# Appendix 23F
# Air Quality and Greenhouse Gases 2040 Analysis

This appendix compares the No Project Alternative at 2040 to the project alternatives at 2040 using modeling tools and methods appropriate for the evaluation of impacts on air quality and greenhouse gases. The analysis in this appendix is provided for informational purposes to help decision-makers and the public better understand whether any of the impact conclusions documented in Chapter 23, *Air Quality and Greenhouse Gases,* would change when considered under future conditions when construction is complete and the project is fully operational. This analysis also supports the Draft Environmental Impact Statement prepared by the U.S. Army Corps of Engineers. This analysis is not required by the California Environmental Quality Act (CEQA) and is not used to support the CEQA conclusions provided in Chapter 23.

As described in Chapter 23, operations and maintenance (O&M) emissions considered for the impact analysis were quantified under 2020 conditions to define baseline conditions consistent with the CEQA directive that existing conditions is normally the baseline for determining impacts of the proposed project and alternatives (CEQA Guidelines §§ 15125(a), 15126.6(e)(1)), although the project would not be fully operational until around 2040. Based on current information, it is projected that the emissions intensity of equipment and vehicles in 2040 will likely be lower than under 2020 conditions because of expected improvements in engine technology and regulations to reduce combustion emissions. Likewise, projections regarding the carbon intensity of electricity generation will be lower in 2040 because of Senate Bill 100, which requires zero-carbon resources comprise 100% of electric retail sales to end-use customers by 2045. Accordingly, the O&M emissions estimates presented in Chapter 23 are based on conservative modeling assumptions; therefore, they likely overstate actual criteria pollutant and GHG emissions that would be generated by the project during its first year of operation in 2040.

Regional and local air quality impacts from construction of the project alternatives are described in Impacts AQ-1 through AQ-6, Chapter 23, Section 23.3.3.2, *Impacts of the Project Alternatives on Air Quality*. Construction-generated GHG emissions are presented in Impact AQ-9, Chapter 23, Section 23.3.3.3, *Impacts of the Project Alternatives on Global Climate Change.* Emissions estimated for project construction were quantified based on the anticipated construction schedule and reflect the expected carbon and emissions content of the economy during those years. Construction of any project alternative would be complete prior to full build; thus, there would be no construction-related air quality or GHG impacts at 2040. This appendix focuses exclusively on O&M activities.

## 23F.1 No Project Alternative

The No Project Alternative is the condition that would occur if none of the project alternatives, including the proposed project, were implemented. Activities associated with long-term maintenance of the existing State Water Project (SWP) and Central Valley Project (CVP) systems (e.g., inspection trips) would continue, but there would be no changes attributable to the No Project Alternative that would affect long-term maintenance emissions. Because personnel and equipment currently required for maintenance is minimal, this analysis assumes emissions resulting from associated vehicle traffic and equipment are zero under existing conditions, and thus, also zero

under 2040 No Project conditions. Criteria pollutant and GHG emissions generated by electricity consumption under existing and 2040 No Project conditions are presented in Table 23-13 in Chapter 23, *Air Quality and Greenhouse Gases*. As shown in Table 23-13, emissions of all pollutants are expected to decrease under the No Project Alternative relative to existing conditions.

# 23F.2 Impacts and Mitigation Approaches

### Impact AQ-1: Result in Impacts on Regional Air Quality within the Sacramento Metropolitan Air Quality Management District

Table 23F-1 summarizes O&M emissions from all alternatives that would be generated in the Sacramento Metropolitan Air Quality Management District (SMAQMD) in pounds per day and tons per year under 2040 conditions. There would be no difference in operating assumptions relative to the 2020 analysis presented in Chapter 23. Only the emissions intensity of equipment and vehicles would differ in the 2040 analysis. As shown in Table 23F-1, O&M activities in SMAQMD under 2040 operating conditions would not exceed SMAQMD's CEQA thresholds. The impact of the project alternatives on regional air quality at 2040 would therefore be similar to what is described in Impact AQ-1 in Chapter 23, although of lesser magnitude.

### Impact AQ-2: Result in Impacts on Regional Air Quality within the San Joaquin Valley Air Pollution Control District

Table 23F-2 summarizes O&M emissions from all alternatives that would be generated in the San Joaquin Valley Air Pollution Control District (SJVAPCD) in pounds per day and tons per year under 2040 conditions. There would be no difference in operating assumptions relative to the 2020 analysis presented in Chapter 23. Only the emissions intensity of equipment and vehicles would differ in the 2040 analysis. As shown in Table 23F-2, O&M activities in SJVAPCD under 2040 operating conditions would not exceed SJVAPCD's CEQA thresholds. The impact of the project alternatives on regional air quality at 2040 would therefore be similar to what is described in Impact AQ-2 in Chapter 23, although of lesser magnitude.

### Impact AQ-3: Result in Impacts on Regional Air Quality within the Bay Area Air Quality Management District

Table 23F-3 summarizes O&M emissions from all alternatives that would be generated in the Bay Area Air Quality Management District (BAAQMD) in pounds per day and tons per year under 2040 conditions. There would be no difference in operating assumptions relative to the 2020 analysis presented in Chapter 23. Only the emissions intensity of equipment and vehicles would differ in the 2040 analysis. As shown in Table 23F-3, O&M activities in BAAQMD under 2040 operating conditions would not exceed BAAQMD's CEQA thresholds. The impact of the project alternatives on regional air quality at 2040 would therefore be similar to what is described in Impact AQ-3 in Chapter 23, although of lesser magnitude.

### Impact AQ-4: Result in Impacts on Air Quality within the Yolo-Solano Air Quality Management District

Table 23F-4 summarizes O&M emissions from all alternatives that would be generated in the Yolo-Solano Air Quality Management District (YSAQMD) in pounds per day and tons per year under 2040 conditions. There would be no difference in operating assumptions relative to the 2020 analysis presented in Chapter 23. Only the emissions intensity of equipment and vehicles would differ in the 2040 analysis. As shown in Table 23F-4, O&M activities in YSAQMD under 2040 operating conditions would not exceed YSAQMD's CEQA thresholds. The impact of the project alternatives on regional air quality at 2040 would therefore be similar to what is described in Impact AQ-4 in Chapter 23, although of lesser magnitude.

### Impact AQ-5: Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions

As shown in Tables 23F-1 through 23F-4, maximum daily and total annual criteria pollutant emissions estimated for O&M activities under 2040 conditions would be below all air district thresholds. Air districts develop region-specific mass emission thresholds in consideration of existing air quality concentrations and attainment designations under the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). While recognizing that air quality is a cumulative issue, air districts typically consider projects that generate criteria pollutant and ozone precursor emissions below these thresholds to be minor in nature and would not adversely affect air quality such that the NAAQS or CAAQS would be exceeded. The impact of the project alternatives on local air quality at 2040 would therefore be similar to what is described in Impact AQ-5 in Chapter 23, although of lesser magnitude.

### Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions

As shown in Tables 23F-1 through 23F-4, total annual particulate matter (PM10 and PM2.5) exhaust emissions from project O&M under 2040 conditions would not exceed one ton per year in any air district. Diesel emissions from vehicles and mobile equipment would also be limited in duration, with some activities requiring less than a day to complete only once per year. Accordingly, vehicles and mobile equipment at 2040 would not expose receptors to substantial pollutant concentrations or result in significant cancer and non-cancer health risks.

Tables 23-66 and 23-67 in Chapter 23 present the highest modeled off-site risks associated with receptor exposure to diesel particulate matter and PM2.5 from stationary emergency generator testing under 2020 conditions. As shown in these tables, regular testing of stationary emergency generators would not result in cancer or non-cancer health risks above air district thresholds. Emissions generated under 2040 conditions would be lower than those modeled at 2020 because of improvements in engine technology and regulations to reduce combustion emissions. Accordingly, risks to exposed receptors under 2040 conditions would be lower than those presented in Tables 23-66 and 23-67. The impact of the project alternatives on receptor exposure to toxic air contaminant emissions at 2040 would therefore be similar to what is described in Impact AQ-6 in Chapter 23, although of lesser magnitude.

**Table 23F-1. Criteria Pollutant and Precursor Emissions from O&M Activities in the Sacramento Metropolitan Air Quality Management District under 2040 Conditions**

| | Maximum Daily Emissions (lbs/day) [a] | | | | | | | | | | Annual Emissions (tons/year) [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | | | PM2.5 | | | | | | | PM10 | | | PM2.5 | | | |
| Alternative | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ |
| 1 | 21 | 23 | 247 | <1 | 2 | 2 | <1 | 1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2a | 21 | 24 | 219 | <1 | 2 | 2 | <1 | 1 | 1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2b | 21 | 22 | 245 | <1 | 2 | 2 | <1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2c | 21 | 22 | 246 | <1 | 2 | 2 | <1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 3 | 21 | 23 | 247 | <1 | 2 | 2 | <1 | 1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4a | 21 | 24 | 219 | <1 | 2 | 2 | <1 | 1 | 1 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4b | 21 | 22 | 245 | <1 | 2 | 2 | <1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4c | 21 | 22 | 246 | <1 | 2 | 2 | <1 | <1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 5 | 21 | 23 | 247 | <1 | 2 | 2 | <1 | 1 | 1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| *Threshold* [c] | *65* | *65* | – | – | – | *80* | – | – | *82* | – | – | – | – | – | – | *14.6* | – | – | *15.0* | – |

CO = carbon monoxide; lbs = pounds; $NO_X$ = nitrogen oxide; O&M = operations and maintenance; PM10= particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SMAQMD = Sacramento Metropolitan Air Quality Management District; ROG = reactive organic gases; $SO_2$ = sulfur dioxide.

[a] The annual estimates include emissions from all monthly, quarterly, bi-annual, and annual activities and conservatively assumes all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum particulate matter exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

**Table 23F-2. Criteria Pollutant and Precursor Emissions from O&M Activities in the San Joaquin Valley Air Pollution Control District under 2040 Conditions**

| | Average Daily Emissions (lbs/day) [a] | | | | | | | | | | Annual Emissions (tons/year) [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | | | PM2.5 | | | | | | | PM10 | | | PM2.5 | | | |
| Alternative | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ |
| 1 | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2a | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2b | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2c | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 3 | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4a | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4b | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4c | 1 | 1 | 7 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 5 | 1 | 1 | 8 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| *Threshold* [c] | *100* | *100* | *100* | – | – | *100* | – | – | *100* | *100* | *10* | *10* | *100* | – | – | *15* | – | – | *15* | *27* |

CO = carbon monoxide; lbs = pounds; $NO_X$ = nitrogen oxide; O&M = operations and maintenance; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; ROG = reactive organic gases; $SO_2$ = sulfur dioxide.

[a] The annual estimates include emissions from all monthly, quarterly, bi-annual, and annual activities and conservatively assumes all long-term activities would occur in that same year. The daily estimates are average daily based on the annual values occurring over 365 days per year.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, the SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

**Table 23F-3. Criteria Pollutant and Precursor Emissions from O&M Activities in the Bay Area Air Quality Management District under 2040 Conditions**

| | Maximum Daily Emissions (lbs/day) [a] | | | | | | | | | | Annual Emissions (tons/year) [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | | | PM2.5 | | | | | | | PM10 | | | PM2.5 | | | |
| Alternative | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ |
| 1 | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2a | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2b | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2c | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 3 | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4a | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4b | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4c | 33 | 33 | 133 | 1 | 9 | 9 | 1 | 4 | 5 | <1 | <1 | <1 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 5 | 29 | 15 | 78 | <1 | 2 | 2 | <1 | <1 | <1 | <1 | <1 | <1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| *Threshold* [c] | *54* | *54* | – | – | – | *82* | – | – | *54* | – | *10* | *10* | – | – | – | *15* | – | – | *10* | – |

CO = carbon monoxide; lbs = pounds; $NO_X$ = nitrogen oxide; O&M = operations and maintenance; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; BAAQMD = Bay Area Air Quality Management District; ROG = reactive organic gases; $SO_2$ = sulfur dioxide.

[a] The annual estimates include emissions from all monthly, quarterly, bi-annual, and annual activities and conservatively assumes all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

**Table 23F-4. Criteria Pollutant and Precursor Emissions from O&M Activities in the Yolo-Solano Air Quality Management District under 2040 Conditions [a]**

| | Maximum Daily Emissions (lbs/day) [a] | | | | | | | | | | Annual Emissions (tons/year) [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PM10 | | | PM2.5 | | | | | | | PM10 | | | PM2.5 | | | |
| Alternative | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ | ROG | $NO_X$ | CO | Exhaust | Dust | Total [b] | Exhaust | Dust | Total [b] | $SO_2$ |
| 1 | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2a | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2b | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 2c | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 3 | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4a | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4b | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 4c | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| 5 | <1 | 4 | 4 | <1 | 1 | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| *Threshold* [c] | – | – | – | – | – | *80* | – | – | – | – | *10* | *10* | – | – | – | – | – | – | – | – |

CO = carbon monoxide; lbs = pounds; $NO_X$ = nitrogen oxide; O&M = operations and maintenance; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; YSAQMD = Yolo-Solano Air Quality Management District; ROG = reactive organic gases; $SO_2$ = sulfur dioxide.

[a] The annual estimates include emissions from all monthly, quarterly, bi-annual, and annual activities and conservatively assumes all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

### Impact AQ-7: Result in Exposure of Sensitive Receptors to Asbestos, Lead-Based Paint, or Fungal Spores That Cause Valley Fever

Once constructed, the project is not expected to require any further demolition, grading, or excavation beyond periodic tunnel dewatering. Accordingly, none of the project alternatives would expose sensitive receptors to asbestos, lead-based paint, or fungal spores that cause valley fever during O&M. The impact at 2040 would therefore be the same as described in Impact AQ-7 in Chapter 23.

### Impact AQ-8: Result in Exposure of Sensitive Receptors to Substantial Odor Emissions

Sources of odors during O&M include diesel exhaust from heavy equipment and vehicles and Microcystis blooms. There would be no difference in equipment operating assumptions relative to the 2020 analysis presented in Chapter 23, *Air Quality and Greenhouse Gases*. The potential for changes in water residence times, dissolved oxygen, ambient water temperatures, and other ambient factors that influence Microcystis blooms at 2040 would be similar to what is described in Impact AQ-8 in Chapter 23.

### Impact AQ-9: Result in Impacts on Global Climate Change from Construction and O&M

Table 23F-5 summarizes long-term GHG emissions associated with O&M under 2040 conditions. There would be no difference in the operating assumptions relative to the 2020 analysis presented in Chapter 23, *Air Quality and Greenhouse Gases*. Only the emissions intensity of equipment and vehicles would differ in the 2040 analysis. Operational SWP and CVP electricity consumption at 2040 would decrease relative to the 2020 plus project analysis. Likewise, the carbon intensity of electricity generation will be lower in 2040 because of Senate Bill 100, which requires zero-carbon resources comprise 100 percent of electric retail sales to end-use customers by 2045.

**Table 23F-5. GHG Emissions from O&M under 2040 Conditions (metric tons $CO_2e$ per year)**

| | DWR-Controlled Sources | | | | Displaced Purchases of CVP Electricity | | |
|---|---|---|---|---|---|---|---|
| | | Increased SWP Pumping | | | | | |
| Alternative | Maintenance | No Project | With Project | Net [a] | No Project | With Project | Net [a] |
| Alternative 1 | 507 | 258,521 | 307,618 | 49,097 | 42,957 | 43,676 | 719 |
| Alternative 2a | 605 | 258,521 | 307,367 | 48,846 | 42,957 | 44,766 | 1,809 |
| Alternative 2b | 459 | 258,521 | 294,660 | 36,139 | 42,957 | 43,287 | 330 |
| Alternative 2c | 506 | 258,521 | 302,615 | 44,094 | 42,957 | 42,957 | 0 |
| Alternative 3 | 502 | 258,521 | 307,970 | 49,449 | 42,957 | 43,676 | 719 |
| Alternative 4a | 599 | 258,521 | 307,462 | 48,942 | 42,957 | 44,819 | 1,862 |
| Alternative 4b | 453 | 258,521 | 295,010 | 36,489 | 42,957 | 43,287 | 330 |
| Alternative 4c | 501 | 258,521 | 302,968 | 44,447 | 42,957 | 42,957 | 0 |
| Alternative 5 | 407 | 258,521 | 316,513 | 57,992 | 42,957 | 43,675 | 718 |

$CO_2e$ = carbon dioxide equivalent; CVP = Central Valley Project; DWR = California Department of Water Resources; O&M = operations and maintenance; SWP = State Water Project.

[a] Difference between with project emissions and No Project emissions.

O&M emissions generated by all project alternatives under 2040 conditions would be less than those presented in Table 23-70 in Chapter 23, which models emissions under 2020 conditions. Likewise, the net increase in emissions from SWP pumping and displaced purchases of CVP electricity between any project alternative and the No Project Alternative would be less than the values reported in Table 23-70 for the 2020 plus project analysis. Therefore, the impact of the project alternatives on global climate change at 2040 would be similar to what is described in Impact AQ-9 in Chapter 23, although of lesser magnitude.

**Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change**

Once constructed, the project is not expected to result in additional land use changes (e.g., excavation). Emissions associated with land use changes that occur during project construction would continue annually through 2040 and beyond. Therefore, the impact of the project alternatives on global climate change at 2040 from land use change would be the same as what is described in Impact AQ-10 in Chapter 23.