4.7 GREENHOUSE GAS EMISSIONS AND ENERGY

1. INTRODUCTION

This section describes the expected emissions of greenhouse gases (GHGs) generated by the proposed CCAP Update. It includes a summary of laws, regulations, policies, and plans on GHG emissions and Energy Conservation that may pertain to the CCAP Update. Government agencies and the public were provided an opportunity to comment on the Project in response to a Notice of Preparation (NOP) of and EIR and an Initial Study that provided a preliminary summary of potential impacts that could result from the Project. No comments related to GHG emissions or energy were received.

2. SETTING

a. Physical Environment

(1) Climate Change and GHG Emissions

Existing GHGs allow about two-thirds of the visible and ultraviolet light from the sun to pass through the atmosphere and be absorbed by the Earth's surface. To balance the absorbed incoming energy, the surface radiates thermal energy back to space at longer wavelengths primarily in the infrared part of the spectrum. Much of the thermal radiation emitted from the surface is absorbed by the GHGs in the atmosphere and is re-radiated in all directions. Since part of the re-radiation is back towards the surface and the lower atmosphere, the global surface temperatures are elevated above what they would be in the absence of GHGs. This process of trapping heat in the lower atmosphere is known as the greenhouse effect.

An increase of GHGs in the atmosphere results in a global warming trend. Increases in global average temperatures have been observed since the mid-20th century, and have been linked to observed increases in GHG emissions from anthropogenic sources. The primary GHG emissions of concern are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other GHGs of concern include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6), but their contribution to climate change is less than 1 percent of the total by well-mixed GHGs.[1]

According to the Intergovernmental Panel on Climate Change (IPCC), the atmospheric concentrations of CO_2, CH_4, and N_2O have increased to levels unprecedented in at least the last 800,000 years due to anthropogenic sources. In 2011, the concentrations of CO_2, CH_4, and N_2O exceeded the pre-industrial[2] levels by about 40, 150, and 20 percent, respectively. The Earth's mean surface temperature in the Northern Hemisphere from 1983–2012 was likely the warmest 30-year period over the last 1,400 years, reflecting in an increase of 0.83°C in global average surface temperature between year 1880 and 2012.[3] In the most recent[4] report, the IPCC summarized the impacts of a climate change scenario of an increase of 1.5°C above the pre-industrial levels, compared to 2°C or more. A number of climate change impacts could be avoided by limiting global warming to 1.5°C, including extreme weather, rising sea levels, and diminishing arctic sea ice. The IPCC states that rapid transitions are needed in land, energy,

[1] IPCC, 2013. Climate Change 2013; the Physical Science Basis; Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

[2] Pre-1750.

[3] IPCC, 2013. *Op. cit.*

[4] IPCC, 2018. IPCC Press Release, Summary for Policymakers of IPCC Special Report on Global Warning of 1.5°C approved by governments. October 8.

industry, building, transport, and urban sectors to limit the global emissions of GHGs to net zero by 2050.

The global increases in CO_2 concentration are due primarily to fossil fuel combustion and land use change (e.g., deforestation). The dominant anthropogenic sources of CH_4 are from ruminant livestock, fossil fuel extraction and use, rice paddy agriculture, and landfills, while the dominant anthropogenic sources of N_2O are from ammonia for fertilizer and industrial activity. Emissions of HFCs, PFCs, and SF_6 are not naturally-occurring and originate from industrial processes such as semiconductor manufacturing, use as refrigerants and other products, and electric power transmission and distribution.

Each GHG has a different global warming potential (GWP). For instance, CH_4 traps about 25 times more heat per molecule than CO_2. As a result, emissions of GHGs are reported in metric tons of "carbon dioxide equivalents" (CO_2e), where each GHG is weighted by its GWP relative to CO_2.

(2) Effects of Greenhouse Gas Emissions

Some of the potential effects of increased GHG emissions, and the associated climate change, may include loss in snow pack (affecting water supply), sea level rise, more frequent extreme weather events, more large forest fires, and more drought years. In addition, climate change may increase electricity demand for cooling, decrease the availability of hydroelectric power, and affect regional air quality and public health.

b. Regulatory Environment

(1) Federal

In 2007, the United States Supreme Court ruled that CO_2 is an air pollutant as defined under the Clean Air Act, and that United States Environmental Protection Agency (USEPA) has the authority to regulate emissions of GHGs. The USEPA made two distinct findings regarding GHGs under Section 202(a) of the Clean Air Act.

- Endangerment Finding: The current and projected concentrations of the six key well-mixed GHGs, CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 in the atmosphere threaten the public health and welfare of current and future generations.

- Cause or Contribute Finding: The combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, these findings were a prerequisite for implementing GHG emissions standards for vehicles. In collaboration with the National Highway Traffic Safety Administration, the USEPA finalized emission standards for light-duty vehicles (2012-2016 model years) in May of 2010 and heavy-duty vehicles (2014-2018 model years) in August of 2011.

There are no federal regulations or policies regarding GHG emissions applicable to the proposed Project.

National Energy Conservation Policy Act. The National Energy Conservation Policy Act (NECPA) is the foundation for federal-level conservation and efficiency goals and requirements for energy and water, and the use of renewable energy sources. The NECPA was a result of the energy crisis during the mid-1970s and was signed into law in 1978. As passed, the NECPA promoted three major roles for the federal government in energy conservation: setting energy-

efficiency standards; disseminating information about energy conservation opportunities; and improving efficiencies of federal buildings.

Energy Policy Act of 2005. The Energy Policy Act addresses energy production in the United States in the following aspects, energy efficiency, renewable energy, oil and gas, coal, tribal energy, nuclear matters and security, vehicles and motor fuels, hydrogen, electricity, energy tax incentives, hydropower and geothermal, and climate change technology. The Energy Policy Act of 2005 granted the Federal Energy Regulatory Commission the responsibilities and the authority to oversee the nation's electricity transmission grid, ensure fair competition in the wholesale power markets, providing rate incentives to promote electric transmission investment, among other duties.

(2) State

Renewable Portfolio Standard – Senate Bills 1078, 107, X1-2, and 350. In 2002, the California Legislature adopted Assembly Bill (AB) 1493, referred to as the "Pavley regulations," which required the CARB to develop and adopt regulations that achieve the maximum feasible and cost-effective reductions in GHG emissions from new passenger vehicles. To meet the requirements of AB 1493, the CARB approved amendments to the California Code of Regulations in 2004 that added GHG emissions standards to California's existing standards for motor vehicle emissions. In 2009, the CARB adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. These regulations are expected to reduce GHG emissions from California passenger vehicles by 30 percent through 2016.

Executive Order S-3-05. In 2005, Governor Schwarzenegger issued Executive Order S-3-05, which states that California is vulnerable to the effects of climate change, including reduced snowpack in the Sierra Nevada Mountains, exacerbation of California's existing air quality problems, and sea level rise. To address these concerns, the executive order established the following statewide GHG emissions reduction targets:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

It should be noted that executive orders are legally binding only on State agencies and have no direct effect on local government or private actions.

California Global Warming Solutions Act of 2006 – AB 32. In 2006, Governor Schwarzenegger signed AB 32, the California Global Warming Solutions Act, which requires California to reduce statewide GHG emissions to 1990 levels by 2020. In December 2008, the CARB adopted the AB 32 Scoping Plan, which outlines a statewide strategy to achieve AB 32 goals. At the regional level, in response to Senate Bill (SB) 375 (see below), the major metropolitan areas in California have developed sustainable communities strategies (SCSs) to integrate land use and transportation planning in order to reduce future motor vehicle travel and decrease GHG emissions.

Low-Carbon Fuel Standard – Executive Order S-1-0.7. In 2007, Governor Schwarzenegger issued Executive Order S-1-07 to enact a low-carbon fuel standard (LCFS). The LCFS calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.

California Environmental Quality Act and SB 97. In 2007, under SB 97, the State acknowledged that climate change is a prominent environmental issue requiring analysis under the California Environmental Quality Act (CEQA). SB 97 directed the Governor's Office of Planning and Research to prepare, develop, and transmit to the California Natural Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA. In 2009, the Natural Resources Agency adopted the State CEQA Guidelines amendments, which provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The amendments became effective in March 2010. The amendments added Sections 15126.4(c) and 15064.4 (discussed further below) to the CEQA Guidelines, which specifically pertain to the significance of GHG emissions, and provide guidance on measures to mitigate GHG emissions when such emissions are found to be significant.

Sustainable Communities Strategy – SB 375. In 2008, California legislature passed SB 375, which aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocations to reduce vehicle emissions. SB 375 requires California's regional land use and transportation authorities to work with local agencies to achieve more compact growth patterns, thereby reducing the quantity of GHGs emitted by passenger vehicles. Each metropolitan planning organization must adopt a Sustainable Communities Strategy or Alternative Planning Strategy, which will prescribe land use allocation in that MPO's Regional Transportation Plan. The Sustainable Communities Strategy seeks to achieve the targeted reductions in GHG emissions by encouraging compact growth in concert with transportation planning.

SB 375 requires CARB to establish GHG emission reduction targets related to transportation for each metropolitan transportation organization region. The Sacramento Area Council of Governments (SACOG) is the designated metropolitan planning organization for the region's six counties: El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba. On 19 April 2012, the SACOG adopted a Metropolitan Transportation Plan/Sustainable Communities Strategy for 2035, which proposes to help the region achieve its GHG goals with a 9 percent per capita GHG reduction in 2020 and a 16 percent reduction in 2035. On 9 June 2016, CARB approved the GHG reduction targets recommended by SACOG.[5]

Low-Emission Vehicle Program. In 2012, the CARB adopted amendments to the low-emission vehicle regulations, which established more stringent emissions reduction standards for GHGs and criteria air pollutants from 2015 and subsequent model year passenger cars, light-duty trucks, and medium-duty vehicles. The low-emission vehicle program essentially expands the scope of the GHG emissions standards established under the Pavley regulations.

Executive Order B-30-15 and SB 32. In 2015, Governor Brown issued Executive Order B-30-15, which set a statewide GHG emissions reduction target of 40 percent below 1990 levels by 2030. This target is in addition to the previous GHG emissions reduction targets established in Executive Order S-3-05 for 2010, 2020, and 2050. The executive order also requires the CARB to update the AB 32 Scoping Plan to identify measures to meet the 2030 target. In November 2017, CARB approved the final scoping plan, which identified new, technologically feasible, and cost-effective strategies to ensure that the State meets its GHG reduction targets, and included policies to reduce GHG emissions from stationary and mobile sources.[6]

In recognizing the potential for large, damaging impacts from climate change, California Governor Arnold Schwarzenegger enacted Executive Order S-03-05 in 2005, requiring a

[5] CARB, 2016. Executive Order G-16-069; Sacramento Area Council of Governments 2016 Sustainable Communities Strategy ARB Acceptance of GHG Quantification Determination. June.

[6] CARB, 2017. California's 2017 Climate Change Scoping Plan. November.

reduction in statewide greenhouse gas (GHG) emissions to 80-percent below 1990 levels by 2050. In March 2012, Governor Jerry Brown enacted EO-B-16-12 to facilitate the rapid commercialization of zero-emission vehicles (ZEVs). The Executive Order sets a target for the number of ZEVs (1.5 million) in California by 2025. The Executive Order also sets 2050 as a target for reduction of GHG emissions from the transportation sector equaling 80 percent less than 1990 levels.

In September 2016, Governor Brown signed SB 32, which expands on the mandate set forth by AB 32 to reduce statement emissions of GHGs to 1990 levels by 2020 by requiring California to reduce GHG emissions to 40 percent below 1990 levels by 2030. This mandate is also consistent with the GHG emissions reduction target established under Executive Order B-30-15. In September 2018, California Governor Jerry Brown issued Executive Order B-55-18 establishing a statewide goal to "achieve carbon neutrality as soon as possible, and no later than 2045, and maintain and achieve negative emissions thereafter." The order directs the California Air Resources Board to work with other state agencies to identify and recommend measures to achieve those goals.

Warren-Alquist Act. The Warren-Alquist Act of 1975 is the legislation that created the California Energy Commission. The Act enables the California Energy Commission to formulate and adopt the nation's first-ever energy conservation standards for buildings constructed and appliances sold in California. The CEC was also directed to create a research and development program with a focus on fostering non-conventional energy sources.

Clean Energy and Pollution Reduction Act. The Clean Energy and Pollution Reduction Act of 2015 (SB 350) established new clean energy, clean air, and greenhouse gas reduction goals for 2030 and beyond. SB 350 increases the State's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. Large utilities will be required to develop Integrated Resources Plans that would reach these goals.

(3) Local

Yolo-Solano Air Quality Management District. The Yolo-Solano Air Quality Management District (YSAQMD) has jurisdiction over all of Yolo County and the northeast portion of Solano County, from Vacaville on the west, to Rio Vista on the South. The YSQAMD recommends that impacts to climate change be evaluated for every CEQA project; however, YSQAMD has not developed specific guidance to evaluate the potential significance of GHG emissions from new projects.[7]

Yolo County Climate Action Plan. In 2011, Yolo County adopted a Climate Action Plan (CAP) pursuant to SB 97. The CAP summarizes GHG emissions inventories for 1990 and 2008 and emission projections estimated for 2020, 2030, and 2050. The CAP also describes measures and actions to reduce GHG emissions and satisfy the GHG reduction goals established by AB 32 and the Governor's Executive Order S-3-05 based on population and employment growth forecasts from the 2030 *Countywide General Plan*. The following measures from the CAP are relevant to the proposed Project:

Measure T-1: Reduce vehicle miles traveled in new development.

Measure E-1: Pursue a community choice aggregation program.

Measure E-4: Increase on-site renewable energy generation to reduce demand for grid energy.

2030 Countywide General Plan. In 2011, the Conservation and Open Space Element of the General Plan was amended to incorporate GHG reduction measures from the adopted CAP.

[7] YSAQMD, 2007. Handbook for Assessing and Mitigating Air Quality Impacts. 11 July.

The following goal, policies, and actions of the amended General Plan related to GHG emissions are relevant to the proposed Project:

Goal CO-8: Climate Change. Reduce greenhouse gas emissions and plan for adaptation to the future consequences of global climate change.

Policy CO-8.1: Assess current greenhouse gas emission levels and adopt strategies based on scientific analysis to reduce global climate change impacts.

Action CO-A117: Pursuant to the adopted Climate Action Plan (CAP), the County shall take all feasible measures to reduce its total carbon dioxide equivalent (CO2e) emissions within the unincorporated area (excluding those of other jurisdictions, e.g., UC-Davis, Yocha Dehe Wintun Nation, DQ University, school districts, special districts, reclamation districts, etc.), from 648,252 metric tons (MT) of CO2e in 2008 to 613,651 MT of CO2e by 2020. In addition, the County shall strive to further reduce total CO2e emissions within the unincorporated area to 447,965 MT by 2030. These reductions shall be achieved through the measures and actions provided for in the adopted CAP, including those measures that address the need to adapt to climate change.

Policy CO-8.5: Integrate climate change planning and program implementation into County decision making.

Action CO-A118: Pursuant to and based on the CAP, the following thresholds shall be used for determining the significance of GHG emissions and climate change impacts associated with future projects:

1) Impacts associated with GHG emissions from projects that are consistent with the General Plan and otherwise exempt from CEQA are determined to be less than significant and further CEQA analysis for this area of impact is not required.

2) Impacts associated with GHG emissions from projects that are consistent with the General Plan, fall within the assumptions of the General Plan EIR, consistent with the CAP, and not exempt from CEQA are determined to be less than significant or mitigated to a less-than-significant level, and further CEQA analysis for this area of impact is generally not required.

To be determined consistent with the CAP, a project must demonstrate that it is included in the growth projections upon which the CAP modeling is based, and that it incorporates applicable strategies and measures from the CAP as binding and enforceable components of the project.

3) Impacts associated with GHG emissions from projects that are not consistent with the General Plan, do not fall within the assumptions of the General Plan EIR, and/or are not consistent with the CAP, and are subject to CEQA review are rebuttably presumed (sic) to be significant and further CEQA analysis is required. The applicant must demonstrate to the County's satisfaction how the project will achieve its fair share of the established targets including:

- Use of alternative design components and/or operational protocols to achieve the required GHG reductions; and
- Use of real, additional, permanent, verifiable and enforceable offsets to achieve required GHG reductions. To the greatest feasible extent,

offsets shall be: locally based, project relevant, and consistent with other long term goals of the County.

The project must also be able to demonstrate that it would not substantially interfere with implementation of CAP strategies, measures, or actions.

The following goal, policies, and actions of the 2030 Countywide General Plan related to energy are relevant to the proposed Project:

Goal CC-4: Project Design. Require project design that incorporates "smart growth" planning principles and "green" building standards that reflect the County's commitment to sustainable development.

Policy CC-4.5: Encourage new construction to install solar panels, waste reuse systems and/or other systems to capture energy sources that would otherwise be wasted.

Policy CC-4.6: Encourage individual and community-based wind and solar energy systems (micro-grids).

Policy CC-4.10: Encourage construction and other heavy equipment vehicles (e.g. mining, agriculture, etc.) to use retrofit emission control devices.

Goal PF-10: Sources of Energy. Provide opportunities for the development of energy alternatives.

Policy PF-10.1: Pursuant to AB 117 (Statutes of 2002) explore "community choice aggregation" as a means of facilitating the purchase of electrical energy at the local level for community needs.

Policy PF-10.2: Streamline the permitting process for the production of biofuels, biomass, and other energy alternatives to reduce dependency on fossil fuels.

Policy PF-10.3: Provide financial and regulatory incentives for the installation of solar energy and other alternate conservation measures in all development approvals.

Action PF-A68: Promote, and require where feasible, use of sustainable renewable energy sources to power homes, businesses, agriculture, and infrastructure.

CCAP Plans and Regulations. The existing ordinances related to mining activity and GHG pollutant emissions are presented below. The CCAP Update proposes minor changes to these ordinances (which are not shown here). Refer to Table 4.7-1 (located at the end of this section) for the proposed CCAP Update changes to these ordinances.

In-Channel Ordinance

Section 10-3.408. Hazards and hazardous materials (changed to 10-3.407 in CCAP Update)

(f) All internal combustion engine driven equipment and vehicles shall be kept tuned according to the manufacturers specifications and properly maintained to minimize the leakage of oils and fuels. No vehicles and equipment shall be left idling for a period of longer than ten minutes.

Mining Ordinance

Section 10-4.407. Conveyor systems.

Wherever practical and economically feasible, portable or movable conveyor systems shall be used to transport raw materials and overburden.

Section 10-4.415. Equipment maintenance.

All internal combustion engine driven equipment and vehicles shall be kept tuned according to the manufacturer's specifications and properly maintained to minimize the leakage of oils and fuel. No vehicles or equipment shall be left idling for a period of longer than ten minutes.

3. IMPACTS AND MITIGATION MEASURES

a. Significance Criteria

The following significance criteria are based on the changes to CEQA, including Appendix G, that were adopted by the California Natural Resources Agency on December 28, 2018.[8] The following criteria are for the topics of greenhouse gas emissions and have not changed from the previously adopted CEQA criteria that were identified in the NOP/Initial Study released in May 2017. Criteria related to Energy are also included in this analysis.

The proposed Project would result in a significant greenhouse gas emissions or energy impact if it would:

Greenhouse gas emissions:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Energy:

c) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy, or wasteful use of energy resources, during project construction or operation?

d) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

b. Impacts Found Less than Significant in the Initial Study

The Initial Study included a preliminary evaluation of the potential impacts of the proposed Project that would occur during project implementation. In the Initial Study, the conclusion was reached that the Project could have potentially significant impacts related to the greenhouse gas emissions significance criteria. No analysis was done in the Initial Study regarding the potential impacts related to energy (that analysis is included below).

c. Approach

The proposed CCAP Update is comprised of a series of specific text changes to eight policy and regulatory County plans and ordinances that govern the County's activities along Lower Cache Creek. The proposed text changes that have the potential to result in impacts related to GHG emissions and energy are identified in Table 4.7-1, located at the end of this section. Each proposed change is discussed in the impact analysis below.

[8] http://resources.ca.gov/ceqa/ accessed January 9, 2019.

GHG emissions were not analyzed in the original 1996 EIRs because it was not yet standard industry practice to evaluate GHG emissions in CEQA documents at that time. In order to quantify and evaluate GHG emissions related to the CCAP program and the Update, a recent air quality analysis (associated with project-level CEQA review and permitting), conducted for one of the current mining operations was used to estimate emissions associated with each ton of material mined. A unit emission rate for each criteria pollutant was calculated by dividing the project-level total emissions (in pounds) by annual mined quantity (in tons). Total emissions for all the off-channel operations were extrapolated by multiplying the unit emission rates and the maximum allowable mined tonnage assumed for all operations (including one potential new off-channel operation that could be established under the Update). To estimate GHG emissions associated with delivery of processed aggregate materials, it was necessary to estimate destinations and distances for the truck trips. The County and the preparers of this EIR contacted the existing operators to ascertain distance and destination information. Based on the results of these interviews, average trip distances were estimated and total miles travelled determined. Based on these estimates, GHG emissions were calculated.

d. Impacts Analysis

Impact GHG-1: The CCAP Update could generate GHG emissions that may have a significant impact on the environment. (S)

The CCAP Update would expand the average annual extracted in-channel tonnage allowed under the CCRMP/CCIP from a maximum of up to 210,000 tons annually to 690,800 tons annually (occasionally reaching 1,381,600 tons, see Chapter 3.0 Project Description) to reflect trends in deposition within Cache Creek. It would also expand the acreage available for future off-channel aggregate mining by an additional 1,188 acres. Allowed activities both in- and off-channel would use a variety of off-road heavy equipment, on-road vehicles, and electricity, which would contribute to the GHG emissions of the Project. GHG emissions were not analyzed in the 1996 CCRMP and OCMP EIRs. While there are no specific thresholds associated with GHG emissions in the YSAQMD CEQA Handbook, the YSAQMD recommends that agencies should include at least a qualitative discussion of GHG emissions for sizeable projects. The analysis below provides a quantitative analysis on GHG emissions from the proposed in-channel and off-channel mining activities.

Proposed Revisions to In-Channel Plans and Regulations

The proposed CCAP Update include the following changes for the in-channel operation that would affect the total GHG emissions:

- Extend CCRMP horizon year to 2068.

- Increase in-channel material removal limit from 210,000 tons to 690,800 tons (and occasionally up to 1,381,600 tons annually, see Chapter 3.0 Project Description).

A description of the potential in-channel projects that would be allowed under the proposed CCAP Update is included in Chapter 3.0, Project Description. Generally, removal of material from the channel would not be allowed to exceed 690,800 tons per year, approximately the average annual amount of sediment material deposited in the channel (except in occasional exceptional years where major deposition occurs). For the purpose of this emissions analysis, it was assumed that a bar-skimming project that would remove an average of 690,800 tons of material per year would occur under the CCAP Update (even though the annual maximum removal under the CCAP Update would be 1,381,600 tons). This assumption is reasonable because long-term average annual GHG emissions are most relevant to global emission inventories and the 1,381,600 tons would unreasonably overestimate the long-term average.

Table 4.7-2 lists the diesel and electric equipment needed to excavate 690,800 tons of material, approximate duration of the operation. The horsepower for each piece of off-road diesel equipment was determined using either 1) published equipment specification; or 2) the default horsepower consistent with the most recent version of the California Emissions Estimator Model (CalEEMod)[9]. Emission factors for off-road diesel equipment were also obtained from CalEEMod.[10] In addition, based on Mitigation Measure TR-3 from Section 4.11 Transportation of this Draft EIR, the combined volume of aggregate material removed from in-channel and off-channel sources that is transported on the County roadway network (after processing) in any given year shall not exceed the annual allocation (as specified in their conditional use permit) assigned to the applicable off-channel operator.

For the purposes of this analysis, it is assumed that any material excavated from within the Cache Creek channel would be transported to and processed at one of the existing aggregate processing facilities. Historical three-year annual average of electric power usage by the main processing plant for the Granite Esparto project was used to estimate CO_2e emissions from a typical local processing plant. State-average carbon intensity factors were obtained from CalEEMod to conservatively describe the electrical utility supplying power to the processing plant. In addition to the processing plant, a radial stacker would also be used to build stockpiles from the mined materials. The radial stacker is assumed to be powered by electricity and operate for the same duration as other off-road diesel equipment, shown in Table 4.7-2.

Table 4.7-2: Equipment Assumptions for In-Channel Material Removal

Category	Equipment[1]	Power Source	Quantity of Equipment[2]
Off-Road	D-9 Dozer	Diesel	2
	631 Scraper	Diesel	8
	988 Wheel Loader	Diesel	2
	Unloader	Diesel	1
Processing Plant[3]	Front End Loader	Diesel	2
	Main Processing Plant[4]	Electric	1
	Radial Stacker[5]	Electric	1

Source: Baseline Environmental Consulting, 2018. Granite Esparto DEIR, 2009

McCloskey International. https://www.mccloskeyinternational.com/products/stackers/wheeled_stackers.

Notes:

[1] Including equipment powered by diesel and electricity.

[2] Quantity is estimated based on the assumed duration of 4 months (approximately 87 8-hour workdays) to remove 690,800 tons from the channel in a year.

[3] Processing Plant mainly consists of electric equipment, except for two front end loaders (Granite Esparto DEIR, 2009).

[4] Assume an identical processing plant to that of the Granite Esparto project.

[5] Typical horsepower (90) for a wheeled stacker was used. An example of the wheeled stacker is ST100 McCloskey Wheeled Stackers.

The calculated daily and annual CO_2e emissions from potential in-channel material removal are summarized in Table 4.7-3. See Appendix C for additional information.

[9] CalEEMod Version 2016.3.2. Available at: http://www.caleemod.com/.

[10] California Air Resources Board, 2018. EMFAC Web Database. Last updated: March 1. Available at: https://www.arb.ca.gov/emfac/.

Table 4.7-3: Anticipated Maximum Emissions of ROG, NOx and PM_{10} under the Proposed CCAP Update[1]

CCAP Operation	Component	Annual Maximum Permitted Tons Mined, Tons/Year	Annual 20% Exceedence Tons Mined, Tons/Year	Maximum GHG Emissions, Metric Tons CO_2e/Year
Sub-Total Existing Conditions[2]		6,944,141	1,113,535	42,941
Assumed Future Conditions	Proposed Teichert Shifler	2,352,942	235,295	14,071
	SGRO (Existing + Proposed CCAP Update)	1,100,000	220,000	7,176
	Proposed In-Channel Maintenance Extraction	690,800[3]	NA	768
Sub-Total Assumed Future Conditions		1,590,800[4]	220,000	7,722
Total		8,334,941[5]	1,333,535	50,663

Notes:
[1] Annual tons mined are based on Table 3-1, Summary of CCAP Mining Tonnages (plus Proposed) in Chapter 3.0, Project Description.
[2] Sub-total existing conditions include the following operations: CEMEX, Granite Capay, Granite Esparto, Granite Woodland, Syar, Teichert Esparto, Teichert Woodland, Teichert Schwarzgruber, and the original in-channel maintenance extraction.
[3] The annual permitted tons mined for the proposed in-channel operation are 690,800 tons. This average annual tonnage was used to evaluate the long-term cumulative impacts of in-channel GHG emissions.
[4,5] The annual total tonnages include 690,800 tons from the proposed in-channel maintenance extraction. The Shifler application was received by the County in September 2018 for 30-year permit to mine on 277 acres of a 310-acre site. It is understood that the Shifler operation would transfer both Schwarzgruber plus Teichert Esparto tonnage which would zero out the annual permitted amount for both those operations (these tonnages are already accounted for in the 6,944,141 subtotal for existing conditions). For this reason, the Shifler total is not included in the subtotal for assumed future conditions.

Source: YSAQMD, 2007 and Baseline, 2018. See Appendix C for additional information.

Proposed Revisions to Off-Channel Plans and Regulations

The proposed CCAP Update includes the following changes for the off-channel operations that would affect the total GHG emissions:

- Extend horizon year to 2068.
- Rezoning of 1,188 new acres within the OCMP planning area (currently zoned as Agriculture Intensive, AI) to AI/SGRO which would allow aggregate mining in the future.

Pursuant to the CCAP, approved annual tons mined was 6,944,141 tons (see Table 3-1, in the Project Description). For the purposes of this analysis, it was assumed that one new mining operation would be established in the "Future Proposed Mining" areas shown on Figure 3-4. It was further assumed that this potential new mining operation would be limited (by use permit) to 1,000,000 tons sold (equivalent of approximately 1,100,000 tons mined).

The 1996 OCMP EIR did not estimate GHG emissions from the maximum allowable production for all existing and proposed off-channel mining operations. However, one of the off-channel projects covered by the 1996 CCAP, Granite Esparto, included GHG emissions in its project-level analysis done in 2009, which was used to estimate the total direct and indirect GHG emissions under the proposed CCAP update.[11,12] As shown in Table 4.7-4, unit emission rates for CO_2e based on the Granite Esparto project were calculated by dividing the project-level emission (in pounds) by annual mined quantity (in tons). Total emissions under the off-channel operation were extrapolated by multiplying the unit emission rates and the maximum allowable mined tonnage, and are shown in Table 4.7-4.

Table 4.7-4: Unit Emission Rates for Off-Channel Operation

Emission Sources	CO_2e Emission Factor, lbs of Pollutants Per Ton of Mined Aggregate
Off-Road	4.8
On-Road	7.1
Total	12.0

Source: Granite Esparto DEIR, 2009

Table 4.7-4 summarizes anticipated maximum GHG emissions are estimated for: 1) potential in-channel activities (a bar skimming project); and 2) off-channel mining and processing operations for all existing mining operations and one potential new mining operation that may be established under the CCAP Update. See Appendix C for additional information. The total calculated tons mined for in-channel and off-channel CCAP activities, including the CCAP Update, would be 8,344,941 and result in an estimated emissions of 50,663 metric tons of CO_2e.

It should be noted that the actual GHG emissions under the proposed CCAP Update could be considerably lower than the anticipated maximum emissions shown in Table 4.7-4, as follows:

- *Fuel efficiency improvements.* GHG emissions related to equipment and truck use are continuously improving under existing State programs that require improved fleet emissions standards fuel efficiency improvements. Emissions quantified in Table 4.7-4 reflect emissions levels from approximately 2009. The Granite Esparto operation, the most recently established off-channel mining operation permitted under CCAP, was evaluated for GHG emissions in 2009 (and that analysis was used to estimate off-channel CCAP-wide emissions from all operations). Since then, emission factors from construction equipment and fleet are likely to have decreased because newer construction equipment and truck fleets tend to have better fuel economy and emit less GHGs during their operation. As equipment and fleets reach the end of useful life, newer equipment and trucks with lower emission factors would be purchased by the mining operators to replace them. Therefore, actual GHG emission factors for the proposed CCAP Update are likely to be lower than those shown in Table 4.7-4.

- *Equipment management.* Section 10-3.408. of the In-channel Ordinance and Section 10-4.415 of the Mining Ordinance also require that mining equipment to be properly tuned and to limit idling time, thus maintaining optimal fuel economy and avoiding wasteful use of fuels.

[11] County of Yolo, 2009. Environmental Impact Report for the Granite Esparto Mining and Reclamation Project, Long-Term Mining Permit Application. Zone File Number: 2007-071. SCH Number: 2009022036. December.

[12] The Granite Esparto mining operation was considered reasonably representative all off-channel mining operations with the CCAP area because it includes dry and wet pit mining, on-site processing, trucking associated with product distribution, and reclamation.

- *Shift to use of clean electricity.* Off-channel mining facilities in the CCAP area have been gradually increasing the use of electricity and alternative energy in their operations. For instance, Section 10-4.407 of the Mining Ordinance requires off-channel mining to use electrically powered conveyor systems for transport of materials. Some mining operations have incorporated on-site generation of alternative energy to partially supply the electricity required for these operations. Cemex has been operating a 1-megawatt wind turbine since 2012 which provides between 20 percent and 30 percent of the project's energy use. Mining projects under the CCAP Update are already consuming electricity produced under the requirements of SB 350,[13] which would result in an increase in renewable electricity procurement for large utility providers. New mining projects under the CCAP Update would also have the option of opting in for Community Choice Aggregation (General Plan Policy PF-10.1) and choosing electricity with lower carbon footprints at competitive rates. New mining projects have the option to choose between the standard portfolio, which has a high percentage of renewable energy, and the 100-percent renewable energy product.

Even with the GHG reductions and improvements in energy use described above, energy use and GHG emission would increase slightly under the CCAP Update. As shown in Table 4.7-3, anticipated maximum emissions under the proposed CCAP Update would be about 50,663 metric tons CO_2e/year. Compared to the estimated total GHG emissions for year 2020 for the unincorporated Yolo County of 993,537 metric tons of CO_2e/year, this would be approximately 5 percent of the total GHG emissions.[14] Some potential benefits of GHG reduction due to the proposed CCAP Update were not represented in Table 4.7-4, such as the lower transportation costs of sourcing building materials locally rather than purchasing from mining operations outside of the County. Nevertheless, this projected net increase in GHG emissions over time from the CCAP Update is conservatively considered to be significant and unavoidable.

Mitigation Measure GHG-1: None available.

Because the level of GHG emission reduction associated with the requirements of the CCAP ordinances cannot be relied on with certainty, this impact would remain significant and unavoidable. (SU)

Impact GHG-2: The CCAP Update would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. (LTS)

The CAP is the main plan adopted for the Yolo County for the purpose of reducing GHG emissions and addressing climate change. GHG emission inventories for the unincorporated Yolo County were prepared as a part of the benchmarking process for the following sectors: Agriculture, Transportation, Energy, Solid Waste, Wastewater, Stationary Sources, and Mining and Construction. GHG emissions from the mining and construction sector include emissions associated with on-site use of heavy duty equipment. However, GHG emissions from transportation energy use associated with the mining land use are captured in other relevant sectors and are not included in the mining and energy sector. Because the County lacks jurisdictional control over the heavy equipment used in the construction and mining sector, this sector was only included in the historical emission inventories for 1990 and 2008, and was

[13] The Clean Energy and Pollution Reduction Act of 2015 (SB 350) established new clean energy, clean air, and greenhouse gas reduction goals for 2030 and beyond. SB 350 increases the State's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. Large utilities will be required to develop Integrated Resources Plans that would reach these goals.

[14] Yolo County, 2011. Climate Action Plan: A Strategy for Smart Growth Implementation, Greenhouse Gas Reduction, and Adaptation to Global Climate Change. March 15.

excluded from the CAP projections for future years.[15] Historically, heavy duty equipment used in mining and construction made up about 2 percent and 4 percent of total emissions in 1990 and 2008, respectively. As discussed under Impact 4.8-1, the magnitude of contribution to county-wide GHG emissions inventory from the proposed CCAP Update is similar to the historical contribution, even after accounting for transportation and electricity use associated with the mining activities. The heavy equipment used for mining under the CCAP was not included in the CAP emission inventory projections because the County determined that they did not have the jurisdiction to control or regulate these types of GHG emissions, and thus relied on State programs for emissions control of this source. The mining industry, like other industries throughout the State must comply with applicable statewide emissions controls for heavy equipment.

Electricity use under the proposed CCAP Update would be consistent with the relevant CAP measures for the energy sector. The CAP encourages the development and use of cleaner sources of electricity, which would be available to the mining operators. Specifically, the following CAP measures are relevant:

Measure E-1: Pursue a community choice aggregation program. [this has been completed and the program is in operation]

Measure E-4: Increase on-site renewable energy generation to reduce demand for grid energy.

Consistent with Mitigation Measure AIR-2 (from Chapter 4.3, Air Quality), off-channel mining facilities will over time, continue to use cleaner sources of electricity. Therefore, electricity use of the CCAP Update would not conflict with the CAP.

Under the proposed CCAP Update, GHG emissions associated with transportation of aggregates would not increase significantly from the existing conditions, and, in fact, would likely decrease over time relative to the existing conditions because of improved fuel economy in on-road heavy diesel trucks. Measure T-1 in the Transportation and Land Use Chapter of the Yolo County CAP[16] requires the reduction of vehicle miles traveled in new development, but is not applicable to the mining land use. Therefore, transportation associated with the CCAP Update would not conflict with the CAP.

In addition to strategies and measures in CAP, the Yolo County General Plan also adopted a list of policies and actions related to GHG emissions, such as integration of climate change planning. The following proposed additions to the existing OCMP and CCRMP goals are consistent with the Yolo County General Plan:

OCMP 6.2-3/CCRMP 4.2-6: Integrate climate-smart adaptation strategies to increase resiliency and prepare for future uncertainty.

In conclusion, the proposed CCAP Update would not conflict with the applicable plans, policies, and regulations related to GHG emissions. This impact is less than significant. (LTS)

[15] Yolo County, 2011. Climate Action Plan: A Strategy for Smart Growth Implementation, Greenhouse Gas Reduction, and Adaptation to Global Climate Change. Chapter 2, Greenhouse Gas Emissions and Reduction Targets. March 15.

[16] Measure T-1 from the County's Climate Action Plan is a measure to be used to reduce GHG emissions and states that new development should reduce vehicle miles traveled.

Impact EN-1: The CCAP Update would not result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy, or wasteful use of energy resources, during project construction or operation. (LTS)

Energy would be used in the forms of fossil fuels and electricity during the proposed in-channel material removal and off-channel mining operations under the CCAP Update. It is in the mining operators' interests to minimize the costs of operations by conserving fossil fuels and electricity required during the operation. In addition, existing regulations require the proper maintenance and tuning of diesel engine driven equipment (Section 10-3.408) and limit on idling time (Section 10-4.415) which would encourage efficient use of fuel. Therefore, the CCAP Update would not result in energy resources being used in a wasteful, inefficient, or unnecessary manner.

Protection of lands containing identified mineral deposits from the encroachment of incompatible land uses would allow aggregate resources to remain available for future use, and thereby reduce transportation energy use requirements. The policies in the CCAP Update such as encouraging recycling efforts and mining efficiencies would result in further energy conservation.

In conclusion, the Project's impact related to wasteful use of energy is less than significant (LTS).

Impact EN-2: The CCAP Update would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (LTS)

Yolo County has not adopted an energy conservation plan. However, as discussed under Impacts GHG-1 and GHG-2, the proposed CCAP Update would not conflict with any adopted goals, policies, actions, and measures related to energy conservation in the Yolo County General Plan and the Yolo County CAP. The effects of the Project on local and regional energy supplies and on requirements for additional capacity would be minimal.

The CCAP Update would not conflict with any state or local plans for renewable energy or energy efficiency. The impact is less than significant (LTS).

Table 4.7-1: Proposed CCAP Updates Related to Greenhouse Gas Emissions and Energy

Greenhouse Gas Emissions	
	CCAP DOCUMENT CHANGE
Changes to Horizon Year of Plans	
CCRMP (page 14)) and OCMP (page 17)	Horizon Year The horizon year for this plan is 2068. Similar to the use of this term in other long-range planning efforts, this reflects how far into the future the plan guidance extends. It also defines the period for consideration of cumulative effects for purposes of environmental impact analysis.
Change in the Amount of Material that Can Be Removed from the Channel in a Given Year	
CCRMP (page 34)	Based on the analysis conducted for the 2017 Technical Studies, between 1996 and 2011, an average of approximately 690,800 tons per year of sediment was actually deposited in the CCRMP area, of which 156,400 tons is estimated to be sand and gravel and 534,400 is estimated to be fines. This estimate of deposition was calculated by comparing topographic maps of Cache Creek in 1996 and 2011. It differs significantly from the original estimate in that it appears much more fine sediment is depositing in Lower Cache Creek than originally predicted. ~~in-stream excavation of sand and gravel has averaged some two million tons, however, which has resulted in a cumulative deficit of nearly 80 million tons since mining intensified in the 1950s. At the natural rate of replacement it would take over 500 year to replenish the material removed~~. ~~In addition, gravel bar skimming disturbs the formation or armor materials and removes riparian vegetation that allow the channel to readjust, thus increasing the potential for erosion.~~ While it is unclear whether the current rate of deposition will continue into the future, it appears likely that at least some portions of Cache Creek are recovering faster than expected in 1996. Based on this information, the cap for in-channel extraction for maintenance purposes should be increased from 210,000 tons annually on average to 690,800 tons annually on average to reflect actual conditions. In addition, in recognition that the creek may in reality deposit no tonnage in a given year or double the tonnage in another (depending on flow conditions) the cap shall be based on the annual average deposition since the last prior year that extraction occurred, not to exceed 690,800 tons annually.
Climate Change Adaptation	
CCRMP (page 66)	4.2-6 Integrate climate-smart adaptation strategies to increase resiliency and prepare for future uncertainty.
OCMP (page 60)	6.2-3 Integrate climate-smart adaptation strategies to increase resiliency and prepare for future uncertainty
Increase in Potential Off-Channel Mining Area	
OCMP (page 15)	**Planning Area for OCMP and CCRMP**~~**The Cache Creek Resources Management Plan**~~ The planning area for the OCMP is defined as the area contained within the Mineral Resource Zones (28,130 acres), minus the planning~~in-channel~~ area regulated under the CCRMP (2,266 acres), or a total of 25,864 acres (see Figure 4). Within the OCMP planning area, 1,900 acres are currently approved for excavation which is a subset of the 2,464-acre total for all approved mine sites (area zoned Sand and Gravel Overlay or SGO), 1,001 acres are zoned currently to allow for future mining (Sand and Gravel Reserve

	Overlay or SGRO), and another 1,188 acres are proposed to be rezoned for future mining, as described below. The planning area for the CCRMP is equal to the active in-channel area of the creek system, as defined by the delineatedpresent channel bank line or the 100-year flood elevation, described in the Westside Tributaries Study prepared by the U.S. Army Corps of Engineers, whichever is wider (see Figure 3) modified as described in the CCRMP . The in-channel area encompasses 5,109around 4,956 acres, including 2,2661,600 acres within the CCRMPpresent channel boundary, plus several thousand acres located in the floodplain north of the City of Woodland (see Figure 3). Subtracting this acreage from the 28,130 acres included in the State MRZs, leaves a total of approximately 23,174 acres within the planning area of the Off-Channel Mining Plan. As described in the following section, however, only 2,887 acres of the plan area are proposed to be rezoned to allow for off-channel mining over the next fifty years, or about 12 percent of the OCMP planning area.