Appendix 26A
Public Health 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 public health. Modeling for the No Project Alternative at 2040 and project alternatives at 2040 incorporates assumptions regarding changes to hydrology and sea level rise as a result of climate change. Information regarding how climate change was considered in the modeling is provided in Appendix 5A, *Modeling Technical Appendix*. 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 26, *Public Health,* 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 California Environmental Quality Act (CEQA) and is not used to support the CEQA conclusions provided in Chapter 26.

26A.1 No Project Alternative

Under the No Project Alternative, DWR would continue to operate the State Water Project (SWP) to divert, store, and convey SWP water consistent with applicable laws and contractual obligations. Because of the interrelated operation of the SWP and Central Valley Project (CVP), the No Project Alternative would also assume the current operation of the CVP would continue. As described in Appendix 9L, *Water Quality 2040 Analysis,* water quality changes within the study area (generally the statutory Sacramento–San Joaquin Delta [Delta][1]) in 2040 would primarily be driven by climate change and sea level rise, because operations of the SWP and CVP would remain similar to existing conditions. The resulting effect would be differing proportions of Delta primary source waters (e.g., Sacramento River, San Joaquin River, San Francisco Bay) throughout the Delta.

Trace metals concentrations under the No Project Alternative would differ negligibly from concentrations that occur under existing conditions. As such, more frequent exceedances of drinking water criteria in the Delta would not occur under the No Project Alternative.

There would be no substantial changes in Delta pesticide concentrations under the No Project Alternative relative to existing conditions. Pesticide use in the Sacramento River and San Joaquin River watersheds would continue separate from facility operations. Current pesticide control programs would continue to address past pesticide-related impairments and prevent potential future impairments in surface waters, including inflows to the Delta.

There may be changes in the potential for the formation of disinfection byproducts (DBPs) in drinking water due to changes in bromide concentrations in the Delta. Bromide concentrations

[1] As described in Chapter 26, *Public Health*, the study area for public health as it relates to water quality and vector-borne disease consists of the statutory Delta. The study area for public health as it relates to vectors and EMF is generally the statutory Delta, where implementation of project alternatives and the Compensatory Mitigation Plan would create new areas of surface water and thus potential mosquito breeding habitat, and where power transmission lines would be constructed. Areas where proposed power transmission lines are sited outside of the Delta are considered as well.

would increase substantially in the western Delta in the Sacramento River at Emmaton, San Joaquin River at Antioch, and Sacramento River at Mallard Island, particularly in the months of July through December. The San Joaquin River at Empire Tract, Contra Costa Water District Pumping Plant #1, Old River at SR 4, Victoria Canal, and Banks and Jones Pumping Plants also would experience higher monthly average bromide concentrations during some months, though to a lesser degree. There would be minimal changes in bromide concentrations in Barker Slough at North Bay Aqueduct and South Fork Mokelumne River at Terminous. These effects would be due to climate change and sea level rise, and associated changes in SWP and CVP facilities and operations. Dissolved organic carbon (DOC) concentrations under the No Project Alternative would differ minimally from the concentrations under existing conditions at most Delta assessment locations.

Modeling results indicate that long-term average water column concentrations of mercury would increase under the No Project Alternative in Barker Slough at the North Bay Aqueduct, Sacramento River at Emmaton and Mallard Island, and San Joaquin River at Antioch by up to 0.75 nanograms per liter (ng/L). Long-term average water column concentrations of mercury also would increase at Contra Costa Water District Pumping Plant #1, Old River at SR 4, and Banks and Jones Pumping Plants but to a lesser degree. Long-term average water column concentrations of mercury would decrease in Victoria Canal, South Fork Mokelumne River at Terminous, and San Joaquin River at Empire Tract. Long-term average water column concentrations of methylmercury would increase nominally (up to 0.01 ng/L) at Barker Slough at the North Bay Aqueduct, Sacramento River at Emmaton, Old River at State Route 4, and Victoria Canal; there would be no increase at the other Delta assessment locations. Increases in fish tissue methylmercury concentrations (as modeled largemouth bass) would be less than 0.1 milligrams per kilogram (mg/kg) wet weight at all Delta assessment locations.

Climate change under the No Project Alternative would also be expected to affect the occurrence of vector-borne diseases relative to existing conditions. With increasing temperatures, it is expected that mosquito abundance, survival and feeding activity would increase because mosquitoes are ectotherms (i.e., “cold-blooded”) and, as such, rely on external sources of heat for reproduction and survival. Further, the rate of development of the pathogen within the mosquito may also increase with increasing ambient temperatures (Rocklöv and Dubrow 2020:479–480).

To the extent that additional electric transmission lines are constructed and operated in the Delta in proximity to sensitive receptors, those receptors could be exposed to electromagnetic fields (EMF). Exposure of sensitive receptors to EMF in the Delta would likely not change substantially overall under the No Project Alternative in 2040, relative to existing conditions, but would be most likely to occur in growing Delta communities, such as those located around the periphery of the Delta (Delta Stewardship Council 2021:2-3).

Cyanobacteria harmful algal blooms (CHABs) would be expected to occur with similar or greater frequency throughout the study area for the No Project Alternative, relative to existing conditions. With climate change in 2040, there would be the potential for earlier *Microcystis* bloom initiation in the Delta and the potential for more frequent large blooms as well. This occurrence would be driven by climate change that would increase water temperatures in the lower Sacramento River, San Joaquin River, and Delta. Higher water temperatures earlier in the year could enable *Microcystis* and other cyanobacteria blooms to begin occurring more often in the Delta in June, rather than in July as is typical under existing conditions. To the extent that future climate change leads to lower inflows to the Delta, hydraulic residence times for various areas in the Delta would increase, which also

would further favor larger cyanobacteria blooms in areas of the Delta where residence times are longest.

The No Project Alternative also accounts for projects, plans, and programs that would be reasonably expected to occur in the foreseeable future if the project were not approved and project objectives were not met. Many of these projects, such as desalination plants or water recycling facilities, would involve construction and operation of facilities by individual public water agencies to ensure local water supply reliability for their constituents. A more comprehensive list of projects and programs is provided in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. However, as explained in Chapter 4, *Framework for the Environmental Analysis*, analysis of the No Project Alternative focuses only on those projects that would happen in absence of the Delta Conveyance Project.

26A.2 Impacts of the Project Alternatives on Public Health in 2040

Impact PH-1: Increase in Vector-Borne Diseases

Potential changes in suitable mosquito breeding habitat in the study area due to operation of the project alternatives, including compensatory mitigation, would be as described in Impact PH-1, in Chapter 26, *Public Health*, Section 26.3.3.2, *Impacts of the Project Alternatives on Public Health*. Relative to the No Project Alternative, where operation of the project alternatives in 2040 create areas of shallow, relatively still water in the study area, there may be an increase in suitable mosquito breeding habitat. This may increase the public's exposure to vector-borne diseases in the study area relative to the No Project Alternative. Overall, the impact of the project alternatives with respect to vector-borne diseases in 2040 would be similar to the impact described in Chapter 26.

Impact PH-2: Exceedance(s) of Water Quality Criteria for Constituents of Concern Such That Drinking Water Quality May Be Affected

Trace Metals

Potential changes in the concentration of trace metals in surface water in the study area due to operation of the project alternatives would be as described in Impact PH-2, in Chapter 26, Section 26.3.3.2. Relative to the No Project Alternative, implementation of the project alternatives at 2040 would not result in more frequent exceedances of drinking water criteria in the Delta related to trace metals. Accordingly, no effect on public health related to trace metals from drinking water sources is anticipated.

Pesticides

Potential changes in the concentration of pesticides in surface water in the study area due to operation of the project alternatives would be as described in Impact PH-2, in Chapter 26, Section 26.3.3.2. Relative to the No Project Alternative, implementation of the project alternatives at 2040 would not result in substantial changes in pesticide use on upstream or adjacent lands or within upstream waterbodies or the Delta. Therefore, the project alternatives would not result in substantial degradation of water quality with regard to pesticides and thus would not impact drinking water quality and public health.

Disinfection Byproducts

As discussed in Appendix 9L, with operation of the project alternatives, monthly average DOC concentrations at the Delta assessment locations modeled would change minimally relative to the No Project Alternative. At locations where model results indicate small increased in DOC, these increases would not be of the magnitude to require modifications to existing drinking water treatment plants in order to further reduce DOC concentrations. Similarly, for all project alternatives, changes in bromide concentrations at the modeled Delta locations would not be of the magnitude that would cause Delta water diverters to exceed drinking water DBPs maximum contaminant levels more often than under the No Project Alternative. Accordingly, no effect on public health related to DBPs in drinking water is anticipated.

Impact PH-3: Substantial Mobilization of or Increase in Constituents Known to Bioaccumulate

Potential changes in the concentration of bioaccumulative pesticides in surface water in the study area due to operation of the project alternatives would be as described in Impact PH-3, in Chapter 26, Section 26.3.3.2. Because of the limited potential for operation and maintenance of the project alternatives in 2040 to affect legacy pesticide concentrations waterbodies in the study area, bioaccumulative pesticides concentrations in fish tissue would not increase relative to the No Project Alternative, and public health would not be affected.

As discussed in Appendix 9L, average concentrations of total mercury and methylmercury in the water column would not differ substantially from the No Project Alternative for all Delta assessment locations. Further, operation of the project alternatives would have little effect on Delta fish tissue concentrations of methylmercury. Relative to the No Project Alternative, fish tissue methylmercury concentrations would increase by no more than 0.01 mg/kg wet weight as averages over the full simulation period at all Delta assessment locations under the project alternatives. Accordingly, there would be no increase in the existing health risks related to mercury due to the consumption of fish in the study area.

Impact PH-4: Adversely Affect Public Health Due to Exposing Sensitive Receptors to New Sources of EMF

The potential for exposure of people to transmission lines generating new sources of EMF in the study area due to operation of the project alternatives would be similar to that described in Impact PH-4, Chapter 26, Section 26.3.3.2. Multiple sensitive receptors, specifically residences and parks (including wildlife preserve areas), are within 300 feet of aboveground and underground 69 kV transmission lines. The predominant land use in the study area is agricultural; other less predominantland uses include areas of open space, rural residential, and recreation (see Chapter 14, *Land Use*). There is also no planned development in the study area near the proposed transmission lines (Figures 14-2 and 26-2). As such, it is reasonable to assume that there will not be a substantial increase in residential growth in the study area in 2040, but it is unknown whether there would be an increase in the number of sensitive receptors within 300 feet of the project's transmission lines. While there may be general public concern about exposure to EMF, there are no state or federal standards (health-based or otherwise) to limit occupational or residential exposure to EMF and, further, there is currently no medical or scientific consensus that EMF exposure poses a health risk.

Impact PH-5: Impact Public Health Due to an Increase in *Microcystis* Bloom Formation

The potential for cyanotoxins to affect public health in the study area due to operation of the project alternatives would be similar to that described in Impact PH-5, Chapter 26, Section 26.3.3.2. As described in Appendix 9L, relative to the No Project Alternative, operation of the project alternatives as modeled may result in increased hydraulic residence times in some locations and months within the central Delta, namely Discovery Bay. The greatest increases in residence time would occur in Discovery Bay, where there are already long residence times under the No Project Alternative (i.e., 3 to 6 weeks). Increases in residence times under the project alternatives may contribute to more *Microcystis* cell and colony production and accumulation and aggregation in Discovery Bay due to a 1- to 2-day increase in residence time in September. However, there is uncertainty regarding how modeled increases in residence time would translate to *Microcystis* bloom size through additional growth, accumulation, and aggregation. As discussed in Appendix 9L, a substantial increase in bloom size or duration is not expected, relative to the No Project Alternative. Similarly, an increase of up to 3 days in November, when water temperatures are cool, would not be sufficient to substantially increase *Microcystis* biomass or cause substantially longer blooms, relative to the No Project Alternative. As such, the project alternatives would not sufficiently affect water temperature, nutrients, turbulence and mixing, water clarity, or residence time in the central Delta to cause substantially increased frequency or magnitude of CHABs in the central Delta, including Discovery Bay. Because the project alternatives are not expected to cause Delta CHABs to be substantially larger in size, and because bloom size does not necessarily dictate toxin concentration in the water, the project alternatives are not expected to substantially increase microcystins or any other cyanotoxins in the Delta, relative to the No Project Alternative. As such, public health would not be adversely affected by CHABs due to operation of the project alternatives.

26A.3 References Cited

Delta Stewardship Council. 2021. *Delta Adapts: Creating a Climate Resilient Future*. June. Available: https://deltacouncil.ca.gov/pdf/delta-plan/2021-06-25-delta-adapts-vulnerability-assessment.pdf. Accessed: February 24, 2022.

Rocklöv, J., and R. Dubrow. 2020. Climate Change: An Enduring Challenge for Vector-Borne Disease Prevention and Control. *Nature Immunology* 21(May):479–483.