

3B.4 CLIMATE CHANGE – WATER

3B.4.1 AFFECTED ENVIRONMENT

GREENHOUSE GASES

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. These layers of gas in the atmosphere can prevent the escape of heat much the same as glass in a greenhouse. Thus, climate change is often referred to as the "greenhouse effect." The gases most responsible for climate change are carbon dioxide (CO₂) and methane. Other greenhouse gases (GHG) include, but are not limited to nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons. It is becoming more widely accepted that continued increases in greenhouse gases will contribute to climate change, although there is uncertainty concerning the magnitude and time of the trend.

Energy-related CO₂ emissions, resulting from petroleum and natural gas, represent 82% of total United States anthropogenic GHG emissions. Another GHG, methane, comes from landfills, coal mines, oil and gas operations, and agriculture; it represents 9% of total emissions. Nitrous oxide totals about 5% of United States emissions, and is emitted from burning fossil fuels and through the use of certain fertilizers and industrial processes. Anthropogenic gases make up about 2% of United States emissions that are released as byproducts of industrial processes and other minor sources (<http://www.eia.doe.gov/oiaf/1605/ggcebro/chapter1.html>).

GLOBAL CLIMATE CHANGE EFFECTS ON WATER RESOURCES

In July 2006, the California Department of Water Resources (DWR) released the report, "Progress on Incorporating Climate Change into Management of California's Water Resources" (DWR 2006). This report responds to the Governor's Executive Order S-3-05 requiring biennial reports on climate change impacts to various areas, including state water resources. DWR has concluded that future hydrologic conditions in California will likely change when compared to the patterns observed over the last century (DWR 2006). Although a full understanding of water resources changes associated with climate change is not yet possible, there is a general consensus among recent investigations that the following effects are likely to occur within the next 50 to 100 years: (1) increases in air temperature; (2) reductions in Sierra Nevada snowpack; (3) earlier snowmelt; and, (4) a rise in sea level (DWR 2006; California Energy Commission [CEC] 2005). These changes could have significant implications for water resources within California.

A major portion of California's annual water storage is held within the Sierra Nevada snowpack. At present, snowmelt provides most of the average 14 million acre-feet of runoff water from the Sierra Nevada during April–July period. DWR estimates that, by 2060, April–July runoff could be reduced by 36% (DWR 2006). These changes, along with anticipated changes in the timing of snowfall, could reduce reservoir refilling during late spring and early summer. In addition, computer models estimate that global climate change could lead to a sea level rise of 0.6 to 1.9 feet over the next 100 years (Intergovernmental Panel on Climate Change [IPCC] 2007). This rise in sea level would increase the frequency of existing 100-year peak high tides in the western Delta to about once in ten years. Salt water intrusion from the ocean into the Delta could also increase, potentially resulting in degradation of freshwater supplies pumped from the Delta.

Further discussion of existing hydrology with the "Water" Study Area is provided in Section 3B.9, "Hydrology and Water Quality - Water."

3B.4.2 REGULATORY FRAMEWORK

The regulatory framework relevant to analysis of climate change impacts is the same for the Off-site Water Facilities as for the Land Use portion of the project. Please refer to Section 3A.4.2 for a discussion of the regulatory framework pertaining to climate change analysis.

3B.4.3 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its impacts. For the purposes of this analysis, climate change impacts would be considered significant if construction and operation of the Off-site Water Facilities would:

- ▶ generate greenhouse gas emissions, either directly or indirectly, that may have a significant impacts on the environment; or
- ▶ conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

SIGNIFICANCE CRITERIA FOR EVALUATING CLIMATE CHANGE

There are no formally adopted thresholds for measuring the significance of a project's impact on the creation of GHG emissions or the project's cumulative contribution to global climate change. For a detailed discussion of significance thresholds for GHG emissions, please refer to Section 3A.4.3 in Section 3A.4, "Climate Change – Land."

ANALYSIS METHODOLOGY

The climate change analysis presented in this section is comprehensive in that it accounts for direct and indirect sources of GHG emissions resulting from the collective construction and operation of Off-site Water Facility Alternatives. The sources include, indirect emissions of GHGs resulting from the new electrical load requirements for conveyance pumping from the Freeport Project to the Folsom SPA, indirect emissions from new electrical load requirements for local water distribution and treatment facilities, and direct GHG emissions from construction- and operational-related vehicle trips. Indirect emissions associated with energy consumption for off-site conveyance pumping were estimated by converting the pump station's horsepower requirements to kilowatt-hours and multiplying these values by Utility Specific Verified Electricity CO₂ Emission Factors provided in Table G.5 and G.6 of the Local Government Operations Protocol, September 2008. Electrical consumption factors from Exhibit 3-10, Electrical Consumption for Surface Water Treatment Plants (ICF International 2008, Local government Operations Protocol 2008) were used to obtain estimates of electrical demand for water treatment and local distribution pumping. The estimates were then subsequently converted to pounds of CO₂ per day using Utility Specific Verified Electricity CO₂ Emission Factors.

Direct emissions of CO₂ from mobile sources from construction and operation were quantified using URBEMIS, 2007 and SMAQMD's Roadway Construction Model and then converted to metric tons. Because the use of back-up generators would be infrequent and secondary to emissions generated during electrical generations, these emissions were not quantified as part of the GHG analysis. Similarly, the City did not attempt to quantify the "bound" energy used in the production and manufacturing of durable goods (e.g., electrical panels) and raw materials (e.g., steel) used in the construction of the Off-site Water Facility Alternatives.

IMPACT ANALYSIS

Impacts that would occur under each of the Off-site Water Facility Alternatives are identified as follows:

NCP (No USACE Permit Alternative)

PA (Proposed Off-site Water Facility Alternative)

1 (Off-site Water Facility Alternative 1 – Raw Water Conveyance – Gerber/Grant Line Road Alignment and White Rock WTP)

1A (Off-site Water Facility Alternative 1A Raw Water Conveyance – Gerber/Grant Line Road Alignment Variation and White Rock WTP)

2 (Off-site Water Facility Alternative 2 Treated Water Conveyance – Douglas Road Alignment and Vineyard SWTP)

2A (Off-site Water Facility Alternative 2A Treated Water Conveyance – Excelsior Road Alignment Variation and Vineyard SWTP)

2B (Off-site Water Facility Alternative 2B Treated Water Conveyance – North Douglas Tanks Variation and Vineyard SWTP)

3 (Off-site Water Facility Alternative 3 Raw Water Conveyance – Excelsior Road Alignment and White Rock WTP)

3A (Off-site Water Facility Alternative 3A Raw Water Conveyance – Excelsior Road Alignment Variation and White Rock WTP)

4 (Off-site Water Facility Alternative 4 Raw Water Conveyance – Easton Valley Parkway Alignment and Folsom Boulevard WTP)

4A (Off-site Water Facility Alternative 4A Raw Water Conveyance – Easton Valley Parkway Alignment Variation and Folsom Boulevard WTP).

The impacts for each alternative are compared relative to the PA at the end of each impact conclusion (i.e., similar, greater, lesser).

IMPACT **Generation of Short- and Long-term Increases in Greenhouse Gases.** *Construction and operation of the*
3B.4-1 *Off-site Water Facility Alternatives would result in a net increase in greenhouse gas emissions, which would*
contribute considerably to cumulative GHG emissions.

NCP, PA, 1, 1A, 3, 3A, 4, and 4A

The potential effect of GHG emissions on global climate change is an emerging issue that warrants discussion under CEQA. Unlike the pollutants discussed previously that may have regional or local adverse effects, GHGs have the potential to contribute to global changes in the environment. In addition, GHG emissions do not directly produce a localized impact, but may cause an indirect impact if the local climate is adversely changed by its cumulative contribution to a change in global climate. Individual public infrastructure projects contribute relatively small amounts of GHGs that when added to all other GHG producing activities around the world result in increases in these emissions that have led many to conclude that these emissions are contributing to global changes in climate. However, at the time of preparation of this EIR/EIS, ARB has not adopted a formal threshold for what would constitute a cumulatively considerable increase in GHG for individual public infrastructure projects.

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. The impacts of global climate change described in AB 32 include changing sea levels, changes in snow pack and availability of potable water, changes in storm flows and flood inundation zones, and other impacts.

At minimum, the Off-site Water Facilities improvements would be required to comply with Title 24 energy efficiency standards (2007), to the extent applicable; however, the extent to which these standards would help the individual improvements in achieving the goals outlined in AB 32 is unknown. In response to this uncertainty and to provide clarification to lead agencies for assessing GHG impacts, ARB and local air districts have begun developing thresholds of significance for common project types that, collectively, are responsible for substantial GHG emissions. As part of updating its CEQA Guidelines, BAAQMD has proposed a threshold of 10,000 metric tons of CO₂ equivalent per year (MTCO₂e/yr) for operational increases in GHG emissions from stationary sources and a separate threshold of 1,100 MTCO₂e/yr for operational sources other than stationary sources (i.e., mobile vehicle trips). However, no construction threshold is currently proposed by BAAQMD. Nevertheless, at the State-level, ARB is considering the inclusion of mandatory performance standards for construction-related GHGs.

The Off-site Water Facilities would emit GHGs during construction from combustion of fuels in worker vehicles and material product delivery and removal accessing the site as well as the off-road construction equipment. Off- and on-road construction GHG emissions were calculated using URBEMIS2007 for the WTP and SMAQMD's Roadway Construction Model (2007) for linear pipeline construction. These models cover the CO₂ emission estimates for the readily quantifiable construction sources, but do not cover the quantities of indirect CO₂ emissions that go into the manufacturing/processing of steel pipe, construction aggregate, etc. In the absence of a significance threshold for construction-related CO₂-emissions, but in acknowledging that the State is considering mandatory performance measures for construction, without the inclusion of any performance measures for construction, the resulting CO₂ emissions would be greater than if no performance measures were incorporated. Based on these considerations, short-term emissions of CO₂ resulting from the construction of the Off-site Water Facility Alternatives could result **potentially significant direct** and **indirect** impacts. *[similar]*

Following construction, the operation of the Off-site Water Facilities is expected to contribute to regional GHG emissions over the long-term. The primary sources of GHG emissions would be associated with daily vehicle trips to and from the WTP along with indirect emissions from new electrical loads associated with the booster pump station, water treatment operations, and distribution of treated water to users within the Folsom SPA. Based on the methodology employed in Section 3A.2.3, quantification of GHG for the Off-site Water Facilities was focused to the CO₂ outputs generated for off-site conveyance pumping, water treatment (On- or Off-site), distribution pumping within the Folsom SPA, and mobile sources. To estimate emissions generated from these sources, emission factors derived from the California Climate Action Registry Power/Utility Protocol Public Reports (as of September 2008)¹ were used in combination with the base electrical usage requirements for the booster pumping station, 1,700 HP, and 1,406 kWh/MG for treatment and local distribution pumping (including those facilities within the Folsom SPA) (ICF International 2008). Assuming the most-conservative operational scenario in which the booster pumping station is operated 24 hours a day, 7 days a week, at an average of 6.5 mgd, Table 3B.2-3 provides the GHG emissions in MTCO₂e/year for each of the Off-site Water Facility Alternatives. As shown in Table 3B.2-3, the GHG estimates calculated for each of the Off-site Water Facility Alternatives is substantially higher than the applied threshold for stationary sources as proposed by BAAQMD and, therefore, this **indirect** impact is considered **significant**. As shown in Table 3B.2-3, non-stationary sources of GHGs would not be significant. *[similar]*

¹ Offsite electricity generation emissions are based on SMUD's utility specific verified electricity CO₂ Emissions factors for 2006. These calculations, presented in Appendix M-VI, are estimates of expected GHG emissions from carbon dioxide, methane, and nitrous oxide generation, the combination of which are representative of CO₂ equivalent emissions.

**Table 3B.4-1
Off-site Water Facility Operational Greenhouse Gas Emission Estimates**

Off-site Water Facility Alternative	Emission Source	MT CO ₂ e/yr	Total	BAAQMD Thresholds	Significant?
No USACE Permit Alternative, Proposed Off-site Water Facility Alternative, and Alternatives 1, 1A, 3, 3A, 4, and 4A	Construction (2011)	<1,296		-- ¹	No
	Construction (2012)	<1,807			
	Off-site Pumping	2,748	22,725	10,000	Yes
	Local Treatment and Distribution	19,978			
	Mobile Sources	759			
Off-site Water Facility Alternatives 2 and 2A	Construction (2011)	<931		-- ¹	No
	Construction (2012)	<930			
	Off-site Pumping	2,667	22,504	10,000	Yes
	Local Treatment and Distribution	19,837			
	Mobile Sources	0			
Off-site Water Facility Alternative 2B	Construction (2011)	666		-- ¹	No
	Construction (2012)	666			
	Off-site Pumping	1,778	21,615	10,000	Yes
	Local Treatment and Distribution	19,837			
	Mobile Sources	0			

Notes:

MT CO₂e/yr = metric tones of carbon dioxide equivalent per year.

Appendix M-VI provides additional detail regarding assumptions and emission factors used in the analysis.

¹ No significance threshold is proposed by BAAQMD for construction-related GHG emissions; however, to enable for evaluation of construction-related mobile source emissions, a threshold of 1,100 MT CO₂e/yr has been used.

Source: RMC 2010, ICF International 2008, URBEMIS 2007, Local Government Operations Protocol 2008

Given the overwhelming scope of global climate change, it is not anticipated that a single public infrastructure project would have an individually discernable effect on global climate change (e.g., that any increase in global temperature or rise in sea level could be attributed to the emissions resulting from one single development project). Rather, it is more appropriate to conclude that the GHG emissions generated by the Off-site Water Facilities would combine with emissions across the state, nation, and globe to cumulatively contribute to global climate change. Based on the nature and size of the Off-site Water Facilities components, without mitigation, the construction and operation of the Off-site Water Facilities could contribute to the State’s inability to reach the emission reduction limits/standards set forth by the State of California by Executive Order S-3-05 and AB 32. For these reasons, the construction and operation of the Off-site Water Facility Alternatives could result in a substantial contribution to global climate change and the **direct** and **indirect** impacts are considered **potentially significant**. [Similar]

Mitigation Measure 3B.4-1a: Implement GHG Reduction Measures during Construction.

The bid specifications for construction of the Off-site Water Facilities shall require that bidders demonstrate how they will comply with each of the following measures during all construction and demolition activities:

- 1) Construction vehicles and equipment will be properly maintained at all times in accordance with manufacturer's specifications, including proper tuning and timing of engines. Equipment maintenance records and equipment design specification data sheets shall be kept on-site during construction and demolition activities and subject to inspection by the SMAQMD.
- 2) Operators will turn off all construction vehicles and equipment and all delivery vehicles when not in use, and not allow idling for more than 5 minutes or for such other more restrictive time as may be required in law or regulation.
- 3) On-site construction vehicles and equipment will use ARB-certified biodiesel fuel if available (a minimum of B20, or 20 percent of biodiesel) except for those with warranties that would be voided if B20 biodiesel fuel were used. Prior to issuance of grading or demolition permits, the contractor shall provide documentation to the City that verifies whether any equipment is exempt; that a biodiesel supply has been secured; and that the construction contractor is aware that the use of biodiesel is required.
- 4) A City-approved Solid Waste Diversion and Recycling Plan (or such other documentation to the satisfaction of the City) will be in place for the Off-site Water Facilities that demonstrates the diversion from landfills and recycling of all nonhazardous, salvageable and re-useable wood, metal, plastic and paper products during construction and demolition activities. The Plan or other documentation shall include the name of the waste hauler, their assumed destination for all waste and recycled materials, and the procedures that will be followed to ensure implementation of this measure.

Implementation: City of Folsom Utilities Department

Timing: Prior to the approval of grading plans and building permits for all off-site water facilities.

- Enforcement:**
1. For improvements that would be located within the City of Folsom: City of Folsom Community Development Department and SMAQMD.
 2. For improvements that would be located within unincorporated Sacramento County: Sacramento County Planning and Community Development Department and SMAQMD.
 3. For improvements that would be located within the City of Rancho Cordova: City of Rancho Cordova Planning Department and SMAQMD.

Mitigation Measure 3B.4-1b: Prepare and Implement an Off-site Water Facilities Climate Action Plan.

Prior to operation, the City shall have in place a Off-site Water Facilities Climate Action Plan and Greenhouse Reduction Strategy (Plan) that has been adopted by the City following an opportunity for review and recommendation by the SMAQMD. At a minimum, the Plan shall include:

- ▶ **Designation of Person Responsible for Implementation.** The Plan shall designate the name and contact information of the person(s) responsible for ensuring continuous and on-going implementation of the Plan.
- ▶ **GHG Inventory and Reduction Target.** The City shall prepare a complete GHG Inventory for the Off-site Water Facilities components within one year following occupancy and a GHG reduction target based on State guidance.

- ▶ **Off-site Water Facilities Design Features.** The Off-site Water Facilities shall include design features to reduce operational GHG emissions, as well as an estimate of the reduction in GHG emissions that is expected to result from each facility. Initial measures that may be considered include, but are not limited to:
 - Design all conditioned occupancies with “cool roofs” using products certified by the Cool Roof Rating Council, and other exposed roof surfaces coated with “cool paints”;
 - Design all conditioned occupancies to take advantage of shade through the planting of deciduous canopy-type trees and/or prevailing winds to reduce energy use;
 - Make maximum use of EnergyStar-qualified energy efficient appliances, heating and cooling systems, office equipment and lighting products;
 - Install a photovoltaic array (solar panels) or other source of renewable energy generation on-site, or otherwise acquire energy that has been generated by renewable sources to meet a portion of the electricity needs of the Off-site Water Facilities;
 - In an effort to reduce GHG emissions from transportation sources, the bid specifications for the Off-site Water Facilities should require that bidders demonstrate that they have given preference to local sources of building materials or offer evidence to support why such local sources have not been used.

Implementation: City of Folsom Utilities Department

Timing: Prior to the approval of grading plans and building permits for all off-site water facilities.

- Enforcement:**
1. For improvements that would be located within the City of Folsom: City of Folsom Community Development Department and SMAQMD.
 2. For improvements that would be located within unincorporated Sacramento County: Sacramento County Planning and Community Development Department and SMAQMD.
 3. For improvements that would be located within the City of Rancho Cordova: City of Rancho Cordova Planning Department and SMAQMD.

2, 2A, and 2B

Under the Off-site Water Facility Alternatives 2, 2A, and 2B, no WTP would be constructed. Rather, water treatment under these alternatives would be provided at the Vineyard SWTP. Consolidation of treatment processes at the Vineyard SWTP could result in the SWTP operating closer to its peak capacity and, therefore, at a higher efficiency. However, increased operations at the Vineyard SWTP would still require an increased electrical load with the operational emissions comparable to the previous alternatives over the longer term. However, with the integration of the Off-site Water Facilities into the Vineyard SWTP, these alternatives would experience a substantial decrease in the amount of bound energy used during construction. However, without the inclusion of any performance standards, **direct** and **indirect** construction and operational-related GHG impacts could be **potentially significant**. [*Lesser*]

Further, under Off-site Water Facility Alternative 2B and with the shortened distance of the conveyance alignment (e.g., from the North Douglas Tanks), the electrical load required for new pumping facilities would be lowered to 1,765 MTCO₂e/year; less than the other conveyance alternatives. However, given that when this

estimate is combined with new electrical demands for treatment at the Vineyard SWTP and local distribution pumping, the total indirect GHG estimate remains substantially higher than the applied threshold, and, therefore, this **indirect** impact is considered **potentially significant**. *[Lesser]*

Mitigation Measure: Implement Mitigation Measures 3B.4-1a and 3B.41b.

With implementation of the measures listed above, Off-Site Water Facility construction-related impacts to global climate change from GHG emissions would be reduced to the extent feasible through the inclusion of mandatory performance standards for Off-Site Water Facility construction. However, given the quantities of GHGs indirectly produced by all the Off-site Water Facility Alternatives greatly exceeds the applied operational threshold of 10,000 MTCO₂e/yr for stationary sources, and the range of feasible mitigation measures available for reducing these emissions, the City does not expect that it would be able to reduce these emissions to a less-than-significant level. For this reason, this impact is considered **significant and unavoidable**.

IMPACT **Effects of Climate Change on the Off-site Water Supply Facilities.** *Global climate change could result in*
3B.4-2 *effects on water quality or water supplies proposed as part of the Off-site Water Facility Alternatives.*

NCP, PA, 1, 1A, 2, 2A, 2B, 3, 3A, 4, and 4A

Effects of Climate Change on Water Quality

Global climate change could produce a rise in sea level and reduced freshwater runoff in the Sacramento River system, resulting in an increase of salt water intrusion into the Delta and potentially degrading water supplies pumped from the Delta. Although it would be speculative to estimate the specific changes in salt water intrusion or the reduced amount of freshwater runoff that might result from climate change, it is not anticipated that salt water intrusion would reach the location of the Freeport Project's intake due to its inland location. In this context, under the Off-site Water Facilities, no changes or potential impacts to operations are anticipated because of increased salt water intrusion resulting from global climate change. This **direct** impact is considered less than significant. **No indirect** impacts would occur. *[Similar]*

In the future, greater saltwater intrusion into the Delta, combined with reduced runoff from the Sacramento and San Joaquin River systems, may require altering releases from reservoirs, including CVP reservoirs to maintain Delta water quality objectives, comply with Delta export-inflow ratio², or maintain water quality at Delta diversions. These effects could reduce the amount of surface water available to the City under the Off-site Water Facility Alternatives. Under these conditions, the City may be required to blend groundwater supplies with surface water to meet demands within the Folsom SPA. However, it is not possible to accurately estimate more-specific changes to water quality that would result from climate change and, therefore, these **direct** impacts as attributable to the Off-site Water Facilities are considered **less than significant**. **No indirect** impacts would occur. *[Similar]*

Effects of Climate Change on Future Water Supply

Global climate change may ultimately affect the amount of water stored within the California Sierra Nevada snowpack, alter the amount of precipitation in the Sacramento River watershed, and increase temperatures. Because the snowpack acts as additional water storage, a reduced snowpack or reduced total precipitation may affect the amounts of water stored in reservoirs, including CVP reservoirs, the timing of reservoir releases, and

² The Delta export-inflow ratio restrictions limit the combined export rate of the SWP and CVP to a specified percentage of the total Delta inflow. The export-inflow ratio values are used to set a maximum export flow in the model. When D-1641 standards are specified the February value is computed based on the January eight river index, while all other months have a specific maximum EI ratio. If export-inflow ratio limits total project exports, the export capacity is shared equally between the SWP and CVP. Unused share of the export capacity by one party can be used by the other party.

the total water volumes available for spring and summer diversion and use. However, given that the City would acquire CVP contract water from a senior water rights holder and that contract water is subject only to limited potential reductions based on low- to very-low storage conditions within Shasta Reservoir, the **direct** implications of such a change would have **less-than-significant** impact on the Off-site Water Facilities. **No indirect** impacts would occur. *[Similar]*

The increased frequency of drier conditions could also increase the demand for water transfers from entities, including NCMWC, thereby cumulatively adding to the types of effects to the Sacramento River analyzed in this section of this EIR/EIS. However, it is not possible to accurately estimate the specific changes to water supplies and the duration over which these changes may occur because of climate change. For this reason, potential **direct** and **indirect** impacts are considered **too speculative for meaningful evaluation**. *[Unknown]*

Mitigation Measure: No mitigation measures are required.

3B.4.4 RESIDUAL SIGNIFICANT IMPACTS

Based on a quantification of the Off-site Water Facility Alternatives' energy requirements to support construction, conveyance, treatment, and local distribution operations at build-out of the Folsom Specific Plan, the Off-site Water Facility Alternatives are expected to generate substantial emissions of GHGs. Even with the application of the prescribed mitigation, the Off-site Water Facilities-related GHG emissions would not be reduced to a less-than-significant level. Therefore, Impact 3B.4-1 would remain significant and unavoidable.

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