# Chapter 26
# Mineral Resources

## 26.3 Environmental Consequences

### 26.3.3 Effects and Mitigation Approaches

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

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

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

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

| Gas Field Name | Natural Gas Field Size (acres)[a] | Annual Average Natural Gas Production 2005–2009 (Mcf) | Acres Of Non-Abandoned Natural Gas Field Affected | Percent of Non-Abandoned Natural Gas Field Affected by Project[b] |
|---|---|---|---|---|
| **Alternative 1A—Dual Conveyance with Pipeline/Tunnel and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | |
| Merritt Island Gas (abandoned) | 269 | ND | — | — |
| River Island Gas | 8,376 | 2,532,876 | 278 | 3 |
| Snodgrass Slough Gas | 168 | ND | 18 | <1 |
| Non-abandoned acres | 8,544 | | 296 | 3 |
| **Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)** | | | | |
| East Island Gas | 684 | 1,502 | 248 | 4 |
| King Island Gas | 204 | 24,857 | 52 | <1 |
| Merritt Island Gas (Abandoned) | 269 | — | — | — |
| Robert Island Gas | 2,034 | ND | 484 | 7 |
| Snodgrass Slough Gas | 169 | ND | 39 | <1 |
| Thornton Gas (abandoned) | 1,752 | — | — | — |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 73 | <1 |
| Non-abandoned acres | 6,943 | | 924 | 13 |
| **Alternative 1C—Dual Conveyance with West /Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario A)** | | | | |
| Dutch Slough Gas | 3,635 | 1,668,346 | 92 | <1 |
| Elkhorn Slough Gas | 411 | 191,942 | 242 | 1 |
| Merritt Island Gas (abandoned) | 269 | — | — | — |
| Rio Vista Gas | 15,752 | 15,176,337 | 546 | 3 |
| Non-abandoned acres | 19,798 | | 880 | 5 |
| **Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 2B—Dual Conveyance with East Alignment and Five Intakes (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1B | | | | |
| **Alternative 2C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario B)** | | | | |
| Same as Alternative 1C | | | | |
| **Alternative 3—Dual Conveyance with Pipeline/Tunnel and Intakes 1 and 2 (6,000 cfs; Operational Scenario A)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3 and 5, (9,000 cfs; Operational Scenario H)** | | | | |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 21~~65~~ | 74~~~~ |
| River Island | 8,376 | 2,532,876 | 87 | 2 |
| | 12,228 | 2,891,183 | 32~~52~~ | 32~~~~ |

| 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 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and Intakes 1-5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 6B—Isolated Conveyance with East Alignment and Intakes 1-5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1B | | | | |
| **Alternative 6C—Isolated Conveyance with West Alignment and Intakes W1-W5 (15,000 cfs; Operational Scenario D)** | | | | |
| Same as Alternative 1C | | | | |
| **Alternative 7—Dual Conveyance with Pipeline/Tunnel, and Intakes 2, 3, and 5, and Enhanced Aquatic Conservation (9,000 cfs; Operational Scenario E)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)** | | | | |
| Same as Alternative 1A | | | | |
| **Alternative 9—Through Delta/Separate Corridors (15,000 cfs; Operational Scenario G)** | | | | |
| Rio Vista Gas | 15,753 | 15,176,337 | 23 | <1 |
| West Thornton–Walnut Grove Gas | 3,852 | 358,307 | 9 | <1 |
| Non-abandoned acres | 19,605 | | 32 | <1 |

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

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

Mcf = 1,000 cubic feet.

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

b Values rounded to the nearest percent.

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

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

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

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

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

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

Because no producing wells within the construction footprint would be permanently abandoned, construction of Alternative 4 would not result in reduced natural gas production in the study area. Alternative 4 would not affect any locally important natural gas wells or result in the loss of any portion of the area's natural gas production and the effects would not be adverse.

***CEQA Conclusion*:** Because no natural gas wells would occur in the construction footprint there would not be any substantial decrease of (losse 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**

***NEPA Effects*:** Construction of Alternative 4 water conveyance facilities would permanently reduce the land surface available for vertical extraction of natural gas from directly underlying gas fields. The proportion of natural gas field area underlying the Alternative 4 permanent construction footprint is small (less than approximately 32% of the areal extent of natural gas field areas intersected) (Table 26-5). No gas fields underlie the proposed east-west transmission line alignment option (within the Areas of Additional Analysis) for this alternative. The reduction in unimproved land surfaces directly overlying gas fields would not be adverse because most of the affected fields could be accessed from other overlying areas (Figure 26-2) and standard directional drilling techniques could enable access to gas fields from a distance. Therefore, there would be no long-term adverse loss of extraction potential from construction of Alternative 4.

Alternative 4 temporary work areas also overlie natural gas fields. Any temporary reduction in ability to extract natural gas during construction of conveyance facilities is considered minor because the effect on natural gas extraction in Sacramento County would be small and temporary,

and the presence of work areas would not prevent recovery of the resource. There would be no adverse effect.

***CEQA Conclusion*:** Significant impacts could occur if construction of water conveyance facilities would preclude the ability to extract from existing natural gas fields. Although the Alternative 4 conveyance facilities would reduce the land surface available for vertical extraction of natural gas from underlying gas fields, the proportion of these gas fields affected would be small (less than approximately 32% of the areal extent of natural gas field areas intersected). Additionally, there would be no substantial loss of existing production or permanent loss of access to the resource because the gas fields would continue to be accessible using conventional or directional drilling techniques. Accordingly, this impact would be less than significant. No mitigation is required.

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

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

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

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

**Impact MIN-5: Loss of Availability of Locally Important Natural Gas Wells as a Result of Implementing ~~Conservation Measures 2–22~~CM2–CM21**

***NEPA Effects:*** Operations and access to natural gas wells would be affected where wells are located in restoration areas to be inundated under *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Natural gas wells can remain productive in flooded areas, but they require modification, which could include construction of a protective cage and platform above the well (Federal Emergency Management

Agency n.d.). The few producing wells that are currently in inundated areas of the Delta are located where flooding is seasonal. With permanent inundation, modification and maintenance of wells may not be cost effective. It is likely that any producing wells in proposed permanent inundation areas in ROAs would need to be abandoned because modifications to these wells would not be feasible. There are approximately 233 active wells within ROAs (Table 26-6); an unknown percentage of these wells in inundation areas would likely be abandoned. Specific inundation areas have not been identified in association with conservation measures of the BDCP at this time.

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

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

***CEQA Conclusion:*** Significant impacts could occur if implementation of CMs 2-21 would preclude use of existing natural gas wells. 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~~ While Mitigation Measure MIN-5 would reduce impacts by attempting to minimize the need for well abandonment or relocation, implementation of ~~Mitigation Measure MIN-5~~this mitigation measure cannot assure that all or a substantial portion of a county's existing natural gas wells will remain accessible after implementation of this alternative, this impact is significant and unavoidable.

**Mitigation Measure MIN-5: Design ~~Conservation Measures 4, 5, and 10~~CM4, CM5, and CM10 to Avoid Displacement of Active Natural Gas Wells to the Extent Feasible**

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

**Impact MIN-6: Loss of Availability of Extraction Potential from Natural Gas Fields as a Result of Implementing ~~Conservation Measures 2–22~~CM2–CM21**

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

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

**Mitigation Measure MIN-6: Design ~~Conservation Measures 4, 5, and 10~~CM4, CM5, and CM10 to Maintain Drilling Access to Natural Gas Fields to the Extent Feasible**

During final design of ~~Conservation Measures 4, 5, and 10~~CM4, CM5, and CM10, the BDCP proponents will ~~consider the location and amount of inundation of natural gas fields and will~~ identify means to maintain feasible drilling access to ~~them~~natural gas fields that could be adversely affected by implementing CM 4, CM5 and CM10. These ~~measures~~ could include ~~maintaining~~ preserving non-inundated ~~locales~~ lands either over or adjacent ~~overlying or near individual gas fields and ensuring that inundation zone design provides feasible access~~ to natural gas fields ~~from adjacent and nearby non-inundated lands~~adequate in size to allow drilling to occur. ~~This mitigation applies to CM4, CM5, and CM10. This~~ These ~~mitigation~~ 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 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.

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

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

resources may be identified within existing MRZ-3 areas with additional study; identification of new resources could expand the resource base during the construction period of the water conveyance facilities. CGS estimates that there are 74 billion tons of non-permitted construction aggregate resources in 31 aggregate study areas in the state (Clinkenbeard 2012). While not all these resources may be mined because of social, environmental, or economic factors (e.g., resources may be located near urban or environmentally sensitive areas, precluding their extraction), CGS states that non-permitted aggregate resources are likely to be the primary resources that will meet California's continuing demand (Clinkenbeard 2013).

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

Alternatively, some sources outside the study area may be used to supply aggregate needs for BDCP water conveyance facilities. Kohler (2006) notes that Yuba County exports a significant portion of its available aggregate to points outside its production region. Additionally, aggregate delivery by barge from the San Francisco Bay is possible. The California State Lands Commission (2010:2–19) notes several existing waterfront facilities in San Francisco Bay, San Pablo Bay, and Suisun Bay that could deliver aggregate from that area to the study area. These areas provide additional aggregate capacity over that of the immediate region and further reduce the project's impact on local and regional aggregate resources. Also, as noted in Section 26.1, *Environmental Setting/Affected Environment*, California imports large volumes of aggregate from Canada and Mexico, and a terminal was recently constructed at the Port of Richmond to receive and distribute aggregate shipments. It may be necessary or financially advantageous to purchase some of this imported aggregate if specific aggregate supplies are insufficient at the local or regional level, although the analysis above indicates that regional supply is sufficient. The Canadian and Mexican sites that are currently providing the aggregate and rock are already permitted under their respective jurisdictions. Consequently, no unanticipated environmental impacts would be generated by purchasing materials that are already being imported from these existing sites. Considering the level of local and regional supplies available, the additional aggregate and rock demand of the BDCP would not be sufficient to be substantially responsible for the development of new mines in Mexico or Canada. Additionally, if federal funding is provided to the project, there might be restrictions on using aggregate from outside the country because of the Buy America Act (see Section 26.2.1.1).

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

The amount of borrow material needed to construct Alternative 4 would be approximately 13,500,000 cubic yards or 20,250,000 tons. Because there is limited excavation associated with this

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

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

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

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

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

***CEQA Conclusion*:** 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**

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

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

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

**Impact MIN-11: Loss of Availability of Locally Important Aggregate Resource Sites (Mines and MRZs) as a Result of Implementing ~~Conservation Measures 2–22~~CM2–CM21**

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

***CEQA Conclusion*:** Significant impacts could occur if implementation of CMs 2-21 result in loss of available locally important aggregate resource sites. 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 would ~~is designed to~~ reduce the impact by replacing lost aggregate by purchasing aggregate from other sources. This impact would be ~~to~~ less than significant.

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

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

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

***NEPA Effects:*** ~~Conservation Measures 2–22~~CM2–CM21 that have the potential to reduce the availability of important aggregate resources are those that would use aggregate resources in construction or maintenance. Four of the conservation measures listed in Table 3-3 have this potential: *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Community Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM10 Nontidal Marsh Restoration*. Aggregate and riprap would be used for levee, berm, access road, and rock revetment construction, and rock would be placed for erosion control and stability at levee breaches and toe drain earthworks. The amounts of aggregate and riprap necessary for these activities cannot be calculated at this time because of the programmatic nature and general design of the conservation measures. However, the amount needed would be used over a period of years and would be expected to be within the available resources of the study area and adjacent aggregate resource study areas discussed in Section 26.1.2.1, *Aggregate Resources* and identified in Table 26-1. There would be no depletion (loss of availability) of regional aggregate supplies substantial enough to cause remaining supplies to be inadequate for future development or to require development of new aggregate sources to meet future demand. Therefore, the use of available aggregate material for the conservation measures of Alternative 4 would not cause an adverse effect.

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