegetation and reestablishment of natural appearing features on the site
- 35 o Ultimate land use
- 36 Hours of operation
- 37 o Night lighting

- 1 o Security fencing
- 2 Noise impacts
- 3 Protection of water quality

4 26.2.3.5 Contra Costa County Ordinance Code

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

8 26.2.3.6 City of Rio Vista Zoning Ordinance

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

12 envelope of a proposed well site.

13 **26.2.3.7** Sacramento County General Plan

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

- Objective 1: Known mineral resources protected from land uses which would preclude or inhibit timely mineral extraction to meet market demand.
- Policy CO-37: Apply the aggregate resources combining land use category to additional
 areas as subsequent studies determine them to contain mineral resources which are feasible
 and appropriate for mining. The aggregate resources combining land use category shall not
 be a prerequisite to (SM) surface mining combining zoning or regulation through the
 procedures of an existing special planning area zoning designation in conjunction with
 proposed surface mining.
- Policy CO-38: Sewer interceptor and trunk alignments shall be routed to avoid areas
 planned for aggregate resource mining to the extent practical. Where such alignments are
 impractical, they shall be designed to minimize aggregate resources which would be
 precluded from mining, and make reasonable attempt to preserve the future use of mined
 areas for flood control or recharge purposes.
- Objective 2: Resources and options for future extraction identified within the context of an
 ongoing local resource evaluation and management program.
- 34 o Implementation Measure 1: Determine the extent and quality of aggregate resources west
 35 of Bradshaw Road between Florin and Elder Creek Roads, on Aerojet property, the
 36 Cosumnes River above Wilton Road and other locations with potential mineral resources.
 37 (PLANNING)
- Implementation Measure 2: Study the feasibility of establishing, in conjunction with use
 permit approval for surface mining, a resource extraction fee to fund a staff geologist and

1 2	consultant services as necessary to implement policies and programs relating to mineral resource protection.
3 4 5	• Implementation Measure 3: Establish regular coordination with the California Geological Survey, provide them with information regarding aggregate resource depletion in the County, and solicit financial and technical assistance for resource studies.
6 7	• Objective 3: Orderly extraction of minerals and subsequent reclamation of mined areas with minimal adverse impacts on aquifers, streams, scenic values, and surrounding residential uses.
8 9 10 11	 Policy CO-39: Surface mining operations shall be subject to appropriate mitigation measures and shall avoid creating any significant nuisances, hazards, and adverse environmental impacts, unless the Board of Supervisors makes the findings to override as required by CEQ Guidelines Section 15091.
12 13	• Policy CO-40: Extractive uses and associated processing uses and facilities shall maintain adequate minimum setbacks to protect adjoining land uses.
14 15 16	• Policy CO-41: Surface mining shall not be allowed without adequate plans for reclamation of mined areas. Reclamation plans should be based on a plan for post-mining land use that is consistent with the land use strategies of the General Plan.
17	• Policy CO-42: Gold extraction utilizing cyanide leaching systems shall not be permitted.
18 19	• Policy CO-43: Hardrock mining shall be conducted in a way that mitigates long-term undesirable impacts.
20 21 22	• Implementation Measure 1: Continue to monitor implementation of use permit conditions approved for surface mining operations or regulation through the procedures of an existing special planning area zoning designation. (PLANNING)
23 24 25 26	 Implementation Measure 2: Maintain and update information pertaining to appropriate state-of-the-art techniques for erosion control, reclamation, nuisance prevention and environmental impact mitigation relative to surface mining operations. (PLANNING)
27 28 29 30	• Implementation Measure 3: Provide pertinent applications, plans and environmental documents to all agencies which may be involved with future reclamation uses, including service providers, parks agencies, and resource management agencies. (PLANNING)
31 32 33 34	• Implementation Measure 4 : Prepare a comprehensive plan for hard rock mining that helps to guide a cohesive and logical pattern for future mining activities based on estimated mineral supply needs, evaluation of environmental impacts and minimizing effects on adjacent land uses (PLANNING).
35 36	• Objective 4: Sequential timing of mining of aggregate areas linked to the timing of urban development.
37 38 39 40 41 42	• Policy CO-44: Due to the predicted shortages of aggregates in Sacramento County, mining of mineral resources within the Urban Services Boundary (USB) is encouraged, where consistent with Habitat Conservation Plans or other County initiated conservation programs and where such mining does not preclude successful completion of these plans, to avoid the potential loss of these mineral resources as a result of potential urban development. This policy is not intended to preclude mining outside the USB.

1 2 3	• Implementation Measure 1 : Develop a strategy for mining within the USB that is consistent with other land uses and the preservation strategies that are currently being developed for the South Sacramento Habitat Conservation Plan. (PLANNING)
4 5 6 7	• Implementation Measure 2: Develop a strategy for mining Mather AFB lands that is consistent with other land uses and the preservation strategies that are currently being developed for the South Sacramento Habitat Conservation Plan and the reuse needs for the Base. (PLANNING)
8 9	• Objective 5: Ten percent and twenty percent of demand for aggregates met by recycled or substitute materials by 2010 and 2020 respectively.
10 11 12	• Policy CO-45: To the maximum extent possible, all base material utilized in County and private road construction shall be composed of recycled asphalt concrete and roadway base material.
13 14 15 16	• Implementation Measure 1: Modify construction standards for County roads to utilize recycled products without altering the engineering properties per the Sacramento County Standard Construction Specifications, and upon approval of the Municipal Services Agency. (MSA-DOT)
17 18	• Implementation Measure 2: Develop appropriate conditions applicable to projects involving private roads. (MSA-PLANNING)
19 20	• Implementation Measure 3: Investigate the use of recycled concrete or substitute materials in other construction applications. (PLANNING and COUNTY ENGINEERING)
21 22	• Implementation Measure 4: Investigate concrete recycling operations elsewhere and determine appropriate mitigation measures. (PLANNING)

23 **26.2.3.8 Zoning Code of Sacramento County**

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

- 28 **26.2.3.9** San Joaquin County General Plan
- Relevant objectives and policies of the San Joaquin County General Plan (San Joaquin County 1992)are listed below.
- **Objective 1:** To protect extractive resources from urban development or encroachment.
- Objective 2: To provide for the production of extractive resources while protecting people,
 property, and the environment from hazards caused by resource extraction.
- Policy 1: Mineral deposits of significant quantity, value, or quality, as identified by CGS
 reports as MRZ-2, shall remain in open space uses until extraction of resources, unless the
 immediate area has been committed to other uses.
- 37 **Policy 2:** Mined lands shall be reclaimed as soon as reasonably possible.
- Policy 3: The county shall permit the development of its oil and natural gas resources,
 provided that such development ensures adequate protection to the resource and the

1 2	environment, protects public health and safety, and is compatible with the current and projected uses of the land.
3 4	• Implementation Measure 1: The county shall continue to require a permit for all resource extraction activities.
5 6 7	• Implementation Measure 2: All development in areas of significant sand and gravel deposits, as identified by SMGB, shall require a discretionary permit conditioned to protect the resources.
8 9	• Implementation Measure 3: A reclamation plan, in accordance with SMARA, shall accompany all applications for mining or mineral extraction permits.
10	26.2.3.10 Solano County General Plan
11 12	Relevant goals and policies of the Solano County General Plan (Solano County 2008) are listed below.
13 14 15	• Policy RS.P-33: The county shall preserve, for future use, areas with important mineral resources by preventing residential, commercial, and industrial development that would be incompatible with mining practices to the extent feasible.
16 17 18	 Implementation Regulation RS.I-17: Evaluate impacts related to extracting mineral resources from new areas as part of the required permitting process to ensure that remediation occurs after minerals are extracted. Comply with regulations found in SMARA.
19 20 21 22 23 24 25 26 27	• Suisun Marsh Policy Addendum to the 2008 General Plan: Extraction and removal of minerals or natural materials from existing quarries and borrow areas within the Secondary Management Area of the Suisun Marsh should be allowed to continue where not in conflict with protection of the marsh and in conformance with county codes. Sites governed by the above provisions include: two on the Tule Vista Livestock Company properties, of which one is located east of Scally Road and the other located northeast of Beldon's Landing; one on the Guy Stewart property 1,500 feet west of Shiloh Road; two on the Barnes property 8,000 feet west of Shiloh Road in the Kirby Hills; and two on the Wagent property 3,000 feet west of Shiloh Road. These are in addition to existing sites
28	under county land use permit.

- 29 **26.2.3.11** Solano County Code
- Chapter 29 of the Solano County Code contains requirements for permitting and reclamation ofmines in compliance with SMARA.

32 26.2.3.12 Yolo County General Plan

- Relevant goals, policies, and implementation actions of the Yolo County General Plan (County of
 Yolo 2009) are listed below.
- Goal CO-3 Mineral Resources: Protect mineral and natural gas resources to allow for their continued use in the economy.
- Action CO-A39: Encourage the responsible development of aggregate deposits along Cache
 Creek as significant both to the economy of Yolo County and the region (Policy CO-3.1).
- 39 Action CO-A40: Encourage recycling of aggregate materials and products (Policy CO-3.1).

1 • Action CO-A44: Coordinate individual surface mining reclamation plans so that the 2 development of an expanded riparian corridor along Cache Creek may be achieved (Policy 3 CO-3.1). 4 Action CO-A47: Ensure that mined areas are reclaimed to a usable condition that is readily 0 5 adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and 6 groundwater management facilities. 7 Policy CO-3.2: Ensure that mineral extraction and reclamation operations are • 8 compatible with land uses both onsite and within the surrounding area, and are 9 performed in a manner that does not adversely affect the environment. 10 Action CO-A46: Maintain standards and procedures for regulating surface mining and 0 11 reclamation operations so that potential hazards and adverse environmental effects are reduced or eliminated (Policy CO-3.1, Policy CO-3.2). 12 Action CO-A52.2: Implement the Cache Creek Area Plan (Policy CO-3.2). 13 0 14 • Action CO-A49: Consider the exploration, drilling, and extraction of natural gas as 15 compatible with agriculture and open space uses (Policy CO-3.3). 16 Action CO-A50: Evaluate any impacts to identified natural gas fields as part of the \cap 17 development review process (Policy CO-3.3). 18 Action CO-A51: Require that abandoned gas wells be sealed in accordance with DOC 0 19 regulations and that all drilling or production facilities be removed. Further require that the 20 disturbed surface area be reincorporated into adjoining agricultural operations or 21 revegetated with native vegetation within one year after abandonment (Policy CO-3.3). 22 Policy CO-3.4: Within the Delta Primary Zone, ensure compatibility of permitted land • 23 use activities with applicable, natural gas policies of the Land Use and Resource 24 Management Plan of the Delta Protection Commission. 25 Policy CO-3.5: Preserve and protect the County's unique geologic and physical features, • 26 which include geologic or soil "type localities," and formations or outcrops of special 27 interest (DEIR MM GEO-1a).

28 **26.2.3.13** Yolo County Code

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

35 26.3 Environmental Consequences

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

1 26.3.1 Methods for Analysis

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

6 potential mineral-related impacts within the proposed Restoration Opportunity Areas (ROAs).

7 26.3.1.1 Construction and Footprint Effects

8 The potential for construction and the physical footprint of the conveyance facilities to directly or 9 indirectly affect fuel and nonfuel mineral resource availability and extraction was evaluated. 10 Construction activities could affect mineral resources by the volume of construction aggregate 11 required. The alternatives' footprints could prevent physical access to mineral resources such as 12 aggregates or natural gas. Such an effect would result if the facilities covered an underlying resource 13 so that it was no longer available. For example, if a canal or tunnel was placed over an underlying 14 aggregate resource, that portion of the resource would no longer be accessible. Similarly, if a canal 15 or tunnel was placed over an existing active natural gas well it could reduce access to the underlying 16 natural gas resource. This analysis entailed use of geographic information system (GIS) data to 17 quantify the number of oil and gas wells, areal extent of natural gas fields, designated mineral zones, 18 and individual mineral commodity producers affected by the footprints of all components of the 19 alternatives, including conveyance-related activities.

- 20 Borrow is a general term used for fine-grained materials that are used as fill in areas such as 21 embankment construction, in-river rock slope protection, and haul roads. These fine-grained 22 borrow materials may come from excavations for canals or tunnels when they contain suitable 23 materials. Where sufficient borrow material is not available from project-related excavation, it may 24 be obtained from new sources in the vicinity of the alternatives or from commercial operations. As 25 noted in Section 26.2.2.1, Surface Mining and Reclamation Act of 1975, borrow pitting constitutes 26 surface mining and a management plan is required even when DWR projects are excluded from 27 SMARA regulations. However, borrow materials are not considered a mineral resource in the same 28 manner as aggregate, and borrow is only addressed in this chapter with respect to the overall 29 volume required and where offsite sources may be required.
- Construction of new electrical transmission facilities could conflict with existing natural gas wells or
 gas distribution pipelines. Because of the minimal size of power pole footprints, the relative ease of
 relocating gas distribution lines, and the flexibility of relocating power pole locations, no adverse
 effects are anticipated, and this issue is not addressed further.

34 26.3.1.2 Operational Effects

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

1 26.3.1.3 Restoration Effects

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

7 documentation after the restoration activities are finalized.

8 26.3.2 Determination of Effects

9 10		se effects under NEPA and significant impacts under CEQA would occur if the action atives would result in either of the following conditions.
11	• Lo	oss of availability of a known mineral resource that would be of value to the region or the state.
12 13 14	0	For purposes of this analysis, loss of availability of a known mineral resource would occur when a non-renewable mineral resource is irretrievably used. In this analysis, this impact applies primarily to aggregate resources.
15 16 17 18 19	0	For aggregate resources, an effect is considered adverse when use of the resource would result in a substantial depletion (loss of availability) of construction-grade aggregate within the six aggregate production study areas (Table 26-1), which would cause remaining supplies to be inadequate for future development based on 50-year demand estimates, and thereby substantially contribute to the need for new aggregate development.
20 21		oss of availability of a locally important mineral resource recovery site delineated by a local eneral plan, specific plan, or other land use plan.
22 23 24	0	For purposes of this analysis, "locally important mineral resource recovery site delineated by a local general plan, specific plan, or other land use plan" refers to natural gas well(s), natural gas field(s), an aggregate mine site, or an MRZ.
25 26 27	0	Any complete covering or permanent blockage of access to an aggregate resource (mines or MRZs) or natural gas field such that the resource cannot be recovered would be considered adverse.
28 29	0	With respect to natural gas wells, substantial loss of existing production resulting from the need to abandon producing wells that cannot be replaced would be considered adverse.
30 31	0	Any permanent elimination of a substantial portion of a county's active natural gas wells would be considered adverse.
32 33 34	0	Temporary obstructions or effects on relatively small areas would not be considered adverse. For the purposes of this analysis, temporary refers to activities occurring during the construction period.
35 36 37 38 39 40	0	Some of the distribution lines that lead from individual natural gas wells to larger collection lines may need to be relocated due to project facilities, including roads and transmission lines. These distribution lines are very small diameter (approximately 2 inches) and shallowly buried (approximately 2–3 feet) and their relocation would not impact the production from their associated natural gas wells. Consequently, this impact is not considered adverse and is not discussed further.

- 1 While taking borrow material requires a management plan under SMARA, borrow material is not a
- 2 mineral resource such as gravel, sand, or quarried rock, and CGS does not map it within MRZs.
- 3 Borrow is more commonly identified on an as-needed basis for individual projects. Consequently,
- 4 while borrow volumes needed for each alternative are identified in this chapter, there is no NEPA or
- 5 CEQA effect threshold related to borrow as a mineral resource. Other aspects related to use of
- 6 borrow are addressed in Chapter 10, *Soils*.
- Effects on mineral resources would be primarily restricted to the study area and would be primarily
 associated with the disturbance and footprint of the conveyance facilities and restoration areas.
 However, adjacent counties are addressed with respect to availability of aggregate resources.
- 9 However, adjacent counties are addressed with respect to availability of aggregate resources.
- Proposed actions to reduce environmental stressors in the study area (called either conservation
 measures (CMs), or Environmental Commitments, depending upon the alternative) are described in
 Chapter 3, *Description of Alternatives*, Section 3.6.2. These measures generally include projects to
 improve water quality, enforce regulations, and improve fisheries. None of these activities would
 affect mineral resources; therefore, effects related to these other conservation actions (CM12–CM17,
 CM20–CM21, or Environmental Commitments 12, 15, and 16 under Alternatives 4A, and 2D, and 5A)
 are not discussed in this chapter.

17 **Consistency with Local Plans and Policies**

- 18 Constructing the proposed water conveyance facilities (CM1) and implementing CM2–CM21 under
- 19 the BDCP alternatives, or constructing the water conveyance facilities and implementing
- 20 Environmental Commitments under the proposed project (California WaterFix) or any of the non-21 HCP alternatives, could potentially result in incompatibilities with plans and policies related to 22 protecting oil, gas, and mineral resources, and encouraging their use. This section summarizes ways 23 in which the proposed project is compatible or incompatible with those plans and policies. Potential 24 incompatibilities with local plans or policies, or with those not binding on the state or federal 25 governments, do not necessarily translate into adverse environmental effects under NEPA or CEQA. 26 Even where an incompatibility "on paper" exists, it does not by itself constitute an adverse physical 27 effect on the environment, but rather may indicate the potential for a proposed activity to have a 28 physical effect on the environment. The relationship between plans, policies, and regulations and
- impacts on the physical environment is discussed in Chapter 13, *Land Use*, Section 13.2.3.
- 30 The LURMP and the Protection Plan have polices that focus on minimizing impacts of natural gas 31 and oil extraction on the resources they protect. The LURMP recommends using existing utility 32 corridors, burying pipelines, and designing utilities to avoid compromising levee integrity. The 33 Protection Plan similarly recommends underground pipelines and storage for natural gas, and 34 measures to avoid damaging tidal marshes and wetlands, or disturbing fish and wildlife or their 35 habitat. The proposed project is compatible with these policies because it does not involve 36 transporting, extracting, or consuming natural gas or oil resources from within the Delta or Suisun 37 Marsh, and would adhere to all policies and regulations for protecting these areas. The proposed 38 project might be considered incompatible where construction of water conveyance facilities and 39 restoration areas or their operation could impair access to natural gas wells or fields, or cause them 40 to be abandoned (e.g., Impact MIN-1: Loss of availability of locally important natural gas wells as a 41 result of constructing the water conveyance facilities; Impact MIN-2: Loss of availability of extraction 42 potential from natural gas fields as a result of constructing the water conveyance facilities; Impact 43 MIN-5: Loss of availability of locally important natural gas wells as a result of implementing CM2-

1 *CM21*¹ Impact MIN-6: Loss of availability of extraction potential from natural gas fields as a result of 2 *implementing CM2–CM21*²). However, oil and gas production in the Delta comprise a very small 3 percentage of statewide and individual counties' production; should wells or fields have to be 4 permanently abandoned, the production loss would not be substantial. Where wells or fields have to 5 be abandoned, it is likely that the resource could be accessed with directional drilling from another 6 location. If suitable alternate land and easements were not available or feasible, the proposed 7 project would be incompatible, but this is likely to be the case for only a small number of an already 8 small proportion of wells or fields. Furthermore, the proposed project incorporates mitigation 9 measures that include designing restoration actions to avoid displacing wells (Mitigation Measure 10 MIN-5); and to maintain access to natural gas fields (Mitigation Measure MIN-6). Because 11 implementation of Mitigation Measures MIN-5 and MIN-6 cannot assure that all or a substantial 12 portion of existing natural gas wells and fields will remain accessible after implementation of an 13 alternative, these impacts are considered significant and unavoidable. Nevertheless, considering the 14 relatively minor potential for lost production or access to resources, the availability of methods to 15 continue extraction, and mitigation measures, the proposed project would be compatible with the 16 LURMP and the Protection Plan.

17 The Alameda County East County Area Plan, Contra Costa County General Plan, Sacramento County 18 General Plan, Solano County General Plan, San Joaquin County General Plan, and the Yolo County 19 General Plan all have policies or goals to protect oil, gas, and hard-rock mineral resources, encourage 20 economic production, and protect the local environment and existing land uses. The proposed 21 project is compatible with these plans and policies. As previously described, the Delta region 22 produces a relatively minor proportion of oil and gas for its counties and the state, and Alternative 4A would affect a minor portion of this amount. Where access to wells or gas fields would be 23 24 temporarily obstructed, it is likely extraction could continue or resume using directional drilling 25 from another location when construction is completed. If a natural gas well or field would be 26 permanently obstructed (covered), and an appropriate alternate well location not available or 27 feasible, the action alternative would be incompatible. However, this is likely to occur in only a small 28 number of cases. In the one restoration opportunity area where restoration actions could inundate 29 an existing aggregate mine, (Impact MIN-11: Loss of availability of locally important aggregate 30 resource sites [mines and MRZs] as a result of implementing CM2–CM21³), Mitigation Measure MIN-11 31 provides for the project proponents to purchase the mine's permitted production and use the 32 aggregate in project construction, thereby fulfilling general plan policy to economically develop the 33 resource. Moreover, project proponents will participate in the public processes for local and 34 regional aggregate evaluation and permitting (Mitigation Measure MIN-14), which will integrate the 35 project aggregate resource needs into land use decisions being made by agencies as part of 36 established mineral resource management policies, and contribute to their economic development. 37 Overall, considering the relatively minor potential for lost production or access to resources, the 38 availability of methods to continue extraction, and mitigation measures, the action alternatives 39 would be compatible with county general plans.

¹ Please note this impact heading is different for Alternatives 4A, 2D and 5A, which do not include implementation of conservation measures.

² Impact heading is different for Alternatives 4A, 2D, and 5A, which do not contain conservation measures.

³ Impact heading is different for Alternatives 4A, 2D, and 5A, which do not contain conservation measures.

26.3.3 Effects and Mitigation Approaches

2 26.3.3.1 No Action Alternative

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

10 The No Action Alternative analysis considered the range of programs and projects in the study area

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

16 Under the No Action Alternative, DOGGR regulatory programs that have jurisdiction over natural gas

17 well development and abandonment would continue with no substantive changes. Similarly,

18 programs that regulate mineral resources and programs to identify and conserve mineral resources

would be implemented with no substantive changes in the future. CGS and SMGB programs would

20 continue to classify and designate important MRZs and DOC would continue to regulate mineral

- 21 extraction under SMARA, and continue to ensure that mining areas are reclaimed to adequately
- 22 support future end uses following completion of regulated activities.

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	Sutus	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 and aggregate resources.
California Department of Water Resources	Mayberry Farms Subsidence Reversal and Carbon Sequestration Project	Completed October 2010	Permanently flood 308-acre parcel of Department of Water Resources- 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 and aggregate resources.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan		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.	This program could, but is unlikely, to reduce access to natural gas wells and aggregate resources.

23 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
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 and 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 and aggregate resources.
California Department of Water Resources	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 and 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 and aggregate resources.
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing	Levee rehabilitation projects in the Delta.	This project could utilize limited aggregate resources.
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps of Engineers	Flood Management Program	Ongoing	South Sacramento Streams Project component consists of levee, floodwall, and channel improvements.	This project could utilize limited aggregate resources.
National Marine Fisheries Service and U.S. Fish and Wildlife Service	2008 and 2009 Biological Opinion	Ongoing	The Biological establish certain reasonable and prudent alternatives to be implemented. Some of the reasonable and prudent alternatives require extensive areas of habitat restoration.	This program could reduce access to natural gas wells and aggregate resources.

1

2 There are projects under consideration in the study area (Appendix 3D, *Defining Existing Conditions*,

3 No Action Alternative, No Project Alternative, and Cumulative Impact Conditions) that could reduce

4 access to natural gas resources including implementation of the National Marine Fisheries Service

5 and U.S. Fish and Wildlife Service 2008 and 2009 Biological Opinions requiring restoration of 8,000

6 acres of tidal habitat. Generally, other projects in the study area have a minimal footprint and would

7 not require moving existing active natural gas wells. The actions arising from the Biological

1 Opinions may block access to the underlying natural gas fields. Various management plans are being 2 developed for areas within the region that could affect active natural gas wells or block access to 3 underlying natural gas fields (see Appendix 3D). These management plans include such projects as 4 the Lower Sherman Island and Yolo Bypass Wildlife Areas Land Management Plans (California 5 Department of Fish and Game) and the San Joaquin County Multi-Species Habitat Conservation and 6 Open Space Plan (San Joaquin Council of Governments). These plans, however, do not necessarily 7 require removal of active natural gas wells. Also, habitat conservation plans (e.g., Yolo County 8 Habitat/Natural Community Conservation Plan and Solano Multispecies Habitat Conservation Plan) 9 are being prepared to provide known mitigation procedures and conservation bank locations that 10 allow development to proceed. Even if certain plan actions block vertical access to natural gas fields, 11 directional drilling could provide access to these fields. Consequently, no major effect on access to 12 natural gas resources is anticipated with the No Action Alternative.

13 A variety of smaller or standard projects in the study area and the broader region will use aggregate 14 resources. These projects include highway and road improvement, housing development, levee 15 improvements (e.g., the DWR Delta Levees Flood Protection Program and the Sacramento Area 16 Flood Control Agency Flood Management Program), and the Folsom Dam Safety and Flood Damage 17 Reduction Project. As discussed in Section 26.1, Environmental Setting/Affected Environment, and 18 shown in Table 26-1, many areas in the study area, the broader region, and statewide only have 19 small percentages of permitted aggregate resources available compared with the projected 50-year 20 aggregate demand (Kohler 2006). However, projects of the scale described above are currently 21 being supplied by the permitted aggregate sources and similarly are within the available permitted 22 regional aggregate resource base (Table 26-1). Additionally, ongoing permitting of new or expanded aggregate extraction sites in Sacramento County is not accounted for in Kohler (2006). Considered 23 24 together, the ongoing aggregate needs and the added availability of materials from ongoing 25 permitting efforts in Sacramento County indicate that there would be no adverse effect on the 26 availability of aggregate resources (Section 26.1.2.1, Aggregate Resources).

27 Catastrophic Seismic Risks

28 The Delta and vicinity are within a highly active seismic area, with a generally high potential for 29 major future earthquake events along nearby and/or regional faults, and with the probability for such events increasing over time. Based on the location, extent and non-engineered nature of many 30 31 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these 32 structures during a major local seismic event is generally moderate to high. (See Appendix 3E, 33 Potential Seismic and Climate Chanae Risks to SWP/CVP Water Supplies, for more detailed 34 discussion.) Reclaiming land or rebuilding levees after a catastrophic event due to climate change or 35 a seismic event would potentially obstruct access to natural gas wells during construction. In the 36 instance of levee failure causing flooding, inundation could also block access to natural gas wells.

37 **CEQA** Conclusion: Under the No Action Alternative, there are projects under consideration in the 38 study area that could reduce access to natural gas resources. Further, management plans and habitat 39 conservation plans within the study area may require removal of active natural gas wells or block 40 access to gas fields. However, mitigation procedures and conservation bank locations would be 41 prepared prior to allowing development to proceed. Additionally, even if certain plan actions block 42 vertical access to natural gas fields, directional drilling could provide access to these fields. Projects 43 within the study area, including highway/road improvements, housing development, and levee 44 improvements are being supplied by permitted aggregate source and are within the available 45 permitted regional extraction sites in Sacramento County. Consequently, impacts on access to

natural gas resources or on the availability of aggregate resources within the study area would be
 less than significant under the No Action Alternative.

326.3.3.2Alternative 1A—Dual Conveyance with Pipeline/Tunnel and4Intakes 1–5 (15,000 cfs; Operational Scenario A)

Alternative 1A includes changes to the SWP and CVP water conveyance infrastructure and
operations as a result of five new north Delta intakes to be constructed and operated under CM1 and
Operational Scenario A. Five intakes, up to 15 solids lagoons, and five sedimentation basins would
be constructed and operated under Alternative 1A. Additionally, the remaining conservations
measures (CM2-CM21) would create up to 65,000 acres of tidal habitat restoration and other
habitat restoration and enhancement. Construction of facilities associated with this alternative could
affect existing mineral resources. Such effects are discussed below.

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

14 The locations of producing natural gas wells within the Alternative 1A construction footprint are 15 shown in Figure 24-5 in Chapter 24, Hazards and Hazardous Materials. Numbers of active natural 16 gas wells in the construction footprint and their total average annual production are identified in 17 Table 26-4, and individual wells are identified in Appendix 26A, Natural Gas Wells. Producing wells 18 in the study area are in Sacramento, San Joaquin, Yolo, Solano, and Contra Costa Counties. Producing wells within the construction footprint, however, are only in Sacramento County. These six wells are 19 20 in areas that would be occupied by the tunnel conveyance facilities and reusable tunnel material 21 (RTM) areas. There are no producing wells in proposed temporary construction work areas.

22 **NEPA Effects:** Because wells within the construction footprint would be permanently abandoned. 23 construction of Alternative 1A could result in reduced natural gas production in the study area. If 24 new wells are developed to replace those that would be abandoned, loss of production would likely 25 be only temporary. Wells in the study area in Sacramento County represent a very minor percentage 26 of the county's average annual natural gas production. Affected wells in the construction footprint 27 produce about 1% of the total annual natural gas production in Sacramento County (Table 26-4). 28 Even if all producing wells in the Alternative 1A construction footprint were abandoned and not 29 replaced with new wells installed outside the construction footprint, the reduction in natural gas 30 production would be minimal.

County		Perm	truction nanent In nber of w	mpact	Area			Constr Tempo Impac (numb	orary	ells)	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	0perable Work Area	2005–2009 Annual Average Natural Gas Production (Mcf)	Project Impacts - % of County's 2005–2009 Ave. Annual Prod. ^b
Alternative 1A-	—Dual Conveyanc	e with	Pipelin	e/Tur	inel ar	nd Inta	kes 1	-5 (15,	000 cfs	; Ope	rational Sce	nario A
Sacramento	16,342,002	3	3	0	0	0	0	0	0	0	165,142	1
San Joaquin	66,723,189	0	0	0	0	0	0	0	0	0	0	0
Total	83,065,191	3	3	0	0	0	0	0	0	0	165,142	1
Alternative 1B-	—Dual Conveyanc	e with	East Ali	ignme	nt and	l Intak	es 1-!	5 (15,0	00 cfs;	Opera	tional Scena	rio A)
San Joaquin	66,723,189	0	0	0	0	1	0	1	0	0	171,903	<1
Total	66,723,189	0	0	0	0	1	0	1	0	0	171,903	<1
	-Dual Conveyance		West Al	lignmo	ent an	d Intal	kes W	1-W5				
Sacramento	erational Scenario 16,342,002	о Ај З	1	0	0	0	0	0	0	0	931,495	6
Solano	14,596,981	3 0	0	0	0	0	0	0	0	0	931,495 0	0
Yolo	3,705,263	0	0	0	0	0	0	0	0	0	0	0
1010		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
	13,688,028	3	1	-	-	0	0	-	0	0	021 / 05	
Contra Costa Total	48,332,274	3	1 Dinalin	0	0	0 nd Fiw	0 Intol	0	0	0	931,495	6
Total Alternative 2A- (15,000 cfs; Op	48,332,274 —Dual Conveyanc erational Scenario	e with		0	0	-		0	0	0	931,495	
Total Alternative 2A- (15,000 cfs; Op Same as Alterna	48,332,274 —Dual Conveyanc erational Scenario tive 1A	e with o B)	Pipelin	0 le/Tur	0 nnel ar	nd Five	e Intal	0 Kes				6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B-	48,332,274 —Dual Conveyanc erational Scenario tive 1A —Dual Conveyanc	e with o B)	Pipelin	0 le/Tur	0 nnel ar	nd Five	e Intal	0 Kes				6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna	48,332,274 —Dual Conveyanc erational Scenario tive 1A —Dual Conveyanc tive 1B	e with o B) e with	Pipelin East Ali	0 e/Tun ignme	0 nnel an ent and	nd Five d Five I	e Intal	0 kes es (15,0	00 cfs;	Opera	ational Scen	6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna Alternative 2C-	48,332,274 —Dual Conveyanc erational Scenario tive 1A —Dual Conveyanc	e with o B) e with	Pipelin East Ali	0 e/Tun ignme	0 nnel an ent and	nd Five d Five I	e Intal	0 kes es (15,0	00 cfs;	Opera	ational Scen	6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna	48,332,274 —Dual Conveyance erational Scenario tive 1A —Dual Conveyance tive 1B —Dual Conveyance	e with o B) e with	Pipelin East Ali	0 e/Tun ignme	0 nnel an ent and	nd Five d Five I	e Intal	0 kes es (15,0	00 cfs;	Opera	ational Scen	6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna Alternative 2C- Scenario B) Same As Alterna Alternative 2D-	48,332,274 —Dual Conveyance erational Scenario tive 1A —Dual Conveyance tive 1B —Dual Conveyance	e with o B) e with e with e with	Pipelin East Ali West Al	0 e/Tun ignme lignmo	0 nnel an ent and ent an	d Five l	e Intal Intake kes W	0 ces es (15,0 1-W5 (00 cfs; 15,000	Opera ocfs; C	ational Scen Operational	6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna Alternative 2C- Scenario B) Same As Alterna Alternative 2D-	48,332,274 —Dual Conveyance erational Scenario tive 1A —Dual Conveyance tive 1B —Dual Conveyance ative 1C —Dual Conveyance erational Scenario	e with o B) e with e with e with	Pipelin East Ali West Al	0 e/Tun ignme lignmo	0 nnel an ent and ent an	d Five l	e Intal Intake kes W	0 ces es (15,0 1-W5 (00 cfs; 15,000	Opera ocfs; C	ational Scen Operational	6
Total Alternative 2A- (15,000 cfs; Op Same as Alterna Alternative 2B- Same as Alterna Alternative 2C- Scenario B) Same As Alterna Alternative 2D- (15,000 cfs; Op Same as Alterna Alternative 3—	48,332,274 —Dual Conveyance erational Scenario tive 1A —Dual Conveyance tive 1B —Dual Conveyance ative 1C —Dual Conveyance erational Scenario	e with o B) e with e with e with o B) with P	Pipelin East Ali West Al Modifie	0 e/Tun ignme lignmo ed Pip	0 nnel an ent and ent an eline/	d Five l d Intal	e Intal Intake kes W el and	0 ces es (15,0 1-W5 (Intake	00 cfs; 15,000	Opera ocfs; C	ational Scen Operational	6

1 Table 26-4. Producing Natural Gas Wells Affected by the Action Alternatives^a

Mineral Resources

County		Perm	truction anent Ir ber of w		Area			Constr Tempo Impac (numb	orary	ells)	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. ^b
	Dual Conveyance		lodified	Pipel	ine/T	unnel	and I	ntakes	2, 3, an	d 5		
(9,000 cfs; Ope Contra Costa	rational Scenario	-	0	0	0	0	0	0	0	0		
Contra Costa Sacramento	13,688,028 16,342,002	0 0	0 0	0 0	0 0	0 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		_
	-Dual Conveyanc	-	•			•	•	-	-	-		
	rational Scenario		Mounie	uip	enne,	I unit.	i unu	mune	, <u>,</u> , , , ,	inu 5		
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		_
	Dual Conveyance	with P	ipeline/	/Tunn	iel and	l Intak	xe 1 (3	3,000 cf	s; Oper	ation	al Scenario C	
Same as Alterna												
	—Dual Conveyanc rational Scenario		Modifie	d Pip	eline/	Tunne	el and	Intake	2			
Same as Alterna		CJ										
	–Isolated Convey	ance w	rith Pipe	eline/	Tunne	el and	Intak	es 1-5				
	erational Scenario			,								
Same as Alterna	tive 1A											
	—Isolated Convey erational Scenario		rith East	Align	iment	and Ir	itakes	5 1-5				
Same as Alterna	tive 1B											
	–Isolated Convey erational Scenario		ith Wes	t Alig	nmen	t and I	ntake	s W1-W	/5			
Same as Alterna	tive 1C											
	Dual Conveyance 9,000 cfs; Operation				iel and	l Intak	xes 2, 3	3, and 5	, and E	nhan	ced Aquatic	
Same as Alterna	-			-								
Alternative 8—	Dual Conveyance		ipeline/	/Tunn	el, Int	akes 2	2, 3, ar	nd 5, an	d Incre	eased	Delta Outflov	7
(9,000 cfs; Ope	rational Scenario	F)										

County		Perm	truction anent li ber of v	Area			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. ^b
Alternative 9—	Through Delta/Se	eparate	e Corrid	lors (1	15,000) cfs; 0	perati	ional So	cenario) G)		
Contra Costa	13,688,028	0	0	0	0	0	0	0	0	0	—	—
Sacramento	16,342,002	0	0	0	0	0	0	0	0	2	36,948	<1
Total	30,030,030	0	0	0	0	0	0	0	0	0	_	_

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

Mcf = 1,000 cubic feet.

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

^b Values rounded to the nearest percent.

1

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

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

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

NEPA Effects: Construction of Alternative 1A water conveyance facilities would permanently reduce
 the land surface available for vertical extraction of natural gas from directly underlying gas fields.

18 The proportion of natural gas field area underlying the Alternative 1A permanent construction

- 19 footprint is small (less than approximately 3% of the areal extent of natural gas field areas
- 20 intersected) (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields
- 21 would not be adverse because most of the affected fields could be accessed from other overlying
- 22 areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields

- 1 from a distance. Therefore, there would be no long-term adverse loss of extraction potential from
- 2 construction of Alternative 1A.

Gas Field Name	Natural Gas Field Size (acres)ª	Annual Average Natural Gas Production 2005– 2009 (Mcf)	Acres Of Non- Abandoned Natural Gas Field Affected	Percent of Non- Abandoned Natural Gas Field Affected by Project ^b
Alternative 1A—Dual Conveyance w	ith Pipeline/	Tunnel and Intakes 1-5 (1	15,000 cfs; Opera	tional Scenario A
Merritt Island Gas (abandoned)	269	ND	—	—
River Island Gas	8,376	2,532,876	278	3
Snodgrass Slough Gas	168	ND	18	<1
Non-abandoned acres	8,544		296	3
Alternative 1B—Dual Conveyance w	ith East Align	ment and Intakes 1-5 (15	5,000 cfs; Operati	ional Scenario A)
East Island Gas	684	1,502	248	4
King Island Gas	204	24,857	52	<1
Merritt Island Gas (Abandoned)	269	—	_	_
Robert Island Gas	2,034	ND	484	7
Snodgrass Slough Gas	169	ND	39	<1
Thornton Gas (abandoned)	1,752	—	_	_
West Thornton–Walnut Grove Gas	3,852	358,307	73	<1
Non-abandoned acres	6,943	_	924	13
Dutch Slough Gas Elkhorn Slough Gas Merritt Island Gas (abandoned)	3,635 411 269	1,668,346 191,942 —	92 242 —	<1 1 —
Rio Vista Gas	15,752	15,176,337	546	3
Non-abandoned acres	19,798	_	880	5
Alternative 2A—Dual Conveyance w (15,000 cfs; Operational Scenario B) Same as Alternative 1A				
Alternative 2B—Dual Conveyance w	ith East Align	ment and Five Intakes (1	5,000 cfs; Operat	tional Scenario B)
Same as Alternative 1B				
Alternative 2C—Dual Conveyance w (15,000 cfs; Operational Scenario B)	th West Alig	nment and Intakes W1-W	5	
Same as Alternative 1C				
Alternative 2D—Dual Conveyance w (15,000 cfs; Operational Scenario B) Same as Alternative 4A	ith Modified	Pipeline/Tunnel and Inta	kes 1, 2, 3, 4, and	15
			(())))))))))))))))))	
Alternative 3—Dual Conveyance wit	h Pineline/Ti	unnel and Intakes 1 and 2	16.000 cts: Oner	ational Scenario /

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

Gas Field Name	Natural Gas Field Size (acres)ª	Annual Average Natural Gas Production 2005– 2009 (Mcf)	Acres Of Non- Abandoned Natural Gas Field Affected	Percent of Non- Abandoned Natural Gas Field Affected by Project ^b
Alternative 4—Dual Conveyance w	ith Modified Pi		es 2, 3, and 5	ŕ
(9,000 cfs; Operational Scenario H West Thornton–Walnut Grove Gas) 3,852	358,307	265	7
River Island	8,376	2,532,876	87	2
	12,228	2,891,183	352	3
Alternative 4A—Dual Conveyance (9,000 cfs; Operational Scenario H		Pipeline/Tunnel and Inta	kes 2, 3, and 5	
West Thornton–Walnut Grove Gas	, 3,852	358,307	265	7
River Island	8,376	2,532,876	87	2
	12,228	2,891,183	352	3
Alternative 5—Dual Conveyance w				
Same as Alternative 1A				
(15,000 cfs; Operational Scenario I Same as Alternative 1A Alternative 6B—Isolated Conveyar (15,000 cfs; Operational Scenario I Same as Alternative 1B Alternative 6C—Isolated Conveyar (15,000 cfs; Operational Scenario I Same as Alternative 1C Alternative 7—Dual Conveyance w Conservation (9,000 cfs; Operation	nce with East A D) nce with West A D) ith Pipeline/Tu	lignment and Intakes W1	L-W5	ed Aquatic
Same as Alternative 1A				
Alternative 8—Dual Conveyance w (9,000 cfs; Operational Scenario F) Same as Alternative 1A				elta Outflow
Alternative 9—Through Delta/Sep			-	-1
Rio Vista Gas West Thornton–Walnut Grove Gas	15,753 3,852	15,176,337 358,307	23 9	<1 <1
Non-abandoned acres	19,605	330,307	32	<1
Source: California Department of Con		ion of Oil Gas and Goothorr		
Note: Average annual natural gas pr average annual gas productio Mcf = 1,000 cubic feet. ^a Gas field size is based on administr ^b Values rounded to the nearest perc	roduction is not n data are not a ative boundarie	reported for abandoned na vailable.		

1

Alternative 1A temporary work areas also overlie natural gas fields. Any temporary reduction in
 ability to extract natural gas during construction of conveyance facilities is considered minor

- 1 because the effect on natural gas extraction in Sacramento County would be small and temporary,
- and the presence of work areas would not prevent recovery of the resource. There would be noadverse effect.

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

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

13 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1A would include 14 moving water, both in infrastructure that would be constructed and in natural channels. These 15 operations would not cause additional effects on natural gas wells beyond those related to water 16 conveyance construction. Similarly, maintenance of the water conveyance facilities would include 17 routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate pumping 18 plants and other appurtenant structures; periodic replacement of erosion protection on the levees 19 and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape 20 maintenance. These activities would not affect natural gas wells or resource recovery. Therefore, the 21 operation and maintenance associated with the water conveyance facilities under Alternative 1A 22 would not have additional effects on access to or use of existing active wells, or accessing plugged 23 inactive wells. Operation and maintenance would not result in permanent covering or blockage of 24 any natural gas wells and no natural gas wells would be eliminated as a result of operation and 25 maintenance. Accordingly, there would be no adverse effect from operation and maintenance.

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

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

34 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1A would 35 primarily involve movement of water in infrastructure constructed under this alternative. These 36 water conveyance operations would not cause additional effects beyond those already addressed for 37 water facilities construction. Similarly, maintenance of the water conveyance facilities would include 38 routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate pumping 39 plants and other appurtenant structures; periodic replacement of erosion protection on the levees 40 and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape 41 maintenance. These activities would not affect natural gas fields and therefore would not cause 42 effects that have not already been addressed related to construction of water conveyance facilities. 43 Operation and maintenance activities associated with the water conveyance facilities would not

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

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 12 **NEPA Effects:** Operations and access to natural gas wells would be affected where wells are located
- 13 in restoration areas to be inundated under CM4 Tidal Natural Communities Restoration, CM5
- 14 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. Natural gas
- 15 wells can remain productive in flooded areas, but they require modification, which could include
- 16 construction of a protective cage and platform above the well (Federal Emergency Management
- Agency n.d.). The few producing wells that are currently in inundated areas of the Delta are located
 where flooding is seasonal. With permanent inundation, modification and maintenance of wells may
 not be cost effective. It is likely that any producing wells in proposed permanent inundation areas in
 ROAs would need to be abandoned because modifications to these wells would not be feasible.
- 21 There are approximately 233 active wells within ROAs (Table 26-6); an unknown percentage of
- these wells in inundation areas would likely be abandoned. Specific inundation areas have not been
- identified in association with CM2–CM21 of the BDCP at this time.

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/	San Joaquin	2	31,063
Mokelumne	Total	2	31,063
	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

24 Table 26-6. Natural Gas Wells in ROAs

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

25

26 The inundation that would occur under CM4, CM5, and CM10 could take place in the Cache Slough,

- 27 Cosumnes/Mokelumne, South Delta, Suisun Marsh, and West Delta ROAs, which lie in Solano, Yolo,
- 28 San Joaquin, Contra Costa, and Sacramento Counties (Figure 24-5 in Chapter 24, *Hazards and*

- 1 *Hazardous Materials*, and Table 26-6). The number of active wells directly affected would vary,
- 2 depending on the specific lands inundated by these three conservation measures. The active wells
- 3 that would be affected could be maintained in place if they were in seasonally inundated locations.
- 4 In permanently flooded areas, the active wells could be replaced using conventional or directional
- 5 drilling techniques at a location outside the inundation zone to maintain production. The likelihood
- of this replacement would depend on the availability of land for lease and the cost of the new
 construction. If a large number of wells had to be abandoned and could not be redrilled, there could
- be a locally adverse effect related to permanent elimination of a substantial portion of a county's
- active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.
- Natural gas wells in areas that would remain uplands could remain operational and unaffected if
 they are avoided when restoration activities are implemented and access to the gas well can be
 maintained. Maintaining access to an oil or gas well is defined by DOC as (1) maintaining rig access
 to the well, and (2) not building over, or in close proximity to, the well (California Department of
 Conservation, Division of Oil, Gas, and Geothermal Resources 2007).
- *CEQA Conclusion*: The number of natural gas wells likely to be affected would be smaller than the
 potential maximum number in the study area because some wells may be relocated using
 conventional or directional drilling; however, there is potential to affect a locally significant number
 of wells. Consequently, this impact is considered significant. Because implementation of Mitigation
 Measure MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells
 will remain accessible after implementation of this alternative, this impact is significant and
 unavoidable.
- 22Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active23Natural Gas Wells to the Extent Feasible
- 24During final design of CM4, CM5, and CM10, the BDCP proponents will avoid permanent25inundation of or construction over active natural gas well sites where feasible taking into26consideration costs, logistics and project objectives in order to minimize the need for well27abandonment or relocation. This mitigation applies to three conservation measures: CM4 Tidal28Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM1029Nontidal Marsh Restoration.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

32 NEPA Effects: Direct, overlying access to natural gas fields would be lost in areas where some 33 conservation measures would permanently inundate new areas to create wetlands. Three of the 34 conservation measures—CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated 35 Floodplain Restoration, and CM10 Nontidal Marsh Restoration—would inundate land overlying 36 natural gas fields. Table 26-7 shows the proportion of the individual gas fields underlying individual 37 ROAs that would be inundated; these depends on the final footprints for these measures and would 38 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 39 outside the inundated areas using either conventional or directional drilling, although feasibility of 40 access would depend on the exact configuration of inundation and the availability of adjacent 41 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 42 moderate, there is potential for a locally adverse effect on access to natural gas fields because the

- 1 resource may be permanently covered (inundated) or otherwise become inaccessible to recovery.
- 2 Mitigation Measure MIN-6 is available to lessen this effect.

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

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

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

^a Natural gas field areas are based on administrative boundaries.

- ^b Values rounded to the nearest percent
- 4

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

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

4 Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to 5 Natural Gas Fields to the Extent Feasible

During final design of CM4, CM5, and CM10, the BDCP proponents will identify means to
maintain feasible drilling access to natural gas fields that could be adversely affected by
implementing CM4, CM5 and CM10. These could include preserving non-inundated lands either
over or adjacent to natural gas fields adequate in size to allow drilling to occur. These measures
will ensure that drilling access to natural gas fields is maintained to the greatest extent
practicable.

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

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

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

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

21 **NEPA Effects:** Alternative 1A would require large amounts of fill, aggregate, and cement for 22 construction of the numerous elements of the water conveyance facilities. The principal demands 23 for construction material would come from the five intakes with pumping plants and associated 24 facilities, the nearly 40 miles of concrete pipeline tunnels, and the forebays. Additional aggregate 25 would be required for construction of permanent and temporary roads and levees. An estimated 26 13,506,000 tons of aggregate would be required including about 5,149,000 tons of aggregate that 27 would be required for concrete including tunnels. This amount is equal to approximately 32% of the 28 permitted aggregate in Sacramento County or 6% of the permitted aggregate in the Stockton-Lodi P-29 C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate in these two 30 areas. This aggregate would be used over the construction period, spreading the effect over time. 31 Because the 50-year demand for aggregate already exceeds the existing permitted supplies in many 32 counties within which the conveyance facilities would be constructed, there would likely be an effect 33 on the availability of local aggregate supplies if the project were to rely solely on local resources, 34 (i.e., resources from one area, such as Sacramento County). However, if aggregate was sourced from 35 several local resources (such as Sacramento County, Stockton-Lodi, and Yuba City-Marysville) there 36 would not be a substantial depletion (loss of availability) of aggregate to meet the regional 50-year 37 demand. Sourcing from multiple locations is likely, considering that the alternative extends many 38 miles north-to-south and different portions of the project would be closer to individual local 39 resources (See Figure 26-1). Because there would not be a substantial depletion of aggregate 40 available to meet the regional 50-year demand, Alternative 1A would not substantially contribute to 41 the need for new aggregate resource development. Therefore, this effect would not be adverse.

- 1 Use of local material only would constitute an indirect effect in that it might reduce the life 2 expectancy of existing quarries, contribute to the need for new quarries to be permitted, and reduce 3 the availability of these building materials for other projects on a local basis. New aggregate 4 resources may be identified within existing MRZ-3 areas with additional study; identification of new 5 resources could expand the resource base during the construction period of the water conveyance 6 facilities. CGS estimates that there are 74 billion tons of non-permitted construction aggregate 7 resources in 31 aggregate study areas in the state (Clinkenbeard 2012). While not all these 8 resources may be mined because of social, environmental, or economic factors (e.g., resources may 9 be located near urban or environmentally sensitive areas, precluding their extraction), CGS states 10 that non-permitted aggregate resources are likely to be the primary resources that will meet 11 California's continuing demand (Clinkenbeard 2012).
- 12 Additionally, as described in Section 26.1.2.1, Aggregate Resources, some of the new aggregate 13 resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge 14 Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate, 15 respectively. Although these sites may not provide materials to the project, their capacities do 16 indicate that a single quarry could provide more than the required annual tonnage to the project and 17 still have capacity for many decades. Although regional values are not available, the statewide 18 decline in aggregate demand went from 246 million to 156.7 million and then to 127.5 million tons 19 (2007, 2008, and 2010, respectively), indicating that some unused capacity exists because of the 20 current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2010).
- 21 Alternatively, some sources outside the study area may be used to supply aggregate needs for BDCP 22 water conveyance facilities. Clinkenbeard (2012) notes that Yuba County exports about 70% of its 23 available aggregate to points outside its production region. Additionally, aggregate delivery by barge 24 from the San Francisco Bay is possible. The California State Lands Commission (2010:2–19) notes 25 several existing waterfront facilities in San Francisco Bay, San Pablo Bay, and Suisun Bay that could 26 deliver aggregate from that area to the study area. These areas provide additional aggregate 27 capacity over that of the immediate region and further reduce the project's impact on local and 28 regional aggregate resources. Also, as noted in Section 26.1, Environmental Setting/Affected 29 Environment, California imports large volumes of aggregate from Canada and Mexico, and a terminal 30 was recently constructed at the Port of Richmond to receive and distribute aggregate shipments. It 31 may be necessary or financially advantageous to purchase some of this imported aggregate if 32 specific aggregate supplies are insufficient at the local or regional level, although the analysis above 33 indicates that regional supply is sufficient. The Canadian and Mexican sites that are currently 34 providing the aggregate and rock are already permitted under their respective jurisdictions. 35 Consequently, no unanticipated environmental impacts would be generated by purchasing materials 36 that are already being mined and imported from these existing sites. Considering the level of local 37 and regional supplies available, the additional aggregate and rock demand of the BDCP would not be 38 sufficient to be substantially responsible for the development of new mines in Mexico or Canada. 39 Additionally, if federal funding is provided to the project, there might be restrictions on using 40 aggregate from outside the country because of the Buy America Act (see Section 26.2.1.1).
- The amount of borrow material required for Alternative 1A would be 13,500,000 cubic yards or 20,250,000 tons. Because there is limited excavation associated with this alternative, most of this borrow material would be developed from borrow pits adjacent to construction areas, nearby suitable locations, and some commercial sites. The use of this amount of borrow would not have an adverse effect because borrow is not defined as a mineral resource and it is developed locally and regionally on an as-needed basis.

- 1 **CEOA Conclusion:** The use of large amounts of construction-grade aggregate (estimated to be 2 equivalent to approximately 5% of the permitted aggregate from Sacramento County and the 3 Stockton-Lodi P-C Region) over the entirety of the construction period would not result in a 4 substantial depletion (loss of availability) of construction-grade aggregate within the six regional 5 aggregate production study areas surrounding the study area (Table 26-1), would not cause 6 remaining supplies to be inadequate for future development, and would not substantially contribute 7 to the need for the development of new aggregate resources. Consequently, although a substantial 8 amount of available aggregate material may be used under Alternative 1A, the impact would be less 9 than significant. No mitigation is required.
- 10 Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
- Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 15 NEPA Effects: The operation of the water conveyance facilities under Alternative 1A would include 16 moving water, both within infrastructure that would be constructed and within natural channels. 17 Adverse effects would only occur if operations prevented access to a locally important aggregate 18 resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area 19 where the alternative would operate. Accordingly, operations would not cover or block access to 20 existing mines or identified MRZs and there would be no effect. Similarly, routine facilities 21 maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road 22 work, and periodic replacement of erosion protection on the levees and embankments would not 23 cover or block access to existing mines or identified MRZs because there are no aggregate mines or 24 MRZs in the area where the alternative would operate. Additionally, operations and maintenance 25 would not increase the existing project footprint so they could not have any effect even if aggregate 26 mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance 27 facilities under Alternative 1A would not have effects on the availability of aggregate resource sites.
- *CEQA Conclusion*: Significant impacts could occur if operation and maintenance of water
 conveyance facilities resulted in loss of available locally important aggregate resource sites. The
 operation and maintenance of Alternative 1A would not have an impact on the availability of locally
 important aggregate resource sites because none exist within the areas affected by Alternative 1A
 operations and operations and maintenance would not increase the alternative's footprint. No
 mitigation is required.

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

36 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1A would include 37 moving water, within infrastructure that would be constructed and within natural channels. No 38 aggregate resources are required for operations so there would be no effect. Small amounts of 39 aggregate and riprap would be required for maintenance of structure foundations, levees, stream 40 banks, and access roads associated with major project features such as intakes and pumping plants. 41 These small amounts could be readily supplied by quarries in the region (Table 26-1) or those 42 currently in the process of permitting and development (Section 26.1.2.1, Aggregate Resources) 43 without affecting the overall availability of aggregate or the supply available for future development. Accordingly, operation and the use of a small amount of aggregate material for the maintenance of
 the water conveyance facilities under Alternative 1A is not an adverse effect.

3 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 4 resources because operation involves moving water through the conveyance infrastructure and no 5 aggregate resources are required for operations. A small amount of aggregate material would be 6 used for maintenance of Alternative 1A. The material would be used for maintenance of structure 7 foundations, levees, stream banks and access roads associated with major project features. The 8 small amount of aggregate used for maintenance would not substantially deplete permitted 9 aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas 10 currently in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the 11 region surrounding the study area. Operation and maintenance would not cause substantial 12 depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet 13 future demands and require developing new sources. Therefore this impact would be less than 14 significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

17 **NEPA Effects:** Implementation of conservation measures beyond CM1 that would have the potential 18 to affect important aggregate resource sites are those that would inundate large areas of land. Three 19 of the conservation measures would inundate large areas: CM4 Tidal Natural Communities 20 Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. 21 Table 26-8 lists two active mines in the ROAs. The mine in the Suisun Marsh ROA, however, is at the 22 north end of the ROA in an upland area that would not be affected by inundation. One aggregate 23 mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation 24 25 Measure MIN-11 is available to reduce this effect.

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

26 Table 26-8. Active Mines in ROAs

27

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

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

3 Depending on the location and extent of inundation to locally important aggregate material sites 4 in restoration efforts, the BDCP proponents shall consider various mitigation strategies to 5 mitigate significant impacts. Such strategies may include avoiding the affected sites and 6 choosing areas that will not impact such mines, directly or indirectly, or downsizing the area to 7 be restored and thereby reducing impacts to the affected mines to less than significant. The 8 BDCP proponents may also choose to purchase the permitted aggregate volume from mines 9 affected by restoration for construction use to ensure available aggregate will not be lost due to 10 construction of restoration sites. The resulting mined site(s) may then be considered for integration into the restoration design of any conservation measure that affects the site(s). For 11 12 example, the mined site(s) could be reshaped to provide aquatic or intertidal habitat of varying 13 depths and configurations. This mitigation applies to CM4, CM5, and CM10. For this latter 14 strategy, coordination would be initiated with the affected local county overseeing SMARA 15 regulation. Additionally, further CEQA review may be required prior to implementing the 16 integration of mined sites into the restoration design.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

19 **NEPA Effects:** CM2–CM21 that have the potential to reduce the availability of important aggregate 20 resources are those that would use aggregate resources in construction or maintenance. Four of the 21 conservation measures listed in Table 3-3 in Chapter 3, Description of Alternatives, have this 22 potential: CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Community Restoration, CM5 23 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. Aggregate and 24 riprap would be used for levee, berm, access road, and rock revetment construction, and rock would 25 be placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts 26 of aggregate and riprap 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 used over a period of years and would be expected to be within the capacity of 29 available resources of the study area and adjacent aggregate resource study areas discussed in 30 Section 26.1.2.1, Aggregate Resources, and identified in Table 26-1. There would be no depletion 31 (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies 32 to be inadequate for future development or to require development of new aggregate sources to 33 meet future demand. Therefore, the use of available aggregate material for the conservation 34 measures of Alternative 1A would not have an adverse effect.

35 **CEQA Conclusion:** CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 36 and access road construction, and placement of rock revetments or riprap for erosion control and 37 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 38 would be within the available resources of the study area or adjacent aggregate resource study areas 39 listed in Table 26-1. Because implementing conservation measures would not use an amount of 40 aggregate that would cause remaining supplies to be inadequate to meet future demands and 41 require developing new sources, this impact would be less than significant. No mitigation is 42 required.

126.3.3.3Alternative 1B—Dual Conveyance with East Alignment and2Intakes 1–5 (15,000 cfs; Operational Scenario A)

3 Alternative 1B would be similar to Alternative 1A except that the water routed from the north Delta 4 to the south Delta would be conveyed primarily through a canal along the east side of the Delta 5 instead of through pipelines/tunnels, and there would be no intermediate forebay. From an 6 intermediate pumping plant, water would be raised to an elevation allowing gravity to carry it 7 through a continuing canal to the new Byron Tract Forebay, adjacent to and south of Clifton Court 8 Forebay. Along the way, diverted water would travel under existing watercourses through culvert 9 siphons or tunnel siphons. CM2–CM21 would also be implemented under this alternative, and their 10 effects would be the same as under Alternative 1A. A detailed description of the alternative is 11 provided in Chapter 3, Description of the Alternatives, Section 3.5.3; a detailed depiction is provided 12 in Mapbook Figure M3-2 in Chapter 3.

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

15 **NEPA Effects:** The locations of producing natural gas wells within the Alternative 1B water 16 conveyance facilities construction footprint are shown in Figure 24-5 in Chapter 24, Hazards and 17 Hazardous Materials. Numbers of natural gas wells in the construction footprint and their total 18 average annual production are identified in Table 26-4, and individual wells are identified in 19 Appendix 26A, Natural Gas Wells. Producing wells in the study area are in Sacramento, San Joaquin, 20 Yolo, Solano and Contra Costa Counties. Two producing wells that would be affected by Alternative 21 1B are in San Joaquin County. In the construction footprint, producing wells are associated with the 22 conveyance canal and temporary construction work areas.

23 Because the two wells within the canal alignment would be permanently abandoned, construction of 24 Alternative 1B could result in reduced natural gas production in the study area. If new wells are 25 developed to replace those that are abandoned, loss of production would likely be only temporary. 26 Wells in the San Joaquin County portion of the study area represent a very minor percentage of the 27 county's average annual natural gas production. Affected wells in the construction footprint produce 28 less than 1% of the county's total annual natural gas production (Table 26-4). Even if both 29 producing wells in the Alternative 1B construction footprint were abandoned and not replaced with 30 new wells, the reduction in natural gas production would be minimal.

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

38 *CEQA Conclusion*: Although two natural gas wells within the canal alignment would be permanently
 39 abandoned, new wells could be developed to replace them and the loss would be temporary.
 40 Additionally, wells in the study area of San Joaquin County produce a very minor percentage of the

41 county's average annual natural gas production. Even if both producing wells in the Alternative 1B

- 42 construction footprint were abandoned and not replaced, the lost natural gas production would be
- 43 less than 1% of county natural gas production. Because this does not represent a substantial portion

- 1 of the county's natural gas wells or natural gas production, this impact would be less than 2 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

5 **NEPA Effects:** Construction of Alternative 1B conveyance facilities would permanently reduce the 6 land surface available for vertical extraction of natural gas from directly underlying gas fields. The 7 proportion of natural gas field area underlying the Alternative 1B permanent construction footprint 8 is small (approximately 13% of individual gas fields intersected) relative to the areal extent of 9 natural gas fields (Table 26-5). The reduction in unimproved land surfaces directly overlying gas 10 fields would not be adverse because most of the affected fields could be accessed from other 11 overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas 12 fields from a distance. There would be no permanent blockage of access to natural gas fields. 13 Therefore, there would be no long-term adverse effect on extraction capability from construction of 14 Alternative 1B.

- 15 Alternative 1B temporary work areas also overlie natural gas fields. Any temporary reduction in
- ability to extract natural gas during construction of conveyance facilities is considered minor
- because the effect on natural gas extraction would be small and temporary and there would be no
- 18 permanent blockage of access to natural gas fields. Accordingly, there would be no adverse effect.
- *CEQA Conclusion*: Although the Alternative 1B conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (approximately 13%). Additionally, the gas fields would continue to
 be accessible using standard directional drilling techniques, so there would be no permanent
 blockage of access to natural gas fields. Accordingly, this impact would be less than significant. No
 mitigation is required.

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

- 27 NEPA Effects: The operation of the water conveyance facilities under Alternative 1B would be 28 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except 29 that periodic maintenance of canal levees would be needed for Alternative 1B. Operation would not 30 result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated 31 as a result of operating the facilities. Similarly, as described under Alternative 1A, maintenance of 32 the water conveyance facilities would include routine activities that would not affect use of or access 33 to natural gas wells or resource recovery. Accordingly, there would be no adverse effect from 34 operation and maintenance.
- 35 *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative
 36 1B would not block access to natural gas wells, cause any wells to be abandoned, or reduce
 37 production. Accordingly, this impact would be less than significant. No mitigation is required.

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

- 40 *NEPA Effects:* The operation of the water conveyance facilities under Alternative 1B would be
- 41 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except

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

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

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

15 NEPA Effects: The conservation measures that would be implemented under Alternative 1B would 16 be the same as those under Alternative 1A. While inundation for permanent wetland creation under 17 CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, and 18 *CM10* Nontidal Marsh Restoration could potentially affect natural gas wells, the number of active 19 wells directly affected would vary, depending on the specific lands inundated by these three 20 conservation measures. In permanently flooded areas, the active wells could be replaced using 21 conventional or directional drilling techniques at a location outside the inundation zone to maintain 22 production. The likelihood of this replacement would depend on the availability of land for lease and 23 the cost of the new construction. If a large number of wells had to be abandoned and could not be re-24 drilled, there could be a locally adverse effect related to permanent elimination of a substantial 25 portion of a county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

- 32Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active33Natural Gas Wells to the Extent Feasible
- 34 Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

NEPA Effects: The conservation measures that would be implemented under Alternative 1B would
 be the same as those under Alternative 1A. Consequently, the impacts would also be the same as
 those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate
 access to portions of some natural gas fields. Although the overall extent of affected natural gas
 fields in the region is low to moderate, there is potential for a locally adverse effect on access to

natural gas fields because the resource may be permanently covered (inundated) or otherwise
 become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.

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

- 15Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to16Natural Gas Fields to the Extent Feasible
- 17 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 1B construction footprint of the water conveyance
 facilities, there would be no effect on the availability of aggregate resources.
- *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint for
 the water conveyance facilities, there would be no impact. No mitigation is required.

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

- 27 **NEPA Effects:** Alternative 1B would require large amounts of fill, aggregate, and cement for 28 construction of the numerous elements of the water conveyance facilities. The principal demands 29 for construction materials would come from construction of the five intakes with pumping plants 30 and associated facilities, 19 bridges, and the 49 miles of canal. Additional aggregate would be 31 required for access road and levee construction. An estimated 8,473,470 tons of aggregate would be 32 required for this alternative including about 2,580,000 tons of aggregate for concrete including 33 tunnels. This amount is equal to approximately 2% of the permitted aggregate in Sacramento 34 County, or 4% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to 35 about 3% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C 36 Region. The amount of aggregate needed for Alternative 1B is about 37% less than needed for 37 Alternative 1A; and Alternative 1A was judged to have no adverse effect on aggregate availability. 38 Similarly, Alternative 1B would not constitute an adverse effect on known aggregate resources or 39 aggregate availability to meet the regional 50-year demand.
- The amount of borrow material required for Alternative 1B would be 200,000,000 cubic yards, or
 approximately 350,000,000 tons distributed over four segments of the route. For the first segment

- 1 of the route, the fill would be nearly balanced cut and fill, so no extra fill would be needed. The
- 2 remaining three segments would require about 138,000,000 cubic yards, or approximately
- 3 207,000,000 tons. The use of this borrow material would not have an adverse effect because borrow
- 4 is developed locally and regionally on an as-needed basis and is not considered an important
- 5 mineral resource in California.

6 CEQA Conclusion: The use of large amounts of construction-grade aggregate (estimated to be 7 equivalent to 3% of the combined permitted aggregate in Sacramento County and the Stockton-Lodi 8 P-C Region) over the entirety of the construction period, would not result in a substantial depletion 9 (loss of availability) of construction-grade aggregate within the six regional aggregate production 10 study areas surrounding the study area (Table 26-1), would not cause remaining supplies to be 11 inadequate for future development, and would not substantially contribute to the need for the 12 development of new aggregate resources. Additionally, the amount of aggregate needed for 13 Alternative 1B would be about 37% less than that needed for Alternative 1A, and Alternative 1A was 14 judged to have no significant impact on aggregate availability. Accordingly, the impact of Alternative 15 1B would be less than significant. No mitigation is required.

- 16 Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
- 17 Consequently, the amount of borrow required for this alternative would not be a significant impact. 18 No mitigation is required
- 18 No mitigation is required.

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

21 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1B would include 22 moving water, within infrastructure that would be constructed and within natural channels. Adverse 23 effects would only occur if operations prevented access to a locally important aggregate resource 24 site; this is not expected to occur because there are no aggregate mines or MRZs in the area where 25 the alternative would operate. Accordingly, operations would not cover or block access to existing 26 mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance 27 activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and 28 periodic replacement of erosion protection on the levees and embankments would not cover or 29 block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in 30 the area where the alternative would operate. Additionally, operations and maintenance would not 31 increase the alternative's footprint so they could not have any effect even if aggregate mines or 32 MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under 33 Alternative 1B would not have effects on the availability of aggregate resource sites.

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

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

- 40 *NEPA Effects:* The operation of the water conveyance facilities under Alternative 1B would include
- 41 moving water, within infrastructure that would be constructed and within natural channels. No
- 42 aggregate resources are required for operations so there would be no effect. Small amounts of
- 43 aggregate and riprap would be required for maintenance of structure foundations, levees, stream

banks, and access roads associated with major project features such as intake and intermediate
pumping plants. These small amounts could be readily supplied by quarries in the region (Table 261) or those currently in the process of permitting and development (Section 26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply available for future
development. Accordingly, operation and the use of a small amount of aggregate material for the
maintenance of the water conveyance facilities under Alternative 1B is not an adverse effect.

7 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 8 resources because operation involves moving water through the conveyance infrastructure and no 9 aggregate resources are required for operations. A small amount of aggregate material would be 10 used for maintenance of Alternative 1B. The material would be used for maintenance of structure 11 foundations, levees, stream banks and access roads associated with major project features. The 12 small amount of aggregate used for maintenance would not substantially deplete permitted 13 aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas 14 currently in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the 15 region surrounding the study area. Operation and maintenance would not cause substantial 16 depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet 17 future demands and require developing new sources. Therefore this impact would be less than 18 significant. No mitigation is required.

19 Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and 20 MRZs) as a Result of Implementing CM2-CM21

21 **NEPA Effects:** Implementation of conservation measures beyond CM1 would be the same for 22 Alternative 1B as under Alternative 1A. Consequently, the effects of inundation under CM4, CM5, 23 and CM10 would be the same. There are no MRZs in the inundation footprints so there would be no 24 effect on them. Table 26-8 shows that there are two active mines in the ROAs. The upland mine in 25 the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in 26 Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this 27 aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this 28 effect.

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

36Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP37Construction

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

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

41 *NEPA Effects:* The conservation measures under Alternative 1B would be the same as those under
42 Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A.

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

12 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 13 and access road construction, and placement of rock revetments or riprap for erosion control and 14 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 15 would be within the available resources of the study area or adjacent aggregate resource study areas 16 listed in Table 26-1. Because implementing conservation measures would not use an amount of 17 aggregate that would cause remaining supplies to be inadequate to meet future demands and 18 require developing new sources, this impact would be less than significant. No mitigation is 19 required.

2026.3.3.4Alternative 1C—Dual Conveyance with West Alignment and21Intakes W1–W5 (15,000 cfs; Operational Scenario A)

22 The water supply facilities under Alternative 1C would be similar to those described for 1A with the 23 exception that the five intakes would be located on the west bank of the Sacramento River between 24 Clarksburg and Walnut Grove, rather than the east bank; the water would be conveyed from intakes 25 to the intermediate pumping plant via a canal on the western side of the Delta rather than a 26 pipeline/tunnel. There would be no intermediate forebay under this alternative. Water would be 27 carried south along the western side of the Delta to an intermediate pumping plant, then pumped 28 through a dual-bore tunnel to a continuing canal to the proposed Byron Tract Forebay immediately 29 northwest of Clifton Court Forebay. Along the conveyance route, diverted water would travel under 30 existing watercourses and one rail crossing through culvert siphons. A detailed description of the 31 alternative is provided in Chapter 3, Description of the Alternatives, Section 3.5.4; a depiction of the 32 physical components is provided in Mapbook Figure M3-3 in Chapter 3.

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

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

Because the four wells within the canal alignment would be permanently abandoned, construction
of Alternative 1C could result in reduced natural gas production in the study area. If new wells were

- 1 developed to replace those that were abandoned, loss of production would be temporary. Wells in
- 2 the construction footprint in Sacramento County produce approximately 6% of the county's annual
- 3 natural gas production. Even if all producing wells in the construction footprint were abandoned
- 4 and not replaced with new wells, the lost natural gas production would not represent a substantial
- 5 portion of county, regional, or statewide natural gas production or eliminate a substantial portion of
- 6 the county's natural gas wells. There would be no wells affected by temporary construction work
- 7 areas. Accordingly, there would not be an adverse effect.
- 8 Abandonment and avoidance measures would be implemented in accordance with state regulations
- 9 and guidance. A summary of laws and regulations related to well abandonment is provided in
- 10 Chapter 24, *Hazards and Hazardous Materials*, Sections 24.2.2.11 and 24.2.2.12.
- 11 CEQA Conclusion: Even if all natural gas wells within the physical footprint of Alternative 1C had to 12 be abandoned, the resultant loss would amount to approximately 6% of Sacramento County's annual 13 natural gas production. Because this amount is not a substantial proportion of natural gas 14 production on a county, regional, or statewide basis, and a substantial portion of the county's 15 natural gas wells would not be eliminated, this impact would be less than significant. No mitigation 16 is required.

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

- 19 NEPA Effects: Construction of Alternative 1C conveyance facilities would permanently reduce the 20 land surface available for vertical extraction of natural gas from directly underlying gas fields. The 21 proportion of natural gas field area underlying the Alternative 1C permanent construction footprint 22 is small (approximately 5% of the gas fields intersected) relative to the areal extent of natural gas 23 field areas (Table 26-5). The reduction in unimproved land surfaces directly overlying gas fields 24 would not be adverse because most of the affected fields could be accessed from other overlying 25 areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields 26 from a distance. Therefore, there would be no long-term substantial loss of availability of extraction 27 potential from construction of Alternative 1C, and there would be no adverse effect.
- Alternative 1C temporary work areas also overlie natural gas fields. Any temporary reduction in
 ability to extract natural gas during construction of conveyance facilities is considered minor.
 Because the effect on natural gas extraction would be small and temporary and would not prevent
 recovery of the resource, there would not be an adverse effect.
- 32 *CEQA Conclusion*: Although the Alternative 1C conveyance facilities would reduce the land surface 33 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas 34 fields affected would be small (approximately 5%). Additionally, the gas fields would continue to be 35 accessible using conventional or directional drilling techniques. There would be no substantial loss 36 of existing production or permanent loss of access to the resource. Accordingly, this impact would 37 be less than significant. No mitigation is required.

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

NEPA Effects: The operational of the water conveyance facilities under Alternative 1C would be
 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except
 that periodic maintenance of canal levees would be needed for Alternative 1C. Operation would not

- 1 result in covering or blockage of any natural gas wells and no natural gas wells would be eliminated
- 2 as a result of operations. Similarly, as described under Alternative 1A, maintenance of the water
- 3 conveyance facilities would include routine activities that would not affect use of or access to
- 4 natural gas wells or resource recovery. Accordingly, there would be no adverse effect from
- 5 operation and maintenance.
- *CEQA Conclusion*: Operation and maintenance of the water conveyance facilities under Alternative
 1C would not block access to natural gas wells, cause any wells to be abandoned, or reduce
 production. Accordingly, there would be no impact. No mitigation is required.

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

- *NEPA Effects:* The operation of the water conveyance facilities under Alternative 1C would be
 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except
 that periodic maintenance of canal levees along the two canal segments would be needed for
 Alternative 1C. Operation and maintenance activities associated with the water conveyance facilities
 would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the
 operation and maintenance associated with Alternative 1C would not have an adverse effect on
 production or access to underlying natural gas fields.
- *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative
 1C would have no impact on access to underlying natural gas fields because operation primarily
 involves movement of water in infrastructure constructed under this alternative. Maintenance
 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.
 Operation and maintenance activities would not obstruct access to natural gas fields and would not
 interfere with recovering the resource. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 26 **NEPA Effects:** The conservation measures that would be implemented under Alternative 1C would 27 be the same as those under Alternative 1A. While inundation for permanent wetland creation under 28 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly 29 affected would vary, depending on the specific lands inundated by these three conservation 30 measures. In permanently flooded areas, the active wells could be replaced using conventional or 31 directional drilling techniques at a location outside the inundation zone to maintain production. The 32 likelihood of this replacement would depend on the availability of land for lease and the cost of the 33 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there 34 could be a locally adverse effect related to permanent elimination of a substantial portion of a 35 county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.
- 36 **CEQA Conclusion:** Although the number of natural gas wells likely to be affected may be a small 37 percentage of the total wells in the study area, and some wells may be relocated using conventional 38 or directional drilling, there is potential to affect a locally significant number of wells. Consequently, 39 this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot 40 assure that all or a substantial portion of a county's existing natural gas wells will remain accessible 41 after implementation of this alternative, this impact is significant and unavoidable.

- Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid 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.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

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.

Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain 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.

Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and 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 1C 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 the water conveyance facilities, there would be no impact. No mitigation is required.

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

- 37 **NEPA Effects:** Alternative 1C would require large amounts of fill, aggregate, and cement for
- 38 construction of the numerous elements of the water conveyance facilities. The principal demands
- 39 for construction materials would come from construction of the five intakes with pumping plants
- 40 and associated facilities, the bridges, the 16 miles of canal, and the 17 miles of concrete-lined tunnel.

- 1 Additional aggregate would be required for access road and levee construction. An estimated
- 2 12,009,807 tons of aggregate would be required for this alternative including about 4,000,000 tons
- 3 for concrete including tunnels. This amount is equal to approximately 29% of the permitted
- 4 aggregate in Sacramento County, or approximately 5% of the permitted aggregate in the Stockton-
- 5 Lodi P-C Region (Table 26-1). This amount is less than 5% of the permitted aggregate in Sacramento
- 6 County and the Stockton-Lodi P-C Region combined. The amount of aggregate needed for
 7 Alternative 1C would be about 11% less than that needed for Alternative 1A; and Alternative 1A was
- judged to have no adverse effect on aggregate availability. Similarly, Alternative 1C would not
- 9 constitute an adverse effect on known aggregate resources or aggregate availability to meet the
- 10 regional 50-year demand.
- 11 The amount of borrow material required for Alternative 1C would be 200,000,000 cubic yards, or 12 approximately 350,000,000 tons. However, for the first segment of the route the fill would be nearly 13 balanced cut and fill, so only an estimated 10% of the needed fill on this segment, or approximately 14 12,000,000 tons, would come from borrow sites away from the canal route. The second segment of 15 this conveyance route is the tunnel; it would require very small amounts of borrow for road 16 construction. In the third segment (the southernmost canal segment), excavated material would 17 significantly exceed the borrow needs. In total, about 12,000,000 tons of borrow from outside the 18 immediate alternative footprint would be required for this alternative. The use of this borrow 19 material would not have an adverse effect because borrow is developed locally and regionally on an 20 as-needed basis and is not considered a significant mineral resource in California.
- 21 **CEQA Conclusion:** The use of large amounts of construction-grade aggregate (estimated to be less 22 than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C 23 Region) over the entirety of the construction period would not result in a substantial depletion (loss 24 of availability) of construction-grade aggregate within the six regional aggregate production study 25 areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate 26 for future development, and would not contribute to the need for development of new aggregate 27 resources. The amount of aggregate use in Alternative 1C would be about 11% less than that needed 28 for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate 29 availability. Consequently, the impact of Alternative 1C would be less than significant. No mitigation 30 is 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.

34Impact MIN-9: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and35MRZs) as a Result of Operation and Maintenance of the Water Conveyance Facilities

36 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1C would include 37 moving water, within infrastructure that would be constructed and natural channels. Adverse effects 38 would only occur if operations prevented access to a locally important aggregate resource site; this 39 is not expected to occur because there are no aggregate mines or MRZs in the area where the 40 alternative would operate. Accordingly, operations would not cover or block access to existing 41 mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance 42 activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and 43 periodic replacement of erosion protection on the levees and embankments would not cover or 44 block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in

- 1 the area where the alternative would operate. Additionally, operations and maintenance would not
- 2 increase the alternative's footprint so they could not have any effect even if aggregate mines or
- 3 MRZs did exist. Accordingly, the operation and maintenance of the water conveyance facilities under
- 4 Alternative 1C would not have effects on the availability of aggregate resource sites.
- *CEQA Conclusion:* The operation and maintenance associated with Alternative 1C would have no
 impact on the availability of locally important aggregate resource sites because none exist within the
 areas affected by Alternative 1C operations, and operations and maintenance would not increase the
 alternative's footprint. No mitigation is required.

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

- 11 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1C would include 12 moving water, within infrastructure that would be constructed and natural channels. No aggregate 13 resources are required for operations so there would be no effect. Small amounts of aggregate and 14 riprap would be required for maintenance of structure foundations, levees, stream banks, and access 15 roads associated with major project features such as intake and intermediate pumping plants. These 16 small amounts could be readily supplied by quarries in the region (Table 26-1) or those currently in 17 the process of permitting and development (Section 26.1.2.1, Aggregate Resources) without affecting 18 the overall availability of aggregate or the supply available for future development. Accordingly, 19 operation and the use of a small amount of aggregate material for the maintenance of the water 20 conveyance facilities under Alternative 1C is not 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 1C. The material would be used for maintenance of structure 25 foundations, levees, stream banks and access roads associated with major project features. The 26 small amount of aggregate used for maintenance would not substantially deplete permitted 27 aggregate resources in the six aggregate production study areas (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.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

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

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

- 8 Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP
 9 Construction
- 10 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

13 NEPA Effects: The conservation measures under Alternative 1C would be the same as those under 14 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. 15 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 16 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time because of the 17 18 programmatic nature and general design of the conservation measures. However, the amount 19 needed would be used over a period of years and would be expected to be within the available 20 resources of the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, 21 Aggregate Resources and identified in Table 26-1. There would be no depletion (loss of availability) 22 of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for 23 future development or to require development of new aggregate sources to meet future demand. 24 Therefore, the use of available aggregate materials for the conservation measures of Alternative 1C 25 would not cause an adverse effect.

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

3326.3.3.5Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five34Intakes (15,000 cfs; Operational Scenario B)

35 Alternative 2A is the same as Alternative 1A except for operational changes associated with water 36 management and possible changes in the locations of two intake structures and associated pumping 37 plants and pipelines. The operational differences would have no effect on access to or availability of 38 natural gas or aggregates. Additionally, under Alternative 2A, an operable barrier with boat lock 39 would be built at the head of Old River (at its confluence with the San Joaquin River), and would 40 require approximately 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of 41 riprap for slope protection on levees and on the channel bottom, which would use aggregate 42 resources.

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

3 **NEPA Effects:** The conveyance facilities associated with Alternative 2A are the same as those under 4 Alternative 1A except for possible changes in intake locations and associated pumping plant and 5 pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 6 and 7 are selected, some of the conveyance pipelines and the initial tunnel between the intake 7 pumping plants and the intermediate forebay would be adjusted. However, the alternate intake 8 locations would not change the effects on natural gas wells. Because of the relatively few (six) 9 producing wells within the Alternative 2A construction footprint, which account for only a small 10 percentage of county annual production, the loss would not represent a substantial portion of the 11 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, 12 13 following applicable state regulations and guidance. A summary of laws and regulations related to 14 well abandonment is provided in Chapter 24, Hazards and Hazardous Materials, Sections 24.2.2.11 15 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

23 **NEPA Effects:** The conveyance facilities associated with Alternative 2A are the same as those under 24 Alternative 1A except for changes in intake locations and pumping plant locations. Currently, 25 Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 and 7 are selected, some of the 26 conveyance pipelines and the initial tunnel between the intake pumping plants and the intermediate 27 forebay would be adjusted. However, the alternate intake locations would not change the effects on 28 extraction potential from natural gas fields. The reduction in unimproved land surfaces directly 29 overlying gas fields would not be an adverse effect because most of the affected fields could be 30 accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques 31 could enable access to gas fields from a distance. Therefore, as in the discussion of Alternative 1A 32 above, Alternative 2A would have no long-term adverse effects 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 2A 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.

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

- *NEPA Effects:* As under Alternative 1A, the operation of the water conveyance facilities under
 Alternative 2A is primarily associated with movement of water within infrastructure and
 maintenance of water conveyance facilities. Routine maintenance activities would not affect natural
 gas wells or resource recovery. Operation and maintenance would not have effects on access to or
 use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would
 not result in permanent covering or blockage of any natural gas wells and no natural gas wells
 would be eliminated as a result of operation and maintenance. Accordingly, there would be no effect.
- *CEQA Conclusion:* The operation and maintenance of the water conveyance facilities under
 Alternative 2A would have no impact on access to locally important natural gas wells, either for
 operating and maintaining existing active wells, or modifying plugged inactive wells, because
 operation and routine maintenance such as painting, cleaning, repairs, levee and landscape
 maintenance and similar activities would not cause the abandonment of wells, eliminate access to
 wells, or reduce production. No mitigation is required.

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 2A 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 of the water conveyance facilities would 22 include routine activities such as painting, cleaning, and repairs to intakes, intake and intermediate 23 pumping plants and other appurtenant structures; periodic replacement of erosion protection on 24 the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and 25 landscape maintenance. These activities would not affect natural gas fields and therefore would not 26 cause impacts that have not already been addressed related to construction of water conveyance 27 facilities. Operation and maintenance activities associated with the water conveyance facilities 28 would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the 29 operation and maintenance of Alternative 2A would not have an adverse effect on production or 30 access to (availability of) underlying natural gas fields.
- 31 **CEQA Conclusion:** Operations primarily involve movement of water in infrastructure constructed 32 under this alternative and would not interfere with recovering the resource. Routine maintenance 33 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would 34 also have no impact on access to underlying natural gas fields. The operation and maintenance of the 35 water conveyance facilities under Alternative 2A would not obstruct access to natural gas fields, or 36 reduce production or the ability to recover the resource. Accordingly, there would be no impact. No 37 mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- *NEPA Effects:* The conservation measures that would be implemented under Alternative 2A would
 be the same as those under Alternative 1A. While inundation for permanent wetland creation under
 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly
- 43 affected would vary, depending on the specific lands inundated by these three conservation

measures. In permanently flooded areas, the active wells could be replaced using conventional or directional drilling techniques at a location outside the inundation zone to maintain production. The likelihood of this replacement would depend on the availability of land for lease and the cost of the new construction. If a large number of wells had to be abandoned and could not be re-drilled, there could be a locally adverse effect related to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

13 14

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

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

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

25 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 26 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 27 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 28 outside the inundated areas using either conventional or directional drilling, although feasibility of 29 access would depend on the exact configuration of inundation and the availability of adjacent 30 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 31 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 32 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 33 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 34 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of 35 existing natural gas fields will remain accessible after implementation of this alternative, this impact 36 is significant and unavoidable.

37Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to38Natural Gas Fields to the Extent Feasible

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

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

- Because there are no permitted resource extraction mines (including aggregate mines) and no
 identified MRZs in the Alternative 2A construction footprint of the water conveyance facilities, there
 would be no effect on the availability of aggregate resources.
- *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 there would be no impact. No mitigation is required.

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 2A would be the 11 same as that under Alternative 1A except for potential minor changes associated with construction 12 of piping for Intakes 6 and 7 rather than 4 and 5. The piping for Intakes 6 and 7 would be slightly longer than the piping for Intakes 4 and 5, so there would be a slightly higher demand for aggregate. 13 14 The construction of an operable barrier at the head of Old River would also require a minor 15 additional amount of aggregate, but not enough to substantially increase demand. The amount of 16 aggregate needed for construction would be approximately 13,506,000 tons, or approximately 5% of the combined permitted aggregate resources in Sacramento County and the Stockton-Lodi P-C 17 18 Region. As in the discussion of Alternative 1A, demand for aggregate resources over the life of the 19 construction period under Alternative 2A would not require a substantial depletion of aggregate 20 available to meet the regional 50-year demand, and would not substantially contribute to the need 21 for new aggregate resource development. Therefore, this effect would not be adverse.
- The amount of borrow material needed to construct Alternative 2A is expected to be similar to that for Alternative 1A. Because borrow is developed locally and regionally on an as-needed basis and is not considered an important mineral resource in California, there would be no effect associated with its use.
- 26 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be 27 equivalent to approximately 5% of the permitted aggregate in Sacramento County and the Stockton-28 Lodi P-C Region combined) over the entirety of the construction period would not result in a 29 substantial depletion (loss of availability) of construction-grade aggregate within the six regional 30 aggregate production study areas within the study area (Table 26-1), would not cause remaining 31 supplies to be inadequate for future development, and would not contribute to the need for 32 development of new aggregate resources. Consequently, although a substantial amount of available 33 aggregate material may be used under Alternative 2A, the impact would be less than significant. No 34 mitigation is required.
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 40 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2A would include
- 41 moving water, both within infrastructure that would be constructed and within natural channels.
- 42 Adverse effects would only occur if operations prevented access to a locally important aggregate

- 1 resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area
- 2 where the alternative would operate. Accordingly, operations would not cover or block access to
- 3 existing mines or identified MRZs and there would be no effect. Similarly, routine facilities
- 4 maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road
- 5 work, and periodic replacement of erosion protection on the levees and embankments would not
- cover or block access to existing mines or identified MRZs because there are no aggregate mines or
 MRZs in the area where the alternative would operate. Additionally, operations and maintenance
- 8 would not increase the existing project footprint so they could not have any effect even if aggregate
- 9 mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance
- 10 facilities under Alternative 2A would not have effects on the availability of aggregate resource sites
- 11 *CEQA Conclusion*: The operation and maintenance associated with Alternative 2A would have no 12 impact on the availability of locally important aggregate resource sites because none exists within 13 the areas affected by Alternative 2A operations; and operations and maintenance would not 14 increase the alternative's footprint. No mitigation is required.

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

- 17 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2A would include 18 moving water, both within infrastructure that would be constructed and natural channels. No 19 aggregate resources are required for operations so there would be no effect. Small amounts of 20 aggregate and riprap would be required for maintenance of structure foundations, levees, stream 21 banks, and access roads associated with major project features such as intakes, pumping plants, and 22 the head of Old River barrier. These small amounts could be readily supplied by quarries in the 23 region (Table 26-1) or those currently in the process of permitting and development (Section 24 26.1.2.1, Aggregate Resources) without affecting the overall availability of aggregate or the supply 25 available for future development. Accordingly, operation and the use of a small amount of aggregate 26 material for the maintenance of the water conveyance facilities under Alternative 2A is not an 27 adverse effect.
- 28 **CEOA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 29 resources because operation involves moving water through the conveyance infrastructure and no 30 aggregate resources are required for operations. A small amount of aggregate material would be 31 used for maintenance of the water conveyance facilities under Alternative 2A. The material would 32 be used for maintenance of levees, stream banks, access roads associated with major project 33 features, and structure foundations. Operation and maintenance would not cause substantial 34 depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet 35 future demands and require developing new sources. Therefore this impact would be less than 36 significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

- 39 **NEPA Effects:** Implementation of conservation measures beyond CM1 would be the same for
- 40 Alternative 2A as they would be for Alternative 1A. Consequently, the effects of these conservation
- 41 measures would be the same. Table 26-8 lists two active mines in the ROAs. The upland mine in the
- 42 Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure
- 43 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and loss of this

aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to reduce this
 effect.

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

9 Mitigation Measure MIN-11 is designed to reduce the impact to a less-than-significant level.

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

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

13 Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of 14 Implementing CM2-CM21

15 **NEPA Effects:** The conservation measures under Alternative 2A would be the same as those under 16 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. 17 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 18 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 19 aggregate necessary for these activities cannot be calculated at this time because of the 20 programmatic nature and general design of the conservation measures. However, the amount 21 needed would be expected to be within the available resources of the study area or adjacent 22 aggregate resource study areas as discussed in Section 26.1.2.1, Aggregate Resources and identified 23 in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies 24 substantial enough to cause remaining supplies to be inadequate for future development or to 25 require development of new aggregate sources to meet future demand. Therefore, the use of 26 available aggregate materials for the conservation measures of Alternative 2A would not have an 27 adverse effect.

28 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 29 and access road construction, and placement of rock revetments or riprap for erosion control and 30 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 31 would be within the available resources of the study area or adjacent aggregate resource study areas 32 listed in Table 26-1. Because implementing conservation measures would not use an amount of 33 aggregate that would cause remaining supplies to be inadequate to meet future demands and 34 require developing new sources, this impact would be less than significant. No mitigation is 35 required.

3626.3.3.6Alternative 2B—Dual Conveyance with East Alignment and Five37Intakes (15,000 cfs; Operational Scenario B)

Alternative 2B is the same as Alternative 1B except for operational changes associated with water
 management and possible changes in the locations of two intake structures and associated pumping
 plants and pipelines. The changed water management would have no effect on access to or
 availability of natural gas or aggregates. Under Alternative 2B, an operable barrier with boat lock

42 would be built at the head of Old River (at its confluence with the San Joaquin River), and would

- 1 require approximately 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of
- 2 riprap for slope protection on levees and on the channel bottom, which would use aggregate
- 3 resources.

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

6 **NEPA Effects:** The water conveyance facilities (primarily canals) associated with Alternative 2B are 7 the same as those under Alternative 1B except for possible changes in intake locations and 8 associated pumping plant and pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are 9 being considered. If Intakes 6 and 7 are selected, some of the conveyance pipelines and the initial 10 canal between the intake pumping plants and the intermediate pumping plant would be adjusted. However, the alternate intake locations would not change the effects on natural gas wells. Two 11 12 producing wells in San Joaquin County would be affected by the conveyance canal and temporary 13 construction work areas. Because there are relatively few (two) producing wells within the 14 construction footprint, the loss of these wells would not eliminate a substantial portion of the 15 county's natural gas wells or natural gas production, and therefore would not constitute an adverse 16 effect. Both producing wells within the construction footprint would be permanently abandoned in 17 coordination with DOC, following applicable state regulations and guidance. A summary of laws and 18 regulations related to well abandonment is provided in Chapter 24, Hazards and Hazardous 19 Materials, Sections 24.2.2.11 and 24.2.2.12.

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

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

- 29 NEPA Effects: The conveyance facilities associated with Alternative 2B are the same as those under 30 Alternative 1B except for possible changes in intake locations and associated pumping plant and 31 pipeline locations. Currently, Intakes 1–5 or Intakes 1–3, 6, and 7 are being considered. If Intakes 6 32 and 7 are selected, some of the conveyance pipelines and the initial canal between the intake 33 pumping plants and the intermediate pumping plant would be adjusted. However, the alternate 34 intake locations would not change the effects on extraction potential from natural gas fields. The 35 reduction in unimproved land surfaces directly overlying gas fields would not be adverse because 36 most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard 37 directional drilling techniques could enable access to gas fields from a distance.
- 38 Alternative 2B temporary work areas also overlie natural gas fields. Any temporary reduction in
- 39 ability to extract natural gas during construction of conveyance facilities is considered minor
- 40 because the effect on natural gas extraction would be small and temporary and there would be no
- 41 permanent blockage of access to natural gas fields.

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

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

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

12 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2B would be 13 similar to that under Alternative 2A and would primarily involve movement of water in 14 infrastructure constructed under this alternative. These water conveyance operations would not 15 cause additional effects beyond those already addressed for water facilities construction. Operation would not result in covering or blockage of any natural gas wells and no natural gas wells would be 16 17 eliminated as a result of operating the facilities. The facilities maintenance activities needed for 18 Alternative 2B would also be similar to Alternative 1B. Routine maintenance of the water 19 conveyance facilities and periodic maintenance of canal levees would not affect use of or access to 20 natural gas wells or resource recovery. Accordingly, there would be no adverse effect from 21 operation and maintenance.

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

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

- 27 NEPA Effects: The operation of the water conveyance facilities under Alternative 2B would be 28 similar to Alternative 2A and primarily involve movement of water in infrastructure constructed 29 under this alternative. These water conveyance operations would not cause additional effects 30 beyond those already addressed for water facilities construction. Similarly, maintenance activities 31 would not cause effects that have not already been addressed related to construction of water 32 conveyance facilities. Operation and maintenance activities associated with the water conveyance 33 facilities would not eliminate natural gas fields or block access to supplies of natural gas. 34 Accordingly, the operation and maintenance associated with Alternative 2B would not have an
- 35 adverse effect on production or access to underlying natural gas fields.
- 36 **CEQA Conclusion:** The operation and maintenance associated with the water conveyance facilities 37 under Alternative 2B not would not eliminate natural gas fields or block access to supplies of natural 38 gas because operation primarily involves movement of water in infrastructure constructed under 39 this alternative. Maintenance activities similarly would not would not eliminate natural gas fields or 40 block access to supplies of natural gas. Operation and maintenance activities would not obstruct 41 access to natural gas fields and would not interfere with recovering the resource. Accordingly, there 42 would be no impact. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 3 **NEPA Effects:** The conservation measures that would be implemented under Alternative 2B would 4 be 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. Mitigation Measure MIN-5 is available to address this effect.
- 12 CEQA Conclusion: Although the number of natural gas wells likely to be affected may be a small 13 percentage of the total wells in the study area, and some wells may be relocated using conventional 14 or directional drilling, there is potential to affect a locally significant number of wells. Consequently, 15 this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot 16 assure that all or a substantial portion of a county's existing natural gas wells will remain accessible 17 after implementation of this alternative, this impact is significant and unavoidable.

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

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

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

30 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 31 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 32 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 33 outside the inundated areas using either conventional or directional drilling, although feasibility of 34 access would depend on the exact configuration of inundation and the availability of adjacent 35 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 36 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 37 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 38 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 39 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a 40 county's existing natural gas fields will remain accessible after implementation of this alternative,

41 this impact is significant and unavoidable.

Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain 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.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 2B construction footprint of the water conveyance
 facilities, there would be no effect on the availability of aggregate resources.
- 9 *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint for
 10 the water conveyance facilities, there would be no impact. No mitigation is required.

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

- 13 **NEPA Effects:** The demand for aggregate resources associated with Alternative 2B would be the 14 same as under Alternative 1B except for potential minor changes associated with construction of 15 piping for Intakes 6 and 7 rather than Intakes 4 and 5. The piping for Intakes 6 and 7 would be 16 slightly longer than the piping for Intakes 4 and 5, so there would be a higher demand for aggregate. 17 The construction of the operable barrier at the head of Old River would also require a minor 18 additional amount of aggregate, but not enough to meaningfully increase demand. The amount of 19 aggregate needed for construction would exceed 8,473,470 tons, which would represent 20 approximately 3% of the combined permitted aggregate resources in Sacramento County and the 21 Stockton-Lodi P-C Region. As in the discussion of Alternative 1B, the amount of aggregate needed is 22 less than that needed for Alternative 1A, and Alternative 1A was judged to have no adverse effect on 23 aggregate availability. Similarly, Alternative 2B demand would not be considered an adverse effect 24 on the availability of known aggregate resources over the life of the construction period, or 25 aggregate availability to meet the regional 50-year demand.
- The amount of borrow material needed to construct Alternative 2B is expected to be similar to that
 for Alternative 1B. Because borrow is not defined as a mineral resource, there would be no effect
 associated with its use.
- 29 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be 30 equivalent to approximately 3% of the permitted aggregate from Sacramento County and the 31 Stockton-Lodi P-C Region) over the entirety of the construction period would not result in a 32 substantial depletion (loss of availability) of construction-grade aggregate within the six regional 33 aggregate production study areas surrounding the study area, would not cause remaining supplies 34 to be inadequate for future development, and would not substantially contribute to the need for the development of new aggregate resources. Accordingly, although a substantial amount of available 35 36 aggregate material may be used under Alternative 2B, the impact would be less than significant. No 37 mitigation is required.
- 38 Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
- 39 Consequently, the amount of borrow required for this alternative would not be a significant impact.
- 40 No mitigation is required.

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

3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2B would include 4 moving water, both within infrastructure that would be constructed and natural channels. Adverse 5 effects would only occur if operations prevented access to a locally important aggregate resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area where 6 7 the alternative would operate. Accordingly, operations would not cover or block access to existing 8 mines or identified MRZs and there would be no effect. Similarly, routine facilities maintenance 9 activities such as painting, cleaning, and structure repair, landscape maintenance, road work, and 10 periodic replacement of erosion protection on the levees and embankments would not cover or 11 block access to existing mines or identified MRZs because there are no aggregate mines or MRZs in 12 the area where the alternative would operate. Additionally, operations and maintenance would not 13 increase the alternative's footprint so they could not have any effect even if aggregate mines or 14 MRZs did exist. Accordingly, the operational components of the water conveyance facilities under 15 Alternative 2B would not have effects on the availability of aggregate resource sites.

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

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

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

29 **CEOA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 30 resources because operation involves moving water through the conveyance infrastructure and no 31 aggregate resources are required for operations. A small amount of aggregate material would be 32 used for maintenance of the water conveyance facilities under Alternative 2B. The material would be 33 used for maintenance of levees, stream banks, access roads, structure foundations, and the head of 34 Old River barrier. The small amount of aggregate used for maintenance of operational components 35 would not substantially deplete permitted aggregate resources in the six aggregate production study 36 areas surrounding the study area, would not cause loss of availability, and would not cause 37 remaining supplies to be inadequate to meet future demands and require developing new sources. 38 Therefore this impact would be less than significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

NEPA Effects: Implementation of conservation measures beyond CM1 would be the same for
Alternative 2B as under Alternative 1A. Consequently, the effects of inundation under CM4, CM5,
and CM10 would be the same. Table 26-8 shows that there are two active mines in the ROAs. The

1 upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc.

- depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and
 loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to
- 4 reduce this effect.

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

- Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP
 Construction
- 14 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

15 Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of 16 Implementing CM2-CM21

17 NEPA Effects: The conservation measures under Alternative 2B would be the same as those under 18 Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. 19 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 20 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 21 aggregate necessary for these activities cannot be calculated at this time because of the 22 programmatic nature and general design of the conservation measures. However, the amount 23 needed would be expected to be within the available resources of the study area or adjacent 24 aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and identified in 25 Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies 26 substantial enough to cause remaining supplies to be inadequate for future development or to 27 require development of new aggregate sources to meet future demand. Therefore, the use of 28 available aggregate materials for the conservation measures of Alternative 2B would not have an 29 adverse effect.

30 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 31 and access road construction, and placement of rock revetments or riprap for erosion control and 32 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 33 would be within the available resources of the study area or adjacent aggregate resource study areas 34 listed in Table 26-1. Because implementing conservation measures would not use an amount of 35 aggregate that would cause remaining supplies to be inadequate to meet future demands and 36 require developing new sources, this impact would be less than significant. No mitigation is 37 required.

3826.3.3.7Alternative 2C—Dual Conveyance with West Alignment and39Intakes W1–W5 (15,000 cfs; Operational Scenario B)

Alternative 2C is the same as Alternative 1C except for operational changes associated with water
 management, and the construction of an operable barrier with boat lock at the head of Old River (at
 its confluence with the San Joaquin River). The different operations would have no effect on access

- 1 to or availability of natural gas or aggregates. The operable barrier would require approximately
- 2 1,500 cubic yards of concrete and 11,000 square feet (450 linear feet) of riprap for slope protection
- 3 on levees and on the channel bottom, which would use aggregate resources.

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

6 **NEPA Effects:** The conveyance facilities associated with Alternative 2C are the same as those under 7 Alternative 1C (Figure 24-5 in Chapter 24, Hazards and Hazardous Materials; Table 26-4). Therefore, 8 the effect on natural gas wells would be the same. Four active wells in Sacramento County would be 9 permanently abandoned because they would be displaced by permanent facility sites. Wells in the 10 construction footprint in Sacramento County produce approximately 6% of that county's annual 11 natural gas production. Even if all producing wells in the construction footprint were abandoned 12 and not replaced with new wells, the effects associated with lost natural gas production would not 13 be adverse because the loss would not represent a substantial portion of county, regional, or 14 statewide natural gas production or eliminate a substantial portion of the county's natural gas wells. 15 There would be no wells affected by temporary construction work areas. Accordingly, there would 16 not be an adverse effect.

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

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

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

- 27 NEPA Effects: The conveyance facilities associated with Alternative 2C are the same as those under 28 Alternative 1C. Therefore, the effect on natural gas fields would be the same. Construction of 29 Alternative 2C conveyance facilities would permanently reduce the land surface available for 30 vertical extraction of natural gas from directly underlying gas fields. The proportion of study area 31 natural gas field area underlying the Alternative 2C permanent construction footprint is small 32 (approximately 3%) relative to the areal extent of natural gas field areas (approximately 5% of the 33 natural gas fields intersected; Table 26-5). The reduction in unimproved land surfaces directly 34 overlying gas fields would not be an adverse effect because most of the affected fields could be 35 accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques 36 could enable access to gas fields from a distance. Therefore there would be no long-term substantial 37 loss of extraction potential from construction of Alternative 2C, and there would be no adverse 38 effect.
- 39 Alternative 2C 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.

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1 CEQA Conclusion: Although the Alternative 2C 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 and maintenance of the water conveyance 10 facilities under Alternative 2C are primarily associated with movement of water within 11 infrastructure and maintenance of water conveyance facilities. Operation would not result in 12 covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a 13 result of operations. Similarly, as described under Alternative 1A, maintenance of the water 14 conveyance facilities would include routine activities that would not affect use of or access to 15 natural gas wells or resource recovery. Accordingly, there would be no adverse effect from 16 operation and maintenance.

17 *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative
 18 2C would not would not block access to natural gas wells, cause any wells to be abandoned, or
 19 reduce production. Accordingly, there would be no impact. No mitigation is required.

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

- NEPA Effects: The operation of the water conveyance facilities under Alternative 1C would be
 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except
 that periodic maintenance of canal levees along the two canal segments would be needed for
 Alternative 2C. Operation and maintenance activities associated with the water conveyance facilities
 would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the
 operation and maintenance associated with Alternative 2C would not have an adverse effect on
 production or access to underlying natural gas fields.
- *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative
 2C would have no impact on access to underlying natural gas fields because operation primarily
 involves movement of water in infrastructure constructed under this alternative. Maintenance
 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.
 Operation and maintenance activities would not obstruct access to natural gas fields and would not
 interfere with recovering the resource. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 37 *NEPA Effects:* The conservation measures that would be implemented under Alternative 2C would
- 38 be 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
- measures. In permanently flooded areas, the active wells could be replaced using conventional or
 directional drilling techniques at a location outside the inundation zone to maintain production. The

likelihood of this replacement would depend on the availability of land for lease and the cost of the
 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there
 could be a locally adverse effect related to permanent elimination of a substantial portion of a
 county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

11 12

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

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

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

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

35Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to36Natural Gas Fields to the Extent Feasible

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

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

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

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 2C are the same as those under 11 Alternative 1C. Therefore, the effects would be the same. Alternative 2C 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 estimated to be less than 5% of the permitted aggregate in Sacramento 15 County and the Stockton-Lodi P-C Region combined (Table 26-1). The amount of aggregate needed 16 for Alternative 2C is about 11% less than that needed for Alternative 1A; and Alternative 1A was 17 judged to have no adverse effect on aggregate availability. The construction of the operable barrier 18 at the head of Old River would require a minor amount of additional aggregate, but not enough to 19 substantially affect demand. As disclosed in the discussion of Alternative 1A, and even with the 20 additional material required for the operable barrier, aggregate use would not produce an adverse 21 effect on aggregate availability to meet the regional 50-year demand, and would not produce an 22 adverse effect on known aggregate resources.
- The amount of borrow material required for Alternative 2C would be 200,000,000 cubic yards or
 approximately 350,000,000 tons. The majority of this material would be used to construct levees for
 the two canal segments of Alternative 2C. However, the use of this borrow material would not have
 an adverse effect because borrow is developed locally and regionally on an as-needed basis and is
 not considered a significant mineral resource in California.
- 28 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be less 29 than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C 30 Region) over the entirety of the construction period would not result in a substantial depletion (loss 31 of availability) of construction-grade aggregate within the six regional aggregate production study 32 areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate 33 for future development, and would not contribute to the need for the development of new aggregate 34 resources. The amount of aggregate use in Alternative 1C is about 11% less than that needed for 35 Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate 36 availability. Consequently, the impact of Alternative 1C would be less than significant. No mitigation
- 37 is required.
- 38 Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
- Consequently, the amount of borrow required for this alternative would not be a significant impact.No mitigation is required.
 - Bay Delta Conservation Plan/California WaterFix Final EIR/EIS

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

- 3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2C would include 4 moving water, both within infrastructure that would be constructed and natural channels. As 5 explained under Alternative 1C, these operations would not affect existing mines or identified MRZs 6 because there are none in the area where the alternative would operate. For the same reason, 7 maintenance activities during the operational life of the facilities would not affect existing mines or 8 identified MRZs. Operation and maintenance would not increase the footprint of the alternative. 9 Accordingly, operation and maintenance of the water conveyance facilities under Alternative 2C 10 would not cover or block access to existing mines or identified MRZs and there would be no effect on 11 the availability of aggregate resource sites.
- *CEQA Conclusion*: The operation and maintenance associated with Alternative 2C would have no
 impact on the availability of locally important aggregate resource sites because none exist within the
 areas affected by Alternative 2C operations; and operations and maintenance would not increase the
 alternative's footprint. No mitigation is required.

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

- 18 **NEPA Effects:** The only use of aggregate resources associated with operation and maintenance of the 19 water conveyance facilities would be small amounts of aggregate and riprap required for 20 maintenance of levees, stream banks, access roads, structure foundations, and the head of Old River 21 barrier. These small amounts could be readily supplied by quarries in the region (Table 26-1) or 22 those currently in the process of permitting and development (Section 26.1.2.1, Aggregate 23 Resources) without affecting the overall availability of aggregate or the supply available for future 24 development. Accordingly, operation and the use of a small amount of aggregate material for the 25 maintenance of the water conveyance facilities under Alternative 2C is not an adverse effect.
- 26 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 27 resources because operation involves moving water through the conveyance infrastructure and no 28 aggregate resources are required for operations. A small amount of aggregate material would be 29 used for maintenance of Alternative 2C. The material would be used for maintenance of features 30 such as levees, stream banks, access roads, structure foundations and the head of Old River barrier. 31 The small amount of aggregate used for maintenance would not substantially deplete permitted 32 aggregate resources in the six aggregate production study areas (Table 26-1) or new resource areas 33 currently in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the 34 region surrounding the study area. Operation and maintenance would not cause substantial 35 depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet 36 future demands and require developing new sources. Therefore this impact would be less than 37 significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

- 40 *NEPA Effects:* Implementation of conservation measures beyond CM1 would be the same for
- 41 Alternative 2C as they would be for Alternative 1A. Consequently, the effects of these conservation
- 42 measures would be the same. There are no identified MRZs in the inundation footprints. Table 26-8
- 43 shows that there are two active mines in the ROAs. The upland mine in the Suisun Marsh ROA would

not be inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in
 the West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an
 adverse effect. Mitigation Measure MIN-11 is available to reduce this effect.

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

- Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP
 Construction
- 13 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

14 Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of 15 Implementing CM2-CM21

16 **NEPA Effects:** The conservation measures under Alternative 2C would be the same as those under 17 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. 18 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 19 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 20 aggregate necessary for these activities cannot be calculated at this time because of the 21 programmatic nature and general design of the conservation measures. However, the amount 22 needed would be expected to be within the available resources of the study area or adjacent 23 aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and identified in 24 Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies 25 substantial enough to cause remaining supplies to be inadequate for future development or to 26 require development of new aggregate sources to meet future demand. Therefore, the use of 27 available aggregate materials for the conservation measures of Alternative 2C would not cause an 28 adverse effect.

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

3626.3.3.8Alternative 3—Dual Conveyance with Pipeline/Tunnel and37Intakes 1 and 2 (6,000 cfs; Operational Scenario A)

- Alternative 3 is the same as Alternative 1A except for changes in the number of intake locations in
 the north Delta and related changes in water movement through the Delta. While Alternative 1A
- 40 uses Intakes 1–5, Alternative 3 only uses Intakes 1 and 2. The decrease in intake locations would not
- 41 change the effects of the operational or conservation measures of the BDCP. There would be a

relatively small decrease in demand for aggregate during construction because three fewer intakes
 and associated facilities would be built.

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

5 **NEPA Effects:** The conveyance facilities associated with Alternative 3 are the same as those under 6 Alternative 1A except that three fewer intakes would be constructed. The decreased construction 7 footprint associated with building intakes for Alternative 3 would not change the effect on natural 8 gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by 9 Alternative 3 construction (Sacramento and San Joaquin Counties) represent a very minor 10 percentage of those counties' average annual natural gas production. In the construction footprint, 11 affected wells produce about 1% of the total annual natural gas production in Sacramento County 12 (Table 26-4). Because the relatively few (six) producing wells within the construction footprint 13 account for only a small percentage of county annual production, the loss would not represent a 14 substantial portion of the county's existing production. Accordingly, Alternative 3 would have no 15 adverse effect on natural gas wells.

- All producing wells within the construction footprint would be permanently abandoned in coordination with DOC, following applicable state regulations and guidance. A summary of laws and regulations related to well abandonment is provided in Chapter 24, *Hazards and Hazardous*
- 19 *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

- 27 **NEPA Effects:** Because the two intakes and associated facilities that would be constructed for 28 Alternative 3 do not overlie known natural gas fields, the effect on potential extraction from natural 29 gas fields would be the same as under Alternative 1A. The proportion of natural gas field area 30 underlying the Alternative 3 permanent construction footprint is small (approximately 3% of the 31 natural gas field intersected) relative to the areal extent of natural gas field areas (Table 26-5). The 32 reduction in unimproved land surfaces directly overlying gas fields would not be adverse because 33 most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard 34 directional drilling techniques could enable access to gas fields from a distance. Consequently, 35 Alternative 3 would have no long-term adverse effect on the extraction potential from natural gas 36 fields.
- 37 Alternative 3 temporary work areas also overlie natural gas fields. Any temporary reduction in
- 38 ability to extract natural gas during construction of conveyance facilities is considered minor
- 39 because the effect on natural gas extraction in Sacramento County would be small and temporary,
- 40 and the presence of work areas would not prevent recovery of the resource. There would be no
- 41 adverse effect.

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

8 Impact MIN-3: Loss of Availability of Locally Important Natural Gas Wells as a Result of 9 Operation and Maintenance of the Water Conveyance Facilities

10 **NEPA Effects:** Like those of Alternative 1A, the operation of the water conveyance facilities under 11 Alternative 3 is primarily associated with movement of water within infrastructure. These 12 operations would not cause additional effects on natural gas wells beyond those related to water 13 conveyance construction. Similarly, maintenance of the water conveyance facilities would include 14 routine activities (described under Alternative 1A) that would not affect natural gas wells or 15 resource recovery. Therefore, the operation and maintenance associated with the water conveyance 16 facilities under Alternative 3 would not have additional effects on access to or use of existing active 17 wells, or accessing plugged inactive wells. Operation and maintenance would not result in 18 permanent covering or blockage of any natural gas wells and no natural gas wells would be 19 eliminated as a result of operation and maintenance. Accordingly, there would be no adverse effect 20 from operation and maintenance.

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

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

- 28 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 3 would primarily 29 involve movement of water in infrastructure constructed under this alternative. These water 30 conveyance operations would not cause additional effects beyond those already addressed for water 31 facilities construction. Similarly, maintenance activities would not affect natural gas fields and 32 therefore would not cause effects that have not already been addressed related to construction of 33 water conveyance facilities. Operation and maintenance activities associated with the water 34 conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. 35 Accordingly, the operation and maintenance of Alternative 3 would not have an adverse effect on 36 production or on access to (availability of) underlying natural gas fields.
- *CEQA Conclusion*: The operation and maintenance of the water conveyance facilities under
 Alternative 3 would have no impact on access to underlying natural gas fields because operations
 primarily involve movement of water in infrastructure constructed under this alternative and would
 not interfere with recovering the resource. Routine maintenance would not obstruct access to
 natural gas fields, or reduce production or the ability to recover the resource. No mitigation is
 required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 3 **NEPA Effects:** The conservation measures that would be implemented under Alternative 3 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 active 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.
- 19Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active20Natural Gas Wells to the Extent Feasible
- 21 Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

- NEPA Effects: The conservation measures that would be implemented under Alternative 3 would be the same as those under Alternative 1A. Consequently, the impacts would also be the same as those described for Alternative 1A. Inundation for creation of permanent wetlands could eliminate access to portions of some natural gas fields. Although the overall extent of affected natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields because the resource may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this effect.
- 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 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 37 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 41 existing natural gas fields will remain accessible after implementation of this alternative, this impact
- 42 is significant and unavoidable.

Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain 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.

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

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

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

- 13 NEPA Effects: The demand for aggregate resources associated with Alternative 3 would be similar to 14 those under Alternative 1A except for small reductions because of the reduced number of intakes 15 and their associated pumping plants and piping. The amount of aggregate needed for construction 16 would be approximately 12, 80,000 tons, or approximately 5% of the combined permitted aggregate 17 resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of 18 Alternative 1A, because there would not be a substantial depletion of aggregate available to meet the 19 regional 50-year demand, and Alternative 3 would not substantially contribute to the need for new 20 aggregate resource development, there would not be an adverse effect on the availability of known 21 aggregate resources over the construction period.
- The amount of borrow material needed to construct Alternative 3 is expected to be slightly smaller
 than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there
 would be no effect on the availability of mineral resources associated with its use.
- 25 **CEQA Conclusion:** The use of large amounts of construction-grade aggregate (estimated to be 26 approximately 5% of the permitted aggregate from Sacramento County and the Stockton-Lodi P-C 27 Region) over the entirety of the construction period would not result in a substantial depletion (loss 28 of availability) of construction-grade aggregate within the six regional aggregate production study 29 areas surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate 30 for future development, and would not substantially contribute to the need for development of new 31 aggregate resources. Consequently, although a substantial amount of available aggregate material 32 may be used under Alternative 3, the impact would be less than significant. No mitigation is 33 required.
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

39 *NEPA Effects:* The operation of the water conveyance facilities under Alternative 3 would include
 40 moving water both within infrastructure that would be constructed and natural channels. These

- 1 operations would not cover or block access to existing mines or identified MRZs because there are
- 2 no aggregate mines or MRZs in the area where the alternative would operate. Similarly,
- 3 maintenance activities during the operational life of the facilities would not affect existing mines or
- 4 identified MRZs. Additionally, operations and maintenance would not increase the existing project
- 5 footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly,
- 6 the operation and maintenance of the water conveyance facilities under Alternative 3 would not
- 7 have effects on the availability of aggregate resource sites.
- 8 *CEQA Conclusion*: The operation and maintenance of Alternative 3 would have no impact on the
- 9 availability of locally important aggregate resource sites because none exist within the areas
 10 affected by Alternative 3 operation and maintenance; and operations and maintenance would not
 11 increase the alternative's footprint. No mitigation is required.

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

- 14 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 3 would include 15 moving water, both within infrastructure that would be constructed and natural channels. No 16 aggregate resources are required for operations so there would be no effect. The only use of 17 aggregate resources would be small amounts of aggregate and riprap required for maintenance of 18 levees, stream banks, access roads, and structure foundations. These small amounts could be readily 19 supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and 20 development (Section 26.1.2.1, Aggregate Resources) without affecting the overall availability of 21 aggregate or the supply available for future development. Accordingly, operation and the use of a 22 small amount of aggregate material for the maintenance of the water conveyance facilities under 23 Alternative 3 would not be an adverse effect.
- 24 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 25 resources because operation involves moving water through the conveyance infrastructure and no 26 aggregate resources are required for operations. A small amount of aggregate material would be 27 used for maintenance of levees, stream banks, access roads, and structure foundations. The small 28 amount of aggregate used for maintenance would not substantially deplete permitted aggregate 29 resources in the six aggregate production study areas (Table 26-1) or new resource areas currently 30 in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the region 31 surrounding the study area. Operation and maintenance would not cause substantial depletion or 32 loss of availability of aggregate resources, and would not cause remaining supplies to be inadequate 33 to meet future demands and require developing new sources. Accordingly, this impact would be less 34 than significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

- 37 *NEPA Effects:* Implementation of conservation measures beyond CM1 would be the same for
 38 Alternative 3 as they would be for Alternative 1A. Consequently, the effects of these conservation
 39 measures would be the same. Table 26-8 shows that there are two active mines in the ROAs and no
- 39 measures would be the same. Table 26-8 shows that there are two active mines in the ROAs and no 40 identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate
- 40 mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be
- 41 mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the west Delta ROA could be 42 inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation
- 42 inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation
- 43 Measure MIN-11 is available to reduce this effect.

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

- 8 Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP
 9 Construction
- 10 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

13 NEPA Effects: The conservation measures under Alternative 3 would be the same as those under 14 Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. 15 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 16 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 17 aggregate necessary for these activities cannot be calculated at this time because of the 18 programmatic nature and general design of the conservation measures. However, the amount 19 needed would be expected to be within the capacity of available resources within the study area or 20 adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and 21 identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate 22 supplies substantial enough to cause remaining supplies to be inadequate for future development or 23 to require development of new aggregate sources to meet future demand. Therefore, the use of 24 available aggregate material for the conservation measures of Alternative 3 would not have an 25 adverse effect.

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

3326.3.3.9Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel34and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

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

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

- 3 **NEPA Effects:** The locations of producing natural gas wells within the Alternative 4 construction 4 footprint are shown in Figure 24-5 in Chapter 24, Hazards and Hazardous Materials. Numbers of 5 active natural gas wells in the construction footprint and their total average annual production are 6 identified in Table 26-4, and individual wells are identified in Appendix 26A, Natural Gas Wells. 7 Producing wells in the study area are in Sacramento, San Joaquin, Yolo, Solano, and Contra Costa 8 Counties. There are no producing wells, however, within the construction footprint. There are no 9 producing wells in proposed temporary construction work areas or in the footprint of the east-west 10 transmission line alignment option.
- 11 Because no producing wells within the construction footprint would be permanently abandoned,
- construction of Alternative 4 would not result in reduced natural gas production in the study area.
 Alternative 4 would not affect any locally important natural gas wells or result in the loss of any
- 14 portion of the area's natural gas production and the effects would not be adverse.
- *CEQA Conclusion*: Because no natural gas wells would occur in the construction footprint there
 would not be any substantial decrease of (loss of availability of) natural gas production, nor
 elimination of a substantial portion of the county's active natural gas wells. Accordingly, there would
 be no impact. No mitigation is required.

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

- 21 **NEPA Effects:** Construction of Alternative 4 water conveyance facilities would permanently reduce 22 the land surface available for vertical extraction of natural gas from directly underlying gas fields. 23 The proportion of natural gas field area underlying the Alternative 4 permanent construction footprint is small (less than approximately 3% of the areal extent of natural gas field areas 24 25 intersected) (Table 26-5). No gas fields underlie the proposed east-west transmission line alignment 26 option (within the Areas of Additional Analysis) for this alternative. The reduction in unimproved 27 land surfaces directly overlying gas fields would not be adverse because most of the affected fields 28 could be accessed from other overlying areas (Figure 26-2) and standard directional drilling 29 techniques could enable access to gas fields from a distance. Therefore, there would be no long-term 30 adverse loss of extraction potential from construction of Alternative 4.
- Alternative 4 temporary work areas also overlie natural gas fields. Any temporary reduction in
 ability to extract natural gas during construction of conveyance facilities is considered minor
 because the effect on natural gas extraction in Sacramento County would be small and temporary,
 and the presence of work areas would not prevent recovery of the resource. There would be no
 adverse effect.
- 36 **CEQA Conclusion:** Significant impacts could occur if construction of water conveyance facilities 37 would preclude the ability to extract from existing natural gas fields. Although the Alternative 4 38 conveyance facilities would reduce the land surface available for vertical extraction of natural gas 39 from underlying gas fields, the proportion of these gas fields affected would be small (less than 40 approximately 3% of the areal extent of natural gas field areas intersected). Additionally, there 41 would be no substantial loss of existing production or permanent loss of access to the resource 42 because the gas fields would continue to be accessible using conventional or directional drilling 43 techniques. Accordingly, this impact would be less than significant. No mitigation is required.

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

3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4 would include 4 moving water, both in infrastructure that would be constructed under this alternative and in the 5 natural channels. These operations would not cause additional effects on natural gas wells beyond 6 those related to water conveyance construction. Similarly, maintenance of the water conveyance 7 facilities would include routine activities such as painting, cleaning, and repairs to intakes, intake 8 pumping plants and other appurtenant structures; periodic replacement of erosion protection on 9 the levees and embankments; sediment and solids removal from the intakes and solids lagoons; and 10 landscape maintenance. These activities would not affect natural gas wells or resource recovery. 11 Accordingly, the operation and maintenance associated with the water conveyance facilities under 12 Alternative 4 would not have additional effects on access to or use of existing active wells, or 13 accessing plugged inactive wells. Operation and maintenance would not result in permanent 14 covering or blockage of any natural gas wells and no natural gas wells would be eliminated as a 15 result of operation and maintenance. Accordingly, there would be no adverse effect from operation 16 and maintenance.

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

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

25 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4 would primarily 26 involve movement of water in infrastructure constructed under this alternative. These water 27 conveyance operations would not cause additional impacts beyond those already addressed for 28 water conveyance facilities construction. Similarly, maintenance of the water conveyance facilities 29 would include routine activities such as painting, cleaning, and repairs to intakes, intake pumping 30 plants, and other appurtenant structures; periodic replacement of erosion protection on the levees 31 and embankments; sediment and solids removal from the intakes and solids lagoons; and landscape 32 maintenance. These activities would not affect natural gas fields and therefore would not cause 33 impacts that have not already been addressed related to construction of water conveyance facilities. 34 Operation and maintenance activities associated with the water conveyance facilities would not 35 eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the operation and 36 maintenance associated with Alternative 4 would not have an adverse effect on production or access 37 to underlying natural gas fields.

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

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

3 **NEPA Effects:** Operations and access to natural gas wells would be affected where wells are located 4 in restoration areas to be inundated under CM4 Tidal Natural Communities Restoration, CM5 5 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. Natural gas 6 wells can remain productive in flooded areas, but they require modification, which could include 7 construction of a protective cage and platform above the well (Federal Emergency Management 8 Agency n.d.). The few producing wells that are currently in inundated areas of the Delta are located 9 where flooding is seasonal. With permanent inundation, modification and maintenance of wells may 10 not be cost effective. It is likely that any producing wells in proposed permanent inundation areas in 11 ROAs would need to be abandoned because modifications to these wells would not be feasible. 12 There are approximately 233 active wells within ROAs (Table 26-6); an unknown percentage of 13 these wells in inundation areas would likely be abandoned. Specific inundation areas have not been 14 identified in association with conservation measures of the BDCP at this time.

15 The inundation that would occur under CM4, CM5, and CM10 could take place in the Cache Slough, 16 Cosumnes/Mokelumne, South Delta, Suisun Marsh, and West Delta ROAs, which lie in Solano, Yolo, 17 San Joaquin, Contra Costa, and Sacramento Counties (see Figure 24-5 in Chapter 24, Hazards and 18 Hazardous Materials, and Table 26-6). The number of active wells directly affected would vary, 19 depending on the specific lands inundated by these three conservation measures. The active wells 20 that would be affected could be maintained in place if they were in seasonally inundated locations. 21 In permanently flooded areas, the active wells could be replaced using conventional or directional 22 drilling techniques at a location outside the inundation zone to maintain production. The likelihood 23 of this replacement would depend on the availability of land for lease and the cost of the new 24 construction. If a large number of wells had to be abandoned and could not be redrilled, there could 25 be a locally adverse effect related to permanent elimination of a substantial portion of a county's 26 active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

32 **CEOA Conclusion:** Significant impacts could occur if implementation of CMs 2-21 would preclude 33 use of existing natural gas wells. Although the number of natural gas wells likely to be affected may 34 be a small percentage of the total wells in the study area, and some wells may be relocated using 35 conventional or directional drilling, there is potential to affect a significant number of locally important gas wells. Consequently, this impact is considered significant. While Mitigation Measure 36 37 MIN-5 would reduce impacts by attempting to minimize the need for well abandonment or 38 relocation, implementation of this mitigation measure cannot assure that all or a substantial portion 39 of a county's existing natural gas wells will remain accessible after implementation of this 40 alternative, this impact is significant and unavoidable.

41Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active42Natural Gas Wells to the Extent Feasible

43During final design of CM4, CM5, and CM10, the BDCP proponents will avoid permanent44inundation of or construction over active natural gas well sites where feasible taking into

consideration costs, logistics and project objectives in order to minimize the need for well
 abandonment or relocation. This mitigation applies to three conservation measures: *CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration,* and *CM10 Nontidal Marsh Restoration.*

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

7 **NEPA Effects:** Direct, overlying access to natural gas fields would be lost in areas where some 8 conservation measures would permanently inundate new areas to create wetlands. Three of the 9 conservation measures—CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated 10 Floodplain Restoration, and CM10 Nontidal Marsh Restoration—would inundate land overlying 11 natural gas fields. Table 26-7 shows the proportion of the individual gas fields underlying individual 12 ROAs that would be inundated; the areal extent of this effect depends on the final footprints for 13 these measures and would range from less than 1% to 100%. Most of these natural gas fields would 14 still be accessible from outside the inundated areas using either conventional or directional drilling, 15 although feasibility of access would depend on the exact configuration of inundation and the 16 availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the 17 region is low to moderate, there is potential for a locally adverse effect on access to natural gas fields 18 because the resource may be permanently covered (inundated) or otherwise become inaccessible to 19 recovery. Mitigation Measure MIN-6 is available to lessen this effect.

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

33Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to34Natural Gas Fields to the Extent Feasible

35During final design of CM4, CM5, and CM10, the BDCP proponents will identify means to36maintain feasible drilling access to natural gas fields that could be adversely affected by37implementing CM 4, CM5 and CM10. These could include preserving non-inundated lands either38over or adjacent to natural gas fields adequate in size to allow drilling to occur. These measures39will ensure that drilling access to natural gas fields is maintained to the greatest extent40practicable.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 4 footprint, including within the footprint for the
 east-west transmission line alignment option, there would be no effect on the availability of
 aggregate resources.
- *CEQA Conclusion*: Significant impacts could occur if construction of the water conveyance facilities
 result in loss of locally important aggregate resource sites. Because there are no permitted mines or
 MRZs in the construction footprint for Alternative 4, including within the footprint for the east-west
 transmission line alignment option, there would be no impact. No mitigation is required.

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

- *NEPA Effects:* Alternative 4 would require large amounts of fill, aggregate, and cement for
 construction of the numerous elements of the water conveyance facilities. The principal demands
 for construction material would come from the three intakes with pumping plants and associated
 facilities, the nearly 40 miles of concrete pipeline tunnels, and the forebays. Additional aggregate
 would be required for construction of permanent and temporary roads and levees.
- 18 Up to an estimated 13,500,000 tons of aggregate would be required for Alternative 4, including the 19 operable barrier at the head of Old River and including about 5,160,000 tons of aggregate that 20 would be required for the water conveyance tunnels under this alternative. Under Alternative 4, 21 Tunnel 1a would be a single-bore, 29-ft inside diameter (ID) tunnel that would carry water from 22 Intakes 2 and 3 on the northern end of the project to the intermediate forebay. The segment of 23 Tunnel 1a between Intake 2 and 3 would have a 20-foot ID. Tunnel 1b would be a single-bore 20-ft 24 ID tunnel that would carry water from Intake 5 to the intermediate forebay. Two 40-foot ID tunnels 25 (Tunnel 2) would carry water from an intermediate forebay to the proposed expanded Clifton Court 26 Forebay on the southern end of the alignment. The total aggregate amount is equal to approximately 27 32% of the permitted aggregate in Sacramento County or 6% of the permitted aggregate in the 28 Stockton-Lodi P-C Region (Table 26-1). It is equal to about 5% of the combined permitted aggregate 29 in these two areas. This aggregate would be used over the life of the construction period, spreading 30 the effect over time. Because the 50-year demand for aggregate already exceeds the existing 31 permitted supplies in many counties within which the conveyance facilities would be constructed, 32 there would likely be an effect on the availability of local aggregate supplies if the project were to 33 rely solely on local resources, (i.e., resources from one area, such as Sacramento County). However, 34 if aggregate was sourced from several local resources (such as Sacramento County, Stockton-Lodi, 35 and Yuba City-Marysville) there would not be a substantial depletion (loss of availability) of 36 aggregate to meet the regional 50-year demand. Sourcing from multiple locations is likely, 37 considering that the alternative extends many miles north-to-south and different portions of the 38 project would be closer to individual local resources (see Figure 26-1). Because there would not be a 39 substantial depletion of aggregate available to meet the regional 50-year demand, Alternative 4 40 would not substantially contribute to the need for new aggregate resource development. Therefore, 41 this effect would not be adverse.

Use of local material only would constitute an indirect effect in that it might reduce the life
expectancy of existing quarries, contribute to the need for new quarries to be permitted, and reduce
the availability of these building materials for other projects on a local basis. New aggregate

- 1 resources may be identified within existing MRZ-3 areas with additional study; identification of new 2 resources could expand the resource base during the construction period of the water conveyance 3 facilities. CGS estimates that there are 74 billion tons of non-permitted construction aggregate 4 resources in 31 aggregate study areas in the state (Clinkenbeard 2012). While not all these 5 resources may be mined because of social, environmental, or economic factors (e.g., resources may 6 be located near urban or environmentally sensitive areas, precluding their extraction), CGS states 7 that non-permitted aggregate resources are likely to be the primary resources that will meet 8 California's continuing demand (Clinkenbeard 2013).
- 9 Additionally, as described in Section 26.1.2.1, *Aggregate Resources*, some of the new aggregate
- resources being developed are substantial. For example, the Teichert Quarry and the Stoneridge
 Quarry in Sacramento County will annually produce 7 million and 6 million tons of aggregate,
- 12 respectively. Although these sites may not provide materials to the project, their capacities do
- indicate that a single quarry could provide more than the required annual tonnage to the project and
 still have capacity for many decades. Although regional values are not available, the statewide
- decline in aggregate demand went from 246 million to 156.7 million and then to 133.5 million tons
 (2007, 2008, and 2009, respectively), indicating that some unused capacity exists because of the
- 17 current recession (Kohler 2007, 2008; Clinkenbeard and Smith 2009).
- 18 Alternatively, some sources outside the study area may be used to supply aggregate needs for BDCP 19 water conveyance facilities. Kohler (2006) notes that Yuba County exports a significant portion of its 20 available aggregate to points outside its production region. Additionally, aggregate delivery by barge 21 from the San Francisco Bay is possible. The California State Lands Commission (2010:2–19) notes 22 several existing waterfront facilities in San Francisco Bay, San Pablo Bay, and Suisun Bay that could 23 deliver aggregate from that area to the study area. These areas provide additional aggregate 24 capacity over that of the immediate region and further reduce the project's impact on local and 25 regional aggregate resources. Also, as noted in Section 26.1, Environmental Setting/Affected 26 *Environment*, California imports large volumes of aggregate from Canada and Mexico, and a terminal 27 was recently constructed at the Port of Richmond to receive and distribute aggregate shipments. It 28 may be necessary or financially advantageous to purchase some of this imported aggregate if 29 specific aggregate supplies are insufficient at the local or regional level, although the analysis above 30 indicates that regional supply is sufficient. The Canadian and Mexican sites that are currently 31 providing the aggregate and rock are already permitted under their respective jurisdictions. 32 Consequently, no unanticipated environmental impacts would be generated by purchasing materials 33 that are already being imported from these existing sites. Considering the level of local and regional 34 supplies available, the additional aggregate and rock demand of the BDCP would not be sufficient to 35 be substantially responsible for the development of new mines in Mexico or Canada. Additionally, if 36 federal funding is provided to the project, there might be restrictions on using aggregate from 37 outside the country because of the Buy America Act (see Section 26.2.1.1).
- Alternative 4 demand would not result in a substantial depletion (loss of availability) of
 construction-grade aggregate within the six regional aggregate production study areas surrounding
 the study area (Table 26-1), would not cause remaining supplies to be inadequate for future
 development, and would not substantially contribute to the need for the development of new
 aggregate resources. Accordingly, it would not have an adverse effect on the availability of known
 aggregate resources over the construction period.
- 44 The amount of borrow material needed to construct Alternative 4 would be approximately
- 45 23,400,000 cubic yards or 35,100,000 tons. Because there is limited excavation associated with this

- 1 alternative, most of this borrow material would be developed from borrow pits adjacent to
- construction areas, nearby suitable locations, and some commercial sites. The use of this amount of
 borrow would not have an adverse effect because borrow is not defined as a mineral resource and it
- 4 is developed locally and regionally on an as-needed basis.
- 5 **CEQA** Conclusion: The use of large amounts of construction aggregate (estimated to be 6 approximately 5% of the permitted aggregate in Sacramento County and the Stockton-Lodi P-C 7 Region) over the life of the construction period would not result in a substantial depletion (loss of 8 availability) of construction-grade aggregate within the six regional aggregate production study 9 areas surrounding the study area, would not cause remaining supplies to be inadequate for future 10 development, and would not contribute to the need for development of new aggregate sources. 11 Consequently, although a substantial amount of available aggregate material may be used under Alternative 4, the impact would be less than significant. No mitigation is required. 12
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
- 15 No mitigation is required.

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

- 18 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4 would include 19 moving water, both within infrastructure that would be constructed and the natural channels. 20 Adverse effects would only occur if operations prevented access to a locally important aggregate 21 resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area 22 where the alternative would operate. Accordingly, operations would not cover or block access to 23 existing mines or identified MRZs and there would be no effect. Similarly, routine facilities 24 maintenance activities such as painting, cleaning, and structure repair, landscape maintenance, road 25 work, and periodic replacement of erosion protection on the levees and embankments would not 26 cover or block access to existing mines or identified MRZs because there are no aggregate mines or 27 MRZs in the area where the alternative would operate. Additionally, operations and maintenance 28 would not increase the existing project footprint so they could not have any effect even if aggregate 29 mines or MRZs did exist. Accordingly, the operation and maintenance of the water conveyance 30 facilities under Alternative 4 would not have effects on the availability of aggregate resource sites.
- *CEQA Conclusion:* Significant impacts could occur if operation and maintenance of water
 conveyance facilities resulted in loss of available locally important aggregate resource sites. The
 operation and maintenance associated with Alternative 4 would have no impact on the availability
 of aggregate resource sites because none exist within the areas affected by Alternative 4 operations
 and operations and maintenance would not increase the alternative's footprint. No mitigation is
 required.

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

- 39 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4 would include
- 40 moving water, both within infrastructure that would be constructed and natural channels. No
- 41 aggregate resources are required for operations so there would be no effect. Small amounts of
- 42 aggregate and riprap would be required for maintenance of structure foundations, levees, stream
- 43 banks, and access roads associated with major project features such as intakes, pumping plants, and

the head of Old River barrier. These small amounts could be readily supplied by quarries in the
region (Table 26-1) or those currently in the process of permitting and development (Section
26.1.2.1, *Aggregate Resources*) without affecting the overall availability of aggregate or the supply
available for future development. Accordingly, operation and the use of a small amount of aggregate
material for the maintenance of the water conveyance facilities under Alternative 4 is not an adverse
effect.

7 **CEQA Conclusion:** Significant impacts could occur if operation and maintenance of water 8 conveyance facilities resulted in loss of known aggregate resources. Operation of the water 9 conveyance facilities would not affect any aggregate resources because operation involves moving 10 water through the conveyance infrastructure and no aggregate resources are required for 11 operations. A small amount of aggregate material would be used for maintenance of Alternative 4. 12 The material would be used for maintenance of structure foundations, levees, stream banks and 13 access roads associated with major project features. The small amount of aggregate used for 14 maintenance would not substantially deplete permitted aggregate resources in the six aggregate 15 production study areas (Table 26-1) or new resource areas currently in the permitting and 16 development stage (Section 26.1.2.1, Aggregate Resources) in the region surrounding the study area. 17 Operation and maintenance would not cause substantial depletion or loss of availability, and would 18 not cause remaining supplies to be inadequate to meet future demands and require developing new 19 sources. Therefore this impact would be less than significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

22 NEPA Effects: Implementation of conservation measures beyond CM1 that would have the potential 23 to affect important aggregate resource sites are those that would inundate large areas of land. Three 24 of the conservation measures would inundate large areas: CM4 Tidal Natural Communities 25 Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. 26 Table 26-8 lists two active mines in the ROAs. The mine in the Suisun Marsh ROA, however, is at the 27 north end of the ROA in an upland area that would not be affected by inundation. One aggregate 28 mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be 29 inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation 30 Measure MIN-11 is available to reduce this effect.

31 **CEQA Conclusion:** Significant impacts could occur if implementation of CMs 2-21 result in loss of 32 available locally important aggregate resource sites. ROAs affected by CM4, CM5, and CM10 include 33 two active mines, both in Solano County (Table 26-8), and no identified MRZs. The upland mine in 34 the Suisun Marsh ROA would not be affected by inundation associated with the conservation 35 measures. An active mine on Decker Island may fall within the inundation footprints associated with 36 CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine (Mega Sand, Inc. 37 depicted in Figure 26-1) would be a significant impact because it would eliminate the potential to 38 recover aggregate resources. Mitigation Measure MIN-11 would reduce the impact by replacing lost aggregate by purchasing aggregate from other sources. This impact would be less than significant. 39

40Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP41Construction

42 Depending on the location and extent of inundation to locally important aggregate material sites
 43 in restoration efforts, the BDCP proponents shall consider various mitigation strategies to

1 mitigate significant impacts. Such strategies may include avoiding the affected sites and 2 choosing areas that will not impact such mines, directly or indirectly, or downsizing the area to 3 be restored and thereby reducing impacts to the affected mines to less than significant. The 4 BDCP Proponents may also choose to purchase the permitted aggregate volume from mines 5 affected by restoration for construction use to ensure available aggregate will not be lost due to 6 construction of restoration sites. The resulting mined site(s) may then be considered for 7 integration into the restoration design of any conservation measure that affects the site(s). For 8 example, the mined site(s) could be reshaped to provide aquatic or intertidal habitat of varying 9 depths and configurations. This mitigation applies to CM4, CM5, and CM10. For this latter 10 strategy, coordination would be initiated with the affected local county overseeing SMARA 11 regulation. Additionally, further CEQA review may be required prior to implementing the 12 integration of mined sites into the restoration design.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Conservation Measures 2–22CM2–CM21

15 **NEPA Effects:** CM2–CM21 that have the potential to reduce the availability of important aggregate 16 resources are those that would use aggregate resources in construction or maintenance. Four of the 17 conservation measures listed in Table 3-3 in Chapter 3, Description of Alternatives, have this 18 potential: CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Community Restoration, CM5 19 Seasonally Inundated Floodplain Restoration, and CM10 Nontidal Marsh Restoration. Aggregate and 20 riprap would be used for levee, berm, access road, and rock revetment construction, and rock would 21 be placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts 22 of aggregate and riprap necessary for these activities cannot be calculated at this time because of the 23 programmatic nature and general design of the conservation measures. However, the amount 24 needed would be used over a period of years and would be expected to be within the available 25 resources of the study area and adjacent aggregate resource study areas discussed in Section 26 26.1.2.1, Aggregate Resources, and identified in Table 26-1. There would be no depletion (loss of 27 availability) of regional aggregate supplies substantial enough to cause remaining supplies to be 28 inadequate for future development or to require development of new aggregate sources to meet 29 future demand. Therefore, the use of available aggregate material for the conservation measures of 30 Alternative 4 would not cause an adverse effect.

31 **CEQA Conclusion:** Significant impacts could occur if implementation of CMs 2-21 result in loss of 32 available known aggregate resources. CM2, CM4, CM5, and CM10 would use small amounts of 33 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap 34 for erosion control and stability at level breaches and toe drain earthworks. The amounts of 35 aggregate are unknown but would be within the available resources of the study area or adjacent 36 aggregate resource study areas listed in Table 26-1. Because implementing conservation measures 37 would not use an amount of aggregate that would cause remaining supplies to be inadequate to 38 meet future demands and require developing new sources, this impact would be less than 39 significant. No mitigation is required.

4026.3.3.10Alternative 5—Dual Conveyance with Pipeline/Tunnel and41Intake 1 (3,000 cfs; Operational Scenario C)

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

acres of tidal marsh restoration while all other action alternatives would have up to 65,000 acres of
 tidal marsh restoration.

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

5 **NEPA Effects:** The conveyance facilities associated with Alternative 5 are the same as those under 6 Alternative 1A except for the reduction in intakes. The six natural gas wells affected by Alternative 5 7 (in Sacramento County) produce about 1% of the total annual natural gas production in Sacramento 8 County (Table 26-4). Because of the relatively few (six) producing wells within the construction 9 footprint, which account for only a small percentage of county annual production, the loss would not 10 represent a substantial portion of the county's existing production and effects on natural gas wells 11 would not be adverse. All producing wells within the construction footprint would be permanently 12 abandoned in coordination with DOC, following applicable state regulations and guidance. A 13 summary of laws and regulations related to well abandonment is provided in Chapter 24, Hazards 14 and Hazardous Materials, Sections 24.2.2.11 and 24.2.2.12.

- 15 *CEQA Conclusion*: Because natural gas wells in the construction footprint represent only about 1%
 16 of the total annual gas production in Sacramento County, abandoning these wells would not
 17 substantially decrease (lose availability of) natural gas production, nor eliminate a substantial
- 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

- 22 **NEPA Effects:** The conveyance facilities associated with Alternative 5 are the same as those under 23 Alternative 1A except for the reduction in intakes. However, the reduced intake locations would not 24 change the effects on extraction potential from natural gas fields. The reduction in unimproved land 25 surfaces directly overlying gas fields would not be adverse because most of the affected fields could 26 be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques 27 could enable access to gas fields from a distance. The effect on natural gas extraction in Sacramento 28 County would be small and temporary, and the presence of work areas would not prevent recovery 29 of the resource. Consequently, Alternative 5 would have no long-term adverse effect on the 30 extraction potential from natural gas fields.
- *CEQA Conclusion*: Although the Alternative 5 conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (less than approximately 3% of the areal extent of natural gas field
 areas intersected). Additionally, there would be no substantial loss of existing production or
 permanent loss of access to the resource because the gas fields would continue to be accessible
 using conventional or directional drilling techniques. Accordingly, this impact would be less than
 significant. No mitigation is required.

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

NEPA Effects: Like those of Alternative 1A, the operational components of the water conveyance
 facilities under Alternative 5 are primarily associated with movement of water within infrastructure
 and maintenance of water conveyance facilities. Routine maintenance activities would not affect

natural gas wells or resource recovery. Operation and maintenance would not have effects on access
 to or use of existing active wells, or accessing plugged inactive wells. Operation and maintenance
 would not result in permanent covering or blockage of any natural gas wells and no natural gas
 wells would be eliminated as a result of operation and maintenance. Accordingly, there would be no
 adverse effect from operation and maintenance.

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

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

13 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 5 would primarily 14 involve movement of water in infrastructure constructed under this alternative. These water 15 conveyance operations would not cause additional impacts beyond those already addressed for 16 water facilities construction. Similarly, maintenance activities would not cause impacts that have not 17 already been addressed related to construction of water conveyance facilities. Operation and 18 maintenance activities associated with the water conveyance facilities would not eliminate natural 19 gas fields or block access to supplies of natural gas. Accordingly, the operation and maintenance 20 associated with Alternative 5 would not have an adverse effect on production or access to 21 (availability of) underlying natural gas fields.

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

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

28 **NEPA Effects:** The conservation measures that would be implemented under Alternative 5 would be 29 the same as those under Alternative 1A except that only up to 25,000 acres of tidal marsh would be 30 restored rather than up to 65,000 acres as proposed for Alternative 1A. While inundation for 31 permanent wetland creation under CM4, CM5, and CM10 could potentially affect natural gas wells, 32 the number of active wells directly affected would vary, depending on the specific lands inundated 33 by these three conservation measures. In permanently flooded areas, the active wells could be 34 replaced using conventional or directional drilling techniques at a location outside the inundation 35 zone to maintain production. The likelihood of this replacement would depend on the availability of 36 land for lease and the cost of the new construction. If a large number of wells had to be abandoned 37 and could not be re-drilled, there could be a locally adverse effect related to permanent elimination 38 of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available 39 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

- assure that all or a substantial portion of a county's natural gas wells will remain accessible after
 implementation of this alternative, this impact is significant and unavoidable.
- Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid 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.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

8 **NEPA Effects:** The conservation measures that would be implemented under Alternative 5 would be 9 the same as those under Alternative 1A except that only up to 25,000 acres of tidal marsh would be 10 restored rather than up to 65,000 acres as proposed for Alternative 1A. The impacts under 11 Alternative 5 would be similar to those described for Alternative 1A. Inundation for creation of 12 permanent wetlands could eliminate access to portions of some natural gas fields. Although the 13 overall extent of affected natural gas fields in the region is low to moderate, there is potential for a 14 locally adverse effect on access to natural gas fields because the resource may be permanently 15 covered (inundated) or otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is 16 available to lessen this effect.

17 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 18 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 19 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from outside the inundated areas using either conventional or directional drilling, although feasibility of 20 21 access would depend on the exact configuration of inundation and the availability of adjacent 22 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 23 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 24 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 25 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. This 26 impact would be significant and unavoidable. Because implementation of Mitigation Measure MIN-6 27 cannot assure that all or a substantial portion of existing natural gas fields will remain accessible 28 after implementation of this alternative, this impact is significant and unavoidable.

29Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to30Natural Gas Fields to the Extent Feasible

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

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

- 34 *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 35 mines) and no identified MRZs in the Alternative 5 construction footprint of the water conveyance
 36 facilities, there would be no effect on the availability of aggregate resources.
- 37 *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 38 there would be no impact. No mitigation is required.

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

3 **NEPA Effects:** The demand for aggregate resources associated with Alternative 5 would be the less 4 than under Alternative 1A because of small reductions due to construction of fewer intakes and 5 their associated pumping plants and piping, and particularly the use of smaller (23-ft ID), single-6 bore tunnels for both Tunnel 1 and Tunnel 2. The amount of aggregate needed for construction 7 would exceed be approximately 10,257,000 tons including about 1,900,000 tons for concrete 8 including the tunnels, or approximately 4% of the combined permitted aggregate resources in 9 Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of Alternative 1A, the 10 Alternative 5 demand would not be considered an adverse effect on the availability of known 11 aggregate resources over the life of the construction period because there would not be a substantial 12 depletion of aggregate available to meet the regional 50-year demand, and it would not contribute to 13 the need for new aggregate resource development.

- 14The amount of borrow material needed to construct Alternative 5 is expected to be similar to that15for Alternative 1A. Because borrow is developed locally and regionally on an as-needed basis and is16not considered an important mineral resource in California, there would be no effect associated with17its use.
- 18 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be 19 equivalent to approximately 4% of the permitted aggregate in Sacramento County and the Stockton-20 Lodi P-C Region) over the entirety of the construction period would not result in a substantial 21 depletion (loss of availability) of construction-grade aggregate within the six regional aggregate 22 production study areas surrounding the study area (Table 26-1), would not cause remaining 23 supplies to be inadequate for future development, and would not substantially contribute to the 24 need for the development of new aggregate resources. Consequently, although a substantial amount 25 of available aggregate material may be used under Alternative 5, the impact would be less than 26 significant. No mitigation is required.
- 27 Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
- Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

32 NEPA Effects: The operation of the water conveyance facilities under Alternative 5 would include 33 moving water, both within infrastructure that would be constructed and natural channels. Adverse 34 effects would only occur if operations prevented access to a locally important aggregate resource 35 site; this is not expected to occur because there are no aggregate mines or MRZs in the area where 36 the alternative would operate. Routine facilities maintenance would not cover or block access to 37 existing mines or identified MRZs for the same reason. Additionally, operations and maintenance 38 would not increase the existing project footprint so they could not have any effect even if aggregate 39 mines or MRZs did exist. Because operations and maintenance would not cover or block access to 40 existing mines or identified MRZs, the operational components of the water conveyance facilities 41 under Alternative 5 would not have effects on the availability of aggregate resource sites.

42 *CEQA Conclusion:* The operation and maintenance of Alternative 5 would have no impacts on the 43 availability of locally important aggregate resource sites because none exist within the areas affected by Alternative 5 and operations and maintenance would not increase the alternative's
 footprint. No mitigation is required.

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

5 **NEPA Effects:** No aggregate resources are required for operations so there would be no effect. 6 Maintenance of the water conveyance facilities would require small amounts of aggregate and 7 riprap for maintenance of levees, stream banks, access roads, and structure foundations. These 8 small amounts could be readily supplied by quarries in the (Table 26-1) or those currently in the 9 process of permitting and development (Section 26.1.2.1, Aggregate Resources) without affecting the 10 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 5 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 the water conveyance facilities under Alternative 5. The material would be 17 used for maintenance of levees, stream banks, access roads, and structure foundations. Operation 18 and maintenance would not cause substantial depletion or loss of availability, and would not cause 19 remaining supplies to be inadequate to meet future demands and require developing new sources. 20 Therefore this impact would be less than significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

23 **NEPA Effects:** Implementation of conservation measures beyond CM1 would be the same for 24 Alternative 5 as they would be for Alternative 1A except that only up to 25,000 acres of tidal marsh 25 would be restored rather than up to 65,000 acres as proposed for Alternative 1A. The effects of 26 implementing these conservation measures would be similar to those described for Alternative 1A. 27 Table 26-8 shows that there are two active mines in the ROAs and no identified MRZs. The upland 28 mine in the Suisun Marsh ROA would not be inundated. The aggregate mine (Mega Sand, Inc. 29 depicted in Figure 26-1) on Decker Island in the West Delta ROA could be inundated. Inundation and 30 loss of this aggregate mine would be an adverse effect. Mitigation Measure MIN-11 is available to 31 reduce this effect.

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

39Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP40Construction

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

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

3 **NEPA Effects:** The conservation measures associated with Alternative 5 are the same as Alternative 4 1A except that only up to 25,000 acres of tidal marsh restoration would occur rather than up to 5 65,000 acres as proposed for Alternative 1A. The effects would be similar to those described for 6 Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock 7 revetment construction and for erosion control and stability at levee breaches and toe drain 8 earthworks. The demand for levee and berm construction and armoring of levee breaches under 9 Alternative 5 would be smaller than under the other alternatives with much larger acreages of tidal 10 marsh creation. The amount of aggregate necessary for these activities cannot be calculated at this 11 time because of the programmatic nature and general design of the conservation measures. 12 However, the amount needed would be expected to be within the capacity of the available resources 13 in the study area or adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate 14 *Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional 15 aggregate supplies substantial enough to cause remaining supplies to be inadequate for future 16 development or to require development of new aggregate sources to meet future demand. 17 Therefore, the use of available aggregate material for the conservation measures of Alternative 5 18 would not have an adverse effect.

19 **CEQA Conclusion:** The extent of conservation actions under Alternative 5 would be similar to but 20 smaller than those under Alternative 1A. CM2, CM4, CM5, and CM10 would use small amounts of 21 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap 22 for erosion control and stability at level breaches and toe drain earthworks. The amounts of 23 aggregate are unknown but would be within the available resources of the study area or adjacent 24 aggregate resource study areas listed in Table 26-1. Because implementing conservation measures 25 would not use an amount of aggregate that would cause remaining supplies to be inadequate to 26 meet future demands and require developing new sources, this impact would be less than 27 significant. No mitigation is required.

2826.3.3.11Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and29Intakes 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

36 **NEPA Effects:** The impacts associated with Alternative 6A are the same as those described for 37 Alternative 1A. Approximately six active wells would be displaced by construction, all in Sacramento 38 County. This represents about 1% of the natural gas production in Sacramento County. Because of 39 the relatively few (six) producing wells within the construction footprint, which account for only a 40 small percentage of county annual production, the loss would not represent a substantial portion of 41 the county's existing production and effects on natural gas wells would not be adverse. All producing 42 wells within the construction footprint would be permanently abandoned in coordination with DOC, 43 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.

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

- 10 **NEPA Effects:** The impacts on natural gas fields associated with Alternative 6A are the same as those 11 described for Alternative 1A. The proportion of natural gas field area underlying the Alternative 6A 12 permanent construction footprint is small (approximately 3% of the natural gas field intersected) 13 relative to the areal extent of natural gas field areas (Table 26-5). The reduction in unimproved land 14 surfaces directly overlying gas fields would not be adverse because most of the affected fields could 15 be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques 16 could enable access to gas fields from a distance. Therefore, there would be no long-term adverse 17 effect on extraction capability from the construction of Alternative 6A because the effect on natural 18 gas extraction in Sacramento County would be small and temporary, and the presence of work areas 19 would not prevent recovery of the resource.
- *CEQA Conclusion*: Although the Alternative 6A conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (less than approximately 3% of the areal extent of natural gas field
 areas intersected). Additionally, there would be no substantial loss of existing production or
 permanent loss of access to the resource because the gas fields would continue to be accessible
 using conventional or directional drilling techniques. Accordingly, this impact would be less than
 significant. No mitigation is required.

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

- 29 **NEPA Effects:** As under Alternative 1A, the operation and maintenance of the water conveyance 30 facilities under Alternative 6A are primarily associated with movement of water within 31 infrastructure and maintenance of water conveyance facilities. Routine maintenance activities 32 would not affect natural gas wells or resource recovery. Operation and maintenance would not have 33 effects on access to or use of existing active wells, or accessing plugged inactive wells. Operation and 34 maintenance would not result in permanent covering or blockage of any natural gas wells and no 35 natural gas wells would be eliminated as a result of operation and maintenance. Accordingly, there 36 would be no adverse effect from operation and maintenance.
- 37 *CEQA Conclusion*: The operation and maintenance of the water conveyance facilities under
- 38 Alternative 6A would have no impact on access to locally important natural gas wells, either for
- 39 operating and maintaining existing active wells, or modifying plugged inactive wells, because
- 40 operation and routine maintenance would not cause the abandonment of wells, eliminate access to
- 41 wells, or reduce production. No mitigation is required.

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

- 3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 6A would
- 4 primarily involve movement of water in infrastructure constructed under this alternative. These
- 5 water conveyance operations would not cause additional impacts beyond those already addressed
- 6 for water facilities construction. Similarly, maintenance activities would not affect natural gas fields
- 7 and therefore would not cause impacts that have not already been addressed related to construction
- 8 of water conveyance facilities. Operation and maintenance activities associated with the water
- 9 conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas.
 10 Accordingly, the operation and maintenance of Alternative 6A would not have an adverse effect on
- 11 production or access to (availability of) underlying natural gas fields.
- *CEQA Conclusion*: Operations primarily involve movement of water in infrastructure constructed
 under this alternative and would not interfere with recovering the resource. Routine maintenance
 would also have no impact on access to underlying natural gas fields. The operation and
 maintenance of the water conveyance facilities under Alternative 2A would not obstruct access to
 natural gas fields, or reduce production or the ability to recover the resource. Accordingly, there
 would be no impact. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 20 **NEPA Effects:** The conservation measures that would be implemented under Alternative 6A would 21 be the same as those under Alternative 1A. While inundation for permanent wetland creation under 22 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly 23 affected would vary, depending on the specific lands inundated by these three conservation 24 measures. In permanently flooded areas, the active wells could be replaced using conventional or 25 directional drilling techniques at a location outside the inundation zone to maintain production. The 26 likelihood of this replacement would depend on the availability of land for lease and the cost of the 27 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there 28 could be a locally adverse effect related to permanent elimination of a substantial portion of a 29 county's active natural gas wells. Mitigation Measure MIN-5 is available to address this effect.
- *CEQA Conclusion:* Although the number of natural gas wells likely to be affected may be a small
 percentage of the total wells in the study area, and some wells may be relocated using conventional
 or directional drilling, there is potential to affect a locally significant number of wells. Consequently,
 this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot
 assure that all or a substantial portion of a county's existing natural gas wells will remain accessible
 after implementation of this alternative, this impact is significant and unavoidable.

36Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active37Natural Gas Wells to the Extent Feasible

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

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

- 10 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 11 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 12 range from less than 1% to 100%. Most of these natural gas recovery fields would still be accessible 13 from outside the inundated areas using either conventional or directional drilling, although 14 feasibility of access would depend on the exact configuration of inundation and the availability of 15 adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to 16 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 17 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 18 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 19 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of 20 existing natural gas fields will remain accessible after implementation of this alternative, this impact 21 is significant and unavoidable.
- Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to
 Natural Gas Fields to the Extent Feasible
- 24 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 6A construction footprint of the water conveyance
 facilities, there would be no effect on the availability of aggregate resources.
- 30 *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 31 there would be no impact. No mitigation is required.

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

- 34 **NEPA Effects:** The demand for aggregate resources associated with Alternative 6A would be the 35 same as that under Alternative 1A (an estimated 13,505,816 tons). This amount is equal to 36 approximately 5% of the combined permitted aggregate in Sacramento County and the Stockton-37 Lodi P-C Region. The use of 5% of the permitted aggregate from Sacramento County and the 38 Stockton-Lodi P-C Region over the entirety of the construction period would not require a 39 substantial depletion of aggregate available to meet the regional 50-year demand, and would not 40 substantially contribute to the need for new aggregate resource development. Therefore, this effect 41 would not be adverse.
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1 The amount of borrow material needed to construct Alternative 6A is expected to be similar to that

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

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

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

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

- 18 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 6A would include 19 moving water, both within infrastructure that would be constructed and natural channels. These 20 operations would not cover or block access to existing mines or identified MRZs because there are 21 no aggregate mines or MRZs in the area where the alternative would operate. Similarly, routing 22 maintenance activities during the operational life of the facilities would not affect existing mines or 23 identified MRZs. Additionally, operations and maintenance would not increase the existing project 24 footprint so they could not have any effect even if aggregate mines or MRZs did exist. Accordingly, 25 the operation and maintenance of the water conveyance facilities under Alternative 6A would not 26 have effects on the availability of aggregate resource sites.
- *CEQA Conclusion*: The operation and maintenance of Alternative 6A would have no impacts on the
 availability of aggregate resource sites because none exist within the areas affected by Alternative
 6A operation and maintenance; and operations and maintenance would not increase the
 alternative's footprint. No mitigation is required.

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

33 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 6A would include 34 moving water, both within infrastructure that would be constructed and natural channels. No 35 aggregate resources are required for operations so there would be no effect. The only use of 36 aggregate resources would be small amounts of aggregate and riprap required for maintenance of 37 levees, stream banks, access roads, and structure foundations. These small amounts could be readily 38 supplied by quarries in the region (Table 26-1) or those currently in the process of permitting and 39 development (Section 26.1.2.1, Aggregate Resources) without affecting the overall availability of 40 aggregate or the supply available for future development. Accordingly, operation and the use of a 41 small amount of aggregate material for the maintenance of the water conveyance facilities under 42 Alternative 6A is not an adverse effect.

1 **CEOA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 2 resources because operation involves moving water through the conveyance infrastructure and no 3 aggregate resources are required for operations. A small amount of aggregate material would be 4 used for maintenance of levees, stream banks, access roads, and structure foundations. The small 5 amount of aggregate used for maintenance would not substantially deplete permitted aggregate 6 resources in the six aggregate production study areas (Table 26-1) or new resource areas currently 7 in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the region 8 surrounding the study area. Operation and maintenance would not cause substantial depletion or 9 loss of availability, and would not cause remaining supplies to be inadequate to meet future 10 demands and require developing new sources. Accordingly, this impact would be less than 11 significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

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

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

28 Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP 29 Construction

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

31Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of32Implementing CM2-CM21

33 NEPA Effects: The conservation measures under Alternative 6A would be the same as those under 34 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. 35 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 36 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 37 aggregate necessary for these activities cannot be calculated at this time because of the 38 programmatic nature and general design of the conservation measures. However, the amount 39 needed would be expected to be within the capacity of available resources of the study area or 40 adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and 41 identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate 42 supplies substantial enough to cause remaining supplies to be inadequate for future development or

- 1 to require development of new aggregate sources to meet future demand. Therefore, the use of
- available aggregate material for the conservation measures of Alternative 6A would not have anadverse effect.

4 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 5 and access road construction, and placement of rock revetments or riprap for erosion control and 6 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 7 would be within the available resources of the study area or adjacent aggregate resource study areas 8 listed in Table 26-1. Because implementing conservation measures would not use an amount of 9 aggregate that would cause remaining supplies to be inadequate to meet future demands and 10 require developing new sources, this impact would be less than significant. No mitigation is 11 required.

1226.3.3.12Alternative 6B—Isolated Conveyance with East Alignment and13Intakes 1–5 (15,000 cfs; Operational Scenario D)

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

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

20 **NEPA Effects:** The conveyance facilities associated with Alternative 6B would be the same as those 21 under Alternative 1B. The locations of producing natural gas wells within the Alternative 6B 22 construction footprint are shown in Figure 24-5 in Chapter 24, Hazards and Hazardous Materials. 23 The two producing wells that would be affected by Alternative 6B are in San Joaquin County (Table 24 26-4) and would be affected by the conveyance canal and temporary construction work areas. 25 Because there are relatively few (two) producing wells within the construction footprint, the loss of 26 these wells would not eliminate a substantial portion of the county's natural gas wells or natural gas 27 production, and therefore would not constitute an adverse effect. Both producing wells within the 28 construction footprint would be permanently abandoned in coordination with DOC, following 29 applicable state regulations and guidance. A summary of laws and regulations related to well 30 abandonment is provided in Chapter 24, Hazards and Hazardous Materials, Sections 24.2.2.11 and 31 24.2.2.12.

32 *CEQA Conclusion*: Although two natural gas wells within the canal alignment would be permanently
 33 abandoned, new wells could be developed to replace them and the loss would be temporary.

- Additionally, wells in the study area of San Joaquin County produce a less than 1% of the county's
- 35 average annual natural gas production. Even if both producing wells in the Alternative 6B
- 36 construction footprint were abandoned and not replaced, the lost natural gas production would
 37 production would not represent a substantial portion of the county's natural gas wells or natural gas
- 37 production would not represent a substantial portion of the county's natural gas wens of natural gas 38 production. Accordingly, this impact would be less than significant. No mitigation is required.

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

NEPA Effects: The conveyance facilities associated with Alternative 6B are the same as those under
 Alternative 1B. Construction of Alternative 6B conveyance facilities would permanently reduce the

- 1 land surface available for vertical extraction of natural gas from directly underlying gas fields by
- 2 approximately 13% of the natural gas fields intersected (Table 26-5). The reduction in unimproved
- 3 land surfaces directly overlying gas fields would not be adverse because most of the affected fields
- 4 could be accessed from other overlying areas (Figure 26-2) and standard directional drilling
- techniques could enable access to fields from a distance. There would be no permanent blockage of
 access to natural gas fields. Therefore, there would be no long-term adverse effect on extraction
- capability from construction of Alternative 6B.
 - 8 Alternative 6B temporary work areas also overlie natural gas fields. Any temporary reduction in
 - 9 ability to extract natural gas during construction of conveyance facilities is considered minor
- 10 because the effect on natural gas extraction would be small and temporary and there would be no
- 11 permanent blockage of access to natural gas fields. Accordingly, there would be no adverse effect.
- *CEQA Conclusion*: Although the Alternative 6B conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (13%). Additionally, the gas fields would continue to be accessible
 using standard directional drilling techniques, so there would be no permanent blockage of access to
 natural gas fields. Accordingly, this impact would be less than significant. No mitigation is required.

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

- 19 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 6B would 20 primarily involve movement of water in infrastructure constructed under this alternative. These 21 water conveyance operations would not cause additional impacts beyond those already addressed 22 for water facilities construction under Alternative 1B. Operation would not result in covering or 23 blockage of any natural gas wells and no natural gas wells would be eliminated as a result of 24 operating the facilities. Similarly, maintenance of the water conveyance facilities would include 25 routine activities and periodic maintenance of canal levees that would not affect use of or access to 26 natural gas wells or resource recovery. Accordingly, there would be no adverse effect from 27 operation and maintenance.
- *CEQA Conclusion*: Operation and maintenance of the water conveyance facilities under Alternative
 6B would not block access to natural gas wells, cause any wells to be abandoned, or reduce
 production. Accordingly, this impact would be less than significant. No mitigation is required.

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

- NEPA Effects: The effects associated with Alternative 6B are the same as those described for
 Alternative 1B. Operation and maintenance activities associated with the water conveyance facilities
 would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the
 operation and maintenance associated with Alternative 6B would not have an adverse effect on
- 37 production or access to underlying natural gas fields.
- 38 *CEQA Conclusion*: The operation and maintenance of the water conveyance facilities under
- 39 Alternative 6B would not would not eliminate natural gas fields or block access to supplies of
- 40 natural gas because operation primarily involves movement of water in infrastructure constructed
- 41 under this alternative. Maintenance activities similarly would not would not eliminate natural gas
- 42 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.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

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

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

- 21Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active22Natural Gas Wells to the Extent Feasible
- 23 Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

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

- county's existing natural gas fields will remain accessible after implementation of this alternative,
 this impact is significant and unavoidable.
- Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to
 Natural Gas Fields to the Extent Feasible
- 5 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

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

- 8 *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
- 9 mines) and no identified MRZs in the Alternative 6B construction footprint of the water conveyance 10 facilities, there would be no effect on the availability of aggregate resources.
- *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint for
 the water conveyance facilities, there would be no impact. No mitigation is required.

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

- 15 NEPA Effects: The impacts associated with Alternative 6B are the same as those described for 16 Alternative 1B. Aggregate would be needed to construct the large water conveyance facilities 17 associated with this alternative (an estimated 8,473,470 tons). This amount of aggregate represents 18 approximately 3% of the combined permitted aggregate resources in Sacramento County and the 19 Stockton-Lodi P-C Region. As in the discussion of Alternative 1B above, the Alternative 6B demand 20 over the entirety of the construction period would not be considered an adverse effect on the 21 availability of known aggregate resources or aggregate availability to meet the regional 50-year 22 demand.
- The amount of borrow material needed to construct Alternative 6B is expected to be similar to that
 for Alternative 1B. Because borrow is not defined as a mineral resource, there would be no effect
 associated with its use.
- 26 **CEQA Conclusion:** The use large amounts of construction-grade aggregate (estimated to be 27 equivalent to approximately 3% of the permitted aggregate from Sacramento County and the 28 Stockton-Lodi P-C Region) over the life of the construction period would not result in a substantial 29 depletion (loss of availability) of construction-grade aggregate within the six regional aggregate 30 production study areas surrounding the study area (Table 26-1), would not cause remaining 31 supplies to be inadequate for future development, and would not substantially contribute to the 32 need for the development of new aggregate resources. Accordingly, although a substantial amount of 33 available aggregate material may be used under Alternative 6B, the impact would be less than 34 significant. No mitigation 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 have a significant37 impact. No mitigation is required.

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

3 **NEPA Effects:** The operational components of the water conveyance facilities under Alternative 6B 4 would include moving water, both within infrastructure that would be constructed and natural 5 channels. There are no aggregate mines or MRZs in the area where the alternative would operate. 6 Accordingly, operations would not cover or block access to existing mines or identified MRZs and 7 there would be no effect. Similarly, maintenance activities during the operational life of the facilities 8 would not would not cover or block access to existing mines or identified MRZs because there are no 9 aggregate mines or MRZs in the area where the alternative would operate. Additionally, operations 10 and maintenance would not increase the alternative's footprint so they could not have any effect 11 even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of the water 12 conveyance facilities under Alternative 1B would not have effects on the availability of aggregate 13 resource sites.

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

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

20 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 1B would include 21 moving water, both within infrastructure that would be constructed and natural channels. No 22 aggregate resources are required for operations so there would be no effect. Small amounts of 23 aggregate and riprap would be required for maintenance of facilities. These small amounts could be 24 readily supplied by quarries in the region (Table 26-1) or those currently in the process of 25 permitting and development (Section 26.1.2.1, Aggregate Resources) without affecting the overall 26 availability of aggregate or the supply available for future development. Accordingly, operation and 27 the use of a small amount of aggregate material for the maintenance of the water conveyance 28 facilities under Alternative 6B is not an adverse effect.

29 **CEOA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 30 resources because operation involves moving water through the conveyance infrastructure and no aggregate resources are required for operations. A small amount of aggregate material would be 31 32 used for maintenance of Alternative 6B. The small amount of aggregate used for maintenance would 33 not substantially deplete permitted aggregate resources in the six aggregate production study areas 34 (Table 26-1) or new resource areas currently in the permitting and development stage (Section 35 26.1.2.1, Aggregate Resources) in the region surrounding the study area. Operation and maintenance 36 would not cause substantial depletion or loss of availability, and would not cause remaining supplies 37 to be inadequate to meet future demands and require developing new sources. Therefore this 38 impact would be less than significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

NEPA Effects: Conservation actions beyond CM1 would be the same for Alternative 6B as under
Alternative 1A. Consequently, the effects of inundation under CM4, CM5, and CM10 would be the
same. Table 26-8 shows that there are two active mines in the ROAs and there are no identified

- 1 MRZs. The upland mine in the Suisun Marsh ROA would not be inundated. The aggregate mine
- 2 (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA could be
- 3 inundated. Inundation and loss of this aggregate mine would be an adverse effect. Mitigation
- 4 Measure MIN-11 is available to reduce this effect.

5 **CEQA Conclusion:** ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano 6 County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not 7 be affected by inundation associated with the conservation measures. An active mine on Decker 8 Island may fall within the inundation footprints associated with CM4, CM5, and CM10. Inundation 9 and loss of the Decker Island aggregate mine would be a significant impact because it would 10 eliminate the potential to recover aggregate resources. Mitigation Measure MIN-11 is designed to 11 reduce the impact to a less-than-significant level.

- Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP
 Construction
- 14 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 1A.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

17 **NEPA Effects:** The conservation measures under Alternative 6B would be the same as those under 18 Alternative 1A. Consequently, the effects would also be the same as described for Alternative 1A. 19 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 20 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 21 aggregate necessary for these activities cannot be calculated at this time because of the 22 programmatic nature and general design of the conservation measures. However, the amount 23 needed would be expected to be within the capacity of available resources of the study area or 24 adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and 25 identified within Table 26-1. There would be no depletion (loss of availability) of regional aggregate 26 supplies substantial enough to cause remaining supplies to be inadequate for future development or 27 to require development of new aggregate sources to meet future demand. Therefore, the use of 28 available aggregate material for the conservation measures of Alternative 6B would not have an 29 adverse effect.

30 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 31 and access road construction, and placement of rock revetments or riprap for erosion control and 32 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 33 would be within the available resources of the study area or adjacent aggregate resource study areas 34 listed in Table 26-1. Because implementing conservation measures would not use an amount of 35 aggregate that would cause remaining supplies to be inadequate to meet future demands and 36 require developing new sources, this impact would be less than significant. No mitigation is 37 required.

3826.3.3.13Alternative 6C—Isolated Conveyance with West Alignment and39Intakes W1–W5 (15,000 cfs; Operational Scenario D)

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

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

3 **NEPA Effects:** The conveyance facilities associated with Alternative 6C are the same as those under 4 Alternative 1C (Figure 24-5 in Chapter 24, Hazards and Hazardous Materials; Table 26-4). Therefore, 5 the effect on natural gas wells would be the same. Four active wells would be permanently 6 abandoned because they would be displaced by permanent facility sites. Wells in the construction 7 footprint in Sacramento County produce approximately 6% of that county's annual natural gas 8 production. Even if all producing wells in the construction footprint were abandoned and not 9 replaced with new wells, the effects associated with lost natural gas production would not be an 10 adverse effect because the loss would not represent a substantial portion of county, regional, or 11 statewide natural gas production or eliminate a substantial portion of the county's natural gas wells. 12 There would be no wells affected by temporary construction work areas. Accordingly, there would 13 not be an adverse effect.

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

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

21 **NEPA Effects:** The conveyance facilities associated with Alternative 6C are the same as those under 22 Alternative 1C. Therefore, the effect on natural gas fields would be the same. Construction of 23 Alternative 6C conveyance facilities would permanently reduce the land surface available for 24 vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas 25 field area underlying the Alternative 6C permanent construction footprint is small (approximately 26 5% of the natural gas fields intersected) relative to the areal extent of natural gas field areas (Table 27 26-5). The reduction in unimproved land surfaces directly overlying gas fields would not be adverse 28 because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and 29 standard directional drilling techniques could enable access to gas fields from a distance. Therefore, 30 there would be no long-term substantial loss of extraction capability from construction of 31 Alternative 6C and there would be no adverse effect.

- Alternative 6C temporary work areas also overlie natural gas fields. Any temporary reduction in
 ability to extract natural gas during construction of conveyance facilities is considered minor
 because the effect on natural gas extraction would be small and temporary, and would not prevent
 recovery of the resource, there would not be an adverse effect.
- *CEQA Conclusion*: Although the Alternative 6C conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (approximately 5%). Additionally, the gas fields would continue to be
 accessible using conventional or directional drilling techniques. There would be no substantial loss
 of existing production or permanent loss of access to the resource. Accordingly, this impact would
 be less than significant. No mitigation is required.

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

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

13 Impact MIN-4: Loss of Availability of Natural Gas Fields as a Result of Operation and 14 Maintenance of the Water Conveyance Facilities

- *NEPA Effects:* The operation of the water conveyance facilities under Alternative 6C would be
 similar to those of Alternative 1A. The facilities maintenance activities would also be similar, except
 that periodic maintenance of canal levees along the two canal segments would be needed for
 Alternative 6C. Operation and maintenance activities associated with the water conveyance facilities
 would not eliminate natural gas fields or block access to supplies of natural gas. Accordingly, the
 operation and maintenance associated with Alternative 6C would not have an adverse effect on
 production or access to underlying natural gas fields.
- *CEQA Conclusion:* Operation and maintenance of the water conveyance facilities under Alternative
 6C would have no impact on access to underlying natural gas fields because operation primarily
 involves movement of water in infrastructure constructed under this alternative. Maintenance
 activities similarly would not eliminate natural gas fields or block access to supplies of natural gas.
 Operation and maintenance activities would not obstruct access to natural gas fields and would not
 interfere with recovering the resource. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

30 **NEPA Effects:** The conservation measures that would be implemented under Alternative 6C would 31 be the same as those under Alternative 1A. While inundation for permanent wetland creation under 32 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly 33 affected would vary, depending on the specific lands inundated by these three conservation 34 measures. In permanently flooded areas, the active wells could be replaced using conventional or 35 directional drilling techniques at a location outside the inundation zone to maintain production. The 36 likelihood of this replacement would depend on the availability of land for lease and the cost of the 37 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there 38 could be a locally adverse effect related to permanent elimination of a substantial portion of a 39 county's active natural gas wells. 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,

this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot
 assure that all or a substantial portion of a county's existing natural gas wells will remain accessible
 after implementation of this alternative, this impact is significant and unavoidable.

4 5

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

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

7 Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result 8 of Implementing CM2-CM21

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

- 16 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 17 inundated by CM4. CM5, and CM10 depends on the final footprints for these measures and would 18 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 19 outside the inundated areas using either conventional or directional drilling, although feasibility of 20 access would depend on the exact configuration of inundation and the availability of adjacent 21 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 22 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 23 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 24 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 25 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a 26 county's existing natural gas fields will remain accessible after implementation of this alternative, 27 this impact is significant and unavoidable.
- Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to
 Natural Gas Fields to the Extent Feasible
- 30 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 6C construction footprint of the water conveyance
 facilities, there would be no effect on the availability of aggregate resources.
- 36 *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 37 there would be no impact. No mitigation is required.

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

- 3 **NEPA Effects:** The conveyance facilities associated with Alternative 6C are the same as those under 4 Alternative 1C. Therefore, the effects would be the same. Alternative 6C would require large 5 amounts of fill, aggregate, and cement for construction of the numerous elements of the water 6 conveyance facilities. An estimated 12,009,807 tons of aggregate would be required for this 7 alternative. This amount is less than 5% of the permitted aggregate in Sacramento County and the 8 Stockton-Lodi P-C Region combined (see Table 26-1). The amount of aggregate needed for 9 Alternative 6C is about 11% less than that needed for Alternative 1A; and Alternative 1A was judged 10 to have no adverse effect on aggregate availability. Alternative 6C aggregate use would not produce 11 an adverse effect on aggregate availability to meet the regional 50-year demand, and would not 12 produce an adverse effect on known aggregate resources.
- 13The amount of borrow material required for Alternative 6C would be 200,000,000 cubic yards or14approximately 350,000,000 tons. The majority of this material would be used to construct levees for15the two canal segments of Alternative 6C. However, the use of this borrow material would not have16an adverse effect because borrow is developed locally and regionally on an as-needed basis and is17not a considered a significant mineral resource in California.
- 18 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be less 19 than 5% of the combined permitted aggregate of Sacramento County and the Stockton-Lodi P-C 20 Region) over the entirety of the construction period would not result in a substantial depletion (loss 21 of availability) of construction-grade aggregate within the six regional aggregate production areas 22 surrounding the study area (Table 26-1), would not cause remaining supplies to be inadequate for 23 future development, and would not contribute to the need for development of new aggregate 24 resources. The amount of aggregate use in Alternative 6C would be about 11% less than that needed 25 for Alternative 1A, and Alternative 1A was judged to have no significant impact on aggregate 26 availability. Consequently, the impact of Alternative 6C would be less than significant. No mitigation 27 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.

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

33 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 6C would include 34 moving water, both within infrastructure that would be constructed and natural channels. As 35 explained under Alternative 1C, these operations would not affect existing mines or identified MRZs 36 because there are none in the area where the alternative would operate. For the same reason, 37 maintenance activities during the operational life of the facilities would not affect existing mines or 38 identified MRZs. Operation and maintenance would not increase the footprint of the alternative. 39 Accordingly, operation and maintenance of the water conveyance facilities under Alternative 6C 40 would not cover or block access to existing mines or identified MRZs and there would be no effect on 41 the availability of aggregate resource sites.

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

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

7 **NEPA Effects:** The only use of aggregate resources associated with operation and maintenance of the 8 water conveyance facilities would be small amounts of aggregate and riprap required for 9 maintenance of levees, stream banks, access roads, and structure foundations. These small amounts 10 could be readily supplied by quarries in the region (Table 26-1) or those currently in the process of 11 permitting and development (Section 26.1.2.1, Aggregate Resources) without affecting the overall 12 availability of aggregate or the supply available for future development. Accordingly, operation and 13 the use of a small amount of aggregate material for the maintenance of the water conveyance 14 facilities under Alternative 6C would not have an adverse effect.

15 **CEQA Conclusion:** Operation of the water conveyance facilities would not affect any aggregate 16 resources because operation involves moving water through the conveyance infrastructure and no 17 aggregate resources are required for operations. A small amount of aggregate material would be 18 used for maintenance of Alternative 6C. The material would be used for maintenance of levees, 19 stream banks, access roads, and structure foundations. The small amount of aggregate used for 20 operational components would not substantially deplete permitted aggregate resources in the six 21 aggregate production study areas surrounding the study area (Table 26-1) or new resource areas 22 currently in the permitting and development stage (Section 26.1.2.1, Aggregate Resources) in the 23 region surrounding the study area. Operation and maintenance would not cause substantial 24 depletion or loss of availability, and would not cause remaining supplies to be inadequate to meet 25 future demands and require developing new sources. Therefore this impact would be less than 26 significant. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

- *NEPA Effects:* Conservation actions beyond CM1 would be the same for Alternative 6C as they would
 be for Alternative 1A. Consequently, the effects of these conservation measures would be the same.
 There are no identified MRZs in the inundation footprints. Table 26-8 shows that there are two
 active mines in the ROAs. The upland mine in the Suisun Marsh ROA would not be inundated. The
 aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta ROA
 could be inundated. Inundation and loss of this aggregate mine would be an adverse effect.
 Mitigation Measure MIN-11 is available to reduce this effect.
- *CEQA Conclusion*: ROAs affected by CM4, CM5, and CM10 include two active mines, both in Solano
 County (Table 26-8), and no identified MRZs. The upland mine in the Suisun Marsh ROA would not
 be affected by inundation associated with the conservation measures. An active mine (Mega Sand,
 Inc. depicted in Figure 26-1) on Decker Island may fall within the inundation footprints associated
 with CM4, CM5, and CM10. Inundation and loss of the Decker Island aggregate mine would be a
 significant impact because it would eliminate the potential to recover aggregate resources.
 Mitigation Measure MIN-11 would reduce this impact to a less-than-significant level.

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

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

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

6 **NEPA Effects:** The conservation measures under Alternative 6C would be the same as those under 7 Alternative 1A. Consequently, the impacts 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 the Planning Area or adjacent 13 aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and identified 14 within 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 6C would not cause 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 26.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 28 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; 29 Operational Scenario E)

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

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

- 39 *NEPA Effects:* The conveyance facilities associated with Alternative 7 are the same as those under
- 40 Alternative 1A except that two fewer intakes would be constructed. The decreased construction
- 41 footprint associated with building intakes for Alternative 7 would not change the effect on natural

- 1 gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by 2 Alternative 7 construction (Sacramento and San Joaquin) represent a very minor percentage of 3 those counties' average annual natural gas production. In the construction footprint, the affected 4 wells produce about 1% of the total annual natural gas production in Sacramento County (Table 26-5 4). Because of the relatively few (six) producing wells within the construction footprint, and their 6 small percentage of county annual production, the loss would not represent a substantial portion of 7 the county's existing production and effects on natural gas wells would not be adverse. All producing 8 wells within the construction footprint would be permanently abandoned in coordination with DOC, 9 following applicable state regulations and guidance. A summary of laws and regulations related to 10 well abandonment is provided in Chapter 24, Hazards and Hazardous Materials, Sections 24.2.2.11 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

- 19 **NEPA Effects:** Because the three intakes and associated facilities that would not be constructed for 20 Alternative 7 do not overlie known natural gas fields, the effect on potential extraction from natural 21 gas fields would be the same as under Alternative 1A. The proportion of natural gas field area 22 underlying the Alternative 7 permanent construction footprint is small (approximately 3% of the 23 natural gas field intersected) relative to the areal extent of natural gas field areas (Table 26-5). The 24 reduction in unimproved land surfaces directly overlying gas fields would not be an adverse effect 25 because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and 26 standard directional drilling techniques could enable access to gas fields from a distance. 27 Consequently, Alternative 7 would have no long-term adverse effect on the extraction potential from 28 natural gas fields because the effect on natural gas extraction in Sacramento County would be small 29 and temporary, and the presence of work areas would not prevent recovery of the resource.
- 30 *CEQA Conclusion*: Although the Alternative 7 conveyance facilities would reduce the land surface
 31 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 32 fields affected would be small(less than approximately 3% of the areal extent of natural gas field
 33 areas intersected). Additionally, there would be no substantial loss of existing production or
 34 permanent loss of access to the resource because the gas fields would continue to be accessible
 35 using conventional or directional drilling techniques. Accordingly, this impact would be less than
 36 significant. No mitigation is required.

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

- 39 *NEPA Effects:* As under Alternative 1A, the operation of the water conveyance facilities under
- 40 Alternative 7 is primarily associated with movement of water within infrastructure and
- 41 maintenance of water conveyance facilities. Routine maintenance activities would not affect natural
- 42 gas wells or resource recovery. Operation and maintenance would not have effects on access to or
- 43 use of existing active wells, or accessing plugged inactive wells. Operation and maintenance would

- not result in permanent covering or blockage of any natural gas wells and no natural gas wells
 would be eliminated as a result of operation and maintenance. Accordingly, there would be no effect.
- *CEQA Conclusion:* The operation and maintenance of the water conveyance facilities under
 Alternative 7 would have no impact on access to locally important natural gas wells, either for
 operating and maintaining existing active wells or modifying plugged inactive wells, because
 operation and routine maintenance would not cause the abandonment of wells, eliminate access to
 wells, or reduce production. No mitigation is required.

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 7 would primarily 11 involve movement of water in infrastructure constructed under this alternative. These water 12 conveyance operations would not cause additional impacts beyond those already addressed for 13 water facilities construction. Similarly, maintenance activities would not affect natural gas fields and 14 therefore would not cause impacts that have not already been addressed related to construction of 15 water conveyance facilities. Operation and maintenance activities associated with the water 16 conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. 17 Accordingly, the operation and maintenance of Alternative 7 would not have an adverse effect on 18 production or access to (availability of) underlying natural gas fields.
- 19 CEQA Conclusion: Operations primarily involve movement of water in infrastructure constructed 20 under this alternative and would not interfere with recovering the resource. Routine maintenance 21 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would 22 also have no impact on access to underlying natural gas fields. The operation and maintenance of the 23 water conveyance facilities under Alternative 7 would not obstruct access to natural gas fields, or 24 reduce production or the ability to recover the resource. Accordingly, there would be no impact. No 25 mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

- 28 **NEPA Effects:** The conservation measures that would be implemented under Alternative 7 would be 29 the same as those under Alternative 1A, except Alternative 7 would have twice as much channel 30 margin restoration and seasonally inundated floodplain. While inundation for permanent wetland 31 creation under CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active 32 wells directly affected would vary, depending on the specific lands inundated by these three 33 conservation measures. In permanently flooded areas, the active wells could be replaced using 34 conventional or directional drilling techniques at a location outside the inundation zone to maintain 35 production. The likelihood of this replacement would depend on the availability of land for lease and 36 the cost of the new construction. If a large number of wells had to be abandoned and could not be re-37 drilled, there could be a locally adverse effect related to permanent elimination of a substantial 38 portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available to address this 39 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

- assure that all or a substantial portion of a county's existing natural gas wells will remain accessible
 after implementation of this alternative, this impact is significant and unavoidable.
- Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid 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.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

- 8 **NEPA Effects:** The conservation measures that would be implemented under Alternative 7 would be 9 the same as those under Alternative 1A, except Alternative 7 would have twice as much channel 10 margin restoration and seasonally inundated floodplain. Consequently, the impacts would be similar 11 to those described for Alternative 1A. Inundation for creation of permanent wetlands could 12 eliminate access to portions of some natural gas fields. Although the overall extent of affected 13 natural gas fields in the region is low to moderate, there is potential for a locally adverse effect on 14 access to natural gas fields because the resource may be permanently covered (inundated) or 15 otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this 16 effect.
- 17 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 18 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 19 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 20 outside the inundated areas using either conventional or directional drilling, although feasibility of 21 access would depend on the exact configuration of inundation and the availability of adjacent 22 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 23 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 24 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 25 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 26 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of 27 existing natural gas fields will remain accessible after implementation of this alternative, this impact 28 is significant and unavoidable.
- 29Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to30Natural Gas Fields to the Extent Feasible
- 31 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 1A.

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

- 34 *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 35 mines) and no identified MRZs in the Alternative 7 construction footprint of the water conveyance
 36 facilities, there would be no effect on the availability of aggregate resources.
- 37 *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 38 there would be no impact. No mitigation is required.

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

3 **NEPA Effects:** The demand for aggregate resources associated with Alternative 7 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 13,258,000 tons, or approximately 5% of the combined permitted 7 aggregate resources in Sacramento County and the Stockton-Lodi P-C Region. As in the discussion of 8 Alternative 1A, demand for aggregate resources over the life of the construction period under 9 Alternative 7 would not require a substantial depletion of aggregate available to meet the regional 10 50-year demand, and would not substantially contribute to the need for new aggregate resource 11 development. Therefore, this effect would not be adverse.

- The amount of borrow material needed to construct Alternative 7 is expected to be slightly smaller
 than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there
 would be no effect on the availability of mineral resources associated with its use.
- 15 **CEQA** Conclusion: The use of large amounts of construction-grade aggregate (estimated to be 16 equivalent to approximately 5% of the permitted aggregate from Sacramento County and the 17 Stockton-Lodi P-C Region) over the entirety of the construction period would not result in a 18 substantial depletion (loss of availability) of construction-grade aggregate within the six regional 19 aggregate production study areas within the study area (Table 26-1), would not cause remaining 20 supplies to be inadequate for future development, and would not contribute to the need for the 21 development of new aggregate resources. Consequently, although a substantial amount of available 22 aggregate material may be used under Alternative 7, the impact would be less than significant. No 23 mitigation is required.
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 29 **NEPA Effects:** The operational components of the water conveyance facilities under Alternative 7 30 would include moving water both within infrastructure that would be constructed and natural 31 channels. These operations would not cover or block access to existing mines or identified MRZs 32 because there are no aggregate mines or MRZs in the area where the alternative would operate. 33 Similarly, maintenance activities during the operational life of the facilities would not affect existing 34 mines or identified MRZs. Additionally, operations and maintenance would not increase the existing 35 project footprint so they could not have any effect even if aggregate mines or MRZs did exist. 36 Accordingly, the operation and maintenance of the water conveyance facilities under Alternative 7 37 would not have effects on the availability of aggregate resource sites.
- *CEQA Conclusion*: The operation and maintenance of Alternative 7 would have no impacts on the
 availability of locally important aggregate resource sites because none exist within the areas
 affected by Alternative 7 operations, and maintenance; and operations and maintenance would not
 increase the alternative's footprint. No mitigation is required.

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

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 7 would not have 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. The small amount of aggregate used for 16 maintenance would not substantially deplete permitted aggregate resources in the six aggregate 17 production study areas (Table 26-1) or new resource areas currently in the permitting and 18 development stage (Section 26.1.2.1, Aggregate Resources) in the region surrounding the study area. 19 Operation and maintenance would not cause substantial depletion or loss of availability of aggregate 20 resources, and would not cause remaining supplies to be inadequate to meet future demands and 21 require developing new sources. Accordingly, this impact would be less than significant. No 22 mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

25 NEPA Effects: Conservation actions beyond CM1 would be the same for Alternative 7 as they would 26 be for Alternative 1A, except Alternative 7 would have twice as much channel margin restoration 27 and seasonally inundated floodplain. Consequently, the effects of these conservation measures 28 would be similar to those described for Alternative 1A. Table 26-8 lists two active mines in the ROAs 29 and there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be 30 inundated. The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the 31 West Delta ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse 32 effect. Mitigation Measure MIN-11 is available to reduce this effect.

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

40Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP41Construction

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

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

3 **NEPA Effects:** The conservation measures under Alternative 7 would be the same as those under 4 Alternative 1A, except Alternative 7 would have twice as much channel margin restoration and 5 seasonally inundated floodplain. Consequently, the impacts would be similar to those described for 6 Alternative 1A. Small amounts of aggregate would be used for levee, access road, and rock 7 revetment construction and for erosion control and stability at levee breaches and toe drain 8 earthworks. The amount of aggregate necessary for these activities cannot be calculated at this time 9 because of the programmatic nature and general design of the conservation measures. However, the 10 amount needed would be expected to be within the capacity of available resources of the study area 11 or adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate 12 13 supplies substantial enough to cause remaining supplies to be inadequate for future development or 14 to require development of new aggregate sources to meet future demand. Therefore, the use of 15 available aggregate material for the conservation measures of Alternative 7 would not have an 16 adverse effect.

17 CEQA Conclusion: CM2, CM4, CM5, and CM10 would use small amounts of aggregate for levee, berm, 18 and access road construction, and placement of rock revetments or riprap for erosion control and 19 stability at level breaches and toe drain earthworks. The amounts of aggregate are unknown but 20 would be within the available resources of the study area or adjacent aggregate resource study areas 21 listed in Table 26-1. Because implementing conservation measures would not use an amount of 22 aggregate that would cause remaining supplies to be inadequate to meet future demands and 23 require developing new sources, this impact would be less than significant. No mitigation is 24 required.

2526.3.3.15Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,263, and 5, and Increased Delta Outflow (9,000 cfs; Operational27Scenario F)

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

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

35 **NEPA Effects:** The conveyance facilities associated with Alternative 8 are the same as those under 36 Alternative 1A except that two fewer intakes would be constructed. The decreased construction 37 footprint associated with building intakes for Alternative 8 would not change the effect on natural 38 gas wells as identified for Alternative 1A. Natural gas wells in the two counties affected by 39 Alternative 8 construction (Sacramento and San Joaquin) represent a very minor percentage of 40 those counties' average annual natural gas production. In the construction footprint, affected wells 41 produce about 1% of the total annual natural gas production in Sacramento County. Because the 42 relatively few (six) producing wells within the construction footprint account for only a small 43 percentage of county annual production, the loss would not represent a substantial portion of the

- county's existing production. Accordingly, Alternative 8 would have no adverse effect on natural gas
 wells.
- 3 All 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.
- *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

- 14 **NEPA Effects:** Because the three intakes and associated facilities that would be constructed for 15 Alternative 8 do not overlie known natural gas fields, the effect on potential extraction from natural 16 gas fields would be the same as under Alternative 1A. The proportion of natural gas field area 17 underlying the Alternative 8 permanent construction footprint is small (approximately 3% of the 18 natural gas fields intersected) relative to the areal extent of natural gas field areas (Table 26-5). The 19 reduction in unimproved land surfaces directly overlying gas fields would not be adverse because 20 most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard 21 directional drilling techniques could enable access to gas fields from a distance. Consequently, 22 Alternative 8 would have no long-term adverse effect on the extraction potential from natural gas 23 fields.
- Alternative 8 temporary work areas also overlie natural gas fields. Any temporary reduction in
 ability to extract natural gas during construction of conveyance facilities is considered minor
 because the effect on natural gas extraction in Sacramento County would be small and temporary,
 and the presence of work areas would not prevent recovery of the resource. There would be no
 adverse effect.
- *CEQA Conclusion*: Although the Alternative 8 conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (less than approximately 3% of the areal extent of natural gas field
 areas intersected). Additionally, there would be no substantial loss of existing production or
 permanent loss of access to the resource because the gas fields would continue to be accessible
 using conventional or directional drilling techniques. Accordingly, this impact would be less than
 significant. No mitigation is required.

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

- 38 *NEPA Effects:* As described under Alternative 1A, the operation of the water conveyance facilities
 39 under Alternative 8 is primarily associated with movement of water within infrastructure and
 40 maintenance of water conveyance facilities. These operations would not cause additional effects on
- 41 natural gas wells beyond those related to water conveyance construction. Similarly, maintenance of
- 42 the water conveyance facilities would include routine activities (described under Alternative 1A)

- 1 that would not affect natural gas wells or resource recovery. Therefore, the operation and
- 2 maintenance associated with the water conveyance facilities under Alternative 8 would not have
- 3 additional effects on access to or use of existing active wells, or accessing plugged inactive wells.
- 4 Operation and maintenance would not result in permanent covering or blockage of any natural gas
- 5 wells and no natural gas wells would be eliminated as a result of operation and maintenance.
- 6 Accordingly, there would be no effect.
- *CEQA Conclusion:* The operation and maintenance of the water conveyance facilities under
 Alternative 8 would have no impact on access to natural gas wells, either for operating and
- 9 maintaining existing active wells, or modifying plugged inactive wells, because operation and
- 10 routine maintenance would not cause the abandonment of wells, eliminate access to wells, or reduce 11 production. No mitigation is required.

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

- 14 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 8 would primarily 15 involve movement of water in infrastructure constructed under this alternative. These water 16 conveyance operations would not cause additional effects beyond those already addressed for water 17 facilities construction. Similarly, maintenance activities would not affect natural gas fields and 18 therefore would not cause effects that have not already been addressed related to construction of 19 water conveyance facilities. Operation and maintenance activities associated with the water 20 conveyance facilities would not eliminate natural gas fields or block access to supplies of natural gas. 21 Accordingly, the operation and maintenance of Alternative 8 would not have an adverse effect on 22 production or on access to (availability of) underlying natural gas fields.
- *CEQA Conclusion*: The operation and maintenance of the water conveyance facilities under
 Alternative 8 would have no impact on availability of natural gas fields because operations primarily
 involve movement of water in infrastructure constructed under this alternative and would not
 interfere with recovering the resource. Routine maintenance would not obstruct access to natural
 gas fields, or reduce production or the ability to recover the resource. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

30 **NEPA Effects:** The conservation measures that would be implemented under Alternative 8 would be 31 the same as those under Alternative 1A. While inundation for permanent wetland creation under 32 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly 33 affected would vary, depending on the specific lands inundated by these three conservation 34 measures. In permanently flooded areas, the active wells could be replaced using conventional or 35 directional drilling techniques at a location outside the inundation zone to maintain production. The 36 likelihood of this replacement would depend on the availability of land for lease and the cost of the 37 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there 38 could be a locally adverse effect related to permanent elimination of a substantial portion of a 39 county's active natural gas wells. 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

- percentage of the total wells in the study area, and some wells may be relocated using conventional
 or directional drilling, there is potential to affect a locally significant number of wells. Consequently,
- 42 of directional drining, there is potential to affect a locarly significant number of wens. Consequently 43 this impact is considered significant. Because implementation of Mitigation Measure MIN-5 cannot

- assure that all or a substantial portion of a county's existing natural gas wells will remain accessible
 after implementation of this alternative, this impact is significant and unavoidable.
- Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid 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.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

- 8 **NEPA Effects:** The conservation measures that would be implemented under Alternative 8 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.
- Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain 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.

Impact MIN-7: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and 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 8 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.

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

3 **NEPA Effects:** The demand for aggregate resources associated with Alternative 8 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 13,258,000 tons, or approximately 5% of the combined permitted 7 aggregate 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 8 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 construction period.

- The amount of borrow material needed to construct Alternative 8 is expected to be slightly smaller
 than that for Alternative 1A. Because borrow is not defined as a mineral resource in California, there
 would be no effect on the availability of mineral resources associated with its use.
- **CEQA Conclusion:** The use of large amounts of construction-grade aggregate (estimated to be 15 16 equivalent to approximately 5% of the permitted aggregate from Sacramento County and the 17 Stockton-Lodi P-C Region) over the life of the construction period would not result in a substantial 18 depletion (loss of availability) of construction-grade aggregate within the six regional aggregate 19 production study areas in the study area, would not cause remaining supplies to be inadequate for 20 future development, and would not substantially contribute to the need for the development of new 21 aggregate resources. Consequently, although a substantial amount of available aggregate material 22 may be used under Alternative 8, the impact would be less than significant. No mitigation is 23 required.
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 29 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 8 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 8 would not 37 have effects on the availability of aggregate resource sites.
- *CEQA Conclusion*: The operation and maintenance of Alternative 8 would have no impacts on the
 availability of locally important aggregate resource sites because none exist within the areas
 affected by Alternative 8 operation and maintenance; and operations and maintenance would not
 increase the alternative's footprint. No mitigation is required.

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

3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 8 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 8 would not have 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 aggregate resources are required for operations. A small amount of aggregate material would be 15 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.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

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

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

40Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP41Construction

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

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing CM2-CM21

3 **NEPA Effects:** The conservation measures under Alternative 8 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 the Planning Area or 10 adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and 11 identified within 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 8 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.

2426.3.3.16Alternative 9—Through Delta/Separate Corridors (15,000 cfs;25Operational Scenario G)

Alternative 9 entails water transfer through existing Delta channels with certain channel
modifications. There would be two screened fish intakes at the Delta Cross Canal and Georgiana
Slough. Water would generally flow through existing channels except that two new canal segments
would be constructed and dredging would occur in certain existing channels.

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

- NEPA Effects: This alternative primarily involves moving water through existing Delta channels
 with a minimal physical construction footprint (Figure 26-2). Because there are no producing
 natural gas wells within the permanent construction footprint, there would be no effect on gas
 production or the availability of natural gas wells.
- 36 *CEQA Conclusion*: This alternative primarily involves moving water through the existing Delta
 37 channels with a minimal physical construction footprint. Because there are no producing natural gas
 38 wells within the permanent construction footprint, there would be no impact on gas production or
 39 the availability of natural gas wells. No mitigation is required.

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

3 **NEPA Effects:** This alternative primarily involves moving water through the existing Delta channels 4 with a minimal physical construction footprint. The construction activity would not limit access to 5 natural gas fields in the study area (Figure 26-2). Less than 1% of natural gas fields intersected 6 would be affected by the construction footprint. The reduction in unimproved land surfaces directly 7 overlying gas fields would not have an adverse effect because most of the affected fields could be 8 accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques 9 could enable access to gas fields from a distance. Because there would be no covering or blockage of 10 access, Alternative 9 would have no long-term adverse effect on the extraction potential from 11 natural gas fields.

CEQA Conclusion: This alternative primarily involves moving water through the existing Delta
 channels with a minimal physical construction footprint. Because less than 1% of natural gas fields
 intersected would be affected by the construction footprint, and there would be no permanent
 blockage of access to natural gas fields, there would be no impact on the availability of extraction
 potential from natural gas fields. No mitigation is required.

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

- NEPA Effects: The operation of the water conveyance facilities under Alternative 9 involves
 management of flows through the Delta channels. Periodic routine maintenance would include
 activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of
 erosion protection on the levees and embankments of water conveyance facilities within the study
 area. Because these activities would not encroach on important natural gas wells, there would be no
 effect on natural gas production.
- *CEQA Conclusion*: Because the operation and maintenance of the water conveyance facilities under
 Alternative 9 would not encroach on natural gas wells, they would have no impact on natural gas
 production. No mitigation is required.

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

- NEPA Effects: The operation of the water conveyance facilities under Alternative 9 involves
 management of flows through the Delta channels. Periodic routine maintenance would include
 activities such as cleaning, structure repair, landscape maintenance, road work, and replacement of
 erosion protection on the levees and embankments. Because these activities would not encroach on
 natural gas fields, there would be no effect on the potential for natural gas recovery.
- 35 *CEQA Conclusion*: Because the operation and maintenance of the water conveyance facilities under
 36 Alternative 9 would not encroach on natural gas fields, they would have no impact on the potential
 37 for natural gas recovery. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing CM2-CM21

40 *NEPA Effects:* The conservation measures that would be implemented under Alternative 9 would be
 41 the same as those under Alternative 1A. While inundation for permanent wetland creation under

1 CM4, CM5, and CM10 could potentially affect natural gas wells, the number of active wells directly 2 affected would vary, depending on the specific lands inundated by these three conservation 3 measures. In permanently flooded areas, the active wells could be replaced using conventional or 4 directional drilling techniques at a location outside the inundation zone to maintain production. The 5 likelihood of this replacement would depend on the availability of land for lease and the cost of the 6 new construction. If a large number of wells had to be abandoned and could not be re-drilled, there 7 could be a locally adverse effect related to permanent elimination of a substantial portion of a 8 county's natural gas wells. Mitigation Measure MIN-5 is available to address this effect.

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

- 15Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active16Natural Gas Wells to the Extent Feasible
- 17 Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 1A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing CM2-CM21

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

27 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 28 inundated by CM4, CM5, and CM10 depends on the final footprints for these measures and would 29 range from less than 1% to 100%. Most of these natural gas fields would still be accessible from 30 outside the inundated areas using either conventional or directional drilling, although feasibility of 31 access would depend on the exact configuration of inundation and the availability of adjacent 32 drilling sites. Although the overall extent of affected natural gas fields in the region is low to 33 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 34 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 35 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 36 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of a 37 county's existing natural gas fields will remain accessible after implementation of this alternative, 38 this impact is significant and unavoidable.

39Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to40Natural Gas Fields to the Extent Feasible

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

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 9 footprint, there would be no effect on the
 availability of aggregate resources.
- *CEQA Conclusion*: Because there are no permitted mines or MRZs in the construction footprint,
 there would be no impact. No mitigation is required.

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

- 10 **NEPA Effects:** Alternative 9 would have a smaller demand for aggregate resources than alternatives 11 with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). Alternative 9 would 12 use aggregate for two short canal segments and several small components such as various operable 13 barriers, two pumping plants, and a boat lock and channel. The estimated amount of aggregate 14 needed for construction is approximately 5,470,000 tons—about 60% less than under Alternative 15 1A. This amount is about 13% of the Sacramento County permitted aggregate and somewhat more 16 than 2% of the Stockton-Lodi P-C Region permitted aggregate. It is about 2% of the combined 17 permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region. This amount of 18 aggregate could be supplied from local sources within the counties that surround the Delta (Table 19 26-1). Because the amount of aggregate material used under Alternative 9 would not result in a 20 substantial depletion (loss of availability) of aggregate resources needed for future development or 21 require new aggregate development, it would not constitute an adverse effect.
- Alternative 9 would only require small amounts of borrow. Because there is limited excavation
 associated with this alternative, most of the borrow material would be developed from borrow pits
 adjacent to construction areas, from nearby suitable locations, and from some commercial sites. The
 use of this amount of borrow (estimated at 4,000,000 tons) would not have an adverse effect
 because borrow is not considered a mineral resource in California. It is usually extracted locally and
 regionally on an as-needed basis.
- 28 **CEQA Conclusion:** Alternative 9 would have a small demand for aggregate resources compared to 29 alternatives with major water conveyance tunnels or canals (e.g., Alternatives 1A, 1B, 1C). The 30 estimated amount of aggregate needed for construction is approximately 5,470,000 tons. The use of 31 moderate amounts of construction-grade aggregate (estimated to be equivalent to about 2% of the 32 combined permitted aggregate in Sacramento County and the Stockton-Lodi P-C Region) over the 33 entirety of the construction period would not result in a substantial depletion (loss of availability) of 34 construction-grade aggregate within the six regional aggregate production study areas surrounding 35 the study area (Table 26-1), would not cause remaining supplies to be inadequate for future 36 development, and would not contribute to the need for the development of new aggregate 37 resources. Consequently, the amount of aggregate material used under Alternative 9 would 38 constitute a less-than-significant impact on aggregate resources. No mitigation is required.
- Alternative 9 would require small amounts of borrow. Borrow is not a defined mineral resource and
 is usually developed on an as-needed basis. Consequently, the amount of borrow required for this
 alternative would not be a significant impact. No mitigation is required.

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

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

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

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

22 **NEPA Effects:** Operation of the water conveyance facilities under Alternative 9 involves 23 management of flows through the Delta channels. No aggregate resources are required for operations so there would be no effect. The only use of aggregate resources associated with 24 25 maintenance of the water conveyance facilities would be small amounts of aggregate and riprap 26 required for maintenance of levees, stream banks, access roads, and structure foundations. These 27 small amounts could be readily supplied by quarries in the region without affecting the overall 28 availability of aggregate. Consequently, operation and the use of the small amount of aggregate 29 material for the maintenance of the water conveyance facilities under Alternative 9 would not have 30 an adverse effect.

CEQA Conclusion: No aggregate resources are required for operation of Alternative 9, so there
 would be no impact. A small amount of aggregate material would be used for maintenance of levees,
 stream banks, access roads, and structure foundations. The small amount of aggregate used for
 operational components would not substantially deplete permitted aggregate resources in the six
 aggregate study areas surrounding the study area and accordingly, would represent a less-than significant reduction in the availability of aggregate resources. No mitigation is required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing CM2-CM21

39 **NEPA Effects:** Conservation actions beyond CM1 would be the same for Alternative 9 as they would

- 40 be for Alternative 1A. Consequently, the effects of these conservation measures would be the same
- 41 as described for Alternative 1A. Table 26-8 shows that there are two active mines in the ROAs and
- 42 there are no identified MRZs. The upland mine in the Suisun Marsh ROA would not be inundated.
- 43 The aggregate mine (Mega Sand, Inc. depicted in Figure 26-1) on Decker Island in the West Delta

ROA could be inundated. Inundation and loss of this aggregate mine would be an adverse effect.
 Mitigation Measure MIN-11 is available to reduce this effect.

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

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

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

13 Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of 14 Implementing CM2-CM21

15 **NEPA Effects:** The conservation measures under Alternative 9 would be the same as those under 16 Alternative 1A. Consequently, the impacts would also be the same as described for Alternative 1A. 17 Small amounts of aggregate would be used for levee, access road, and rock revetment construction 18 and for erosion control and stability at levee breaches and toe drain earthworks. The amount of 19 aggregate necessary for these activities cannot be calculated at this time because of the 20 programmatic nature and general design of the conservation measures. However, the amount 21 needed would be expected to be within the available resources of the study area or adjacent 22 aggregate resource study areas discussed in Section 26.1.2.1, Aggregate Resources, and identified in 23 Table 26-1. There would be no depletion of regional aggregate supplies substantial enough to cause 24 remaining supplies to be inadequate for future development or to require development of new 25 aggregate sources to meet future demand. Accordingly, the use of available aggregate material for 26 the conservation measures of Alternative 9 would not have an adverse effect.

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

26.3.4 Effects and Mitigation Approaches—Alternatives 4A, 2D, and 5A

36 **26.3.4.1** No Action Alternative Early Long-Term

The effects of the No Action Alternative Early Long-Term (ELT) considered for the purposes of Alternative 4A, 2D, and 5A would be expected to be similar to the effects described for the No Action Alternative Late Long-Term (LLT) in Section 26.3.3.1. Access to natural gas wells and fields and

40 aggregate resources and resulting production rates would be expected to be similar to those

- described under Existing Conditions and would include continued programs by federal, state, and
 local agencies and non-profit groups as well as projects that are permitted or assumed to be
 constructed in the ELT period. Because of the shorter implementation period, the magnitude of
 activities that could adversely affect access to natural gas wells and fields and aggregate resources in
 the Plan Area would be less than those considered under in 2060. In addition, impacts on mineral
 resources attributable to climate change and sea level rise, (increased flooding risk) would be
 expected to be less when compared to conditions under the No Action Alternative (LLT).
- 8 Under the No Action Alternative (ELT), DOGGR regulatory programs that have jurisdiction over
 9 natural gas well development and abandonment would continue with no substantive changes.
 10 Similarly, programs that regulate mineral resources and programs to identify and conserve mineral
- resources would be implemented with no substantive changes in the future. CGS and SMGB
 programs would continue to classify and designate important mineral resource zones (MRZs) and
 DOC would continue to regulate mineral extraction under SMARA and continue to ensure that
 mining areas are reclaimed to adequately support future end uses following completion of regulated
 activities.
- 16 While there could be adverse impacts on mineral resources in the ELT period as a result of changes 17 in land uses within the Plan Area, primarily as a result of planned restoration activities, 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 (ELT). A variety of smaller or standard projects in the study area and 21 the broader region will use aggregate resources. However, projects of the scale described above are 22 currently being supplied by the permitted aggregate sources and similarly are within the available 23 permitted regional aggregate resource base (Table 26-1). Considered together, the ongoing 24 aggregate needs and the added availability of materials from ongoing permitting efforts indicate that 25 there would be no adverse effect on the availability of aggregate resources (Section 26.1.2.1, 26 Aggregate Resources).
- 27 **CEQA** Conclusion: Under the No Action Alternative (ELT), some projects could occur in the Plan 28 Area that could reduce access to natural gas and mineral resources. Land use changes within the 29 Plan Area, including habitat restoration projects, could result in loss of access to mineral resources, 30 although to a lesser degree than under the No Action Alternative (LLT). Access to these resources 31 could be offset by implementing mitigation actions such as directional drilling. Other actions that 32 would consume mineral resources (i.e., restoration actions, flood control improvements, roadway 33 improvements, etc.) would occur within Plan Area, but would be supplied through existing 34 permitted sites. As such, there would be no significant impacts on access to natural gas resources or 35 the availability of aggregate resources within study area under the No Action Alternative (ELT).

3626.3.4.2Alternative 4A—Dual Conveyance with Modified37Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational38Scenario H)

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

NEPA Effects: The locations of producing natural gas wells within the Alternative 4A construction
 footprint would be the same as indicated for Alternative 4 (see Figure 24-5 in Chapter 24, *Hazards and Hazardous Materials*). There are no producing wells within the construction footprint, the

- temporary construction work areas or the east-west transmission line alignment option (Table 26 4).
- Because no producing wells within the construction footprint would be permanently abandoned,
 construction of Alternative 4A would not result in reduced natural gas production in the study area.
 Alternative 4A would not affect any locally important natural gas wells or result in the loss of any
 portion of the area's natural gas production and the effects would not be adverse.
- *CEQA Conclusion:* Because no natural gas wells would occur in the construction footprint there
 would not be any loss in active natural gas wells or change in the availability of natural gas
 production. The construction of Alternative 4A would not affect natural gas wells or gas production.
 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

- 13 **NEPA Effects:** The extent of construction and permanent footprint and resulting loss of extraction 14 potential for natural gas fields would be the same as described under Alternative 4. Alternative 4A 15 water conveyance facilities would permanently reduce the land surface available for vertical 16 extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area 17 underlying the Alternative 4A permanent construction footprint is small (less than approximately 18 3% of the areal extent of natural gas field areas intersected; see Alternative 4 in Table 26-5). 19 However, most of the affected gas fields could be accessed from other overlying areas. Similarly, 20 effects on potential gas extraction resulting from construction work areas would be small and 21 temporary and would not prevent recovery of natural gas. Therefore, there would be no short or 22 long-term adverse effect on natural gas extraction potential from construction of Alternative 4A.
- *CEQA Conclusion:* Although the Alternative 4A conveyance facilities would reduce the land surface
 available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas
 fields affected would be small (less than approximately 3% of the areal extent of natural gas field
 areas intersected). Additionally, there would be no substantial loss of existing production or
 permanent loss of access to the resource because the gas fields would continue to be accessible
 using conventional or directional drilling techniques. Accordingly, this impact would be less than
 significant. No mitigation is required.

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

- 32 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4A would include 33 moving water, both in infrastructure that would be constructed under this alternative and in the 34 natural channels. These operations would not cause additional effects on natural gas wells beyond 35 those related to water conveyance construction. Maintenance of the water conveyance facilities 36 under Alternative 4A would be the same as discussed for Alternative 4. These activities would not 37 affect natural gas wells or resource recovery. Accordingly, the operation and maintenance 38 associated with the water conveyance facilities under Alternative 4A would not result in adverse 39 effects on access to or use of existing active wells. Accordingly, there would be no adverse effect on 40 natural gas wells from operation and maintenance of Alternative 4A.
- 41 *CEQA Conclusion:* The operation and maintenance associated with the water conveyance facilities 42 under Alternative 4A would have no impact on access to natural gas wells, either for operating and

- 1 maintaining existing active wells, or modifying plugged inactive wells, because operation and
- 2 routine maintenance such as painting, cleaning, repairs, levee and landscape maintenance, and
- 3 similar activities would not cause the abandonment of wells, eliminate access to wells, or reduce
- 4 production. Therefore, this impact would be less than significant. No mitigation is required.

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

7 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4A would include 8 moving water, both in infrastructure that would be constructed under this alternative and in the 9 natural channels. These operations would not cause additional effects on access to natural gas fields 10 beyond those related to water conveyance construction. Maintenance of the water conveyance 11 facilities under Alternative 4A would be the same as discussed for Alternative 4. These activities 12 would not affect access to natural gas fields. Accordingly, the operation and maintenance associated 13 with the water conveyance facilities under Alternative 4A would not result in adverse effects on 14 access to or use of existing active wells, or accessing plugged inactive wells. Accordingly, there 15 would be no adverse effect from operation and maintenance.

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

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15, and 16

- The type of effects on locally important natural gas wells associated with Environmental
 Commitments 3, 4, 6–12, 15, and 16 would be similar to those described for Alternative 4. However,
 as described in Chapter 3, *Description of Alternatives*, Environmental Commitments implemented
 under Alternative 4A would affect much less land within the Plan Area when compared to
 Alternative 4. Therefore, the magnitude of effects of Alternative 4A on mineral resources within the
 Plan Area would be smaller than those disclosed under Alternative 4.
- 30 NEPA Effects: Because locations for these activities have not been determined, the extent of the 31 effect of implementing restoration actions on locally important natural gas wells cannot be precisely 32 determined. It is anticipated that restoration actions expected under Alternative 4A would result in 33 adverse effects on locally important natural gas wells however to a lesser degree than under 34 Alternative 4 because less land would be restored. Similar to Alternative 4, natural gas wells located 35 in areas that would be permanently inundated could remain productive with the use of protective 36 cages or platforms. However, for those instances, modification and maintenance of wells may not be 37 cost effective. It is likely that any producing wells in proposed permanent inundation areas would 38 need to be abandoned because modifications to these wells would not be feasible.
- 39 The number of active wells directly affected would vary, depending on the specific lands inundated
- 40 by Environmental Commitments 4 and 10. The active wells that would be affected could be
- 41 maintained in place if they were in seasonally inundated locations. In permanently flooded areas,
- 42 the active wells could be replaced using conventional or directional drilling techniques at a location
- 43 outside the inundation zone to maintain production. The likelihood of this replacement would

- 1 depend on the availability of land for lease and the cost of the new construction. If a large number of
- 2 wells had to be abandoned and could not be redrilled, there could be a locally adverse effect related
- 3 to permanent elimination of a substantial portion of a county's active natural gas wells. Mitigation
- 4 Measure MIN-5 is available to address this effect.
- Natural gas wells in areas that would remain uplands could remain operational and unaffected if
 they are avoided when restoration activities are implemented and access to the gas well can be
 maintained. Maintaining access to an oil or gas well is defined by the California Department of
 Conservation as (1) maintaining rig access to the well, and (2) not building over, or in close
 proximity to, the well (California Department of Conservation, Division of Oil, Gas, and Geothermal
 Resources 2007).
- 11 CEQA Conclusion: Although the number of natural gas wells likely to be affected may be a small 12 percentage of the total wells in the study area, and some wells may be relocated using conventional 13 or directional drilling, there is potential to affect a significant number of locally important gas wells. 14 Consequently, this impact is considered significant. Because implementation of Mitigation Measure 15 MIN-5 cannot assure that all or a substantial portion of a county's existing natural gas wells will 16 remain accessible after implementation of this alternative, this impact is significant and 17 unavoidable.
- Mitigation Measure MIN-5: Design Environmental Commitments 4 and 10 to Avoid
 Displacement of Active Natural Gas Wells to the Extent Feasible
- 20During final design of Environmental Commitments 4 and 10, the project proponents will avoid21permanent inundation of or construction over active natural gas well sites where feasible to22minimize the need for well abandonment or relocation.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15, and 16

- 25 **NEPA Effects:** Because locations of restoration actions occurring under Alternative 4A have not been 26 determined, the extent of the effect of implementing these actions on natural gas fields within the 27 Plan Area cannot be precisely determined. It is anticipated that restoration actions expected under 28 Alternative 4A would result in adverse effects on the potential to extract natural gas from these 29 fields although to a lesser degree than under Alternative 4 because less land would be restored. 30 Similar to Alternative 4, some natural gas fields could be permanently inundated resulting in 31 potential losses in production. However, most natural gas fields would still be accessible from 32 outside the inundated areas using either conventional or directional drilling, although feasibility of 33 access would depend on the exact configuration of inundation and the availability of adjacent 34 drilling sites. Although the overall extent of affected natural gas fields in the region is low, there 35 remains the potential for a locally adverse effect on access to natural gas fields because the resource 36 may be permanently covered (inundated) or otherwise become inaccessible to recovery. Mitigation 37 Measure MIN-6 is available to lessen this effect.
- *CEQA Conclusion:* The areal extent of lands overlying study area natural gas fields that would be
 inundated by through restoration actions depends on final footprints for these measures. Most of
 these natural gas fields would still be accessible from outside the inundated areas using either
 conventional or directional drilling, although feasibility of access would depend on the exact
 configuration of inundation and the availability of adjacent drilling sites. Although the overall extent
 of affected natural gas fields in the region is low to moderate, there is potential for a locally

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

Mitigation Measure MIN-6: Design Environmental Commitments 4 and 10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible

8 During final design of actions to offset the impacts of constructing and operating the water 9 conveyance facilities, the project proponents will identify means to maintain access to natural 10 gas fields that could be adversely affect by implementing Environmental Commitments 4 and 10 11 where feasible. These could include preserving non-inundated lands either over or adjacent to 12 natural gas fields adequate in size to allow drilling to occur. These measures will ensure that 13 drilling access to natural gas fields is maintained to the greatest extent practicable.

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

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

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

25 **NEPA Effects:** The demand for construction materials, including aggregates and borrow materials 26 for Alternative 4A would be identical to Alternative 4. The principal demands for construction 27 material would come from the three intakes and associated facilities, the nearly 40 miles of concrete 28 pipeline tunnels, and forebays. The approximately 13,500,000 tons of aggregate required for 29 Alternative 4A would be equal to approximately 32% of the permitted aggregate in Sacramento 30 County or 6% of the permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to 31 about 5% of the combined permitted aggregate in these two areas. Similar to the discussion of 32 Alternative 4, sourcing this demand is likely to come from multiple sources considering that the 33 alternative extends many miles north-to-south and different portions of the project would be closer 34 to individual local resources (See Figure 26-1). Also, as discussed under Alternative 4, there is 35 potential for the development of new aggregate sources in the area as well as recently developed 36 individual guarries whose available volumes could provide more than the required annual tonnage 37 to the project. Consequently, the Alternative 4A aggregate demand would not result in a substantial 38 depletion of construction-grade aggregate within the six regional aggregate production study areas, 39 would not cause remaining supplies to be inadequate for future development, and would not 40 substantially contribute to the need for the development of new aggregate resources. The amount of 41 borrow required for Alternative 4A is the same as Alternative 4. The use of this amount of borrow 42 would not have an adverse effect because borrow is not defined as a mineral resource and it is

- developed locally and regionally on an as-needed basis. Accordingly, it would not have an adverse
 effect on the availability of known aggregate resources or borrow materials over the water
 conveyance facilities construction period.
- 4 **CEQA** Conclusion: The use of large amounts of construction aggregate over the entirety of the 5 construction period would not result in a substantial depletion of construction-grade aggregate 6 from the study area, would not cause remaining supplies to be inadequate for future development, 7 and would not contribute to the need for development of new aggregate sources. The use of borrow 8 would not have a significant impact because borrow is not defined as a mineral resource and it is 9 developed locally and regionally on an as needed basis. Consequently, although a substantial amount 10 of available aggregate material may be used under Alternative 4A, the impact on aggregate resources would be less than significant. No mitigation is required. 11
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 17 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4A would include 18 moving water, both within infrastructure that would be constructed and the natural channels. 19 Adverse effects would only occur if operations prevented access to a locally important aggregate 20 resource site; this is not expected to occur because there are no aggregate mines or MRZs in the area 21 where the alternative would operate. Accordingly, operation of Alternative 4A would not block 22 access to existing mines or identified MRZs and similar to Alternative 4, there would be no effect. 23 Similarly, routine facilities maintenance activities such as painting, cleaning, and structure repair, 24 landscape maintenance, road work, and periodic replacement of erosion protection on the levees 25 and embankments would not cover or block access to existing mines or identified MRZs because 26 there are no aggregate mines or MRZs in the area where the alternative would operate. Additionally, 27 operations and maintenance would not increase the existing project footprint so they could not have 28 any effect even if aggregate mines or MRZs did exist. Accordingly, the operation and maintenance of 29 the water conveyance facilities under Alternative 4A would not have effects on the availability of 30 aggregate resource sites.
- 31 **CEQA Conclusion:** Significant impacts could occur if operation and maintenance of water
- 32 conveyance facilities result in loss of available locally important aggregate resource sites. The
- 33 operation and maintenance associated with Alternative 4A would have no impact on the availability
- of aggregate resource sites because none exist within the areas affected by Alternative 4A
 operations and operations and maintenance would not increase the alternative's footprint. No
- 36 mitigation is required.

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

- 39 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 4A would include
- 40 moving water, both within infrastructure that would be constructed and natural channels. Similar to
- 41 Alternative 4, no aggregate resources are required for operations so there would be no effect and
- 42 only small amounts of aggregate and riprap would be required for maintenance of structure
- 43 foundations, levees, stream banks, and access roads associated with major project features such as

- 1 intakes, pumping plants, and the head of Old River barrier. As discussed under Alternative 4, the
- demand for these materials could be easily met locally. Accordingly, operation and the use of a small
 amount of aggregate material for the maintenance of the water conveyance facilities under
- 4 Alternative 4A would not result in adverse effects.
- 5 **CEQA** Conclusion: Operation of the water conveyance facilities under Alternative 4A would not 6 affect any aggregate resources because operation involves moving water through the conveyance 7 infrastructure and no aggregate resources are required for operations. A small amount of aggregate 8 material would be used for maintenance of Alternative 4A which would be available from local 9 sources. Operation and maintenance would not cause substantial depletion or loss of availability. 10 and would not cause remaining supplies to be inadequate to meet future demands and require 11 developing new sources. Therefore this impact would be less than significant. No mitigation is 12 required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15, and 16

- 15 **NEPA Effects:** The Environmental Commitments that would have the potential to affect important aggregate resource sites are those that would inundate large areas of land. The loss of important 16 17 aggregate resource sites under Alternative 4A would be similar to that described under Alternative 18 4. However, the potential for loss of important aggregate resource sites would be less than 19 Alternative 4 because much less land would be restored within the Plan Area and over a much 20 shorter period. Nevertheless, the potential for inundation and loss of this aggregate resource sites 21 would remain under Alternative 4A and is considered an adverse effect. Mitigation Measure MIN-11 22 is available to reduce this effect.
- CEQA Conclusion: As described under Alternative 4, an active mine on Decker Island may fall within
 the inundation footprints associated with implementing restoration actions associated with tidal
 natural communities and nontidal marsh. Although less acreage would be restored under
 Alternative 4A, restoration actions could result in inundation of aggregate resources. Although the
 impact is expected to be less than under Alternative 4, the potential loss would remain a significant
 impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure
 MIN-11 is designed to reduce the impact to a less-than-significant level.

30Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in Project31Construction

32 Depending on the location and extent of inundation to locally important aggregate material sites 33 in restoration efforts, the project proponents shall consider various mitigation strategies to 34 mitigate significant impacts. Such strategies may include avoiding the affected sites and 35 choosing areas that will not impact such mines, directly or indirectly, or downsizing the area to 36 be restored and thereby reducing impacts to the affected mines to less than significant. DWR 37 may also choose to purchase the permitted aggregate volume from mines affected by restoration 38 for construction use to ensure available aggregate will not be lost due to construction of 39 restoration sites. The resulting mined site(s) may then be considered for integration into the 40 restoration design of any Environmental Commitment that affects the site(s). For example, the mined site(s) could be reshaped to provide aquatic or intertidal habitat of varying depths and 41 42 configurations. For this latter strategy, coordination would be initiated with the affected local

county overseeing SMARA regulation. Additionally, further CEQA review may be required prior
 to implementing the integration of mined sites into the restoration design.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15, and 16

5 **NEPA Effects:** Restoration actions occurring under Alternative 4A have the potential to reduce the 6 availability of important aggregate resources. When compared to Alternative 4, loss of aggregate 7 resources under Alternative 4A would be less because the total acreage of restoration occurring 8 with the Plan Area would be substantially less. Similar to Alternative 4, aggregate and riprap would 9 be used for levee, berm, access road, and rock revetment construction, and rock would be placed for 10 erosion control and stability at levee breaches and toe drain earthworks. The amounts of aggregate 11 and riprap necessary for these activities cannot be calculated at this time because of the 12 programmatic nature and general design of the restoration actions. However, the amount needed 13 would be used over a period of years and would be expected to be within the available resources of 14 the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate 15 *Resources*, and identified in Table 26-1. There would be no depletion (loss of availability) of regional 16 aggregate supplies substantial enough to cause remaining supplies to be inadequate for future 17 development or to require development of new aggregate sources to meet future demand. 18 Therefore, the use of aggregate material for the restoration actions under Alternative 4A would not 19 cause an adverse effect on the availability of aggregate resources.

20 **CEQA Conclusion:** Restoration actions occurring under Alternative 4A would use small amounts of 21 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap 22 for erosion control and stability at level breaches and toe drain earthworks. The amounts of 23 aggregate are unknown but would be within the available resources of the study area or adjacent 24 aggregate resource study areas. Because implementing Environmental Commitments would not use 25 an amount of aggregate that would cause remaining supplies to be inadequate to meet future 26 demands and require developing new sources, this impact would be less than significant. No 27 mitigation is required.

2826.3.4.3Alternative 2D—Dual Conveyance with Modified29Pipeline/Tunnel and Intakes 1, 2, 3, 4, and 5 (15,000 cfs;30Operational Scenario B)

31Impact MIN-1: Loss of Availability of Locally Important Natural Gas Wells as a Result of32Constructing the Water Conveyance Facilities

NEPA Effects: The conveyance facilities associated with Alternative 2D would include the same
 physical/structural components as Alternative 4, with the addition of two river intakes. The
 configuration of river intakes would be identical to Alternative 1A. There are no producing wells
 within the construction footprint, the temporary construction work areas, or the east-west
 transmission line alignment option (see Table 26-4).

Because no producing wells within the construction footprint would be affected, construction of
 Alternative 2D would not reduce natural gas production in the study area. Alternative 2D would not
 affect any locally important natural gas wells or result in the loss of any portion of the study area's
 natural gas production.

- 1 *CEQA Conclusion:* Because no natural gas wells occur in the Alternative 2D water conveyance
- 2 facility footprint, there would be no change in the number of active natural gas wells or natural gas
- 3 production. The construction of Alternative 2D would not impact natural gas wells or gas
- 4 production. 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

7 **NEPA Effects:** The extent of the construction and permanent footprints of the water conveyance 8 facilities and resulting loss of extraction potential from natural gas fields under Alternative 2D 9 would be the same as described under Alternative 4. Constructing the water conveyance facilities 10 would permanently reduce the land surface available for vertical extraction of natural gas from 11 directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 2D 12 permanent construction footprint is small (less than approximately 3% of the areal extent of natural 13 gas field areas intersected; see Table 26-5). However most of the affected gas fields could be 14 accessed from other overlying areas. Similarly, effects on potential gas extraction resulting from 15 construction work areas would be small and temporary and would not prevent recovery of natural 16 gas. Therefore, there would be no short or long-term adverse effect on the potential to extract 17 natural gas as a result of constructing the water conveyance facilities.

CEQA Conclusion: Although the Alternative 2D 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. The impact is less than significant because the
 potential to extract natural gas would not be substantially reduced. No mitigation is required.

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

- 27 **NEPA Effects:** The operation and maintenance of the water conveyance facilities under Alternative 28 2D would be similar to those under Alternative 4, and would include moving water through the new 29 water conveyance infrastructure and in natural channels. These operations would not cause 30 additional effects on natural gas wells beyond those occurring as a result of constructing the water 31 conveyance facilities. Maintenance of these facilities under Alternative 2D would be similar but 32 slightly greater as discussed for Alternative 4. Operation and maintenance activities would occur on 33 or immediately adjacent to the water conveyance facilities. Accordingly, the operation and 34 maintenance associated with the water conveyance facilities would not restrict access to or use of 35 existing active wells. There would be no adverse effect on natural gas wells from operating or 36 maintaining Alternative 2D.
- *CEQA Conclusion:* The operation and maintenance of water conveyance facilities under Alternative
 2D would have no impact on access to natural gas wells because operation and routine maintenance
 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would
 occur on or immediately adjacent to the facilities and would not require the abandonment of wells,
 eliminate access to wells, or reduce natural gas production. Therefore, the impact on natural gas
 wells would be less-than-significant. No mitigation is required.

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

- 3 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2D would be same
- 4 as Alternative 2A and would include moving water through the new water conveyance
- 5 infrastructure and in natural channels. These operations would not cause additional effects on
- 6 access to natural gas fields beyond those occurring as a result of constructing the water conveyance
- 7 facilities. Maintenance of the water conveyance facilities under Alternative 2D would be similar but
- 8 slightly greater than as discussed for Alternative 4 facilities and as such would not restrict access to
- 9 or use of existing natural gas fields. There would be no adverse effect on natural gas fields from
- 10 operating or maintaining Alternative 2D.
- 11 CEQA Conclusion: The operation and maintenance of Alternative 2D water conveyance facilities 12 would have no impact on the access to natural gas fields because operation and routine maintenance 13 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would 14 occur on or immediately adjacent to the facilities. The impact on the availability of natural gas fields 15 is considered less than significant because access to these fields would not be restricted when 16 operation and maintenance of the water conveyance facilities is occurring. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Environmental Commitments 3, 4, 6-12, 15 and 16

- 19 The type of effects on locally important natural gas wells associated with Environmental 20 Commitments, 4, 6–12, 15, and 16 would be similar to those described for Alternative 4. Inundation 21 for permanent wetland creation under Environmental Commitment 4 and Environmental 22 Commitment 10 could potentially affect natural gas wells, the number of active wells directly 23 affected would vary, depending on the specific lands inundated by these two Environmental 24 Commitments. However, as described in Chapter 3, Description of Alternatives, Environmental 25 Commitments implemented under Alternative 2D would affect much less land within the project 26 area when compared to Alternative 4. Therefore, the magnitude of effects of Alternative 2D on 27 mineral resources within the project area would be smaller than those disclosed under Alternative 28 4.
- *NEPA Effects:* Implementing the Environmental Commitments under Alternative 2D would result in
 adverse effects on locally important natural gas wells however to a lesser degree than under
 Alternative 4 because much less land would be restored. Similar to Alternative 4, natural gas wells
 located in areas that would be permanently inundated could remain productive with the use of
 protective cages or platforms. However, for those instances, modification and maintenance of wells
 may not be cost effective.
- 35 The number of active wells directly affected would vary, depending on the specific lands inundated 36 by the Environmental Commitments. The active wells that would be affected could be maintained in 37 place if they were only seasonally inundated. In permanently flooded areas, the active wells could be 38 replaced using conventional or directional drilling techniques at a location outside the inundation 39 zone to maintain production. The likelihood of this replacement would depend on the availability of 40 land for lease and the cost of the new construction. If a large number of wells had to be abandoned 41 and could not be re-drilled, there could be a locally adverse effect related to permanent elimination 42 of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available 43 to address this effect.

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

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

- 10
- Mitigation Measure MIN-5: Design Environmental Commitments 4 and 10 to Avoid
 Displacement of Active Natural Gas Wells to the Extent Feasible
- 15 Please see Mitigation Measure MIN-5 under Impact MIN-5 in the discussion of Alternative 4A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15, and 16

- 18 **NEPA Effects:** It is anticipated that restoration actions occurring under Alternative 2D would result 19 in adverse effects on the potential to extract natural gas from these fields although to a lesser degree 20 than under Alternative 4 because less land would be restored. Similar to Alternative 4, some natural 21 gas fields could be permanently inundated resulting in potential losses in production. However, 22 most natural gas fields would still be accessible from outside the inundated areas using either 23 conventional or directional drilling, although feasibility of access would depend on the exact 24 configuration of inundation and the availability of adjacent drilling sites. Although the overall extent 25 of affected natural gas fields in the region is low, there remains the potential for a locally adverse 26 effect on access to natural gas fields because the resource may be permanently inundated or 27 otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this 28 effect.
- 29 **CEOA Conclusion:** The areal extent of lands overlying study area natural gas fields that would be 30 inundated by Environmental Commitment 4 and Environmental Commitment 10 depends on the 31 final footprints for these measures and would range from less than 1% to 100%. Most of these 32 natural gas fields would still be accessible from outside inundated areas using either conventional or 33 directional drilling, although feasibility of access would depend on the exact configuration of the 34 restoration sites the availability of adjacent drilling sites. Although the overall extent of affected 35 natural gas fields in the region is low to moderate, there is potential for a locally significant impact 36 on access to natural gas fields if they are permanently covered (inundated) such that the resource 37 cannot be recovered. Implementation of Mitigation Measure MIN-6 would reduce this impact, but 38 not to a less-than-significant level. Because implementation of Mitigation Measure MIN-6 cannot 39 assure that all or a substantial portion of existing natural gas fields will remain accessible after 40 implementation of Alternative 2D, this impact is significant and unavoidable.

Mitigation Measure MIN-6: Design Environmental Commitments 4 and 10 to Maintain 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 4A.

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

- *NEPA Effects:* Because there are no permitted resource extraction mines (including aggregate
 mines) and no identified MRZs in the Alternative 2D footprint, including within the footprint for the
 east-west transmission line alignment option, there would be no effect on the availability of
 aggregate resources.
- *CEQA Conclusion:* Because there are no permitted mines or MRZs in the construction footprint for
 Alternative 2D, including within the footprint for the east-west transmission line alignment option,
 there would be no impact. No mitigation is required.

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

15 **NEPA Effects:** The demand for construction materials, including aggregates and borrow materials 16 for Alternative 2D would be slightly greater than Alternative 4 because of the two additional intakes. The principal demands for construction material would come from the five intakes, Clifton Court 17 18 Forebay pumping plant and associated facilities, the nearly 40 miles of concrete pipeline tunnels, 19 and forebays. The two additional intakes add approximately 60,000 tons of aggregate to the total 20 amount of aggregate necessary compared to Alternative 4. The approximately 13,560,000 tons of 21 aggregate required for Alternative 2D would be equal to approximately 32% of the permitted 22 aggregate in Sacramento County or 6% of the permitted aggregate in the Stockton-Lodi P-C Region 23 (Table 26-1). It is equal to about 5% of the combined permitted aggregate in these two areas. Similar 24 to the discussion of Alternative 4, sourcing this demand is likely to come from multiple sources 25 considering that the alternative extends many miles north-to-south and different portions of the 26 project would be closer to individual local resources (see Figure 26-1). Also, as discussed under 27 Alternative 4, there is potential for the development of new aggregate sources in the area as well as 28 recently developed individual quarries whose available volumes could provide more than the 29 required annual tonnage to the project. Alternative 2D requires more borrow material than 30 Alternatives 4 and 4A because it has five intakes rather than three. The two additional intakes add 31 about 5,200,000 cubic vards or 7,800,000 tons of borrow compared to Alternatives 4 and 4A or 32 about 28,600,000 cubic yards and 42,900,000 tons total. The use of this amount of borrow would 33 not have an adverse effect because borrow is not defined as a mineral resource and it is developed 34 locally and regionally on an as-needed basis. Consequently, the Alternative 2D aggregate demand 35 would not result in a substantial depletion of construction-grade aggregate within the six regional 36 aggregate production study areas, would not cause remaining supplies to be inadequate for future 37 development, and would not substantially contribute to the need for the development of new 38 aggregate resources. Accordingly, it would not have an adverse effect on the availability of known 39 aggregate resources or borrow materials over the water conveyance facilities construction period.

40 *CEQA Conclusion:* The use of large amounts of construction aggregate over the life of the

- 41 construction period would not result in a substantial depletion of construction-grade aggregate
 42 from the study area, would not cause remaining supplies to be inadequate for future development,
- 43 and would not contribute to the need for development of new aggregate sources. The use of borrow

- 1 would not have a significant impact because borrow is not defined as a mineral resource and it is
- 2 developed locally and regionally on an as needed basis. Consequently, although a substantial amount
- 3 of available aggregate material may be used to construct Alternative 2D, the impact on aggregate
- 4 resources would be less 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 2D would include 11 moving water through both the new water conveyance infrastructure and 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 Alternative 2D would operate. Accordingly, operation of Alternative 2D would not block access to 15 existing mines or identified MRZs and similar to Alternative 4, there would be no effect. Similarly, 16 routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape 17 maintenance, road work, and periodic replacement of erosion protection on the levees and 18 embankments would occur at or immediately adjacent to water conveyance facilities and would not 19 cover or block access to existing mines or identified MRZs. Accordingly, the operation and 20 maintenance of the water conveyance facilities under Alternative 2D would not have effects on the 21 availability of aggregate resource sites.
- *CEQA Conclusion:* The operation and maintenance of Alternative 2D water conveyance facilities
 would have no impact on locally important aggregate resources because operation and routine
 maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar
 activities would be limited to the water conveyance facilities. The impact on locally important
 aggregate resources is considered less than significant because access to areas containing these
 resources would not be restricted when operation and maintenance of the water conveyance
 facilities is occurring. No mitigation is required.

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

- 31 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 2D would include 32 moving water through both the new water conveyance infrastructure and natural channels. Adverse 33 effects would only occur if operations prevented access known aggregate resources; this is not 34 expected to occur because there are no known aggregate resources the area where Alternative 2D 35 would operate. Similarly, routine facilities maintenance activities such as painting, cleaning, and 36 structure repair, landscape maintenance, road work, and periodic replacement of erosion protection 37 on the levees and embankments would occur at or immediately adjacent to water conveyance 38 facilities and would not cover or block access known aggregate resources, Accordingly, the 39 operation and maintenance of the water conveyance facilities under Alternative 2D would not have 40 effects on known aggregate resources.
- 41 *CEQA Conclusion:* The operation and maintenance of Alternative 2D water conveyance facilities
 42 would have no impact on known aggregate resources because operation and routine maintenance
 43 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would be

- 1 limited to the water conveyance facilities. The impact on known aggregate resources is considered
- 2 less than significant because access to areas containing these resources would not be restricted
- 3 when operation and maintenance of the water conveyance facilities is occurring. No mitigation is
- 4 required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Environmental Commitments 3, 4, 6–12, 15 and 16

NEPA Effects: Implementation of the Environmental Commitments would have the potential to
affect locally important aggregate resource sites are those that would inundate large areas of land.
The loss of important aggregate resource sites under Alternative 2D would be similar to that
described under Alternative 4. However, the potential for loss of important aggregate resource sites
would be less than Alternative 4 because much less land would be restored within the project area
and over a much shorter period. Nevertheless, the potential for inundation and loss of this aggregate
resource sites would remain under Alternative 2D and is considered an adverse effect. Mitigation

- 14 Measure MIN-11 is available to reduce this effect.
- 15 **CEQA** *Conclusion:* As described under Alternative 4, an active mine on Decker Island may fall within
- 16 the inundation footprints associated with implementing restoration actions associated with tidal
- natural communities and nontidal marsh. Although less acreage would be restored under
 Alternative 2D, restoration actions could result in inundation of aggregate resources. Although the
 impact is expected to be less than under Alternative 4, the potential loss would remain significant
 impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure
 MIN-11 is designed to reduce the impact to a less-than-significant level.
- Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in Project
 Construction
- 24 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 4.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Environmental Commitments 3, 4, 6-12, 15 and 16

27 **NEPA Effects:** Restoration actions occurring under Alternative 2D have the potential to reduce the 28 availability of important aggregate resources. When compared to Alternative 4, loss of aggregate 29 resources under Alternative 2D would be less because the total acreage of restoration occurring 30 with the project area would be substantially less. Similar to Alternative 4, aggregate and riprap 31 would be used for levee, berm, access road, and rock revetment construction, and rock would be 32 placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts of 33 aggregate and riprap necessary for these activities cannot be calculated at this time because of the 34 programmatic nature and general design of the restoration actions. However, the amount needed 35 would be used over a period of years and would be expected to be within the available resources of 36 the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate 37 *Resources*, and identified in Table 26-1. There would be no depletion (loss of availability) of regional 38 aggregate supplies substantial enough to cause remaining supplies to be inadequate for future 39 development or to require development of new aggregate sources to meet future demand. 40 Therefore, the use of aggregate material for the restoration actions under Alternative 2D would not

41 cause an adverse effect on the availability of aggregate resources.

1 **CEOA Conclusion:** Restoration actions occurring under Alternative 2D, would use small amounts of 2 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap 3 for erosion control and stability at level breaches and toe drain earthworks. The amounts of 4 aggregate are unknown but would be within the available resources of the study area or adjacent 5 aggregate resource study areas. The impact on known aggregate resources would be less than 6 significant because implementing Environmental Commitments would not use an amount of 7 aggregate that would cause remaining supplies to be inadequate to meet future demands or require 8 developing new sources. No mitigation is required.

926.3.4.4Alternative 5A—Dual Conveyance with Modified10Pipeline/Tunnel and Intake 2 (3,000 cfs; Operational Scenario C)

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

- *NEPA Effects:* The conveyance facilities associated with Alternative 5A would include the same
 physical/structural components as Alternative 4. However the number of Sacramento River intakes
 would be reduced to one located near Clarksburg (Intake 2). There are no producing natural gas
 wells within the construction footprint, the temporary construction work areas, or the east-west
 transmission line alignment option (Table 26-4).
- Because no producing natural gas wells within the construction footprint would be affected,
 construction of Alternative 5A would not reduce natural gas production in the study area.
 Alternative 5A would not affect any locally important natural gas wells or result in the loss of any
 portion of the study area's natural gas production.
- *CEQA Conclusion:* Because no natural gas wells occur in the Alternative 5A water conveyance
 facility footprint, there would be no change in the number of active natural gas wells or natural gas
 production. The construction of Alternative 5A would not impact natural gas wells or gas
 production. 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

- 28 **NEPA Effects:** The extent of the construction and permanent footprints of the water conveyance 29 facilities and resulting loss of extraction potential from natural gas fields under Alternative 5A 30 would be the same as described under Alternative 4. Constructing the water conveyance facilities 31 would permanently reduce the land surface available for vertical extraction of natural gas from 32 directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 5A 33 permanent construction footprint is small (less than approximately 3% of the areal extent of natural 34 gas field areas intersected; see Table 26-5). However most of the affected gas fields could be 35 accessed from other overlying areas. Similarly, effects on potential gas extraction resulting from 36 construction work areas would be small and temporary and would not prevent recovery of natural 37 gas. Therefore, there would be no short- or long-term adverse effect on the potential to extract 38 natural gas as a result of constructing the water conveyance facilities.
- *CEQA Conclusion:* Although the Alternative 5A 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

- 1 permanent loss of access to the resource because the gas fields would continue to be accessible
- 2 using conventional or directional drilling techniques. The impact is less than significant because the
- 3 potential to extract natural gas would not be substantially reduced. No mitigation is required.

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

6 **NEPA Effects:** The operation and maintenance of the water conveyance facilities under Alternative 7 5A would be similar to those under Alternative 4, and would include moving water through the new 8 water conveyance infrastructure and in natural channels. These operations would not cause 9 additional effects on natural gas wells beyond those occurring as a result of constructing the water 10 conveyance facilities. Maintenance of these facilities under Alternative 5A would be similar but slightly greater as discussed for Alternative 4. Operation and maintenance activities would occur on 11 12 or immediately adjacent to the water conveyance facilities. Accordingly, the operation and 13 maintenance associated with the water conveyance facilities would not restrict access to or use of 14 existing active wells. There would be no adverse effect on natural gas wells from operating or 15 maintaining Alternative 5A.

CEQA Conclusion: The operation and maintenance of water conveyance facilities under Alternative
 5A would have no impact on access to natural gas wells because operation and routine maintenance
 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would
 occur on or immediately adjacent to the facilities and would not require the abandonment of wells,
 eliminate access to wells, or reduce natural gas production. Therefore, the impact on natural gas
 wells would be less-than-significant. No mitigation is required.

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

NEPA Effects: The operation of the water conveyance facilities under Alternative 5A would include
 moving water through the new water conveyance infrastructure and in natural channels. These
 operations would not cause additional effects on access to natural gas fields beyond those occurring
 as a result of constructing the water conveyance facilities. Maintenance of the water conveyance
 facilities under Alternative 5A would be similar but slightly greater than as discussed for Alternative
 4 facilities and as such would not restrict access to or use of existing natural gas fields. There would
 be no adverse effect on natural gas fields from operating or maintaining Alternative 5A.

31 *CEQA Conclusion:* The operation and maintenance of Alternative 5A water conveyance facilities 32 would have no impact on the access to natural gas fields because operation and routine maintenance 33 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would 34 occur on or immediately adjacent to the facilities. The impact on the availability of natural gas fields 35 is considered less than significant because access to these fields would not be restricted when 36 operation and maintenance of the water conveyance facilities is occurring. No mitigation is required.

Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing Environmental Commitments 3, 4, 6, 7, 9–11, 15, and 16

- 39 The type of effects on locally important natural gas wells associated with Environmental
- 40 Commitments 4, 6–12, 15, and 16 would be similar to those described for Alternative 4. Inundation
- 41 for permanent wetland creation under Environmental Commitment 4 and Environmental
- 42 Commitment 10 could potentially affect natural gas wells, the number of active wells directly

- 1 affected would vary, depending on the specific lands inundated by these two Environmental
- 2 Commitments. However, as described in Chapter 3, *Description of Alternatives*, Environmental
- 3 Commitments implemented under Alternative 5A would affect much less land within the study area
- 4 when compared to Alternative 4. Therefore, the magnitude of effects of Alternative 5A on mineral
- 5 resources within the study area would be much smaller than those disclosed under Alternative 4.

NEPA Effects: Implementing the Environmental Commitments under Alternative 5A would result in
 adverse effects on locally important natural gas wells however to a lesser degree than under
 Alternative 4 because much less land would be restored. Similar to Alternative 4, natural gas wells
 located in areas that would be permanently inundated could remain productive with the use of
 protective cages or platforms. However, for those instances, modification and maintenance of wells
 may not be cost effective.

- 12 The number of active wells directly affected would vary, depending on the specific lands inundated 13 by the Environmental Commitments. The active wells that would be affected could be maintained in 14 place if they were only seasonally inundated. In permanently flooded areas, the active wells could be 15 replaced using conventional or directional drilling techniques at a location outside the inundation 16 zone to maintain production. The likelihood of this replacement would depend on the availability of 17 land for lease and the cost of the new construction. If a large number of wells had to be abandoned 18 and could not be re-drilled, there could be a locally adverse effect related to permanent elimination 19 of a substantial portion of a county's active natural gas wells. Mitigation Measure MIN-5 is available 20 to address this effect.
- Natural gas wells in upland areas could remain operational and unaffected if they are avoided when
 restoration activities are implemented and access to the gas well can be maintained. Maintaining
 access to an oil or gas well is defined by DOC as (1) maintaining rig access to the well, and (2) not
 building over, or in close proximity to, the well (California Department of Conservation, Division of
 Oil, Gas, and Geothermal Resources 2007).
- *CEQA Conclusion:* Although the number of natural gas wells likely to be affected under Alternative
 5A may be a small percentage of the total wells in the study area, and some wells may be relocated
 using conventional or directional drilling, there is potential to affect a significant number of locally
 important gas wells. Consequently, this impact is considered significant. Because implementation of
 Mitigation Measure MIN-5 cannot assure that all or a substantial portion of a county's existing
 natural gas wells will remain accessible after implementation of this alternative, this impact is
 significant and unavoidable.

33Mitigation Measure MIN-5: Design Environmental Commitments 4 and 10 to Avoid34Displacement 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 4A.

Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing Environmental Commitments 3, 4, 6, 7, 9–12, 15, and 16

- 38 **NEPA Effects:** It is anticipated that restoration actions occurring under Alternative 5A would result
- in adverse effects on the potential to extract natural gas from these fields although to a lesser degree
- 40 than under Alternative 4 because less land would be restored. Similar to Alternative 4, some natural
- 41 gas fields could be permanently inundated resulting in potential losses in production. However,
- 42 most natural gas fields would still be accessible from outside the inundated areas using either

1 conventional or directional drilling, although feasibility of access would depend on the exact

- 2 configuration of inundation and the availability of adjacent drilling sites. Although the overall extent
- 3 of affected natural gas fields in the region is low, there remains the potential for a locally adverse
- effect on access to natural gas fields because the resource may be permanently inundated or
 otherwise become inaccessible to recovery. Mitigation Measure MIN-6 is available to lessen this
 effect.
- 7 **CEQA** Conclusion: The areal extent of lands overlying study area natural gas fields that would be 8 inundated as a result of restoration actions depends on the final footprints for these measures and 9 would range from less than 1% to 100%. Most of these natural gas fields would still be accessible 10 from outside inundated areas using either conventional or directional drilling, although feasibility of 11 access would depend on the exact configuration of the restoration sites the availability of adjacent drilling sites. Although the overall extent of affected natural gas fields in the region is low to 12 13 moderate, there is potential for a locally significant impact on access to natural gas fields if they are 14 permanently covered (inundated) such that the resource cannot be recovered. Implementation of 15 Mitigation Measure MIN-6 would reduce this impact, but not to a less-than-significant level. Because 16 implementation of Mitigation Measure MIN-6 cannot assure that all or a substantial portion of 17 existing natural gas fields will remain accessible after implementation of Alternative 5A, this impact 18 is significant and unavoidable.
- 19Mitigation Measure MIN-6: Design Environmental Commitments 4 and 10 to Maintain20Drilling Access to Natural Gas Fields to the Extent Feasible
- 21 Please see Mitigation Measure MIN-6 under Impact MIN-6 in the discussion of Alternative 4A.

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

- *NEPA Effects:* Because there is no permitted resource extraction mines (including aggregate mines)
 and no identified MRZs in the Alternative 5A footprint, including within the footprint for the east west transmission line alignment option, there would be no effect on the availability of aggregate
 resources.
- *CEQA Conclusion:* Because there are no permitted mines or MRZs in the construction footprint for
 Alternative 5A, including within the footprint for the east-west transmission line alignment option,
 there would be no impact. No mitigation is required.

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

33 **NEPA Effects:** The demand for construction materials, including aggregates and borrow materials 34 for Alternative 5A would be slightly less than Alternative 4 because of the two fewer intakes. The 35 principal demands for construction material would come from the one intake, Clifton Court Forebay 36 pumping plant and associated facilities, the nearly 40 miles of concrete pipeline tunnels, and 37 forebays. The approximately 13,440,000 tons of aggregate required for Alternative 5A would be 38 equal to approximately 32% of the permitted aggregate in Sacramento County or 6% of the 39 permitted aggregate in the Stockton-Lodi P-C Region (Table 26-1). It is equal to about 5% of the 40 combined permitted aggregate in these two areas. Similar to the discussion of Alternative 4, 41 sourcing this demand is likely to come from multiple sources considering that the alternative 42 extends many miles north-to-south and different portions of the project would be closer to

- 1 individual local resources (see Figure 26-1). Also, as discussed under Alternative 4, there is potential 2 for the development of new aggregate sources in the area as well as recently developed individual 3 quarries whose available volumes could provide more than the required annual tonnage to the 4 project. Alternative 5A requires less borrow material than Alternatives 4 and 4A because it has one 5 intake rather than three. The two fewer intakes reduce the amount of borrow required by about 6 5,200,000 cubic yards or 7,800,000 tons compared to Alternatives 4 and 4A or about 18,200,000 7 cubic yards and 27,300,000 tons total. The use of this amount of borrow would not have an adverse 8 effect because borrow is not defined as a mineral resource and it is developed locally and regionally 9 on an as-needed basis. Consequently, the Alternative 5A aggregate demand would not result in a 10 substantial depletion of construction-grade aggregate within the six regional aggregate production 11 study areas, would not cause remaining supplies to be inadequate for future development, and 12 would not substantially contribute to the need for the development of new aggregate resources. 13 Accordingly, it would not have an adverse effect on the availability of known aggregate resources or 14 borrow materials over the water conveyance facilities construction period.
- 15 **CEQA** Conclusion: The use of large amounts of construction aggregate over the life of the 16 construction period would not result in a substantial depletion of construction-grade aggregate 17 from the study area, would not cause remaining supplies to be inadequate for future development, 18 and would not contribute to the need for development of new aggregate sources. The use of borrow 19 would not have a significant impact because borrow is not defined as a mineral resource and it is 20 developed locally and regionally on an as needed basis. Consequently, although a substantial amount 21 of available aggregate material may be used to construct Alternative 5A, the impact on aggregate 22 resources would be less than significant. No mitigation is required.
- Borrow is not a defined mineral resource and is usually developed on an as-needed basis.
 Consequently, the amount of borrow required for this alternative would not be a significant impact.
 No mitigation is required.

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

- 28 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 5A would include 29 moving water through both the new water conveyance infrastructure and natural channels. Adverse 30 effects would only occur if operations prevented access to a locally important aggregate resource 31 site; this is not expected to occur because there are no aggregate mines or MRZs in the area where 32 Alternative 5A would operate. Accordingly, operation of Alternative 5A would not block access to 33 existing mines or identified MRZs and similar to Alternative 4, there would be no effect. Similarly, 34 routine facilities maintenance activities such as painting, cleaning, and structure repair, landscape 35 maintenance, road work, and periodic replacement of erosion protection on the levees and 36 embankments would occur at or immediately adjacent to water conveyance facilities and would not 37 cover or block access to existing mines or identified MRZs. Accordingly, the operation and 38 maintenance of the water conveyance facilities under Alternative 5A would not have effects on the 39 availability of aggregate resource sites.
- 40 *CEQA Conclusion:* The operation and maintenance of Alternative 5A water conveyance facilities
 41 would have no impact on locally important aggregate resources because operation and routine
 42 maintenance such as painting, cleaning, repairs, levee and landscape maintenance and similar
 43 activities would be limited to the water conveyance facilities. The impact on locally important
 44 aggregate resources is considered less than significant because access to areas containing these

resources would not be restricted when operation and maintenance of the water conveyance
 facilities is occurring. No mitigation is required.

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

5 **NEPA Effects:** The operation of the water conveyance facilities under Alternative 5A would include 6 moving water through both the new water conveyance infrastructure and natural channels. Adverse 7 effects would only occur if operations prevented access known aggregate resources; this is not 8 expected to occur because there are no known aggregate resources located in the area where 9 Alternative 5A would operate. Similarly, routine facilities maintenance activities such as painting, 10 cleaning, and structure repair, landscape maintenance, road work, and periodic replacement of 11 erosion protection on the levees and embankments would occur at or immediately adjacent to water 12 conveyance facilities and would not cover or block access known aggregate resources, Accordingly, 13 the operation and maintenance of the water conveyance facilities under Alternative 5A would not 14 have effects on known aggregate resources.

CEQA Conclusion: The operation and maintenance of Alternative 5A water conveyance facilities
 would have no impact on known aggregate resources because operation and routine maintenance
 such as painting, cleaning, repairs, levee and landscape maintenance and similar activities would be
 limited to the water conveyance facilities. The impact on known aggregate resources is considered
 less than significant because access to areas containing these resources would not be restricted
 when operation and maintenance of the water conveyance facilities is occurring. No mitigation is
 required.

Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing Environmental Commitments 3, 4, 6, 7, 9–12, 15, and 16

24 **NEPA Effects:** Implementation of Environmental Commitments would have the potential to affect 25 locally important aggregate resource sites are those that would inundate large areas of land. The 26 loss of important aggregate resource sites under Alternative 5A would be similar to that described 27 under Alternative 4. However, the potential for loss of important aggregate resource sites would be 28 less than Alternative 4 because much less land would be restored within the project area and over a 29 much shorter period. Nevertheless, the potential for inundation and loss of this aggregate resource sites would remain under Alternative 5A and is considered an adverse effect. Mitigation Measure 30 31 MIN-11 is available to reduce this effect.

32 *CEQA Conclusion:* As described under Alternative 4, an active mine on Decker Island may fall within 33 the inundation footprints associated with implementing restoration actions associated with tidal 34 natural communities and nontidal marsh. Although less acreage would be restored under 35 Alternative 5A, restoration actions could result in inundation of aggregate resources. Although the 36 impact is expected to be less than under Alternative 4, the potential loss would remain significant 37 impact because it would eliminate the potential to recover aggregate resources. Mitigation Measure 38 MIN-11 is designed to reduce the impact to a less-than-significant level.

39Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in Project40Construction

41 Please see Mitigation Measure MIN-11 under Impact MIN-11 in the discussion of Alternative 4.

Impact MIN-12: Loss of Availability of Known Aggregate Resources as a Result of Implementing Environmental Commitments 3, 4, 6, 7, 9–12, 15, and 16

3 **NEPA Effects:** Restoration actions occurring under Alternative 5A have the potential to reduce the 4 availability of important aggregate resources. When compared to Alternative 4, loss of aggregate 5 resources under Alternative 5A would be less because the total acreage of restoration occurring 6 with the project area would be substantially less. Similar to Alternative 4, aggregate and riprap 7 would be used for levee, berm, access road, and rock revetment construction, and rock would be 8 placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts of 9 aggregate and riprap necessary for these activities cannot be calculated at this time because of the 10 programmatic nature and general design of the restoration actions. However, the amount needed 11 would be used over a period of years and would be expected to be within the available resources of 12 the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, Aggregate 13 *Resources*, and identified in Table 26-1. There would be no depletion (loss of availability) of regional 14 aggregate supplies substantial enough to cause remaining supplies to be inadequate for future 15 development or to require development of new aggregate sources to meet future demand. 16 Therefore, the use of aggregate material for the restoration actions under Alternative 5A would not 17 cause an adverse effect on the availability of aggregate resources.

18 **CEQA Conclusion:** Restoration actions occurring under Alternative 5A would use small amounts of 19 aggregate for levee, berm, and access road construction, and placement of rock revetments or riprap 20 for erosion control and stability at level breaches and toe drain earthworks. The amounts of 21 aggregate are unknown but would be within the available resources of the study area or adjacent 22 aggregate resource study areas. The impact on known aggregate resources would be less than 23 significant because implementing Environmental Commitments would not use an amount of 24 aggregate that would cause remaining supplies to be inadequate to meet future demands or require 25 developing new sources. No mitigation is required.

26 **26.3.5 Cumulative Analysis**

27 The cumulative effects analysis for mineral resources addresses the potential for the action 28 alternatives to act in combination with other past, present, and probable future projects or 29 programs to create a cumulatively significant impact on natural gas and aggregate resources. 30 Implementation of the proposed project and other local and regional projects as presented in Table 31 26-9, could contribute to regional impacts and hazards associated with minerals. These programs 32 and projects have been drawn from a more substantial compilation of past, present, and reasonably 33 foreseeable programs and projects included in Appendix 3D, Defining Existing Conditions, No Action 34 Alternative, No Project Alternative, and Cumulative Impact Conditions. This analysis considers 35 projects that could affect mineral resources and, where relevant, on the same schedule as the 36 project, resulting in a cumulative impact.

Table 26-9. Effects on Minerals from the Plans, Policies, and Programs Considered in the 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 Department of Water Resources-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 Land Management Plan		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.	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.
California Department of Water Resources	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.

Agency	Program/Project	Status	Description of Program/Project	Effects on Mineral Resources
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing	Levee rehabilitation projects in the Delta.	This project could utilize limited aggregate resources.
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps of Engineers	Flood Management Program	Ongoing	South Sacramento Streams Project component consists of levee, floodwall, and channel improvements.	This project could utilize limited aggregate resources.
California Department of Water Resources	Cache Slough Area Restoration	Currently under study	Restoration of lands within the Cache Slough Complex located in the Delta.	The project could reduce access to natural gas wells and aggregate resources.
California Department of Water Resources and Solano County Water Agency	North Bay Aqueduct Alternative Project	Currently under study	Extending the North Bay Aqueduct to the Sacramento River.	The project could reduce access to natural gas wells and aggregate resources.
California Department of Water Resources	California Water Action Plan	Initiated in January 2014	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	Minor effects on mineral resources.
Delta Conservancy	California EcoRestore	Initiated in 2015	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	Minor effects on mineral 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 proposed project. The geographic scope of the 6 aggregate cumulative analysis is centered on the counties and the designated aggregate resource 7 production regions included in and adjacent to the study area (see Table 26-1). This geographic limit 8 was established to coincide with the most likely sources of aggregate sought to support construction 9 activities. It is unlikely, based on historic aggregate transportation patterns and costs, that a larger 10 region within northern and central California would be drawn upon to supply aggregate resources 11 to the proposed project and other Delta region projects. With the high cost of ground transportation, 12 it is more likely that supplies from outside of the six local aggregate production study areas would 13 arrive by boat and barge from the San Francisco Bay area (with sources outside of California) than 14 from hard rock mines or large stream systems north of Sutter and Yuba Counties, east of Sacramento

- 1 and Placer Counties, or south of San Joaquin County. If federal funding is provided to the project
- 2 there might be restrictions on using aggregate from outside the country because of the Buy America
- 3 Act (see Section 26.2.1.1).

4 26.3.5.1 Cumulative Effects of the No Action Alternative

5 The cumulative No Action Alternative scenario would include projects as listed in Table 26-9, and 6 would include projects that could have effects on natural gas resources and aggregate resources. 7 Generally, these other projects in the study area would have a minimal footprint and would not 8 require moving existing active natural gas wells. Even if certain plan actions block vertical access to 9 natural gas fields, directional drilling could provide access to these fields. A variety of smaller or 10 standard projects in the study area and the broader region will use aggregate resources. However, 11 projects in the cumulative No Action Alternative scenario are currently being supplied by the 12 permitted aggregate sources and similarly are within the available permitted regional aggregate 13 resource base (Table 26-1). Projects under the cumulative No Action Alternative scenario would 14 also have to undergo independent environmental analysis and would also be subject to existing 15 regulations over mineral resources which require identifying and conserving mineral resources. 16 Therefore, it is anticipated that there would be no adverse effect on mineral resources.

17 The Delta and vicinity are within a highly active seismic area, with a generally high potential for 18 major future earthquake events along nearby and/or regional faults, and with the probability for 19 such events increasing over time. Based on the location, extent and non-engineered nature of many 20 existing levee structures in the Delta area, the potential for significant damage to, or failure of, these 21 structures during a major local seismic event is generally moderate to high. (See Appendix 3E, 22 Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies, for more detailed 23 discussion.) Reclaiming land or rebuilding levees after a catastrophic event due to climate change or 24 a seismic event would potentially obstruct access to natural gas wells during construction. In the 25 instance of levee failure causing flooding, inundation could also block access to natural gas wells. 26 While similar risks would occur under implementation of the action alternatives, these risks may be 27 reduced by project-related levee improvements along with those projects identified for the 28 purposes of flood protection in Table 26-9.

29 26.3.5.2 Concurrent Project Effects

Construction and operation of the water conveyance facility under the BDCP alternatives
(Alternatives 1A-2C, 3, 4, 5, or 6A-9) would have an adverse impact on mineral resources by
restricting or eliminating access to natural gas and aggregate deposits located in the Plan Area.
Construction activities would consume aggregate resource but not to the level that would severely
diminish local supplies Operation and maintenance of the water conveyance facilities would not
adversely impact access to natural gas or aggregate resources.

- Implementing CM2-CM4 and CM6-CM11 would restrict or eliminate access to natural gas fields and
 reduce the availability of locally important aggregate resource sites. These impacts would occur
 because of the large land area that would be restored within the Plan Area. Mitigation Measures
 MIN-6 and MIN-11 would reduce these impacts to less-than-significant levels by designing
- 40 restoration projects ins such a fashion that would allow continued access to natural gas fields and to
- 41 prioritize the use of the aggregate resources that would otherwise be lost as a result of
- 42 implementing the restoration projects.

- 1 The combined impact of constructing and operating the water conveyance facility with
- 2 implementing CM2–CM4 and CM6–CM11 would increase the magnitude of the significant impact on
- 3 access to natural gas fields and aggregate resource sites. However, implementing Mitigation
- 4 Measures MIN-6 and MIN-11 would reduce these impacts to a less-than-significant level.
- Concurrent effects of the non-HCP alternatives (Alternatives 4A, 2D, and 5A) on mineral resources
 would likely be much less than under the BDCP alternatives because restoration actions under the
- 7 non-HCP alternatives would be reduced compared with BDCP alternatives.

8 **26.3.5.3** Cumulative Effects of the Action Alternatives

9 Impact MIN-13: Cumulative Loss of Natural Gas Production from Construction, Operation, and 10 Implementation of CM1-CM21 of Alternatives

11 **NEPA Effects:** The elements of the action alternatives that could contribute to a cumulative effect on 12 natural gas production are construction of the water conveyance facilities and implementation of 13 restoration actions that result in permanent flooding of study area lands. Construction activity could 14 displace between one and eleven active wells in the study area counties. The inundation associated 15 with CM4, CM5, and CM10 under the BDCP alternatives could displace up to 233 active wells in the 16 counties that make up the study area (Sacramento, Solano, Yolo, San Joaquin, Alameda, and Contra 17 Costa). Environmental Commitments 4 and 10 under Alternatives 4A 2D, and 5A would also 18 potentially displace active wells in the counties that make up the study area. However, these 19 Environmental Commitments would only affect up to 295 acres and up to 832 acres, respectively 20 (see Chapter 3, *Description of Alternatives*, for more detailed information). These acreages are much 21 smaller than those associated with CM4, CM5 and CM10 (65,000 acres, 10,000 acres, and 1,200 22 acres, respectively) so proportionately smaller numbers of active wells might be affected even 23 though the exact locations where Environmental Commitments would be implemented are 24 undetermined. Although the number of natural gas wells likely to be eliminated may be a small 25 percentage of the total sites in the study area, there is potential to affect a locally significant number 26 of wells. Consequently, the inundation losses are considered an adverse effect even with feasible 27 mitigation.

- A review of related projects in the study area indicates there are no large-scale construction projects under consideration that are likely to displace active natural gas wells or reduce production or access to natural gas resources. Because most of the construction projects—including DWR's Delta Levees Flood Protection Program—have a minimal footprint, they would not require the displacement or abandonment of active natural gas wells or block access to large areas with underlying natural gas fields.
- 34 Various management plans being developed within the study area could have the potential to affect 35 active natural gas wells or to block access to underlying natural gas fields. These management plans 36 include the Lower Sherman Island Wildlife Area Land Management Plan (California Department of 37 Fish and Game) and the San Joaquin County Multi-Species Habitat Conservation and Open Space 38 Plan (San Joaquin Council of Governments). These plans could result in large acreages being 39 converted to habitat, including flooding for wetland habitat creation. These plans, however, do not 40 necessarily require removal of active natural gas wells. Also, habitat management and conservation 41 plans are prepared to provide mitigation procedures and identify conservation bank locations that 42 allow development to proceed. Even if some study area lands are modified such that direct vertical 43 access to natural gas fields is prevented, conventional or directional drilling from adjacent lands

1 could still provide access to some of these fields. Areas for habitat modification could also be 2 selected that do not require displacement of a substantial portion of active natural gas wells or 3 substantial loss of natural gas production. Consequently, the other projects are considered to have a 4 very minor effect on access to natural gas resources. However, because implementation of any of the 5 action alternatives alone would cause adverse effects on natural gas wells or resources, the 6 incremental effects of the action alternatives considered with the other regional projects would 7 result in a cumulative adverse effect. Mitigation Measures MIN-5 and MIN-6 would be available to 8 reduce project-related effects.

9 **CEOA Conclusion:** The physical projects and programs under consideration in the study area would 10 have minimal to no impacts on natural gas resources. However, because implementation of any of 11 the alternatives alone would cause significant and unavoidable impacts on natural gas wells or 12 resources, implementing these projects in combination with any action alternative would result in a 13 significant cumulative impact and the incremental contribution to this impact of any action 14 alternative would be cumulatively considerable. Implementation of Mitigation Measures MIN-5 and 15 MIN-6 would reduce the project-related impact, but not to a less-than-significant level. Because 16 implementation of Mitigation Measure MIN-5 and MIN-6 cannot assure that all or a substantial 17 portion of a county's existing natural gas wells or fields will remain accessible after implementation 18 of the action alternatives, this cumulative impact is significant and unavoidable and the project 19 contribution is cumulatively considerable.

Mitigation Measure MIN-5: Design CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible

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

Mitigation Measure MIN-6: Design CM4, CM5, and CM10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible

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

Impact MIN-14: Cumulative Loss of Aggregate from Construction, Operation, and Implementation of CM1-CMCM4, CM5, and CM10 of Alternatives

- 28 **NEPA Effects:** The elements of the action alternatives that could contribute to a cumulative effect on 29 aggregate resources include construction and maintenance of the water conveyance facilities; 30 implementation of conservation measures that result in permanent flooding of study area lands; and 31 maintenance of levees, berms, and structures constructed for conservation measures. The estimates 32 for aggregate use for construction activities range from 4,000,000 tons (Alternative 9) to 20,453,000 33 tons (Alternative 4) over the life of the construction period. The areas of flooding associated with 34 conservation measures for all alternatives could inundate one existing mine, permanently blocking 35 access to the resource, and no identified MRZs. Mitigation Measure MIN-11 would address the effect 36 on the inundated mine.
- The cumulative effects analysis considered the range of projects in the study area and adjacent areas that might have effects on aggregate resources (Appendix 3D, *Defining Existing Conditions, No Action*
- 39 Alternative, No Project Alternative, and Cumulative Impact Conditions). A variety of smaller or
- 40 standard projects in the study area and the broader region will use aggregate resources. These
- 41 projects include highway and road improvement, housing development, levee improvements (e.g.,
- 42 the Delta Levees Flood Protection Program, the Sacramento Area Flood Control Agency Flood

1 Management Program, 2012 Central Valley Flood Protection Plan [California Department of Water 2 Resources 2011]), and the Folsom Dam Safety and Flood Damage Reduction Project. As disclosed in 3 the discussions of individual alternatives, the aggregate requirements of the action alternatives 4 would not have any adverse effects on the availability of aggregate resources. As discussed in 5 Section 26.1, Environmental Setting/Affected Environment, and shown in Table 26-1, many areas in 6 the study area, the broader region, and statewide only have small percentages of permitted 7 aggregate resources available compared to the projected 50-year aggregate demand (Kohler 2006). 8 However, projects of the scale described above are within the available permitted regional 9 aggregate resource base listed in Table 26-1. Additionally, as described in Section 26.1.2.1 Aggregate 10 *Resources*, new aggregate resources are being permitted and are not accounted for in Kohler (2006). 11 Also, there is unused capacity because of the reduction in demand caused by the recession. 12 Considering the level of permitted and available local and regional supplies, the ongoing aggregate 13 needs, the added availability of materials from new permitted resources, and the additional 14 aggregate demand from other projects in the region, none of the alternatives would be expected to 15 substantially contribute to a cumulative effect on aggregate resources.

- 16 However, if larger projects with large, short-term aggregate requirements move forward on a 17 schedule similar to the proposed project (particularly, any of Alternatives 1A through 8), there is 18 potential to generate sufficient aggregate demand over the next decade so as to cause a cumulative 19 effect on the availability of aggregate resources. As pointed out in the Delta Stewardship Council 20 Draft Delta Plan EIR (Delta Stewardship Council 2011), the more or less simultaneous development 21 of large projects with large aggregate demands has the potential to use a sufficient amount of the 22 resource to reduce the amount available for future development. This cumulative effect would be 23 more likely and more severe as the California economy recovers from the current downturn over 24 the next several years. Given the large amount of aggregate needed for construction of the proposed 25 conveyance facilities, the incremental contribution of a selected action alternative to this 26 cumulatively significant impact would be considered cumulatively considerable and adverse. 27 Mitigation Measures MIN-11, MIN-13, and MIN-14 are available to address this cumulative effect.
- 28 **CEQA** Conclusion: A variety of smaller or standard projects in the study area and the broader Delta 29 region—e.g., highway and road improvement, housing development, levee improvements, and the 30 Folsom Dam Safety and Flood Damage Reduction Project—will use aggregate resources. Projects of 31 this scale, including the alternatives, are within the available permitted aggregate resource base. 32 Although the aggregate requirements of any selected alternative would not have a project-specific 33 significant impact on the availability of aggregate resources, many areas in the study area and the 34 broader aggregate production region only have small percentages of permitted aggregate resources 35 available compared with the projected 50-year aggregate demand (Kohler 2006). Taken together, 36 ongoing aggregate needs, the additional aggregate demand from constructing an alternative, and 37 other regional projects, considered with the added availability of materials from new resource sites, 38 would not substantially contribute to a cumulative impact on aggregate resources.
- However, if larger projects with large, short-term aggregate requirements move forward on a
 schedule similar to that of any of Alternatives 1A through 8, there is potential to generate sufficient
 aggregate demand over the next decade to cause a cumulative impact sufficient to reduce the
 availability of aggregate resources for future development. The likelihood and severity of this
 cumulative impact would increase as California's economy recovers from the current downturn over
 the next several years.

- 1 Implementing these projects in combination with any of Alternatives 1A through 8 would result in
- 2 the loss of availability of locally or regionally important aggregate resource that would cause
- 3 remaining supplies to be inadequate for future development. This would constitute a significant
- 4 cumulative impact and the incremental contribution to this impact of any of Alternatives 1A through
- 5 8 would be cumulatively considerable. Implementation of Mitigation Measures MIN-11, MIN-13, and
- 6 MIN-14 would reduce the severity of the project's contribution to this cumulative impact by 7 reducing the need to use local sources of aggregate and by participating in processes to develop
- 8 additional resources. Because these measures cannot assure the ongoing availability of aggregate
- 9 resources for future development, this cumulative impact would be significant and unavoidable and
- 10 the project's contribution to this impact would remain cumulatively considerable.

11Mitigation Measure MIN-11: Purchase Affected Aggregate Materials for Use in BDCP12Construction

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

14Mitigation Measure MIN-13: Recycle BDCP-Derived Materials and Use Recycled Materials15to the Extent Practicable During Construction

16 During final project design and construction, the project proponents will recycle or reuse 17 materials from excavation or removal of existing features (e.g., excavated sand and gravel; 18 riprap and aggregate in existing roads and levees) to the extent feasible in light of costs, 19 logistics, and technological considerations, including the quality of the excavated or removed 20 sand, gravel, and reusable aggregate. Also, the project proponents will use commercially 21 available recycled materials for project components when practicable, considering costs, 22 technological considerations, quality and availability of recycled materials, and other 23 considerations. The use of recycled material will reduce the impact by reducing the need to use 24 local sources of aggregate.

25Mitigation Measure MIN-14: BDCP Proponents Will Participate in the Local and Regional26Aggregate Evaluation and Permitting Process

27 Project proponents will participate in the local and regional dialog that evaluates the 28 development of new MRZ-2 lands and the permitting of new aggregate and quarry resources. 29 project proponents will participate in the public and agency involvement process to inform the 30 public and local, regional, and state permitting agencies about project aggregate requirements 31 and the need to prevent cumulative impacts on aggregate resources that might cause remaining 32 supplies to be inadequate for future development. Participation in these public processes will 33 reduce the impact on aggregate because it will coordinate and integrate project resource needs 34 into land use decisions being made by other agencies as part of established mineral resource 35 management policies, and will contribute to the potential that these needed resources would be 36 developed.

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