Chapter 21
Energy

21.3 Environmental Consequences

21.3.1 Methods for Analysis

21.3.1.1 Construction

Electrical energy needs for construction were evaluated based on the estimated annual energy required for each alternative. The construction energy requirements were estimated from the facilities that would require electrical energy during construction, as described in DWR design documents for each alternative. The construction-related energy demand is considered temporary (i.e., will cease once construction is complete). Construction of the water conveyance facility would require the use of electricity for lighting, tunnel ventilation, tunnel boring, earth removal from the tunnels, and other construction machinery. Annual electrical energy use estimates for each alternative were provided by DWR and are summarized in Table 21-9.

Table 21-9. Temporary Annual Electrical Use Estimates for Construction (~~GWh~~MWh)

Year	Alt 1A, 2A, 6A	Alt 7, 8	Alt 3	Alt 4	Alt 5	Alt 1C, 2C, 6C	Alt 1B, 2B, 6B	Alt 9
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	2,829	2,688	2,618	5,518	1,446	1,568	806	368
2019	16,255	15,445	15,040	20,635	8,308	9,008	4,630	2,115
2020	80,318	76,318	74,318	121,701	41,051	44,508	22,878	10,449
2021	213,837	203,188	197,863	319,387	109,294	118,498	60,910	27,820
2022	300,279	285,325	277,848	445,586	153,475	166,400	85,532	39,066
2023	267,305	253,993	247,337	396,550	136,621	148,127	76,140	34,776
2024	278,819	264,934	257,991	410,648	142,506	154,508	79,419	36,274
2025	188,090	178,723	174,040	280,791	96,134	104,230	53,576	24,470
2026	67,151	63,807	62,134	103,456	34,321	37,212	19,127	8,736
2027	12,826	12,187	11,868	23,441	6,555	7,107	3,653	1,669
2028	339	322	314	4,646	173	188	97	44
2029	10	9	9	23	5	6	3	1
Total	1,428,059	1,356,939	1,321,380	2,132,383	729,890	791,359	406,771	185,788

Project construction would consume gasoline and diesel through operation of heavy-duty construction equipment and vehicles. Materials manufacturing would also consume energy, although information on the intensity and quantity of fuel used during manufacturing is currently unknown and beyond the scope of project-level environmental analyses. Accordingly, this analysis focuses on energy associated with physical construction of the water conveyance facilities (i.e., fuel

consumed by heavy-duty equipment and vehicles), and an analysis of energy associated with materials manufacturing is considered speculative and is not presented.

DWR and 5RMK Inc. (5RMK) developed construction assumptions for diesel and gasoline consumption as part of an economic analysis ("cost estimate") for Alternative 4. The cost estimate included daily fuel use values for off-road equipment (e.g., bulldozers), onsite vehicles (e.g., dump trucks), marine vessels, and locomotives. Fuel data from the cost estimate for these equipment and vehicles types were directly incorporated into the energy analysis. Diesel and gasoline consumption by offsite vehicles (i.e., employee commute vehicles, as needed vehicles, and material delivery vehicles) was calculated by converting greenhouse gas (GHG) emissions calculated by the air quality analysis (refer to Chapter 22, *Air Quality and Greenhouse Gases*) using the rate of carbon dioxide (CO_2) emissions emitted per gallon of combusted gasoline (8.78 kilograms/gallon) and diesel (10.21 kilograms/gallon) (Climate Registry 2015).

Table 21-10 summarizes total construction-related diesel and gasoline consumption under Alternative 4. Anticipated fuel use by the BDCP Alternatives is qualitatively analyzed relative to the Alternative 4 estimate, based on similarities in construction design.

Table 21-10. Alternative 4 Gasoline and Diesel Estimates for Construction (Million Gallons per Year)

Year	Gasoline	Diesel	Total
2016	<1	<1	<1
2017	<1	<1	<1
2018	1	2	2
2019	1	4	5
2020	1	7	8
2021	2	11	13
2022	2	12	14
2023	1	11	12
2024	1	12	13
2025	1	13	15
2026	1	8	9
2027	1	6	7
2028	1	3	4
2029	<1	1	1
Total	15	90	104

Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8[a]	Year 9[a]
Alternative 1A, 2A, 6A (15,000 cfs, 2 33-ft Tunnels)	20	32	56	220	324	376	236	81	81
Alternative 4 (9,000 cfs, 2 40-ft Tunnels)	74	197	345	449	480	483	363	129	28
Alternative 7, 8 (9,000 cfs, 2 33-ft Tunnels)	13	21	45	209	314	366	231	78	78
Alternative 3 (6,000 cfs, 2 33-ft Tunnels)	10	16	40	204	308	361	228	77	77
Alternative 5 (3,000 cfs, 1 33-ft Tunnel)	7	11	24	112	170	197	124	43	43
Alternative 1C, 2C, 6C (West Alignment)	22	34	45	121	169	196	120	42	42
Alternative 1B, 2B, 6B (East Alignment)	22	41	66	83	70	62	26	18	18
Alternative 9[b] (Through Delta/ Separate Corridors)	11	21	33	42	35	31	13	-	-

- No construction

[a] DWR estimated electrical use to be one-quarter of year 5 use.

[b] DWR estimated electrical use to be one-half of Alternatives 1B, 2B, 6B (east alignment).

21.3.3 Effects and Mitigation Approaches

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the 9 year construction period would be about 1,4286 GWh. That is an average of 158 119 GWh/year, with a peak use of 376 300 GWh occurring in year 62022, concurrent with expected tunnel boring activity. Diesel and gasoline consumption would likely be slightly greater than Alternative 4 (see Table 21-10), due to increased equipment and vehicle activity required to construct Alternative 1A. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 1A would result in 41% more CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 1A would consume approximately 147 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.2, construction of the water conveyance facilities associated with Alternative 1A includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an

equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 1A equate to 1,428~~6~~ GWh ~~over the 9-year~~during the construction period. Alternative 1A would also consume approximately 147 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.2, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 1A would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about 40~~6~~7 GWh. This is an average of ~~45~~ 34 GWh/year, with a peak use of 8~~3~~6 GWh occurring in ~~year 4~~2022. Diesel and gasoline consumption would likely be slightly greater than Alternative 4 (see Table 21-10), due to increased equipment and vehicle activity required to construct Alternative 1B. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 1B would result in 29% more CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 1B would consume approximately 134 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.3, construction of the water conveyance facilities associated with Alternative 1B includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 1B equate to 40~~6~~7 GWh ~~over the 9-year~~during the construction period. Alternative 1B would also consume approximately 134 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.3, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 1B would therefore not

result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about 791 GWh. That is an average of ~~88~~ 66 GWh/year, with a peak use of ~~196~~ 166 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would likely be slightly greater than Alternative 4 (see Table 21-10), due to increased equipment and vehicle activity required to construct Alternative 1C. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 1C would result in 48% more CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 1C would consume approximately 154 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases,* Section 22.3.3.4, construction of the water conveyance facilities associated with Alternative 1C includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 1C equate to 791 GWh ~~over the 9-year~~during the construction period. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.4, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 1C would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about 1,42~~86~~ GWh. That is an average of ~~158~~ 119 GWh/year, with a peak use of ~~376~~ 300 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would be similar to Alternative 1A equate to approximately 147 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.5, construction of the water conveyance facilities associated with Alternative 2A includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 2A equate to 1,42~~6~~8 GWh ~~over the 9-year~~during the construction period. Diesel and gasoline consumption would be similar to Alternative 1A equate to approximately 147 million gallons over the construction period. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.5, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 2A would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~406~~ 407 GWh. This is an average of ~~45~~ 34 GWh/year, with a peak use of ~~83~~ 86 GWh occurring in ~~year 4~~2022. Diesel and gasoline consumption would be similar to Alternative 1B equate to approximately 134 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.6, construction of the water conveyance facilities associated with Alternative 2B includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 2B equate to 40~~6~~7 GWh ~~over the 9-year~~during the construction period. Diesel and gasoline consumption would be similar to Alternative 1B equate to approximately 134 million gallons over the construction period. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.6, construction activities include all feasible control measures to improve

equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 2B would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~790~~ 791 GWh. This is an average of ~~88~~ 66 GWh/year, with a peak use of ~~196~~ 166 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would be similar to Alternative 1C equate to approximately 154 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.7, construction of the water conveyance facilities associated with Alternative 2C includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 2C equate to 79~~0~~1 GWh ~~over the 9-~~during the ~~year~~ construction period. Diesel and gasoline consumption would be similar to Alternative 1C equate to approximately 154 million gallons over the construction period. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.7, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 2C would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about 1,321~~0~~ GWh. This is an average of ~~147~~ 110 GWh/year, with a peak use of ~~361~~ 278 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would likely be slightly lower than Alternative 4 (see Table 21-10), due to reduced equipment and vehicle activity required to construct Alternative 3. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 3 would result in 5% less CO_2 from equipment and

vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 3 would consume approximately 99 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.8, construction of the water conveyance facilities associated with Alternative 3 includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 3 equate to 1,320~~0~~1 GWh ~~over the 9-year~~during the construction period. Alternative 3 would also consume approximately 99 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.8, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 3 would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Alternative 4 would require energy transmission and use for a pumping capacity of 9,000 cfs at north Delta intakes and conveyance through the tunnel. The maximum power requirements to operate the alternative would be about 50 MW for pumping to transport a maximum flow of 9,000 cfs from the Sacramento River near Hood to the SWP Clifton Court Forebay near Tracy. The north Delta intakes and conveyance energy factor for Alternative 4 is 65 MWh/TAF.

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~2,549~~2,132 GWh. This is an average of ~~283~~178 GWh/year, with a peak use of ~~483~~446 GWh occurring in ~~year 6~~2022. Alternative 4 would also consume approximately 104 million gallons of diesel and gasoline (see Table 21-10).

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.9, construction of the water conveyance facilities associated with Alternative 4 includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the

wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 4 would equate to ~~2,549~~2,132 GWh ~~over the 9-year~~during the construction period. Alternative 4 would also consume approximately 104 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.9, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 4 would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

Impact ENG-2: Wasteful or Inefficient Energy Use for Pumping and Conveyance

NEPA Effects: As shown in Table 21-1~~1~~2, for Alternative 4, the average north Delta intake pumping under Scenario H1 would be 2,674 TAF/yr under 2025 conditions and 2,463 TAF/yr under 2060 conditions. Under Scenario H4, average north Delta intake pumping would be 2,2883 TAF/yr under 2025 conditions and 2,144 TAF/yr under 2060 conditions. The energy use for north Delta intake pumping and tunnel conveyance was estimated to be 161 GWh/yr (2060 conditions) and 140 GWh/yr (2060 conditions) for Scenarios H1 and H4, respectively. These two scenarios reflect the range of effects that would result from the four potential outcomes under Alternative 4. While all scenarios would increase energy demand at the north delta, relative to the No Action Alternative, operation of the water conveyance facility would be managed to maximize efficient energy use, including off-peak pumping and use of gravity. Accordingly, implementation of Alternative 4 would not result in a wasteful or inefficient energy use. There would be no adverse effect.

***CEQA Conclusion*:** Operation of Alternative 4 under Scenario H1 would require an additional 175 GWh/yr under 2025 conditions and 161 GWh/yr under 2060 conditions for north Delta pumping, relative to Existing Conditions. Operation of Alternative 4 under Scenario H4 would require an additional 150 GWh/yr under 2025 conditions and 140 GWh/yr under 2060 conditions for north Delta pumping, relative to Existing Conditions. ~~operation~~ Operation of the water conveyance facility would be managed to maximize efficient energy use, including off-peak pumping and use of gravity. Accordingly, implementation of Alternative 4 would not result in a wasteful or inefficient energy use. Accordingly, this impact would be less than significant. No mitigation is required.

Impact ENG-3: Compatibility of the Proposed Water Conveyance Facilities and CM2–~~CM22~~CM21 with Plans and Policies

NEPA Effects: The potential for inconsistencies with plans or polices would be similar to the discussion in Alternative 1A, Impact ENG-3. Construction and implementation of Alternative 4 would be compatible with applicable plans and policies related to energy sources.

***CEQA Conclusion*:** Physical effects associated with implementation of the alternative are discussed in impacts ENG-1 and ENG-2, above and no additional CEQA conclusion is required related to the consistency of the alternative with relevant plans and polices. The relationship between plans, policies, and regulations and impacts on the physical environment is discussed in Chapter 13, *Land Use,* Section 13.2.3

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~731~~ 730 GWh. This is an average of ~~81~~ 61 GWh/year, with a peak use of ~~197~~ 153 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would likely be slightly lower than Alternative 4 (see Table 21-10), due to reduced equipment and vehicle activity required to construct Alternative 5. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 5 would result in 16% less CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 5 would consume approximately 87 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.10, construction of the water conveyance facilities associated with Alternative 5 includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 5 equate to ~~731~~ 730 GWh ~~over the 9-year~~during the construction period. Alternative 4 would also consume approximately 87 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.10, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 5 would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about 1,42~~6~~8 GWh. This is an average of ~~158~~ 119 GWh/year, with a peak use of ~~376~~ 300 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would be similar to Alternative 1A equate to approximately 147 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.11, construction of the water conveyance facilities associated with Alternative 6A includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result

of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 6A equate to 1,4286 GWh ~~over the 9-year~~during the construction period. Alternative 6A would also consume approximately 147 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.11, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 6A would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~406~~ 407 GWh. This is an average of ~~45~~ 34 GWh/year, with a peak use of ~~83~~ 86 GWh occurring in ~~year 4~~2022. Diesel and gasoline consumption would be similar to Alternative 1B equate to approximately 134 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.12, construction of the water conveyance facilities associated with Alternative 6B includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 6B equate to 4076 GWh ~~over the 9-year~~during the construction period. Alternative 1B would also consume approximately 134 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.12, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 6B would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~790~~ 791 GWh. This is an average of ~~88~~ 66 GWh/year, with a peak use of ~~196~~ 166 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would be similar to Alternative 1C equate to approximately 154 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.13, construction of the water conveyance facilities associated with Alternative 6C includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 6C equate to 791~~0~~ GWh ~~over the 9-year~~during the construction period. Alternative 1C would also consume approximately 154 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.13, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 6C would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~1,355~~1,357 GWh. This is an average of ~~151~~ 113 GWh/year, with a peak use of ~~366~~ 285 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would likely be slightly greater than Alternative 4 (see Table 21-10), due to increased equipment and vehicle activity required to construct Alternative 7. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 7 would result in 8% more CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 7 would consume approximately 117 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.14, construction of the water conveyance facilities associated with Alternative 7 includes all feasible control measures to

improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 7 equate to ~~1,355~~1,357 GWh ~~over the 9-year~~during the construction period. Alternative 7 would also consume approximately 117 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.14, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 7 would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

21.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2, 3, and 5, and Increased Delta Outflow (9,000 cfs; Operational Scenario F)

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~9-year~~ construction period would be about ~~1,355~~ 1,357 GWh. This is an average of ~~151~~ 113 GWh/year, with a peak use of ~~366~~ 285 GWh occurring in ~~year 6~~2022. Diesel and gasoline consumption would be similar to Alternative 8 equate to approximately 117 million gallons over the construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.15, construction of the water conveyance facilities associated with Alternative 8 includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 8 equate to 1,357 ~~1,355~~ GWh ~~over the 9-year~~during the construction period. Alternative 8 would also consume approximately 117 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.15, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 8 would therefore

not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

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

Impact ENG-1: Wasteful or Inefficient Energy Use for Temporary Construction Activities

NEPA Effects: Table 21-9 indicates that the total construction energy use estimate for the ~~7-year~~ construction period would be about 186 GWh. This is an average of ~~27~~ 15 GWh/year, with a peak use of ~~42~~ 39 GWh occurring in ~~year 4~~2022. Diesel and gasoline consumption would likely be slightly lower than Alternative 4 (see Table 21-10), due to reduced equipment and vehicle activity required to construct Alternative 9. Based on the analysis presented in Chapter 22, *Air Quality and Greenhouse Gases*, it is estimated that Alternative 9 would result in 22% less CO_2 from equipment and vehicles than Alternative 4. Using CO_2 as a proxy for fuel consumption, Alternative 9 would consume approximately 81 million gallons of diesel and gasoline over the entire construction period.

As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.16, construction of the water conveyance facilities associated with Alternative 9 includes all feasible control measures to improve equipment efficiency and reduce energy use. Although energy will be consumed as a result of construction activities, BMPs will ensure that only high-efficiency equipment is utilized during construction. Appendix 3B, *Environmental Commitments*, Section 3B.2.9.1 also outlines an equipment exhaust control plan that will reduce unnecessary equipment idling and ensure all construction equipment is in proper working condition according to manufacturer's specifications. These and other policies will help reduce construction energy and are consistent with state and local legislation and policies to conserve energy. Construction activities would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, there would be no adverse effect.

***CEQA Conclusion*:** Energy requirements for construction of the water conveyance facilities associated with Alternative 9 equate to 186 GWh ~~over the 9-year~~during the construction period. Alternative 9 would also consume approximately 81 million gallons of diesel and gasoline. As discussed in Chapter 22, *Air Quality and Greenhouse Gases*, Section 22.3.3.16, construction activities include all feasible control measures to improve equipment efficiency and reduce energy use. Construction of the water conveyance facilities associated with Alternative 9 would therefore not result in the wasteful, inefficient or unnecessary consumption of energy. Accordingly, this impact would be less than significant and no mitigation is required.

21.3.3.17 Cumulative Analysis

Impact ENG-3: Cumulative Impact on Energy Error! Bookmark not defined. **Use from Diesel and Gasoline Consumption during Construction**

NEPA Effects: **Alternatives**Error! Bookmark not defined. **1A through 9**

Project construction would consume gasoline and diesel through operation of heavy-duty construction equipment and vehicles. Alternatives 1A through 9 and the cumulative projects listed in Table 5.2.2.17-1 would all incorporate energy-saving measures required by a myriad of state and local energy policies to improve energy efficiency and reduce waste. Measures pursued by the

project are summarized in Appendix 3B, *Environmental Commitments*. With all projects, including the proposed project, implementing similar measures, a cumulative effect related to the inefficient use of energy would not occur.

***CEQA Conclusion*:** Project construction would consume gasoline and diesel through operation of heavy-duty construction equipment and vehicles. Alternatives 1A through 9 and the cumulative projects listed in Table 5.2.2.17-1 would all incorporate energy-saving measures required by a myriad of state and local energy policies to improve energy efficiency and reduce waste. Measures pursued by the project are summarized in Appendix 3B, *Environmental Commitments*. With all projects, including the proposed project, implementing similar measures, a cumulative impact related to the inefficient use of energy would not occur. No mitigation is required.

21.4 References

21.4.1 Printed References

Climate Registry. 2015. Default Emission Factors. Available: http://www.theclimateregistry.org/wp-content/uploads/2015/04/2015-TCR-Default-EF-April-2015-FINAL.pdf. Accessed: June 10, 2015.