Draft Memorandum

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Cc:	Monique Briard, ICF, Project Manager
From:	Nicole Williams, ICF CEQA/NEPA Task Lead
Date:	July 10, 2020
Re:	**Sites Reservoir Project Greenhouse Gas Mitigation Measures**

Purpose

This memorandum describes the hydropower generated by Alternative A, Alternative C1, and Alternative D and how they relate to the greenhouse gas (GHG) mitigation measures in the 2017 *Public Draft Public Draft Environmental Impact Report/Environmental Impact Statement* (2017 Draft EIR/EIS). Alternatives A and D included hydropower generation, while Alternative C1 did not. The 2017 Draft EIR/EIS did not include any specific GHG-related mitigation measures for any of the project alternatives evaluated and concluded that the effects of all alternatives were significant and unavoidable. In other words, the mitigation identified on pages 25–23, 25–24, and 25–25 of the 2017 Draft EIR/EIS use mitigation measures from the air quality chapter, preconstruction and final design, and construction best management practices (BMPs) identified on pages 25-24 and 25-25 of the 2017 Draft EIR/EIS to address GHG effects. Because there was no variation in mitigation between the hydropower-generating alternatives (i.e., Alternatives A and D) and the alternative that did not generate hydropower (i.e., Alternative C1), the hydropower generation did not demonstrably help reduce effects related to GHGs.

This memorandum also discusses GHG mitigation measures that might be required as part of the impact evaluation of Alternatives 1 and 2 in the Revised EIR/EIS, as these alternatives are eliminating a large hydropower component and expecting to produce 40 megawatts (MW) of power.[1])

[1] Currently there is some discussion as to if it is 40 MW of power for the entire project, or 40 MW of power per facility (e.g., releases to Funks Reservoir, releases to CBD). This distinction may make a difference in the GHG mitigation.

Hydropower Components of Alternatives A, C1, and D

Tables 1 and 2 describe project maximum power pumping demand and project maximum pumping generation for Alternatives A, C1, and D of the 2017 Draft EIR/EIS, which were used in the power production and energy analysis of the 2017 Draft EIR/EIS.

Table 1. Project Maximum Pumping Demand by Alternative

Location	Alternative A (MW)	Alternative C1 (MW)	Alternative D (MW)
Sites Pumping/Generating Plant	158	181.35	181.35
Delevan Pipeline Intake/Drainage Facilities	65.65	65.65	65.65
Terminal Regulating Reservoir	19.68	19.68	19.68
Red Bluff Pumping Plant	6	6	6
GCID Main Canal Intake	3.39	3.39	3.39
Total	252.72	276.07	276.07

Source: Table 31-4 Project Maximum Pumping Demand by Alternative from the 2017 Draft EIR/EIS
MW = megawatts

Table 2. Project Maximum Pumping Generation by Alternative

Location	Alternative A (MW)	Alternative C1 (MW)	Alternative D (MW)
Sites Pumping/Generating Plant	107	0	121
Delevan Pipeline Intake/Drainage Facilities	10.8	0	10.8
Terminal Regulating Reservoir	9.8	0	9.8
Total	127.6	0	141.6

Source: Table 31-5 Project Maximum Pumping Generation by Alternative from the 2017 Draft EIR/EIS
MW = megawatts

Summary of GHG Modeling and Analysis

Information in this section was primarily generated by reviewing Section 25.3, Greenhouse Gases, of the 2017 Draft EIR/EIS. GHGs were evaluated by modeling the existing and potential changes in water operations, power generation, and pumping in the Extended and Secondary study areas as a result of construction, operation, and maintenance and their associated potential changes in GHG emissions. GHG emissions are not directly linked to specific impacts at geographic locations. Instead, emissions from individual sources around the globe, including those potential sources of emissions described as part of the Project, result in contributions to global GHG concentrations in the atmosphere, which may result in impacts that manifest themselves at global, regional, and local scales. GHG emissions were analyzed for the Project in terms of shorter-term construction emissions and longer-term operational and maintenance emissions, regardless of source locations. GHG emissions from implementation of the Project were analyzed as a cumulative environmental impact; therefore, GHG emissions from the Project have been placed in the context of the statewide, national, and global GHG emissions, and global atmospheric concentrations of GHGs.

The Project was evaluated to determine how construction, operations, and maintenance of Project facilities would generate GHG emissions. GHG emissions associated with the Project could contribute to the cumulatively considerable impact of global climate change by adding GHGs to the atmosphere. The evaluation reviews potential generation of GHG emissions for each of the Project's action alternatives.

Construction-related GHG emissions would result primarily from fuel combustion in construction equipment, trucks, and worker vehicles. To support calculations of GHG emissions, lists of the types and numbers of construction equipment and number of days required for construction of each Project facility were developed by Project engineers, and assumptions were developed about hours of operation for each type of equipment. Information on the dates of construction start and finish, and the duration of construction for each project feature, were obtained from the Concept Schedule for Sites Reservoir provided by URS. This schedule was used to estimate emissions for Alternatives A and C1. A different schedule to expedite construction was developed for construction of Alternative D, which was used in the emissions estimates for Alternative D.

Equipment-specific hours of use were multiplied by equipment-specific carbon dioxide (CO_2) emission factors to calculate total equipment emissions for construction of each Project facility. Total CO_2 emissions for each Project facility were estimated by summing the results of the equipment emissions. For construction, emissions of other GHGs, such as methane (CH_4) and nitrous oxide (N_2O), were not estimated, due to the lack of equipment-specific emission factors for GHGs other than CO_2. Emissions of CH_4 and N_2O from fuel combustion would be much lower than emissions of CO_2, contributing in the range of 2 to 4 percent of total CO_2 emissions. Therefore, it was assumed that CH_4 and N_2O emissions would not substantially contribute to the construction-related GHG emissions. Table 3 summarizes the potential construction CO_2 emissions.

Table 3. Construction CO_2 Emissions Summary (Metric Tons CO_2e)

Alternative	Emissions from Mobile Construction Equipment	Emissions from Concrete Production	Total Construction-Related Emissions
Alternative A	172,066	66,637	238,704
Alternative C1	212,369	73,269	285,638
Alternative D	212,296	73,269	285,565

Sources: Table 25-2, Estimated Total GHG Emissions from Construction of Alternative A (Metric Tons CO2e); Table 25-5, Estimated Total GHG Emissions from Construction of Alternative C (Metric Tons CO2c); Table 25-6, Estimated Total GHG Emissions from Construction of Alternative D (Metric Tons CO2c)

Equipment and personnel requirements for maintenance of facilities were assumed to be the same for all Project alternatives (e.g., A, C1, and D). Maintenance activities would include both routine activities and major inspections. Routine activities would occur on a daily basis throughout the year, whereas major inspections would occur annually. Exhaust emissions from construction-type equipment were calculated using load factors, horsepower, and emission factors from the CalEEMod

User's Guide, Appendix D. Emission factors for a motor boat and boat-operated dredge were obtained from the OFFROAD2011 model, using the California Harbor Craft Emissions Inventory Database and California Barge and Dredge Emissions Inventory Database, respectively. Vehicle exhaust emissions were estimated using emission factors from the California Air Resources Board (ARB) EMFAC2014 model for the Colusa County portion of the Sacramento Valley Air Basin.

Emissions from operation of the Project alternatives were estimated by post-processing the CALSIM II modeling runs. CALSIM II provides estimates of the amount of water that would be pumped and released at each of the facilities during each month of the year for various water year types and hydrologic conditions. The pumping and releasing of water can be converted to electricity use and electricity generation by applying assumptions about efficiency of each pumping or generating plant. As discussed in Chapter 31, Power Production and Energy, of the 2017 Draft EIR/EIS, water pumping would occur to the extent possible during times when renewable (zero emissions) electricity is available, and releases of water, which generate electricity, would be done to the extent possible when electricity is in high demand. Therefore, electricity generated at the proposed Alternative A and D facilities—with no emissions of GHGs—would offset some of the most inefficient and highest emitting-generating resources in the electricity market. These system integration benefits are not reflected in the emissions reported in Table 4 below, which summarizes the net emissions over operations. In addition, the discussion notes Alternatives A and D would provide critical renewable integration services to the California grid that would facilitate additional renewable energy generation and further reduce GHG emissions. Both in the pumping and generating phase, Alternatives A and D would have the flexibility to modify their operations to balance generation from intermittent renewable electricity supplies. The analysis in Chapter 25, Climate Change and Greenhouse Gas Emissions, qualitatively discusses the potential benefits associated with hydropower generation, but does not quantify the expected reduction in GHG emissions associated with optimizing operations to both generate hydropower and use renewable resources when pumping. In other words, the analysis does not take "credit" for the hydropower generation when describing impacts and ultimately identifies that Alternatives A, C1, and D would be net users of electricity, thereby resulting in increases to GHG emissions.

Table 4. Summary of Net Long-Term Electricity Use

Condition/Alternative	Electricity Net Use (All Facilities: CVP, SWP, Proposed Facilities) – Long Term (gigawatt hours/year)	Total GHG Emissions (mt/yr CO_2e)	Incremental Increase (Compared to the Existing Conditions/No Project/No Action Condition) in GHG Emissions (mt/yr CO_2e)
Existing Conditions/No Project/No Action Condition	132	39,081.1	Not Applicable
Alternative A	499	147,738.5	108,657.4
Alternative C1	700	207,248.4	168,167.3
Alternative D	477	141,225.0	102,143.8

Source Table 25-3, Indirect GHG Emissions from Net Long-Term Electricity Use for the Existing Conditions/No Project/No Action Condition, and Alternatives A, B, C,C1, and D mt/yr CO_2e = million tons per year of carbon dioxide equivalent

Impact Determinations, Mitigation, and Best Management Practices

Effects for all Project alternatives evaluated for Impact GHG-1: Generation of Cumulative GHG Emissions were considered Significant with no feasible mitigation, resulting in a determination of Significant and Unavoidable for all Project alternatives. There was no variation in level of significance or amount of mitigation related to GHG impacts depending on whether the alternatives generated hydropower or not. Further, with regard to the electricity use associated with the Project alternatives, the annual rate of GHG emissions would depend on the specific sources of the electricity used. Further, electricity use and generation would vary annually and seasonally, depending on hydrologic conditions, renewable system integration, timing of generation and use, and use of pumpback operations under Alternatives A and D. Ultimately, Chapter 25 concludes that Alternatives A and D have the same impact determination of Significant and Unavoidable as Alternative C1, even though the qualitative discussion of Alternatives A and D indicate the production of hydropower and optimization of operations would reduce overall GHG emissions quantified in Table 4 above (source Table 25-3).

While there was no mitigation incorporated related specifically to GHG effects, the 2017 Draft EIR/EIS did include BMPs for preconstruction/final design and construction of all Project alternatives (see Attachment A, Best Management Practices, for a list of all BMPs). In addition, beyond implementation of construction BMPs and Mitigation Measure Air Qual-1b, project optimization, and use of renewable electricity sources, there are no feasible mitigation measures. See Attachment B, for Air Quality 1b measures.

Revised EIR/EIS

For the Revised EIR/EIS, it is anticipated that the BMPs and Mitigation Measure Air Qual-1b would be partially or wholly retained, because these commitments will demonstrate that construction-related GHG impacts are being minimized to the extent feasible. Additional mitigation measures for the Revised EIR/EIS may also be proposed to provide further substantiation of the Authority's commitment to minimizing GHG emissions. Most of the commonly used techniques to reduce emissions from construction activities are incorporated in the BMPs and Mitigation Measure Air Qual-1b. Broadly, these activities include using electric or alternatively fueled vehicles and equipment instead of diesel-powered equipment; minimizing haul truck trips and the amount of time spent in congested roadway conditions; using less GHG emissions-intensive materials, such as concrete; and maximizing the efficiency of construction equipment and activities (see Attachments A and B for a comprehensive list).

The quantitative effects of the BMPs or Mitigation Measure Air Qual 1-b appear not to have been incorporated into the modeling of the 2017 Draft EIR/EIS. However, the Revised EIR/EIS analysis would assess whether any of the practices or techniques can be quantified as a GHG reduction benefit. Thus, the revised analysis may show additional quantitative GHG reductions if it is feasible to do so. Based on the revised equipment list and type of construction activities for the proposed action alternatives (i.e., Alternative 1 and Alternative 2), additional practices or techniques that result in a GHG reduction benefit may also be included as either qualitative or quantitative measures. Given the magnitude of the 2017 Draft EIR/EIS emissions, it is anticipated that even the inclusion of additional GHG mitigation in the Revised EIR/EIS will result in substantial increases in GHG emissions.

GHG emissions can be indirectly mitigated through the purchase of offsets also known as mitigation credits. Offsets, which must be real, additional, permanent, verifiable, and enforceable, are a valid mitigation strategy under the California Environmental Quality Act (CEQA). Offsets or mitigation credits can be purchased from a voluntary GHG credit provider that has an established protocol and requires projects generating GHG credits to demonstrate that the reduction of GHG emissions is real, additional, permanent, verifiable, and enforceable. Examples of potential GHG credit sources include the California Action Reserve Voluntary Offset Registry and Climate Forward program, the American Carbon Registry, or other providers that use the Verified Carbon Standard.

Offset mitigation would not directly reduce GHG emissions from construction activities, but it would facilitate GHG reductions elsewhere in the world equal to the magnitude of emissions from construction. There are, however, no adopted GHG thresholds of significance for water infrastructure projects under which emissions would be considered not significant. In other words, there is no applicable bright-line GHG threshold for a project such as the Sites Reservoir. Furthermore, offsetting the total net emissions increase associated with the proposed action alternatives may be exceedingly cost intensive. Thus, the use of offsets as mitigation would require careful consideration of the mitigation cost, the feasibility of obtaining a very large number of offsets, and the consequences of the lead agency determining significant and unavoidable impacts (possibly with or without the incorporation of offsets) and issuing a statement of overriding considerations.

With respect to the hydropower potential of the proposed action alternatives, the hydropower component would generate electricity that is emissions-free. Senate Bill 100 (SB-100) requires that the state increase its carbon-free electricity portfolio to 60% by 2030 and 100% by 2045. As such, the contribution of the proposed action alternatives' hydropower would aid in the advancement of the state's plans, as outlined in SB-100. Although it is assumed the proposed action alternatives would generate a total of 40 MW of hydropower, it is anticipated a substantial amount of emissions would occur for an extended period of time during the proposed action alternatives' construction. Additionally, operational and maintenance emissions would be generated and would occur continuously. The total 40 MW of power generation and the corresponding benefits with respect to emissions and renewable energy goals would, therefore, be evaluated in the Revised EIR/EIS. However, as a result of the magnitude of the expected construction and operational GHG emissions, it is recommended all feasible GHG mitigation measures be incorporated into the Revised EIR/EIS. As noted previously, the 2017 Draft EIR/EIS measures would be retained and supplemented, as feasible. The use of offsets or mitigation credits could mitigate the proposed action alternative's impacts, but the magnitude of offsets that would likely be needed may make such an option infeasible.

Attachments

List of Attachments:

- Attachment A: Best Management Practices
- Attachment B: Air Quality Mitigation Measure 1b

Attachment A
Best Management Practices

The following measures are considered best management practices (BMPs) for Department of Water Resources (DWR) construction and maintenance activities. Implementation of these practices will reduce greenhouse gas (GHG) emissions from construction projects by minimizing fuel usage by construction equipment, reducing fuel consumption for transportation of construction materials, reducing the amount of landfill material, and reducing emissions from the production of cement.

Pre-Construction and Final Design BMPs

Pre-construction and final design BMPs are designed to ensure that individual projects are evaluated and their unique characteristics taken into consideration when determining whether specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the project. While all projects will be evaluated to determine whether these BMPs are applicable, not all projects will implement all of the following BMPs.

BMP 1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.

BMP 2. Evaluate the feasibility and efficacy of performing onsite material hauling with trucks equipped with on-road engines.

BMP 3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels such as propane or solar to power generators to the maximum extent feasible.

BMP 4. Evaluate the feasibility and efficacy of producing concrete onsite and specify that batch plants be set up onsite or as close to the site as possible.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize GHG emissions from cement production and curing, while preserving all required performance characteristics.

BMP 6. Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours.

Construction BMPs

Construction BMPs apply to construction and maintenance projects that DWR completes or for which DWR issues contracts. Projects are expected to implement all Construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief, as applicable, and the variance is approved by the DWR CEQA Climate Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the Greenhouse Gas Reduction Plan. Construction BMPs consist of the following:

BMP 7. Minimize idling time by requiring that equipment be shut down after 5 minutes when not in use (as required by the State airborne toxics control measure [Title 13, Section 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

BMP 8. Maintain construction equipment in proper working condition and perform preventative maintenance. Required maintenance includes compliance with manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of engine and emissions systems in proper operating condition. Maintenance schedules will be detailed in an Air Quality Control Plan prior to commencement of construction.

BMP 9. Implement tire inflation program on job site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives onsite and every 2 weeks for equipment that remains onsite. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program will be documented in an Air Quality Management Plan prior to commencement of construction.

BMP 10. Develop a project-specific ride share program to encourage carpools, shuttle vans, and transit passes, and secure bicycle parking for construction worker commutes.

BMP 11. Reduce electricity use in temporary construction offices by using high-efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

Attachment B
Air Quality Mitigation Measure 1b

Mitigation Measure Air Qual-1b: Implement Measures to Reduce Equipment and Vehicle Exhaust Emissions

Measures to reduce equipment and vehicle exhaust emissions to be implemented during construction, operation, and maintenance of the Project shall include the following to reduce oxides of nitrogen (NOx), particulate matter 10 micrometers or less in diameter (PM10), and reactive organic gas (ROG) emissions:

- All construction-type equipment shall be maintained according to manufacturer's specifications.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California Airborne Toxics Control Measure, codified in Title 13, Section 2485 of the California Code of Regulations [CCR]).
- During all activities, diesel-fueled portable equipment with maximum power greater than 25 horsepower shall be registered under the ARB's Statewide Portable Equipment Registration Program.
- All fleets of diesel-fueled off-road vehicles and equipment shall comply with emissions standards and requirements pursuant to CCR Title 13, Section 2449. To the extent feasible, operate off-road construction vehicles and equipment with engines certified to the Tier 3 or higher emissions standards. If off-road construction vehicles and equipment with engines that meet Tier 3 or 4 standards is not available, the best available emissions control technology shall be used.
- All diesel-fueled on-road trucks shall be operated in compliance with the emission standards per CCR Title 13, Section 2025. To the extent feasible, operate on-road trucks with engines certified to the 2012 model year or newer heavy-duty diesel engine emissions standards.
- To the extent feasible, electric equipment shall be operated.
- Alternatively, fueled equipment shall be used, to the extent feasible, such as compressed natural gas, liquefied natural gas, propane, or biodiesel.
- Electricity used to power facilities and equipment shall be generated by renewable energy sources with state-of-the-art emissions control systems, to the extent feasible.