APPENDIX G

LAKE WOHLFORD DAM REPLACEMENT PROJECT GREENHOUSE GAS ANALYSIS

GREENHOUSE GAS ANALYSIS
FOR THE
LAKE WOHLFORD DAM REPLACEMENT PROJECT

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SECTION 1
INTRODUCTION

Lake Wohlford is man-made reservoir owned and operated by the City of Escondido (City) and located in the rural foothills of unincorporated County of San Diego (County). Lake Wohlford is within the County's unincorporated Valley Center Community Planning Area, on land owned by the City. The reservoir is formed by Lake Wohlford Dam, which is a 100-foot-high embankment dam composed primarily of rock fill on the downstream side and hydraulically placed fill on the upstream side. The City is planning to construct a replacement dam immediately downstream of the existing dam and deconstruct the existing dam. This greenhouse gas (GHG) analysis was prepared to support the environmental review process and provide information regarding potential impacts to global climate change associated with the construction and operation of the proposed project.

GHG emissions have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. Global climate change also has the potential to result in sea level rise (resulting in flooding of low-lying areas), affect rainfall and snowfall (leading to changes in water supply and runoff), affect temperatures and habitats (affecting biological and agricultural resources), and result in many other adverse effects.

Legislation, regulations, and executive orders on the subject of climate change have established federal and statewide contexts and processes for developing an enforceable cap on GHG emissions. Given the nature of environmental consequences from GHGs and global climate change, the California Environmental Quality Act (CEQA) requires that lead agencies evaluate the cumulative impacts of GHGs, even relatively small additions, on a global basis.

The purpose of this report is to discuss global climate change and existing GHG emissions sources; summarize applicable federal, state, and local regulations; and analyze the impacts from construction and operation of the proposed project.

1.1 PROJECT DESCRIPTION

The project entails constructing a replacement dam immediately downstream (west) of the existing dam and partially deconstructing the existing dam by removing the hydraulic fill material that is at a higher elevation than the original rock fill. The replacement dam would feature an outlet tower that is integrated into the dam's upstream face; the top of the existing outlet tower would be demolished, and the bottom of the existing outlet tower and the outlet pipe

would be abandoned in place. To accommodate the replacement dam's configuration, the project also entails realignment of the portion of Oakvale Road that passes the southern dam abutment. This portion of the road would be realigned south of its current location, requiring excavation into the adjacent hillside.

The project is intended to achieve the following primary objectives:

1. Alleviate public safety and flooding concerns due to seismic instability of the existing Lake Wohlford Dam.
2. Restore the City's municipal water-storage capacity in Lake Wohlford to its historic capacity of 6,500 acre-feet.
3. Restore water level in Lake Wohlford to previous levels and support fishing and other water-dependent recreational opportunities.
4. Provide a dam facility with a life expectancy of 100 years.
5. Minimize the project's temporary and long-term impact on the environment.

The replacement Lake Wohlford Dam would be constructed immediately downstream of the existing dam, with the replacement dam's crest approximately 200 feet downstream of the existing dam's crest. The replacement dam's crest would rise approximately 125 feet above the foundation grade, to an elevation of 1,490 feet above mean sea level (AMSL), and the crest would span approximately 650 feet from the right (north) abutment to the left (south) abutment.

1.2 PROJECT CONSTRUCTION

Oakvale Road Improvements

Oakvale Road skirts a steep rock face just southwest of the existing left abutment of the existing dam and conflicts with the proposed location for the replacement dam's left abutment. The project entails realigning approximately 1,200 feet of the road toward the south and straightening the road. To create enough of a surface that would accommodate the realignment, the project requires excavation into the hillside and removal of approximately 56,000 cubic yards of rock and earth.

The new road would be constructed to County standards and would be 28 feet wide, including two 12-foot lanes with a 3-foot bench constructed on the downhill (northern) side. Drainage improvements would include reconstruction of a storm drain beneath the western end of the

roadway improvements, and a new 18-inch storm drain beneath the road on the eastern side of the project limits.

Dam Foundation

Material would be excavated from the downstream canyon floor and rocky slopes to create a solid foundation and suitable surfaces to place the abutments. Consolidation grouting would be provided to ensure a more uniform foundation modulus for support of the dam. A double-row grout curtain would be installed in the foundation to strengthen the foundation and reduce seepage. Approximately 59,516 cubic yards of earth and rock are anticipated to be excavated for establishment of the dam foundation.

Right Abutment Access Road

The project would entail construction of a paved access road from the Lake Wohlford Marina to the right (north) abutment of the replacement dam. The road would provide construction access to the dam construction zone and, following completion of the project, would provide permanent maintenance and inspection access to the right abutment and the dam crest. Constructing the access road would require excavation into the hillside to create a level surface for installation of the road. A locked gate would be installed to prevent trespassing and unauthorized access to the dam crest.

Dam Construction

The dam would be constructed of roller-compacted concrete (RCC), which is a modern method of placing mass concrete for gravity dams. This method utilizes the materials of conventionally placed concrete (cement, coarse aggregate, sand, and water), but minimizes the water content to allow material handling with conventional soil-placing methods. RCC is placed using conveyors, dump trucks, dozers, and roller compactors. Like engineered soil placement, RCC is placed in thin layers starting from the base of the dam (usually 12 inches thick), as opposed to conventionally placed mass concrete, which is poured in large sections that are typically 5 feet thick. The RCC method reduces water content such that the mix is dry enough to prevent roller equipment from sinking, but wet enough to permit adequate distribution of the material in each layer. Approximately 100,000 cubic yards of RCC concrete are anticipated to be placed to form the dam. This phase of project construction is anticipated to involve 24-hour work (weather permitting) to maximize the effectiveness of placing the RCC layers.

Project engineers estimate the 100,000 cubic yards of RCC would require 175,000 tons of aggregate material, 9,250 tons of fly ash, and 8,750 tons of cement, or a total of 193,000 total tons of RCC material that would need to be delivered to the site.

A batch mixer would be established at the primary staging yard located at the Lake Wohlford Marina. RCC can be transported via truck or conveyor, or some combination of the two, and the project engineers intend to maintain flexibility in the transport mode, giving the contractor the option of establishing a conveyor or using trucks. However, the project design is likely to include a conveyor system for transporting material along the access road and placing the material onto the dam.

Demolition of Existing Dam and Existing Outlet Tower

After completion of the new dam construction, the hydraulic fill portion of the existing dam would be removed down to1,450 feet AMSL. A notch would be constructed in the existing dam to 1,420 feet AMSL to allow full flow access from the reservoir to the new outlet tower. The left abutment of the existing dam will be removed in its entirety to existing natural grade. Excavation quantity for the existing dam removal is estimated at approximately 37,100 cubic yards. The City intends to issue a bid alternative for this construction contract that would involve full removal of the existing dam. This would require additional drawdown of the reservoir, and additional excavation and off-hauling of material. The full demolition excavation is estimated at 22,000 additional cubic yards beyond that described above for the top part of the dam, for a total of 59,100 cubic yards of excavated material that would be hauled off-site.

1.3 CONSTRUCTION SCHEDULE

Total project construction, excluding reservoir dredging but including contractor mobilization and demobilization, is expected to require approximately 16 months. The Oakvale Road realignment excavation is anticipated to take approximately 4 months, followed by another month to construct the realigned road. Excavation of the foundation is anticipated to take 2 to 3 months. Establishment of the temporary access road is anticipated to take 1 to 2 months. The dam raise construction is anticipated to take 5 months. Demolition of the existing dam and existing outlet tower would take approximately 9 weeks.

SECTION 2
EXISTING CONDITIONS

2.1 SCIENTIFIC BASIS OF CLIMATE CHANGE

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. A portion of the solar radiation that enters the earth's atmosphere is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back toward space. This infrared radiation (i.e., thermal heat) is absorbed by GHGs within the earth's atmosphere. As a result, infrared radiation released from the earth that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on the earth.

GHGs are present in the atmosphere naturally, are released by natural and anthropogenic sources, and are formed from secondary reactions taking place in the atmosphere. Natural sources of GHGs include the respiration of humans, animals and plants, decomposition of organic matter, and evaporation from the oceans. Anthropogenic sources include the combustion of fossil fuels, waste treatment, and agricultural processes. The following are GHGs that are widely accepted as the principal contributors to human-induced global climate change:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF_6)
- Nitrogen Trifluoride (NF_3)

The majority of CO_2 emissions are byproducts of fossil fuel combustion. CH_4 is the main component of natural gas and is associated with agricultural practices and landfills. N_2O is a colorless GHG that results from industrial processes, vehicle emissions, and agricultural practices. HFCs are synthetic chemicals used as a substitute for chlorofluorocarbons in automobile air conditioners and refrigerants. PFCs are produced as a byproduct of various industrial processes associated with aluminum production and the manufacturing of semiconductors. SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable GHG used for insulation in electric power transmission and distribution equipment, and in semiconductor

manufacturing. NF_3 is used in the electronics industry during the manufacturing of consumer items, including photovoltaic solar panels and liquid-crystal-display (i.e., LCD) television screens.

Global warming potential (GWP) is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to CO_2. The GWP of a GHG is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time (i.e., lifetime) that the gas remains in the atmosphere ("atmospheric lifetime"). The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHGs that have been attributed to human activity include CH_4, which has a GWP of 28, and N_2O, which has a GWP of 265 (IPCC 2013). For example, 1 ton of CH_4 has the same contribution to the greenhouse effect as approximately 28 tons of CO_2. GHGs with lower emissions rates than CO_2 may still contribute to climate change, because they are more effective at absorbing outgoing infrared radiation than CO_2 (i.e., high GWP). The concept of CO_2-equivalents (CO_2e) is used to account for the different GWP potentials of GHGs to absorb infrared radiation.

Although the exact lifetime of any particular GHG molecule is dependent on multiple variables, it is understood by scientists who study atmospheric chemistry that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. GHG emissions related to human activities have been determined as "extremely likely" to be responsible (indicating 95% certainty) for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's atmosphere and oceans, with corresponding effects on global circulation patterns and climate (ARB 2014a).

2.2 GHG EMISSION SOURCES

GHG emissions contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, electric utility, residential, commercial, and agricultural categories. The majority of CO_2 emissions are byproducts of fossil fuel combustion, and CH_4, a highly potent GHG, is the primary component in natural gas and is associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management.

For purposes of accounting for and regulating GHG emissions, sources of GHG emissions are grouped into emission categories. The California Air Resources Board (ARB) identifies the following main GHG emission categories that account for most anthropogenic GHG emissions generated within California:

- *Transportation:* On-road motor vehicles, recreational vehicles, aviation, ships, and rail

- *Electric Power:* Use and production of electrical energy
- *Industrial:* Mainly stationary sources (e.g., boilers and engines) associated with process emissions
- *Commercial and Residential:* Area sources, such as landscape maintenance equipment, fireplaces, and consumption of natural gas for space and water heating
- *Agriculture:* Agricultural sources that include off-road farm equipment; irrigation pumps; crop residue burning (CO_2); and emissions from flooded soils, livestock waste, crop residue decomposition, and fertilizer volatilization (CH_4 and N_2O)
- *High GWP:* Refrigerants for stationary and mobile-source air conditioning and refrigeration, electrical insulation (e.g., SF_6), and various consumer products that use pressurized containers
- *Recycling and Waste:* Waste management facilities and landfills; primary emissions are CO_2 from combustion and CH_4 from landfills and wastewater treatment

California

ARB performs an annual GHG inventory for emissions and sinks of the six major GHGs. California produced 459 million metric tons (MMT) of CO_2e in 2012. As shown in Figure 1, combustion of fossil fuel in the transportation category was the single largest source of California's GHG emissions in 2012, accounting for 36% of total GHG emissions in the state. The transportation category was followed by the electric power category (including in-state and out-of-state sources), which accounts for 21% of total GHG emissions in California, and the industrial category, which accounts for 19% of the state's total GHG emissions (ARB 2014b).

San Diego County

The University of San Diego School of Law, Energy Policy Initiative Center, prepared a GHG inventory for San Diego County in 2008. The inventory was updated in 2014 using the best available data and following the U.S. Community Protocol for Accounting and Reporting of GHG Emissions (University of San Diego 2014). Total GHG emissions in San Diego County in 2012 were estimated to be 32.9 MMT of CO_2e. This represents an 11% increase compared to 1990 emissions levels of 29.5 MMT CO_2e (University of San Diego 2014). Transportation is the largest emissions sector, accounting for approximately 14 MMT of CO_2e, or 41% of total emissions. Energy consumption, including electricity and natural gas use, is the next largest source of emissions, at 32% of the total.

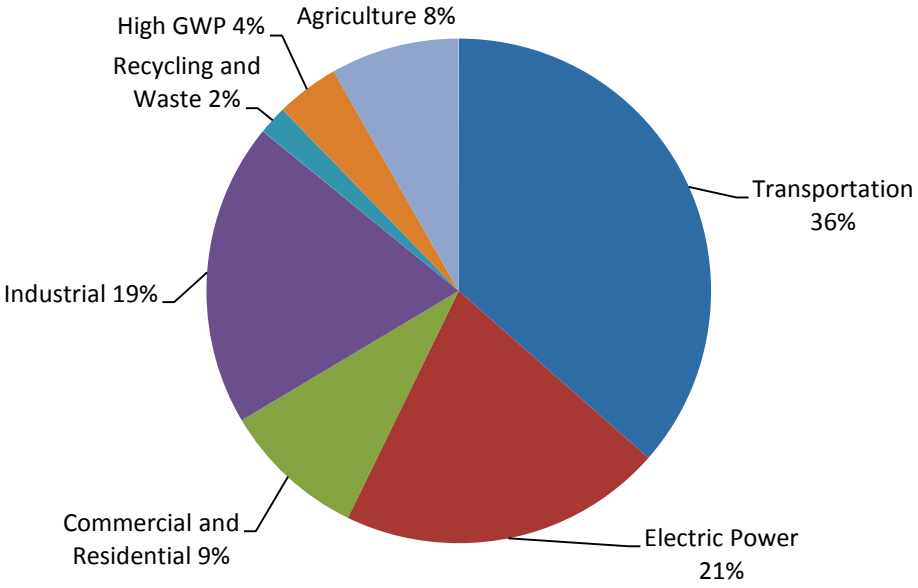

Figure 1. 2012 California GHG Emissions by Category

City of Escondido

In February 2011, the City of Escondido completed a 2005 GHG emissions inventory of both municipal and community-wide GHG emissions through participation in the San Diego Foundation's Regional Climate Protection Initiative. In 2013, the City developed the Escondido Climate Action Plan (E-CAP) that revised the 2005 inventory and also developed emission estimates for 2010, 2020, and 2035. As a result of changes to assumptions for vehicle miles traveled (VMT) and water estimates, the revised community-wide inventory estimated the 2005 emissions at 927,266 metric tons (MT) CO_2e.

The GHG emissions for 2010 were 886,118 MT CO_2e from community-wide activities and 18,143 MT CO_2e from municipal operations. Energy consumption is the largest source of emissions in the 2010 GHG inventory, at 45% of the total. Transportation is the next largest emissions sector, accounting for approximately 42% of total emissions. Accounting for future population and economic growth, the City estimates that GHG emissions will increase to approximately 992,583 MT CO_2e in 2020 and 1,230,182 MT CO_2e in 2035.

2.3 GLOBAL CLIMATE TRENDS AND ASSOCIATED IMPACTS

Trends of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) concluded that variations in natural phenomena, such as solar radiation and volcanoes, produced most of the warming of the earth from pre-industrial times to 1950. These variations in natural phenomena also had a small cooling effect. From 1950 to the present, increasing GHG concentrations resulting from human activity, such as fossil fuel burning and deforestation, have been responsible for most of the observed temperature increase.

Global surface temperature has increased by approximately 1.53 degrees Fahrenheit (°F) over the last 140 years (IPCC 2013); however, the rate of increase in global average surface temperature has not been consistent. The last three decades have warmed at a much faster rate per decade (IPCC 2013).

During the same period when increased global warming has occurred, many other changes have occurred in other natural systems. Sea levels have risen; precipitation patterns throughout the world have shifted, with some areas becoming wetter and others drier; snowlines have risen in elevation, resulting in changes to the snowpack, runoff, and water storage; and numerous other conditions have been observed. Although it is difficult to prove a definitive cause-and-effect relationship between global warming and other observed changes to natural systems, there is a high level of confidence in the scientific community that these changes are a direct result of increased global temperatures caused by the increased presence of GHGs in the atmosphere (IPCC 2013).

Additional changes related to climate change can be expected by the year 2050 and on to the end of the century, including the following:

- California's mean temperature may rise by 2.7°F by 2050 and by 4.1°F to 8.6°F by the end of the century (CEC 2012). Temperatures in San Diego County may rise by 3.2°F to 5.7°F during that same period (CEC 2014).
- A consistent rise in sea level has been recorded worldwide over the last 100 years. Rising average sea level over the past century has been attributed primarily to warming of the world's oceans, the related thermal expansion of ocean waters, and the addition of water to the world's oceans from the melting of land-based polar ice (IPCC 2007). Sea level rise is expected to continue, and the most recent climate science report, Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, has

estimated that sea levels along the U.S. Pacific coast will increase by up to 66 inches by 2100 (NRC 2012). The project area would not be subject to flooding as a result of sea level rise related to climate change.

- Various California climate models provide mixed results regarding forecasted changes in total annual precipitation in the state through the end of this century. However, recent projections suggest that 30-year statewide average precipitation will decline by more than 10% (CEC 2012).
- Historically, extreme warm temperatures in the San Diego region have mostly occurred in July and August, but as climate warming continues, the occurrences of these events will likely begin in June and could continue to take place into September. All simulations indicate that hot daytime and nighttime temperatures (heat waves) will increase in frequency, magnitude, and duration (San Diego Foundation 2008).

SECTION 3
REGULATORY FRAMEWORK

3.1 FEDERAL STANDARDS

The Environmental Protection Agency (EPA) is the federal agency responsible for implementing the federal Clean Air Act (CAA). The Supreme Court of the United States ruled on April 2, 2007, that CO_2 is an air pollutant as defined under the CAA, and that EPA has the authority to regulate emissions of GHGs.

Greenhouse Gas Findings under the Federal Clean Air Act

On December 7, 2009, EPA signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—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 Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Although these findings did not themselves impose any requirements on industries or other entities, this action was a prerequisite to finalizing EPA's *Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles*. On May 7, 2010, the final *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards* were published in the Federal Register. The emissions standards will require model year 2016 vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, which is equivalent to 35.5 miles per gallon if the automobile industry were to meet this CO_2 level solely through fuel economy improvements.

On August 28, 2012, the U.S. Department of Transportation (USDOT) and EPA issued a joint Final Rulemaking requiring additional federal GHG and fuel economy standards for model year 2017 through 2025 passenger cars and light-duty trucks. The standards would require these

vehicles to meet an estimated combined average emissions level of 163 grams of CO_2 per mile in model year 2025, which is equivalent to 54.5 miles per gallon if the improvements were made solely through fuel efficiency.

In addition to the standards for light-duty vehicles, USDOT and EPA adopted complementary standards to reduce GHG emissions and improve the fuel efficiency of heavy-duty trucks and buses on September 15, 2011. These standards together form a comprehensive heavy-duty national program for all on-road vehicles rated at a gross vehicle weight at or above 8,500 pounds for model years 2014 through 2018. The standards will phase in with increasing stringency in each model year from 2014 through 2018. The EPA standards adopted for 2018 will represent an average per-vehicle reduction in GHG emissions of 17% for diesel vehicles and 12% for gasoline vehicles (EPA 2011). The President has directed USDOT and EPA to develop and issue the next phase of heavy-duty vehicle fuel efficiency and GHG standards by March 2016.

Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, EPA published the Final Mandatory Greenhouse Gas Reporting Rule (Reporting Rule) in the Federal Register. The Reporting Rule requires reporting of GHG data and other relevant information from fossil fuel and industrial GHG suppliers, vehicle and engine manufacturers, and all facilities that would emit 25,000 MT or more of CO_2e per year. Facility owners are required to submit an annual report with detailed calculations of facility GHG emissions on March 31 for emissions from the previous calendar year. The Reporting Rule also mandates recordkeeping and administrative requirements to enable EPA to verify the annual GHG emissions reports.

Council on Environmental Quality Guidance

On February 18, 2010, the Council on Environmental Quality (CEQ) chair issued a memorandum titled *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (CEQ 2010). The draft guidance recognizes that many federal actions would result in the emission of GHGs, and that, where a proposed federal action may emit GHG emissions "in quantities that the agency finds may be meaningful," CEQ proposes that the federal agency's National Environmental Policy Act (NEPA) analysis focus on aspects of the environment that are affected by the proposed action and the significance of climate change for those aspects of the affected environment. In particular, the guidance proposes a reference point of 25,000 MT per year of direct GHG emissions as a "useful indicator" of when federal agencies should evaluate climate change impacts in their NEPA documents. CEQ notes

that this indicator is not an absolute standard or threshold to trigger the discussion of climate change impacts.

On December 18, 2014, CEQ released revised draft guidance that supersedes the draft GHG and climate change guidance released by CEQ in February 2010. The revised draft guidance applies to all proposed Federal agency actions, including land and resource management actions. This guidance explains that agencies should consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHG emissions, and the implications of climate change for the environmental effects of a proposed action (CEQ 2014). The guidance encourages agencies to draw from their experience and expertise to determine the appropriate level (broad, programmatic or project- or site-specific) and type (quantitative or qualitative) of analysis required to comply with NEPA. The guidance recommends that agencies consider 25,000 MT CO2e on an annual basis as a reference point below which a quantitative analysis of GHG emissions is not recommended unless it is easily accomplished based on available tools and data (CEQ 2014).

3.2 STATE STANDARDS

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act.

Assembly Bill 1493

Assembly Bill (AB) 1493 requires ARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with model year 2009. In June 2009, the EPA Administrator granted a CAA waiver of preemption to California. This waiver allowed California to implement its own GHG emissions standards for motor vehicles beginning with model year 2009.

ARB's Advanced Clean Cars program builds on efforts to improve fuel economy and reduce GHG emissions for passenger vehicles and light-duty trucks. The standards were developed in coordination with the federal government and combine fuel economy and GHG emissions. In January 2012, ARB approved a new fuel economy and emissions-control program for model years 2017 through 2025. On August 28, 2012, NHTSA and EPA issued a final rulemaking for fuel-economy and GHG standards for model year 2017 through 2025 passenger vehicles and light-duty trucks. The federal standards adopted are considered appropriate for California and create a single national program for manufacturers that addresses both fuel economy standards

and GHG emissions. The Advanced Clean Cars Program also includes the LEV III amendments to the LEV regulations and Zero Emission Vehicle Program. The Zero Emission Vehicle Program is designed to achieve California's long-term emission reduction goals by requiring manufacturers to offer for sale specific numbers of the very cleanest cars available.

Executive Order S-3-05

Executive Order S-3-05, signed in June 2005, proclaimed that California is vulnerable to the impacts of climate change. Executive Order S-3-05 declared that increased temperatures could reduce the Sierra Nevada's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established total GHG emissions targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050.

Assembly Bill 32

In 2006, California passed the California Global Warming Solutions Act of 2006 (AB 32; California Health and Safety Code Division 25.5, Sections 38500, et seq.). AB 32 further details and puts into law the mid-term GHG reduction target established in Executive Order S-3-05: reduce GHG emissions to 1990 levels by 2020. AB 32 also identifies ARB as the state agency responsible for the design and implementation of emissions limits, regulations, and other measures to meet the target.

In December 2008, ARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which contains the main strategies California will implement to achieve the required GHG reductions required by AB 32 (ARB 2008). The Scoping Plan also includes ARB-recommended GHG reductions for each emissions sector of California's GHG inventory. ARB further acknowledges that decisions about how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emissions sectors.

ARB is required to update the Scoping Plan at least once every 5 years to evaluate progress and develop future inventories that may guide this process. ARB approved the first update to the Climate Change Scoping Plan: Building on the Framework in June 2014 (ARB 2014a). The Scoping Plan update includes a status of the 2008 Scoping Plan measures and other federal, state, and local efforts to reduce GHG emissions in California, and potential actions to further reduce GHG emissions by 2020.

Executive Order S-1-07

Executive Order S-1-07, which was signed by then California Governor Arnold Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at more than 40% of statewide emissions. Executive Order S-1-07 establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10% by 2020. ARB adopted the Low Carbon Fuel Standard (LCFS) on April 23, 2009. ARB is currently considering readoption of an updated LCFS in 2015.

Senate Bill 97

Senate Bill (SB) 97 required the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

Senate Bill 375

SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or an Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). On September 23, 2010, ARB adopted regional GHG targets for passenger vehicles and light trucks for 2020 and 2035 for the 18 MPOs in California. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

The San Diego Association of Governments' (SANDAG) current GHG targets are per capita CO_2 emission reductions from passenger vehicles of 7% by 2020 and 13% by 2035 relative to 2005 levels. SANDAG adopted the 2050 RTP/SCS in 2011 (SANDAG 2011). ARB reviewed the adopted RTP/SCS and determined that, if implemented, it would achieve the reduction targets for the San Diego region in compliance with SB 375.

ARB is required to update the regional GHG targets at least every 8 years and may revise them every 4 years. ARB is planning to revise the 2035 GHG targets for the four largest MPOs, including SANDAG, in 2015.

Executive Order B-30-15

In April 2015, Governor Edmund Brown issued an executive order establishing a statewide GHG reduction goal of 40 percent below 1990 levels by 2030. The emission reduction target acts as an interim goal between the AB 32 goal (i.e., achieve 1990 emission levels by 2020) and Governor Brown's Executive Order S-03-05 goal of reducing statewide emissions 80 percent below 1990 levels by 2050. In addition, the executive order aligns California's 2030 GHG reduction goal with the European Union's reduction target (i.e., 40 percent below 1990 levels by 2030) that was adopted in October 2014.

3.3 LOCAL STANDARDS

ARB also acknowledges that local governments have broad influence and, in some cases, exclusive jurisdiction over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations.

San Diego Air Pollution Control District

In San Diego County, the San Diego Air Pollution Control District (SDAPCD) is the agency responsible for protecting public health and welfare through the administration of federal and state air quality laws and policies. The SDAPCD has no regulations relative to GHG emissions.

City of Escondido

General Plan

The City of Escondido adopted an updated General Plan in 2012. The following policies contained in the Resource Conservation Element of the General Plan are applicable to the project:

- *Goal 6*. Preservation and protection of the City's surface water and groundwater quality and resources.
- *Water Resources and Quality Policy 6.2*. Protect the surface water resources in the city including Lake Wohlford, Dixon Lake, Lake Hodges, Escondido Creek, and other waterways.
- *Goal 7*. Improved air quality in the city and the region to maintain the community's health and reduce green-house gas emissions that contribute to climate change.

- *Air Quality and Climate Protection Policy 7.1*. Participate in regional planning efforts and coordinate with the San Diego Air Pollution Control District and San Diego Association of Governments in their efforts to reduce air quality impacts and attain state and federal air quality standards.
- *Air Quality and Climate Protection Policy 7.2*. Reduce regional greenhouse gas emissions through the following measures including, but not limited to:
    a) Implementing land use patterns that reduce automobile dependence (compact, mixed-use, pedestrian, and transit-oriented development, etc.);
    b) Reducing the number of vehicular miles traveled through implementation of Transportation Demand Management programs, jobs-housing balance, and similar techniques;
    c) Supporting public transportation improvements;
    d) Encouraging the use of alternative modes of transportation by expanding public transit, bicycle, and pedestrian networks and facilities;
    e) Participating in the development of park-and-ride facilities;
    f) Maintaining and updating the City's traffic signal synchronization plan;
    g) Promoting local agriculture;
    h) Promoting the use of drought-tolerant landscaping; and
    i) Encouraging the use of non-polluting alternative energy systems.
- *Air Quality and Climate Protection Policy 7.3*. Require that new development projects incorporate feasible measures that reduce construction and operational emissions.
- *Air Quality and Climate Protection Policy 7.4*. Locate uses and facilities/operations that may produce toxic or hazardous air pollutants an adequate distance from each other and from sensitive uses such as housing and schools as consistent with California Air Resources Board recommendations.
- *Air Quality and Climate Protection Policy 7.7*. Encourage businesses to alter local truck delivery schedules to occur during non-peak hours, when feasible.
- *Air Quality and Climate Protection Policy 7.8*. Require that government contractors minimize greenhouse gas emissions in building construction and operations, which can be accomplished through the use of low or zero-emission vehicles and equipment.

- *Air Quality and Climate Protection Policy 7.10*. Purchase low-emission vehicles for the City's fleet and use clean fuel sources for trucks and heavy equipment, when feasible.
- *Air Quality and Climate Protection Policy 7.11*. Educate the public about air quality, its effect on health, and efforts the public can make to improve air quality and reduce greenhouse gas emissions.

Climate Protection Plans

The City of Escondido has taken steps to address climate change impacts at a local level. The City adopted the E-CAP in December 2013. The development of the E-CAP coincided with the City's General Plan Update. The E-CAP provides an analysis of GHG emissions and sources attributable to the City of Escondido, estimates on how those emissions are expected to increase with the General Plan, recommended policies and actions that can reduce GHG emissions to meet state and federal targets, a timeline of implementation, and a defined tracking and reporting mechanism that measures progress toward the goals.

Pursuant to the state's adopted AB 32 GHG reduction target, Escondido has set a goal to reduce emissions back to 1990 levels by the year 2020. This target was calculated as a 15% decrease from 2005 levels, as recommended in the AB 32 Scoping Plan. To reach the reduction target, the City would implement additional local reduction measures that encourage energy efficiency and renewable energy in buildings, transit-oriented planning, water conservation, and increase waste diversion. After 2020, many of the E-CAP and statewide reduction measures would continue to reduce GHG emissions.

SECTION 4
ANALYSIS OF IMPACTS

4.1 THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the CEQA Guidelines, a project's GHG emissions and its incremental contribution to global climate change would be considered significant if it would do either of the following:

- generate GHG emissions, either directly or indirectly, that may have a significant cumulative impact on the environment, or
- conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

The SDAPCD has neither quantitative thresholds nor specific guidelines for determining the significance of impacts under CEQA. The City of Escondido has adopted a Climate Action Plan and established a threshold of 2,500 MT CO_2e per year as a project-level GHG significance threshold that would apply to land use development projects (City of Escondido 2013). The threshold was set at a level that would account for both operational and construction emissions attributable to new development projects through 2020. The emissions level is considered a threshold above which a project would require "project-specific technical analysis to quantify and mitigate project emissions" (City of Escondido 2013). The project site is located outside the City's municipal boundaries, within unincorporated San Diego County. The County of San Diego is in the process of developing a Climate Action Plan, but this document has not been finalized and adopted. The County Planning and Development Services Department has issued recommended guidance until the County adopts the Climate Action Plan (County of San Diego 2015), but these guidelines are non-binding. Because the County of San Diego has not officially adopted a Climate Action Plan or significance threshold for GHG emissions, the City has elected to apply their adopted threshold for GHG emissions in analyzing the impacts of the project pursuant to CEQA.

Although the threshold was established primarily for land use development projects with ongoing operational emissions (e.g., residential and commercial projects), this analysis conservatively compares the construction emissions for the proposed project to the adopted threshold. Since the specific month that project construction would start can vary, the proposed project's annual average construction emissions over the duration of the project will be compared with the 2,500 MT CO_2e per year threshold to determine significance.

The Federal Energy Regulatory Commission (FERC) is the federal lead agency on this project, and NEPA analysis is provided for their use in environmental review and federal permitting needs. The NEPA analysis is based on the CEQ guidance. The CEQ guidance explains that agencies should consider both the estimated GHG emissions and the implications of climate change for the environmental effects of a proposed action. If the project exceeds 25,000 MT CO2e per year, the project would have a significant effect on the environment.

4.2 METHODOLOGY

Construction-related exhaust emissions for the proposed project were estimated for construction worker commutes, haul trucks, and the use of off-road equipment. GHG emissions generated by construction activities would be primarily in the form of CO_2. Although emissions of other GHGs, such as CH_4 and N_2O, are important with respect to global climate change, the emission levels of these other GHGs from on- and off-road vehicles used during construction are relatively small compared with CO_2 emissions, even when factoring in the relatively larger global warming potential of CH_4 and N_2O.

Construction-related emissions for the proposed project were estimated using emission factors from ARB's OFFROAD and EMFAC 2011 inventory models (ARB 2013). Construction emissions from the operation of diesel-fueled off-road equipment were estimated by multiplying daily usage (i.e., hours per day) and total days of construction by OFFROAD equipment-specific emission factors. GHG emissions from on-road motor vehicles were estimated using vehicle trips, VMT, and EMFAC2011 mobile source emission factors. The emission factors represent the fleet-wide average emission factors within San Diego County.

The proposed project is not anticipated to generate new vehicle trips and would not generate any additional activities related to maintenance or operations that would exceed existing levels. The proposed project would not significantly increase the generation or use of electricity, water, wastewater, and solid waste. Therefore, operational GHG emissions were not estimated for the proposed project.

4.3 PROJECT IMPACTS

This section determines whether the potential impacts from project construction and operation would result in a significant impact. Significant impacts are defined below in relation to the thresholds of significance outlined in Section 4.1. If the project would exceed a threshold and potentially result in a significant impact, mitigation measures are required to reduce the potential

impact to below a level of significance. If the project would not exceed a threshold, mitigation measures are not required, although recommended measures are provided below to help reduce project air emissions.

Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction-related GHG exhaust emissions would be generated by sources such as heavy-duty off-road equipment, trucks hauling materials to the site, and construction worker commutes. Project construction is estimated to occur over approximately 16 months. The Oakvale Road realignment excavation is anticipated to take approximately 4 months, followed by another month to construct the realigned road. Excavation of the foundation is anticipated to take 2 to 3 months. Establishment of the temporary access road is anticipated to take 1 to 2 months. The dam raise construction is anticipated to take 5 months.

Consistent with the traffic analysis for the proposed project, construction emissions were estimated using the earliest calendar year when construction could begin (i.e., 2015) to generate conservative estimates. If construction occurs in later years, advancements in engine technology, retrofits, and turnover in the equipment fleet are anticipated to result in lower levels of emissions.

As shown in Table 1, the total construction-related emissions over the construction period for the project would be approximately 3,561 MT CO_2e, which would result in approximately 1,781 MT CO_2e per year of construction.

Table 1
Construction-Related GHG Emissions (MT CO_2e/yr)

Year	Emissions (MT CO_2e)
2015	1,018
2016	2,527
Total	**3,545**
Annual Average Emissions	**1,772**
Significance Threshold	**2,500**
Exceeds Threshold?	**No**

MT CO_2e = metric tons of carbon dioxide equivalent
Note: Totals may not add due to rounding.
Additional details available in Appendix A.
Source: Modeled by AECOM in 2015

As shown in Table 1, the annual average construction-related CO_2e emissions associated with the proposed project would be less than the 2,500 MT threshold of significance recommended by the City of Escondido. Therefore, the project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. This impact would be less than significant.

The total GHG emissions would also not exceed the CEQ threshold of 25,000 MT CO2e per year. Therefore, the proposed project would not result in a substantial adverse effect related to the generation of greenhouse gas emissions, either directly or indirectly, that may have a significant effect on the environment.

Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG?

The project is outside the City's municipal boundaries, in unincorporated San Diego County. At the time of this writing, the County of San Diego's Climate Action Plan has not been adopted, and therefore, cannot be considered as an approved plan. Therefore, for the purposes of this analysis, the applicable GHG reduction plan to evaluate the project against is the E-CAP. The E-CAP is an approved plan that was designed to fulfill the requirements identified in CEQA Guidelines Section 15183.5. One of the goals of the E-CAP is to allow programmatic level review and mitigation of GHG emissions that allows streamlining of CEQA review for subsequent development projects. Therefore, for the purposes of this analysis, the applicable GHG reduction plans to evaluate the project against are the statewide AB 32 Scoping Plan and the E-CAP. Projects that would be consistent with the goals and strategies of the AB 32 Scoping Plan and the E-CAP would be considered not to conflict with the state's purpose of reducing GHG emissions.

ARB's First Update to the Climate Change Scoping Plan: Building on the Framework includes measures to meet California's goal of reducing emissions to 1990 levels by 2020 and also reiterates the state's role in the long-term goal established in Executive Order S-3-05, which is to reduce GHG emissions to 80% below 1990 levels by 2050. The Scoping Plan Update confirms that the state is on track to meet the 2020 emissions reduction target, but will need to maintain and build upon its existing programs, scale up deployment of clean technologies, and provide more low-carbon options to accelerate GHG emission reductions, especially after 2020, in order to meet the 2050 target. However, the plan does not recommend additional measures for meeting specific GHG emissions limits beyond 2020. In general, the measures described in the plan are designed to meet emissions goals in 2020 and do not become increasingly stringent until after 2020.

The Scoping Plan did not directly create any regulatory requirements for construction of the proposed project. However, measures included in the Scoping Plan would indirectly address GHG emissions levels associated with construction activities, including the phasing-in of cleaner technology for diesel engine fleets (including construction equipment) and the development of a low-carbon fuel standard. The proposed project would comply with any mandate or standards set forth by the Scoping Plan update.

The General Plan also includes implementation tools that are presented as separate policies and documents related to the proposed project. The Resource Conservation Element of the General Plan has goals to preserve and protect the City's surface water (Goal 6) and protect the surface water resources in the City, including Lake Wohlford (Water Resources and Quality Policy 6.2). The General Plan also includes policies to require that new development projects incorporate feasible measures that reduce construction and operational emissions (Air Quality and Climate Protection Policy 7.3) and to encourage businesses to alter local truck delivery schedules to occur during non-peak hours, when feasible (Air Quality and Climate Protection Policy 7.7).

The E-CAP is an implementation tool of the General Plan to guide development in Escondido by focusing on attaining the various goals and policies of the General Plan while also achieving GHG reduction goals. The E-CAP includes actions that encourage energy efficiency and renewable energy in buildings, transit-oriented planning, water conservation, and increased waste diversion. With respect to the project, Measure R2-C1, Construction Emissions Reductions, includes the following options for projects to reduce construction-related emissions:

- Turn off all diesel-powered vehicles and gasoline-powered equipment when not in use for more than five minutes.
- Use electric or natural gas-powered construction equipment in lieu of gasoline or diesel-powered engines, where feasible.
- Require 10 percent of the construction fleet to use any combination of diesel catalytic converters, diesel oxidation catalysts, diesel particulate filters, and/or CARB-certified Tier III equipment or better.
- Support and encourage ridesharing and transit incentives for the construction crew.

During the CEQA review process, the City will screen proposed projects to determine if compliance with the E-CAP measures is required. According to the City, projects that generate less than 2,500 MT CO_2e would be considered to have a "less than significant GHG emissions impact" and would have a difficult time implementing the R2 measures (City of Escondido 2013). As shown in Table 1, the average annual emissions for the proposed project would not

exceed the threshold of significance. Therefore, the proposed project would be consistent with the goals of the E-CAP and implementation of Measure R2-C1 is not required.

The 2014 CEQ guidance also states that agencies should consider the implications of climate change for the environmental effects of a proposed action. Climate change can affect the environment of a proposed action in a variety of ways. Climate change can increase the vulnerability of a resource, ecosystem, human community, or structure, which would then be more susceptible to climate change and other effects and result in a proposed action's effects being more environmentally damaging.

The purpose of the proposed project is to restore the City's municipal water-storage capacity and alleviate a public safety concern. The proposed project would protect infrastructure and resources by proactively improving and upgrading the Lake Wohlford Dam. The project would thus help avoid reactive rebuilding and repairing expenditures as a result of natural disasters or infrastructure failure, which would lead to losses and disruptions to economic activities and reduction in the quality of life of local residents in the case that a flood event impacted the area. The intent, purpose, and functions of the proposed project are consistent with the goals of the AB 32 Scoping Plan to protect against the detrimental effects of climate change.

The project would be consistent with the goals and strategies of the ARB Scoping Plan update and the E-CAP. Therefore, the project would not conflict with any applicable plan, policy, or regulation for the purpose of reducing GHG emissions. This impact would be less than significant.

SECTION 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. The project would not conflict with any applicable plan, policy, or regulation for the purpose of reducing GHG emissions. This impact would be considered less than significant. Therefore, the project would not result in any significant climate change impacts.

5.2 RECOMMENDATIONS

No mitigation measures or GHG emissions reduction measures are recommended.

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SECTION 6
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APPENDIX A

MODELING DATA

Lake Wohlford Dam
Construction Emissions Summary
Unmitigated

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e
YEAR 2015						YEAR 2015					
Oakvale Road	*10.69*	*108.83*	*44.04*	*65.97*	*17.62*	*0.66*	*6.18*	*2.75*	*2.72*	*0.78*	*1,017.16*
Construction Equipment	10.52	107.44	40.75	3.87	3.31	0.65	6.11	2.59	0.23	0.21	966.59
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				61.89	14.18				2.48	0.57	
Year 2015 Maximum Daily	10.69	108.83	44.04	65.97	17.62	0.66	6.18	2.75	2.72	0.78	1,017.16
YEAR 2016						YEAR 2016					
Dam Foundation	*13.93*	*133.56*	*51.70*	*81.41*	*18.06*	*0.42*	*4.01*	*1.55*	*2.44*	*0.54*	*722.56*
Construction Equipment	13.77	132.18	48.41	4.55	3.93	0.41	3.97	1.45	0.14	0.12	692.22
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	30.34
Fugitive Dust				76.65	14.01				2.30	0.42	
Temporary Access Road	*6.29*	*51.11*	*29.60*	*164.67*	*27.76*	*0.13*	*1.02*	*0.59*	*3.29*	*0.56*	*142.25*
Construction Equipment	6.13	49.72	26.31	2.19	2.02	0.12	0.99	0.53	0.04	0.04	122.02
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	20.23
Fugitive Dust				162.27	25.63				3.25	0.51	
Replacement Dam	*19.20*	*206.87*	*74.59*	*115.53*	*20.22*	*0.96*	*10.34*	*3.73*	*5.78*	*1.01*	*1,527.20*
Construction Equipment	19.04	205.49	71.30	6.96	6.09	0.95	10.27	3.56	0.35	0.30	1,476.63
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				108.36	14.01				5.42	0.70	
Demolition of Existing Dam	*1.10*	*29.85*	*7.55*	*94.46*	*14.78*	*0.02*	*0.67*	*0.17*	*2.13*	*0.33*	*133.00*
Construction Equipment	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	110.24
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.76
Fugitive Dust				93.51	14.16				2.10	0.32	
Year 2016 Maximum Daily	19.20	206.87	74.59	164.67	27.76	1.53	16.04	6.04	13.64	2.44	2,525.02
											3,542.18

Lake Wohlford Dam
Construction Emissions Summary
Mitigated

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e
YEAR 2015						YEAR 2015					
Oakvale Road	*10.69*	*108.83*	*44.04*	*28.84*	*9.11*	*0.66*	*6.18*	*2.75*	*1.24*	*0.44*	*1,017.16*
Construction Equipment	10.52	107.44	40.75	3.87	3.31	0.65	6.11	2.59	0.23	0.21	966.59
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				24.75	5.67				0.99	0.23	
Year 2015 Maximum Daily	10.69	108.83	44.04	28.84	9.11	0.66	6.18	2.75	1.24	0.44	1,017.16
YEAR 2016						YEAR 2016					
Dam Foundation	*13.93*	*133.56*	*51.70*	*35.42*	*9.65*	*0.42*	*4.01*	*1.55*	*1.06*	*0.29*	*722.56*
Construction Equipment	13.77	132.18	48.41	4.55	3.93	0.41	3.97	1.45	0.14	0.12	692.22
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	30.34
Fugitive Dust				30.66	5.61				0.92	0.17	
Temporary Access Road	*6.29*	*51.11*	*29.60*	*56.50*	*11.31*	*0.13*	*1.02*	*0.59*	*1.13*	*0.23*	*142.25*
Construction Equipment	6.13	49.72	26.31	2.19	2.02	0.12	0.99	0.53	0.04	0.04	122.02
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	20.23
Fugitive Dust				54.10	9.17				1.08	0.18	
Replacement Dam	*19.20*	*206.87*	*74.59*	*46.84*	*13.35*	*0.96*	*10.34*	*3.73*	*2.34*	*0.67*	*1,527.20*
Construction Equipment	19.04	205.49	71.30	6.96	6.09	0.95	10.27	3.56	0.35	0.30	1,476.63
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				39.67	7.14				1.98	0.36	
Demolition of Existing Dam	*1.10*	*29.85*	*7.55*	*38.35*	*6.28*	*0.02*	*0.67*	*0.17*	*0.86*	*0.14*	*133.00*
Construction Equipment	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	110.24
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.76
Fugitive Dust				37.41	5.66				0.84	0.13	
Year 2016 Maximum Daily	19.20	206.87	74.59	56.50	13.35	1.53	16.04	6.04	5.40	1.32	2,525.02
											3,542.18

1771.08909

Oakvale Road Improvements

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Vegetation Removal																		
Dozers < = 175	Dozer - D7	1	8	240	15	1.55	11.16	6.67	0.63	0.58	0.01	0.08	0.05	0.00	0.00	7.77	0.00	7.10
Excavators > 50 and < = 120	Excavator - 1CY, 40,000 lbs	1	8	110	15	0.73	4.63	4.08	0.36	0.33	0.01	0.03	0.03	0.00	0.00	4.42	0.00	4.03
Water Truck	3,000 gal water truck	1	8	230	15	1.00	7.85	2.96	0.26	0.24	0.01	0.06	0.02	0.00	0.00	9.99	0.00	9.11
Other Construction Equipment > 120 and < = 175	Brush Chipper	1	8	174	15	0.64	5.31	4.69	0.27	0.24	0.00	0.04	0.04	0.00	0.00	6.39	0.00	5.83
	Highway Truck (25,000 lbs)	1	120		1,800	0.08	2.37	0.35	0.06	0.04	0.00	0.02	0.00	0.00	0.00	3.37	0.00	3.06
Total						**4.00**	**31.32**	**18.75**	**1.58**	**1.44**	**0.03**	**0.23**	**0.14**	**0.01**	**0.01**	**31.93**	**0.00**	**29.13**
Rock Scaling																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	1	8	175	20	0.54	3.92	2.74	0.12	0.11	0.01	0.04	0.03	0.00	0.00	15.05	0.00	13.71
Excavators > 50 and < = 120	Excavator - 1CY, 40,000 lbs	1	8	110	20	0.73	4.63	4.08	0.36	0.33	0.01	0.05	0.04	0.00	0.00	5.89	0.00	5.38
Total						**1.27**	**8.55**	**6.82**	**0.48**	**0.44**	**0.01**	**0.09**	**0.07**	**0.00**	**0.00**	**20.94**	**0.00**	**19.08**
Material Excavation																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	2	8	175	80	1.09	7.84	5.48	0.23	0.21	0.04	0.31	0.22	0.01	0.01	120.39	0.00	109.65
Excavators > 250 and < = 500	Excavator - 3.5 CY	2	8	384	80	2.52	18.59	7.94	0.66	0.61	0.10	0.74	0.32	0.03	0.02	149.59	0.01	136.36
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	80	0.87	7.24	2.85	0.23	0.22	0.03	0.29	0.11	0.01	0.01	54.96	0.00	50.09
Dozers < = 175	Dozer - D6	2	8	145	80	3.11	22.31	13.33	1.26	1.16	0.12	0.89	0.53	0.05	0.05	82.87	0.01	75.69
Generator Sets > 25 and < = 50	Generators	1	8	210	80	0.56	2.10	1.97	0.15	0.14	0.02	0.08	0.08	0.01	0.01	9.80	0.00	8.97
Water Truck	3,000 gal water truck	1	8	230	80	1.00	7.85	2.96	0.26	0.24	0.04	0.31	0.12	0.01	0.01	53.29	0.00	48.59
	Highway Truck (25,000 lbs)	10	2,100		168,000	1.37	41.51	6.20	1.07	0.73	0.05	1.66	0.25	0.04	0.03	314.07	0.00	285.83
Total						**10.52**	**107.44**	**40.75**	**3.87**	**3.31**	**0.42**	**4.30**	**1.63**	**0.15**	**0.13**	**784.96**	**0.03**	**715.18**
Slope Stabilization																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	2	8	175	20	1.09	7.84	5.48	0.23	0.21	0.01	0.08	0.05	0.00	0.00	30.10	0.00	27.41
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	20	0.87	7.24	2.85	0.23	0.22	0.01	0.07	0.03	0.00	0.00	13.74	0.00	12.52
Generator Sets > 25 and < = 50	Generators	1	8	210	20	0.56	2.10	1.97	0.15	0.14	0.01	0.02	0.02	0.00	0.00	2.45	0.00	2.24
Total						**2.52**	**17.18**	**10.30**	**0.62**	**0.57**	**0.03**	**0.17**	**0.10**	**0.01**	**0.01**	**46.29**	**0.00**	**42.18**
Road Construction																		
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 160	1	8	128	40	0.68	5.06	4.68	0.27	0.25	0.01	0.10	0.09	0.01	0.00	16.22	0.00	14.79
Plate Compactors	Compactor	2	8	19	40	0.08	0.50	0.42	0.02	0.02	0.00	0.01	0.01	0.00	0.00	1.38	0.00	1.26
Dozers < = 175	Dozer - D6	1	8	145	40	1.55	11.16	6.67	0.63	0.58	0.03	0.22	0.13	0.01	0.01	20.72	0.00	18.92
Graders > 120 and < = 175	Grader - 120	1	8	135	40	1.04	7.63	5.86	0.42	0.39	0.02	0.15	0.12	0.01	0.01	19.83	0.00	18.09
Paving Equipment > 175 and < = 250	Paving Equipment	1	8	128	40	0.91	8.40	2.75	0.32	0.29	0.02	0.17	0.06	0.01	0.01	19.57	0.00	17.85
Rollers > 175 and < = 250	Roller BW 190AD4	2	8	205	40	1.77	17.52	5.72	0.59	0.54	0.04	0.35	0.11	0.01	0.01	48.99	0.00	44.66
Water Truck	3,000 gal water truck	1	8	230	40	1.00	7.85	2.96	0.26	0.24	0.02	0.16	0.06	0.01	0.00	26.65	0.00	24.30
Total						**7.04**	**58.12**	**29.06**	**2.51**	**2.31**	**0.14**	**1.16**	**0.58**	**0.05**	**0.05**	**153.35**	**0.01**	**139.87**
Demolition																		
Dozers < = 175	Dozer - D6	1	8	145	10	1.55	11.16	6.67	0.63	0.58	0.01	0.06	0.03	0.00	0.00	5.18	0.00	4.73
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	10	0.87	7.24	2.85	0.23	0.22	0.00	0.04	0.01	0.00	0.00	6.87	0.00	6.26
Water Truck	3,000 gal water truck	1	8	230	10	1.00	7.85	2.96	0.26	0.24	0.01	0.04	0.01	0.00	0.00	6.66	0.00	6.07
	Highway Truck (25,000 lbs)	2	240		2,400	0.16	4.74	0.71	0.12	0.08	0.00	0.02	0.00	0.00	0.00	4.49	0.00	4.08
Total						**3.58**	**30.99**	**13.19**	**1.25**	**1.12**	**0.02**	**0.15**	**0.07**	**0.01**	**0.01**	**23.20**	**0.00**	**21.15**

Notes:
Vegetation removal includes one truck operating at 15 miles per hour for 8 hours per day.
Estimates for material excavation assumes 70 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	100	147,840	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	55.44	0.00	50.57

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**10.69**	**108.83**	**44.04**	**4.09**	**3.43**								
Maximum Annual Emissions						**0.66**	**6.18**	**2.75**	**0.24**	**0.21**	**1,116.11**	**0.06**	**1,017.16**

Dam Foundation

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Dam Foundation																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	1	8	175	60	0.54	3.92	2.74	0.12	0.11	0.02	0.12	0.08	0.00	0.00	45.14	0.00	41.12
Excavators > 250 and < = 500	Excavator - 3.5 CY	7	8	384	60	8.83	65.07	27.80	2.31	2.13	0.26	1.95	0.83	0.07	0.06	392.68	0.02	357.94
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	60	0.87	7.24	2.85	0.23	0.22	0.03	0.22	0.09	0.01	0.01	41.22	0.00	37.57
Dozers < = 175	Dozer - D6	1	8	145	60	1.55	11.16	6.67	0.63	0.58	0.05	0.33	0.20	0.02	0.02	31.07	0.00	28.38
Generator Sets > 25 and < = 50	Generator	1	8	375	60	0.56	2.10	1.97	0.15	0.14	0.02	0.06	0.06	0.00	0.00	7.35	0.00	6.73
	Highway Truck (25,000 lbs)	6	2,160		129,600	1.41	42.69	6.38	1.10	0.75	0.04	1.28	0.19	0.03	0.02	242.28	0.00	220.48
Total						**13.77**	**132.18**	**48.41**	**4.55**	**3.93**	**0.41**	**3.97**	**1.45**	**0.14**	**0.12**	**759.75**	**0.03**	**692.22**

Note:
Estimates for material excavation assumes 96 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	60	88,704	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	33.27	0.00	30.34

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**13.93**	**133.56**	**51.70**	**4.76**	**4.05**								
Maximum Annual Emissions						**0.42**	**4.01**	**1.55**	**0.14**	**0.12**	**793.01**	**0.04**	**722.56**

Temporary Access Road

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Temporary Access Road																		
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 160	1	8	128	40	0.68	5.06	4.68	0.27	0.25	0.01	0.10	0.09	0.01	0.00	16.22	0.00	14.79
Plate Compactors	Compactor	2	8	19	40	0.08	0.50	0.42	0.02	0.02	0.00	0.01	0.01	0.00	0.00	1.38	0.00	1.26
Dozers < = 175	Dozer - D6	1	8	145	40	1.55	11.16	6.67	0.63	0.58	0.03	0.22	0.13	0.01	0.01	20.72	0.00	18.92
Graders > 120 and < = 175	Grader - 120	1	8	135	40	1.04	7.63	5.86	0.42	0.39	0.02	0.15	0.12	0.01	0.01	19.83	0.00	18.09
Rollers > 175 and < = 250	Roller BW 190AD4	2	8	205	40	1.77	17.52	5.72	0.59	0.54	0.04	0.35	0.11	0.01	0.01	48.99	0.00	44.66
Water Truck	3,000 gal water truck	1	8	230	40	1.00	7.85	2.96	0.26	0.24	0.02	0.16	0.06	0.01	0.00	26.65	0.00	24.30
Total						**6.13**	**49.72**	**26.31**	**2.19**	**2.02**	**0.12**	**0.99**	**0.53**	**0.04**	**0.04**	**133.78**	**0.01**	**122.02**

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	40	59,136	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.18	0.00	20.23

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**6.29**	**51.11**	**29.60**	**2.40**	**2.14**								
Maximum Annual Emissions						**0.13**	**1.02**	**0.59**	**0.05**	**0.04**	**155.96**	**0.01**	**142.25**

Replacement Dam

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Dam Construction																		
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	20	211	100	2.16	18.09	7.13	0.59	0.54	0.11	0.90	0.36	0.03	0.03	171.74	0.01	156.53
Cranes > 120 and < = 175	Crane, 30 Ton	1	20	152	100	1.84	13.37	9.59	0.76	0.70	0.09	0.67	0.48	0.04	0.03	80.34	0.01	73.32
Rollers > 175 and < = 250	Roller BW 190AD4	2	20	205	100	4.43	43.79	14.30	1.47	1.35	0.22	2.19	0.72	0.07	0.07	306.18	0.02	279.13
Plate Compactors	Compactor	1	20	19	100	0.10	0.63	0.53	0.02	0.02	0.01	0.03	0.03	0.00	0.00	4.31	0.00	3.94
Cement and Mortar Mixers	Concrete mixer	1	24	2	100	0.18	1.11	0.93	0.05	0.04	0.01	0.06	0.05	0.00	0.00	7.58	0.00	6.92
Pumps > 175 and < = 250	Concrete pump	2	24	210	100	5.22	63.70	19.19	1.81	1.66	0.26	3.18	0.96	0.09	0.08	483.29	0.02	440.39
Generator Sets > 25 and < = 50	Generator	2	24	375	100	3.39	12.61	11.83	0.93	0.85	0.17	0.63	0.59	0.05	0.04	73.50	0.02	67.27
	Highway Truck (25,000 lbs)	14	2,640		264,000	1.72	52.18	7.80	1.34	0.92	0.09	2.61	0.39	0.07	0.05	493.54	0.00	449.12
Total						**19.04**	**205.49**	**71.30**	**6.96**	**6.09**	**0.95**	**10.27**	**3.56**	**0.35**	**0.30**	**1,620.48**	**0.08**	**1,476.63**

Note:
Estimates for material excavation assumes 88 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	100	147,840	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	55.44	0.00	50.57

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**19.20**	**206.87**	**74.59**	**7.18**	**6.21**								
Maximum Annual Emissions						**0.96**	**10.34**	**3.73**	**0.36**	**0.31**	**1,675.93**	**0.08**	**1,527.20**

Demolition - Existing Dam

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 924	1	8	128	45	0.68	5.06	4.68	0.27	0.25	0.02	0.11	0.11	0.01	0.01	18.25	0.00	16.64
Cranes > 120 and < = 175	Crane - 30 Ton	1	8	152	45	0.74	5.35	3.84	0.30	0.28	0.02	0.12	0.09	0.01	0.01	14.46	0.00	13.20
	Highway Truck (25,000 lbs)	6	1,440		64,800	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	121.14	0.00	110.24
Total						**0.94**	**28.46**	**4.25**	**0.73**	**0.50**	**0.02**	**0.64**	**0.10**	**0.02**	**0.01**	**121.14**	**0.00**	**110.24**

Note:
Estimates for material excavation assumes 96 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	45	66,528	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	24.95	0.00	22.76

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**1.10**	**29.85**	**7.55**	**0.94**	**0.62**								
Maximum Annual Emissions						**0.02**	**0.67**	**0.17**	**0.02**	**0.01**	**146.09**	**0.00**	**133.00**