Energy Consumption and Climate Change

Affected Environment

This discussion is not organized by river segment because impacts related to energy consumption and climate change tend not to be specific to the segments.

Regulatory Framework

Federal Laws and Policies

The Energy Policy Act

The Energy Policy Act of 2005 contains several provisions designed to reduce energy use by federal agencies. These include annual energy reduction goals, renewable energy purchase targets, reauthorization of Energy Savings Performance Contracts, required federal procurement of Energy Star or similar products, and updates to green building standards with emphasis on energy efficiency, among other measures. The act also contains an incentive program to encourage agencies to reinvest utility cost savings into future energy projects.

Energy and Independence Security Act and Corporate Average Fuel Economy Standards

The Energy and Independence Security Act of 2007 amended the Energy Policy and Conservation Act to further reduce fuel consumption and expand production of renewable fuels. The Energy and Independence Security Act's most significant amendment includes a statutory mandate for the National Highway Traffic Safety Administration to set passenger car Corporate Average Fuel Economy standards for each model year at the maximum feasible level. This statutory mandate eliminated the former default standard of 27.5 miles per gallon. The Energy and Independence Security Act requires that standards for model years 2011 through 2020 be set sufficiently high to achieve an industrywide goal of 35 miles per gallon on average for passenger cars and light-duty trucks. The rulemaking for this goal, as requested by President Barack Obama, was divided into two parts. The first part, which was published in the Federal Register in March 2009, included standards for model year 2011 to meet the statutory deadline (i.e., March 30, 2009). The second part of the rulemaking applies to model year 2012 and subsequent years. These would be the maximum standards feasible under the limits of the Energy and Independence Security Act and the Energy Policy and Conservation Act. The National Highway Traffic Safety Administration and U.S. Environmental Protection Agency (EPA) are working in coordination to develop a national program targeting model year 2012 through 2016 passenger cars and light trucks.

U.S. Environmental Protection Agency Actions

In response to the issue of climate change, the EPA has taken actions to regulate, monitor, and potentially reduce greenhouse gas (GHG) emissions, as briefly summarized below.

Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act

On April 23, 2009, the EPA published its proposed *Endangerment and Cause or Contribute Findings for Greenhouse Gases* under the Clean Air Act (Endangerment Finding) in the Federal Register. The Endangerment Finding is based on Section 202(a) of the Clean Air Act, which states that the EPA administrator should regulate and develop standards for "emission[s] of air pollution from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The proposed rule addresses Section 202(a) in two distinct findings. The first deals with whether the concentrations of the six key GHGs (i.e., carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perflurorocarbons, and sulfur hexafluoride) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and thus increase the threat of climate change.

The EPA administrator proposed the finding that atmospheric concentrations of GHG endanger the public health and welfare within the meaning of Section 202(a) of the Clean Air Act. The evidence supporting this finding consists of "high atmospheric levels" of anthropogenic GHG emissions, which are likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wildfires, droughts, sea level rise, higher intensity storms) are a threat to public health and welfare.

The EPA administrator also proposed the finding that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. The proposed finding states that, in 2006, motor vehicles were the second largest contributor to domestic GHG emissions (24% of the total), behind electricity generation. Furthermore, in 2005, the United States was responsible for 18% of global GHG emissions. Thus, GHG emissions from motor vehicles and motor vehicle engines were found to contribute to air pollution that endangers public health and welfare.

On December 7, 2009, the EPA finalized its decision that GHG emissions from motor vehicles constitute an "endangerment" under the Clean Air Act. This finding allowed for the establishment of GHG emissions standards for new motor vehicles. In June 2009, in a related action, the EPA granted California a waiver under the federal Clean Air Act, allowing the state to impose its own, stricter GHG regulations for vehicles beginning in 2009.

Notice of Intent for Development of New Greenhouse Gas and Fuel Economy Standards

In September 2010, the National Highway Traffic Safety Administration, together with the EPA, published a Notice of Intent for the development of new GHG and fuel economy standards for vehicle model years 2017 through 2025. The agencies published a Supplemental Notice of Intent in December 2010, with a final rule due to be adopted in 2012 (NHTSA 2010).

Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, the EPA released its final Greenhouse Gas Reporting Rule (Reporting Rule). The Reporting Rule is a response to the fiscal year 2008 Consolidated Appropriations Act (House Rule 2764; Public Law 110-161), which required the EPA to develop "mandatory reporting of Greenhouse Gas above appropriate thresholds in all sectors of the economy." The Reporting Rule applies to most entities that emit 25,000 metric tons of carbon dioxide equivalent or more per year. Starting in 2010, facility owners were required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The Reporting Rule also mandated recordkeeping and administrative requirements so that the EPA could verify annual GHG emissions reports.

Executive Orders

Executive order 13423: Strengthening Federal Environmental, Energy, and Transportation Management. This order calls upon all federal agencies to adopt an Environmental Management System, which is a process developed by the International Organization for Standardization. Furthermore, this order requires the Office of Management and Budget (OMB) Director to issue instructions concerning periodic evaluation, budget matter, and acquisition relating to agency implementation of the Order. OMB issues budget guidance through updates to Circular No. A-11. OMB will also continue to track agencies' progress on EO and EPACT goals through the three management scorecards on environmental stewardship, energy, and transportation.

Executive Order 13514: Federal Leadership in Environmental, Energy and Economic Performance. This order directs federal agencies, including the National Park Service (NPS), to measure, report, and reduce their GHG emissions from direct and indirect activities. Pursuant to Executive Order 13514, the NPS has established its Climate Friendly Parks Program. To date, many federal agencies, including the NPS, have developed GHG emission inventories and are in the process of developing emissions reduction plans.

Climate Change Context

The term *global warming* refers to the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century. The evidence of global warming is now considered indisputable (Intergovernmental Panel on Climate Change 2007), with global surface temperatures increasing an average of approximately 1.33 degrees Fahrenheit over the past 100 years. Continued warming over the next 100 years is projected to increase the average global temperature between 2 and 11 degrees Fahrenheit.

The causes of this warming have been identified as both natural processes and human activities. The Intergovernmental Panel on Climate Change concluded that variations in natural phenomena, such as solar radiation and volcanoes, produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. However, after 1950, increasing GHG concentrations resulting from human activity, such as fossil fuel burning and deforestation, have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than

45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries.

Greenhouse gasses naturally trap heat by impeding the exit of solar radiation that has entered the earth's atmosphere. Some GHGs occur naturally and are necessary for keeping the earth's surface inhabitable. However, increases in atmospheric concentrations of these gases during the past 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and causing the increase in average global temperature.

The principal GHGs of concern are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Each of the principal GHGs has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat-trapping ability of each gas varies significantly. CH_4 is 23 times as potent as CO_2, and SF_6 is 22,200 times more potent than CO_2. Conventionally, GHGs have been reported as CO_2 equivalents (CO_2e). CO_2e takes into account the relative potency of non-CO_2 GHGs and converts their quantities to an equivalent amount of CO_2 so that all emissions can be reported as a single quantity.

California Climate Trends and Associated Impacts

Maximum (daytime) and minimum (nighttime) temperatures are increasing almost everywhere in California, though at different rates. The annual minimum temperature averaged over the entire state increased 0.33 degree Fahrenheit per decade during the period 1920 to 2003, and the annual maximum temperature increased an average of 0.1 degree Fahrenheit per decade (Moser et al. 2009).

With respect to California's water resources, the most significant impacts of global warming have been changes to the water cycle and sea level rise. Over the past century, the precipitation mix between snow and rain has shifted in favor of more rainfall and less snow (Mote et al. 2005; Knowles and Cayan 2006), and the snowpack in the Sierra Nevada range is melting earlier in the spring (Kapnick and Hall 2009). The average early-spring snowpack in the Sierra Nevada has decreased by about 10% during the last century — a loss of 1.5 million acre-feet of snowpack storage (DWR 2008). These changes have significant implications for water supply, flooding, aquatic ecosystems, forest health, and recreation, both throughout the state and within Yosemite National Park (NPS 2009H; Lutz et al. 2009; Saunders et al. 2009).

Individual projects contribute to the cumulative effects of climate change by emitting GHGs during the demolition, construction, and operational phases. The primary GHGs associated with land use and development projects are CO_2, CH_4, and N_2O.

Statewide Greenhouse Gas Emissions

The California Air Resources Board estimated that in 2008 California produced about 478 million gross metric tons (about 525 million U.S. tons) of CO_2e. The Air Resources Board found that transportation is the source of 37% of the state's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 24% and industrial sources at 19%. Commercial and residential fuel use (primarily for heating) accounted for 9% of GHG emissions (CARB 2011c).

Parkwide Greenhouse Gas Emissions

National Park Service Climate Friendly Parks Program. Yosemite National Park is a participant in the NPS's Climate Friendly Parks Program. Funded through an interagency agreement between the EPA and the NPS, this program assists national parks in the development of short- and long-term comprehensive strategies for reducing their GHG and criteria air pollutant emissions. The program also includes a public awareness and education component.

National Park Service Pacific West Region Directive PW-047, October 31, 2006. This directive provides policies pertaining to renewable energy generated on-site. Specifically, it encourages conversion to renewable sources of energy, and allows for the purchase of green power (including wind, solar, biomass, and geothermal) when on-site renewable energy systems are not feasible. Alternatively, this directive also permits the purchase of green power tags, which are renewable energy certificates from a source that does not directly connect to the local utility that supplies park facilities.

Yosemite National Park Action Plan, November 2006. In 2006, Yosemite National Park published its first comprehensive climate action plan. The plan outlines a framework for actions the park will take to further the mission of the Climate Friendly Parks Program. Emission reduction measures identified in the plan include utilizing alternative energy sources, increasing lighting efficiency, promoting and engaging in energy-efficient building design, and optimizing energy use, among others (NPS 2006C). As part of this effort, the park committed to conducting GHG emissions inventories, monitoring progress toward emissions reductions, and to continuing to explore additional emission-reducing actions and incorporating them into subsequent climate action plans.

NPS Green Parks Plan (GPP). The GPP, adopted in April 2012, defines a vision and long-term strategic plan for sustainable management of NPS operations. Goals of the GPP related to GHGs include the following:

1. The NPS will reduce Scope 1 and Scope 2 GHG emissions by 35 percent by 2020 from the 2008 baseline. (Scope 1 and Scope 2 emissions are associated with on-site fossil fuel combustion and electricity consumption from the grid, respectively.)
2. The NPS will reduce Scope 3 GHG emissions by 10 percent by 2020 from the 2008 baseline. (Scope 3 emission sources such as commuter travel and off-site wastewater treatment are indirect in nature.)
3. The NPS will develop and implement guidance on adapting the location, structure, or function of park facilities in anticipation of climate change, including severe weather impacts.

Secretarial Order 3285: Renewable Energy Development by the Department of the Interior. This Order establishes the development of renewable energy as a priority for the Department of the Interior and establishes a Departmental Task Force on Energy and Climate Change. This Order also amends and clarifies Departmental roles and responsibilities to accomplish this goal.

Secretarial Order 3289: Addressing the Impacts of Climate Change on America's Water, Land and Other Natural and Cultural Resources. This Order establishes a department-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective

response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department of the Interior manages.

A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park. The latest community-wide GHG inventory, depicted in **table 9-155**, presents life-cycle GHG emissions for years 2008 through 2011 and includes Scope 1, 2, and 3 emissions. The largest contribution of GHG emissions comes from the miles traveled by visitors within the park, accounting for an average of 40 percent of the inventory; followed by food consumption at 30 percent; energy (electricity and stationary fuels) at 17 percent; NPS and DNC car usage at 8 percent; waste at 3 percent; waste water at 1.6 percent; and cement at about 0.4 percent. Although fire contributes to total park emissions, wildfires would still occur even in the absence of fire management, resulting in the same level of emissions. Therefore, GHG emissions due to fire are omitted from the estimates shown here (Villalba *et al* 2012a).

TABLE 9-155: PARK-WIDE GHG EMISSIONS FOR YEARS 2008-2011

Scope	Source[a]		Year 2008	Year 2009	Year 2010	Year 2011
Scope 1 and 2 In-boundary Emissions (metric tons/yr)	Electricity		8,223	8,207	7,836	7,537
	Transportation Fuels	YNP-PTW	3,798	3,884	3,884	4,032
	Stationary Fuels	Propane	3,400	3,629	3,622	3,748
		Diesel	7,774	8,168	8,276	8,789
	Wastewater		2,114	1,970	1,805	2,036
Scope 3 Upstream and Downstream Emissions to Supplement In-boundary emissions (metric tons/yr)	Electricity		258	238	272	275
	Transportation Fuels	YNP-PTW	903	922	919	944
		Visitors (bus) WTW	949	790	953	924
		Visitors (non-bus rec) WTW	44,136	48,483	50,185	50,718
		Commuting-cars WTW	5,106	5,106	5,106	5,106
		Commuting-buses WTW	228	258	157	151
	Stationary Fuels	Propane	530	565	564	584
		Diesel	1,943	2,042	2,069	2,197
	Solid Waste	Landfill	7,877	8,300	6,775	3,405
		Compost	--	--	200	474
	Cement		275	275	275	275
	Food		38,020	38,324	38,327	38,795
Scope 1 and 2 Total			25,309	25,858	25,424	26,142
Scope 3 Total			100,224	105,303	105,847	103,848
TOTAL (metric tons/yr)			125,533	131,161	131,271	129,990
Visitors			3,431,514	3,737,472	3,901,408	3,951,393
TOTAL GHG per visitor (kg CO_2e/visitor)			36.58	35.09	33.65	32.90

[a] Notes: YNP = Yosemite National Park; WTP = Well-to-Pump emissions; PTW = Pump-to-Wheel emissions; WTW = Well-to-Wheel emissions or life cycle emissions, which is also the sum of WTP and PTW

SOURCE: Villalba *et al* 2012a.

A summary of 2008 through 2011 energy consumption within Yosemite Valley is shown in **table 9-156.**

TABLE 9-156: ENERGY CONSUMPTION TOTALS USED IN THE GHG EMISSIONS INVENTORY 2008-2011

Source		Total Consumption			
		Year 2008	Year 2009	Year 2010	Year 2011
Electricity (Gigawatt -hours)		23.63	22.00	23.19	22.62
Transportation Fuels	YNP (gallons)	462,500	486,913	471,259	512,985
Stationary Fuels	Propane (gallons)	583,818	623,123	622,049	643,625
	Diesel (gallons)	761,206	799,838	810,438	643,625
SOURCE: Villalba *et al* 2012b					

As is evident from the table, stationary sources (e.g., lighting, heating) within Yosemite Valley consume electricity, fuel oil and propane. NPS and Delaware North Companies Parks and Resorts at Yosemite (DNC) mobile sources (e.g., motor vehicles) consume gasoline and diesel fuel, and the majority of visitor vehicles operate on gasoline. It should be noted that energy consumption in Yosemite Valley varies from year to year. Measures taken by the park and the park concessioner to reduce energy consumption and GHG emissions include: (1) purchase of 18 hybrid electric-diesel shuttle buses that provide free transit to 2.5 million park visitors within the Valley annually (NPS 2005c), (2) installation of high-efficiency heating and cooling systems in employee housing (NPS 2007g), use of reclaimed water for irrigation (NPS 2008g), and installation at the El Portal Administrative Site of the largest solar energy system in the national park system (NPS 2011q), among other actions.

Environmental Consequences Methodology

Changes in energy consumption in the Merced River corridor are qualitatively evaluated by assessing changes in housing, park and concessioner facilities, camping, and vehicle fuel use. The climate change analysis evaluates both whether and how each alternative could contribute to climate change. Although there is a broad consensus in the scientific community that human activities are contributing to global warming, there is limited guidance available on how to properly analyze the impact of local development projects with respect to climate change. This is particularly true where the project is unlikely to result in large changes in local or regional emissions. This evaluation considers changes in the amount of energy consumed and related levels of direct and indirect GHG emissions, the alteration of land uses that sequester GHGs, and changes in land uses.

- **Context.** Any change in energy consumption and GHG emissions in the Merced River corridor would be negligible at a statewide and global scale. However, the contribution of each alternative will be evaluated.

- **Intensity.** The intensity of the impact considers whether the impact would be negligible, minor, moderate, or major. Negligible impacts would not be detectable and would have no discernible effect on the amount of energy consumed or the amount of GHG emissions (assumed to be 1% or less of threshold) generated. Minor impacts would be slightly detectable but would not be expected to have an overall effect on those conditions. For GHG emissions, minor impacts are assumed to occur up to 50% of the applicable threshold. Moderate impacts

would be clearly detectable and could have an appreciable effect on energy use or GHG emissions (assumed to occur at emission levels greater than 50% but less than the applicable threshold). Major impacts would have a substantial, highly noticeable influence on and could permanently alter those conditions. For GHG emissions, major impacts are assumed to occur when emissions exceed the applicable threshold.

For this analysis, the EPA Mandatory Reporting Rule level of 25,000 metric tons of CO_2e per year is used to identify a major source of GHGs.

- **Duration.** The duration of the impact considers whether the impact would occur in the short term or the long term. A short-term impact would be temporary in duration and would be associated with transitional types of activities. A long-term impact would have a long-lasting or permanent effect on energy use, emissions, or land use.

- **Type of Impact.** Impacts are evaluated for whether they would be beneficial or adverse in terms of energy consumption and climate change. Beneficial impacts would reduce energy consumption, reduce emissions, or change land uses to those that would reduce emissions. Adverse impacts would increase energy consumption, increase emissions, or change land uses to those that would make it more difficult to reduce emissions.

Environmental Consequences of Alternative 1 (No Action)

Impacts Common to Segments 1–8

Alternative 1 (No Action) assumes a continuation of existing regulations and management practices that govern energy consumption and climate change into the foreseeable future. No new structures would be constructed in the Merced River corridor, except for minor structures that are small temporary, easily removed, and not habitable; designed to support existing uses, systems, and programs; located within the existing building footprint; and not created solely for commercial purposes. Temporary housing for employees displaced by the 2008 rockfall would continue as needed at Huff House, Lost Arrow, Yosemite Lodge, Ahwahnee concessioner employee housing area, Boys Town, and El Portal Trailer Village, and for NatureBridge students at Curry Village. Housing for NPS employees and park partner staff would remain at current levels and locations.

Recent efforts by the park and primary park concessioner to reduce overall energy consumption and GHG emissions include purchasing 18 hybrid electric-diesel shuttle buses; replacing existing park vehicles with alternative-fuel and hybrid vehicles; implementing additional recycling and composting measures; using reclaimed water for irrigation; as well as installing energy-efficient appliances and lighting and passive heating and cooling systems in employee housing, solar panels on park housing units, and the largest solar energy system in the national park system (at the El Portal Administrative Site).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Under Alternative 1 (No Action), energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to those under Alternative 1. No new buildings or facilities would be constructed as part of Alternative 1, so no substantial new sources of energy consumption or emissions would be

introduced. Although park visitation would be expected to increase at a rate of approximately 3% annually, Segments 1, 5, 6, and 8 do not have transportation facilities and are relatively inaccessible, so visitor use in these areas would not likely increase at the same rate as the more developed areas of the park. Alternative 1 would therefore result in a long-term, negligible, and adverse impact with respect to energy and GHG conditions along Segments 1, 5, 6, and 8.

Segments 1, 5, 6, & 8 Impact Summary. Implementation of Alternative 1 would result in result in segmentwide, long-term, negligible, and adverse impacts with respect to energy and GHG conditions along Segments 1, 5, 6, and 8.

Segments 2, 3, 4, and 7: Yosemite Valley, Merced River Gorge, El Portal, and Wawona (Nonwilderness)

Under Alternative 1, it is expected that visitation levels would increase primarily during the current nonpeak periods (i.e., the months on either side of the peak summer months and on weekdays during peak summer months). If this were to occur, then traffic congestion and associated GHG emissions during nonpeak periods could approximate current peak-period levels. Visitation could also increase during peak periods and, to the degree that such increases were to happen, traffic congestion and GHG emissions would marginally worsen. Mobile emissions sources would continue to include automobiles, trucks, and buses and would remain subject to state and federal emissions control standards and programs (including statewide Pavley and Low Carbon Fuel Standards), which are expected to lead to a decrease in GHG emissions in the foreseeable future. Because mobile sources from visitors are the primary source of non-fire related GHGs at the park (according to the latest inventory), and visitation is projected to increase over time, GHG emissions would be expected to increase in the future although at a reduced rate because of regulations governing mobile-source GHGs. Thus, increased traffic and traffic congestion under Alternative 1 would result in a long-term, minor, adverse impact with respect to energy consumption and GHG emissions.

Emissions sources would continue to include energy consumption at existing NPS and concessioner facilities in the Merced River corridor, regular maintenance activities, and campfires. Most of these sources would continue in the same manner and extent as under existing conditions, though some could decrease as a result of sustainability measures and others would increase in relative proportion to visitor-use levels. Daily, routine, and intermittent operational maintenance intended to stabilize and protect park facilities, address visitor health and safety issues, and protect natural and cultural resources would continue as under existing conditions. This includes campground maintenance, road and trail maintenance, building and grounds maintenance, and utility system repair and maintenance throughout Segments 1–8. However, alternative-fuel or hybrid park vehicles would reduce GHG emissions associated with these activities. In addition, energy-efficiency upgrades and green building designs that have been and are currently being implemented by the NPS would continue to reduce energy consumption and associated GHG emissions under Alternative 1. Campfire usage could increase in proportion to the increased visitation, especially during nonpeak periods. Thus, GHG emissions would be expected to increase in the future in rough proportion to the increased usage of campfires under Alternative 1. Overall for these sources, the continuation of NPS climate action plan strategies under Alternative 1 would result in a long-term, moderate, beneficial impact with respect to energy consumption and GHG emissions.

Segments 1, 5, 6, & 8 Impact Summary. Implementation of Alternative 1 would result in long-term, moderate beneficial impacts associated with the continuation of NPS climate-action-plan sustainability strategies for Segments 2, 3, 4, and 7; however, because mobile sources generate the vast majority of all GHGs in the park, and visitation is projected to increase, Alternative 1 would result in an overall long-term, minor, adverse impact related to energy and GHGs.

Cumulative Impacts for Alternative 1 (No Action)

The discussion of cumulative impacts related to energy consumption and climate change is based on analysis of past, present, and reasonably foreseeable future actions in the Merced River corridor, in combination with the potential effects of Alternative 1. Past actions have generally resulted in the construction of new facilities to accommodate additional visitors and employees.

Past Actions

Past actions have had both adverse and beneficial impacts related to energy and climate change. Temporary constructions activities associated with the majority of past projects listed in Appendix B had short-term adverse effects on energy and climate change (i.e., from fuel usage and GHG emissions related to equipment and motor vehicle exhaust). However, most of these projects have had either no net adverse effects or beneficial effects on current or future energy and climate change conditions. The following past projects had long-term, minor, beneficial impacts on energy and climate change conditions, which would continue under Alternatives 2–6.

The **Yosemite Area Regional Transportation System (YARTS)** was established in 2000 to provide an alternative to private vehicles accessing the park. YARTS was intended to expand the range of travel options for visitors to Yosemite Valley and to other primary park destinations, and for employees commuting to work in the park. It also provides a means for visitors to travel to Yosemite Valley when restricted-access measures are implemented for private vehicles during times of severe congestion. YARTS has had a long-term, beneficial effect by reducing the number of day visitors arriving in private vehicles.

Housing Projects (i.e., Curry Village Employee Housing, Curry Village Huff House Temporary Housing, Yosemite Valley Lost Arrow Temporary Employee Housing, and Yosemite Valley Ahwahnee Temporary Employee Housing) involved the construction of housing and related facilities to accommodate concessioner employees. The housing units replaced concessioner housing lost in the January 1997 flood and the rockfall events at Curry Village in October 2008 and were developed in consultation with litigants as part of a settlement agreement concerning the *Merced Wild and Scenic River Comprehensive Management Plan*. These actions provided temporary lodging for concessioner employees, and were needed to help meet immediate short-term housing needs for the park concessioner until permanent employee housing became available. Construction was completed from 2007 to 2009.

Yosemite Valley Shuttle Bus Stop Improvements consisted of the preparation of preliminary design plans, environmental compliance documents, and construction drawings; the construction of six 10-foot by 80-foot concrete braking pads; the rehabilitation or replacement of 94,000 square feet of asphalt road approaches; and the construction of bus stop shelters. Construction was completed in 2010. These improvements support shuttle bus service in Yosemite Valley, resulting in a segmentwide, long-term, minor, beneficial impact.

Hybrid Electric-Diesel Shuttle Bus Procurement consisted of the purchase of diesel hybrid transit buses by the NPS. Hybrid bus operations result in long-term benefits to fuel usage and GHG emissions in comparison to diesel-only buses.

The **replacement of existing park service vehicles** with alternative fueled or hybrid vehicles has also reduced GHGs.

Installation of the **solar array and rehabilitation of existing facilities** has resulted in sustainable energy generation and reduced energy consumption.

Habitat Restoration Projects (i.e., Cook's Meadow Ecological Restoration, DNC Yosemite Valley Ecological Restoration, Fern Springs Restoration, Happy Isles Fen Habitat Restoration, Merced River Ecological Restoration at Eagle Creek, and Red Peak Pass Trail Rehabilitation) included revegetation of affected areas, which resulted in long-term, beneficial effects resulting from CO_2 sequestration.

Present Actions

Present projects that could have a corridorwide, long-term, beneficial, cumulative effect on energy and climate change include:

- *2004 Fire Management Plan/EIS*
- The following projects, which would individually, and in combination, encourage travel to the park by alternative (nonprivate vehicle) modes, and would manage traffic and parking to reduce congestion and associated fuel usage and GHG emissions:
  - Increased YARTS services
  - Changeable electronic signs in Mariposa, Midpines, and El Portal, alerting drivers to traffic conditions in Yosemite Valley
  - Computer-Aided Dispatch / Automatic Vehicle Locator
  - Software design and purchase to process raw data form vehicle counters to produce useful information for visitors on parking and traffic conditions

Restricted access measures will continue to control the volume of incoming vehicles when traffic and parking conditions in Yosemite Valley are over congested. The YARTS will continue to reduce the number of individual vehicles operated within the park.

Present projects listed immediately below could have a short-term, adverse effect from construction but a long-term, beneficial, cumulative effect on energy and climate change.

- The following transportation projects, could increase atmospheric carbon sequestration within affected areas:
  - Fuels Reductions/Forest Rehabilitation
  - General Ecological Restoration
  - *Vegetation Management Plan*

- The following transportation projects could improve transportation circulation and thereby reduce fuel usage and GHG emissions:
  - South Park Intelligent Transportation System: electronic signs and groundhog automatic vehicle counters at entrance stations and parking lots to know when parking lots are full
  - Parking alternative option at the El Portal Maintenance Facility
  - Parkwide Communication Data Network infrastructure upgrade
- The following energy-related projects could improve facility efficiency and sustainability:
  - *Ahwahnee Comprehensive Rehabilitation Plan*
  - Crane Flat Utilities
  - *East Yosemite Valley Utilities Improvement Plan/EA*

Present projects that could have a short-term adverse effect on energy and climate change include all projects not mentioned above that include some temporary construction activities. There would be no net long-term, adverse or beneficial impacts on energy and climate change from these projects.

Reasonably Foreseeable Future Actions

Similar to past actions, reasonably foreseeable future actions would result in both adverse and beneficial energy and climate change impacts. Reasonably foreseeable future projects that could have a long-term, beneficial, cumulative impact related to energy and climate change include the Transit Passenger Information System.

Other beneficial impacts for reasonably foreseeable future actions are similar to those discussed for past and present actions (i.e., the restricted access measures and increased YARTS services). Reducing traffic congestion and encouraging travel to the park by alternative (nonprivate vehicle) modes would have segmentwide, long-term, beneficial impacts on energy and climate change.

Reasonably foreseeable future actions that could have a short-term adverse effect on energy and climate change include all projects that would involve some temporary construction activities. There would be no net long-term, adverse or beneficial impacts on energy and climate change from these projects.

Overall Cumulative Impact

Because Alternative 1 would not involve substantial construction projects, it would not be expected to contribute to construction-related GHG impacts. Continued management of traffic, encouragement of alternative forms of transportation, and energy conservation measures would have long-term, beneficial energy and GHG impacts.

There would be long-term, beneficial impacts associated with the continuation of NPS climate-action-plan sustainability strategies. However, because mobile sources generate the substantial majority of all GHGs in the park, and visitation is projected to increase, Alternative 1 would result in an overall long-term, minor, adverse energy and GHG impact.

Environmental Consequences of Actions Common to Alternatives 2–6

Impacts Common to Segments 1–8

Changes to energy consumption in the Merced River corridor are qualitatively evaluated by assessing changes in housing, park and concessioner facilities, camping, and vehicle fuel usage. The climate change analysis evaluates both whether and how each alternative might contribute to climate change, which could include GHGs generated by short-term construction (i.e., equipment and on-road vehicle exhaust) and long-term operations (i.e., on-road vehicle exhaust, natural gas combustion, campfires, vegetation [sequestration] removal or restoration, and indirect sources from electricity generation).

Impacts of Actions to Protect and Enhance River Values

In general, the impacts of actions to protect and enhance river values would be associated with short-term construction activities, such as demolition, removal of trees, infrastructure, roads, habitat restoration, or trail development, which would require fuel consumption and would result in temporary emissions of GHGs. Overall construction activities associated with actions to protect and enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap. Over the long-term, tree removal would reduce sequestration, whereas habitat restoration would increase sequestration. However, sequestration changes would be negligible overall.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur across all segments under Alternatives 2-6 include removing 3,400 feet of riprap from the river bank and revegetating with riparian species, and replacing an additional 2,300 feet of riprap with bioengineered riverbank stabilization devices. This work would require the use of heavy equipment, including loaders and dump trucks. The removal, transport, disposal, restoration, and monitoring work associated with these actions would require several weeks of park staff time to implement, but would not substantially disrupt other ongoing construction, demolition, and restoration activities in the Valley and beyond. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

In general, the Impacts of Actions to Manage User Capacity, Land Use, and Facilities stem from short-term construction activities requiring fuel consumption and therefore temporary emissions of GHGs. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

Long-term impacts of these actions would primarily be associated with on-road vehicles (visitors and employees) and area pollution sources. Mobile sources would include automobiles, trucks, and buses and would remain subject to regulations governing mobile source GHG controls (including statewide Pavley and Low Carbon Fuel Standards), which are expected to lead to a continuing decrease in emissions per VMT for the foreseeable future. Since visitor on-road vehicular sources are the primary

generator of GHG emissions in the park, the increase or decrease in visitor capacity and VMT would have the greatest impact on total GHGs.

GHG emissions sources would continue to include energy consumption at NPS and concessioner facilities located in the Merced River corridor, regular maintenance activities, and campfires. Actions that would reduce housing, campsites, or lodging would result in a proportional reduction in area source emissions, including emissions from maintenance/landscaping, natural gas combustion for heating/cooling, and campfires. Daily, routine, and intermittent operational maintenance would continue, including campground maintenance, road and trail maintenance, buildings and grounds maintenance, and utility system repair and maintenance throughout the park. However, alternative fuel or hybrid park vehicles would reduce the GHG emissions associated with these activities. In addition, energy-efficient upgrades and green building designs that have been and are currently being implemented by the NPS would continue to reduce energy consumption and associated GHG emissions under Alternatives 2–6. Overall for these sources, the continuation of NPS climate action plan strategies would result in a long-term, moderate, beneficial energy and GHG impact.

Impacts of specific projects are described below for each river segment where appropriate.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Actions to protect and enhance river values that would occur in Yosemite Valley under Alternatives 2-6 involve removal of abandoned infrastructure and other development affecting the Merced River's hydrologic function, extensive meadow restoration, and management of high visitor-use areas to address associated impacts on riparian habitats and sensitive cultural resources. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, removal, transport, disposal, restoration, and monitoring work associated with these actions would require more than one year of crew and equipment time. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternatives 2-6 include: restoring 4.5 acres of riparian habitat in the area of Yosemite Lodge and 20 acres in the area of the Former Upper Pines Loop Campground; restoring impacted areas of Ahwahnee Meadow, including through removal of tennis courts; improving access and removing infrastructure from riparian areas at Cathedral Beach, Housekeeping Camp, and Bridalveil; constructing a boardwalk extension to reduce Sentinel Meadow trampling; removing one and formalizing five other traffic pullouts along El Portal Road; and fencing and vegetation management at Stoneman Meadow, restoring floodplain habitat at Devil's Elbow, and filling ditches not serving current operational needs. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, removal, transport, disposal, restoration, and monitoring work associated with these actions would require more than one year of park staff time to implement. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternatives 2-6 include: placing constructed logjams in the channel between Clarks and Sentinel Bridges; and removing the abandoned gauging station at Pohono Bridge, removing the footings and former river gauge base at Happy Isles, and restoring these areas to natural conditions. This work would involve the use of heavy equipment, including excavators, a skid steer, and dump trucks, and require approximately more than 17 weeks of crew and equipment time to implement. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Cultural Resource Actions. Specific projects to protect and enhance the river's cultural values that would occur within Segment 2 under Alternatives 2-6 include rehabilitation of informal trails and parking in the vicinity rock art and rock shelters in the area of Bridalveil Falls, fencing and/or restricting access to the archeologically significant large bedrock mortar (pounding rock) next to Yosemite Falls Trail, restoration of impacted portions of Ahwahnee Meadow, and removal of abandoned infrastructure from the Bridalveil sewer plant to enhance oak recruitment. With the exception of abandoned infrastructure removal, the majority of this work would be completed through the use of hand tools and require a nominal commitment of staff time. As such, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Scenic Resource Actions. Specific projects to protect and enhance the river's scenic values that would occur within Segment 2 under Alternatives 2-6 include: selectively thinning conifers and other vegetation in the vicinities of The Ahwahnee and Meadow, Bridalveil Falls and West Valley, Cooks and Sentinel Meadows, Curry Village, El Capitan, Housekeeping Camp, Yosemite Lodge, and other areas of the Valley; restoring grassland and oak habitat in the areas of Bridalveil Straight; repairing riverbank erosion at Clark's Bridge; and addressing informal trails and trampling at the east end of El Capitan Meadow. Much of this work would be accomplished through the use of hand tools, but could also involve heavy equipment for various handling, transport, and restoration activities. This work would occur over the course of several years. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Actions to manage visitor use and facilities within Segment 2 that would occur under Alternatives 2-6 involve substantial changes to campsites, visitor and administrative facilities, employee housing, and transportation. The construction, demolition, transport, and disposal activities associated with this work would contribute to a short-term, regional and local, moderate, adverse impact on air quality, even after implementation of Mitigation Measure AQ-MM-2 (see Appendix C). As such, the impact on GHG emissions and energy consumption would be short-term, minor, and adverse, as vehicle traffic and visitation would be reduced as a result.

Curry Village and Campgrounds. The park would remove the Happy Isles Snack Stand at Curry Village. At The Ahwahnee, the park would remove the swimming pool and tennis courts; redesign, formalize, and improve drainage within the existing parking lot; and construct a new 50 parking space lot east of the current parking area. This work would require the use of heavy equipment, including excavators and skid steers. As such, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Camp 6 and Yosemite Village. The park would remove from Yosemite Village the Concessioner General Office, Concessioner Garage, and the Arts and Activities Center (Bank Building), and repurpose the Village Sports Shop for public use. It would also construct a new maintenance building near the Government Utility Building. This work would require the use of heavy equipment, including excavators and skid steers. As such, the impact on GHG emissions and energy consumption would be short-term, negligible to minor, and adverse.

West Yosemite Valley. The park would remove the NPS Volunteer Office, post office, swimming pool, and snack stand. It would also remove old and temporary employee housing (Thousands Cabins and Highland Court) and replace it with new housing. This work would require the use of heavy equipment, including excavators and skid steers. As such, the impact on GHG emissions and energy consumption would be short-term, negligible to minor, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. Actions to manage user capacities, land use, and facilities would have short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

To protect and enhance river values within the Merced River gorge and El Portal, the park would remove informal trails, nonessential roads, fill materials, and abandoned infrastructure throughout Segments 3 and 4. The demolition, removal, transport, and disposal of waste materials; and restoration of these areas would have a short-term, negligible to minor, and adverse impact on GHG emissions and energy consumption.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 4 under Alternatives 2-6 include removing development, asphalt and imported fill from the Abbieville and Trailer Village areas. The project would require the use of a skid steer and dump truck, and take several weeks to complete. Accordingly, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic resource values include restoring the Greenemeyer Sand Pit to natural conditions. The work would require the use of heavy equipment over a period of several weeks. Accordingly, the impact on GHG and energy consumption would be short-term, negligible, and adverse.

Scenic Resource Actions. Specific projects to protect and enhance the river's scenic values that would occur within Segment 3 under Alternatives 2-6 include: selectively thinning conifers in the area of the Cascade Falls viewpoint. Much of this work would be accomplished through the use of hand tools, but could also involve heavy equipment for various handling, transport, and restoration activities. This

work would occur over the course of a few days. Accordingly, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Under each alternative, the park would construct infill housing in El Portal Village Center. The park would also construct a restroom for visitor use in Old El Portal. The work would require the use of heavy equipment throughout the construction process. As such, the projects would have a short-term, negligible to minor, adverse impact on GHG emissions and energy consumption. Over the long-term, occupation of the new residential units would contribute to a negligible, adverse impact.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have short-term and long-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4.

Segments 6 and 7: Wawona and Wawona Impoundment

Impacts of Actions to Protect and Enhance River Values

The park would improve Wawona Campground wastewater and refuse management and facilities, remove abandoned infrastructure, and undertake numerous site-specific management measures to counteract or minimize ongoing impacts on cultural resources. These actions would have a short-term, negligible, adverse impact on GHG emissions and energy consumption.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic values that would occur within Segment 7 under Alternatives 2-6 include developing a waste water collection system, including the construction of a pump station above the Wawona Campground. This work would require the use of heavy equipment, including an excavator, skid steer, loader, and dump truck. This effort would require approximately one month of crew time to complete. Accordingly, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Cultural Resource Actions. Specific projects to protect and enhance the river's cultural values that would occur within Segment 7 under Alternatives 2-6 include removing and relocating campsites that cause potential impacts to sensitive archeological resources. This work could require the use of heavy equipment, including an excavator, skid steer, loader, and dump truck. This effort would require approximately one week to complete. Accordingly, the impact on GHG emissions and energy consumption would be short-term, negligible, and adverse. Over the long-term, reduced campsites would result in reduced campfires, which would be a negligible, beneficial impact.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

To improve operational efficiency, the park would construct new facilities to house maintenance operations and a new wildland fire station within Segment 7. The park would also remove staged

materials, abandoned utilities, vehicles, and a parking lot from the riparian buffer at the Wawona Maintenance Yard and restore the area's native ecosystem, and remove roadside parking between the Wawona Store and Chilnualna Falls Road. The construction and restoration activities associated with these projects would involve the use of heavy equipment and occur over a period of several months. The resulting impact on Segment 7 GHG emissions and energy consumption would be short-term, negligible to minor, and adverse.

Wawona. The park would redesign the bus stop at the Wawona Store to accommodate increased visitor use. This project would be carried out primarily through the use of hand and small power tools. The resulting energy and GHG impact would be short-term, negligible, and adverse.

Segment 7 Impact Summary: With implementation of mitigation measure MM-AIR-2 (see Appendix C), as applicable, actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. Actions to manage user capacities, land use, and facilities would have short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact.

Summary of Impacts Common to Alternatives 2–6

Alternatives 2–6 would result in energy consumption and GHG emissions associated with short-term construction and long-term operational activities. Overall, more energy consumption and greater emissions of GHGs would occur in nonwilderness portions of the Merced River corridor to a much greater extent than wilderness portions. Stationary sources would continue to be regulated under the applicable air district rules and regulations, some area sources would continue to be subject to park regulations, and mobile sources would continue to be subject to state and federal emissions standards.

Environmental Consequences of Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

All River Segments

Impacts of Actions to Protect and Enhance River Values

Impacts associated with implementation of Alternative 2 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to protect and enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Impacts associated with implementation of Alternative 2 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

With regard to long-term impacts associated with visitor capacity under Alternative 2, on-road mobile emissions were quantified using the California Air Resources Board's emission's factors model (EMFAC2007) and compared with the Federal Mandatory Reporting Rule threshold of 25,000 metric tons of CO_2e per year. Although bus operations are projected to increase under Alternative 2, the reduction in total daily visitor and administrative use and capacity would result in a long-term, minor, beneficial impact owing to reduced on-road vehicles in the park, as depicted in the **table 9-157** below.

TABLE 9-157: ON-ROAD VEHICLE GHG EMISSIONS (METRIC TONS/YEAR)[a]

Scenario	CO_2e
Alternative 2 Emissions	38,278
Alternative 1 (No Action) Emissions	49,619
Incremental Change[b]	(11,341)
Federal Mandatory Reporting Rule Threshold	25,000
Impact Intensity, Type?[c]	Minor, Beneficial

[a] Emissions were calculated using EMFAC2007 factors and assume 2.4 visitors per car with approximately 22 VMT per vehicle (calibrated based on annual VMT projected for Alternative 1 assuming 240 days/year peak and shoulder seasons) and bus trip VMT from *Supporting Information: A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park* (Villalba *et al* 2012b). User capacities included in the Alternatives chapter were totaled for each alternative to determine the regional GHG emissions. Specific assumptions and emission factors incorporated into the calculations are included in Appendix G.

[b] Values in (parentheses) are net reductions with respect to Alternative 1 (No Action) emissions.

[c] Negligible impacts would not be detectable and would have no discernible effect on GHG emissions (assumed to be 1% or less of threshold). Minor impacts would be those that are present but not expected to have an overall effect on those conditions (assumed to occur up to 50% of applicable threshold). Moderate impacts are clearly detectable and could have an appreciable effect (assumed to occur at emissions levels greater than 50% but does not exceed the applicable threshold). Major impacts would have a substantial, highly noticeable influence on GHG emissions (assumed to occur when emissions exceed applicable threshold).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Under Alternative 2, long-term energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to those under Alternative 1 (No Action). No new buildings and facilities would be constructed within Segments 1, 5, 6, and 8 as part of Alternative 2, so no substantial new sources of energy consumption or emissions would be introduced. Overnight visitation and total daily use levels would be 26% and 33% less, respectively, than under Alternative 1. With fewer on-road vehicles in the vicinity under Alternative 2, the overall effect on energy consumption and GHGs along Segments 1, 5, 6, and 8 would be long-term, minor, and beneficial.

Merced Lake High Sierra Camp. The park would close the Merced Lake High Sierra Camp and remove all associated infrastructure, convert the area to designated Wilderness, and expand dispersed camping at Merced Lake Backpackers Camping Area into the former High Sierra Camp footprint. Closure of the camp would temporarily increase energy consumption and GHG emissions associated

with facilities removal and restoration. The short-term impact would be negligible and adverse. Over the long-term, these actions would reduce the amount of energy (and associated emissions) required to stock, operate, and maintain the facility. The resulting impact would be long-term, negligible to minor, and beneficial.

Segments 1, 5, 6, & 8 Impact Summary: Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segments 1, 5, 6, & 8.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternative 2 include: rerouting trails at Ahwahnee Meadows; removing and restoring a portion of Northside Drive (900 feet) and rerouting the bike path; removing 1,335 feet of Southside Drive, re-alignment of the road, reconfiguring Curry Orchard parking lot, and extending the Stoneman Meadow boardwalk; removing development, asphalt, and fill material, and restoring 35.6 acres of floodplain at the former Upper and Lower River campgrounds; removing campsites and infrastructure from the 100-year floodplain and restoring an additional 25.1 acres of floodplain and riparian habitat; and removing informal trails and informal parking at El Capitan Meadow. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and restoration work would require approximately 65 weeks of crew and equipment time over a period of three years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 2 include: relocating unimproved Camp 6 parking and rerouting a portion of Northside Drive; removing the Stoneman, Ahwahnee and Sugar Pine Bridges; and restoring these areas to natural conditions. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and revegetation activities associated with this work would require approximately 30 weeks of crew and equipment time. As a result, these actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping, lodging, parking, circulation, employee housing, and service facilities would be similar to those described above for the analysis common to Alternatives 2–6.Reduced housing or lodging would result in a proportional reduction in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion

for heating/cooling) and facility energy usage. Since campsites would be reduced along this segment (estimated at 450 versus 466 for Alternative 1), there would also be a proportional reduction in campfire GHG emissions. With fewer on-road vehicles and potential area sources under Alternative 2, the overall effect on energy consumption and GHGs would be long-term, minor, and beneficial.

Curry Village and Campground. The park would construct 78 new hard-sided units in Boys Town, bringing the total number of new and retained units at Curry Village to 433. The park would remove campsites from lower Pines (32), North Pines (86), and Upper Pines (24). Several of these actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting short-term GHG impact would be negligible and adverse.

Camp 6 and Yosemite Village. The park would reroute Northside Drive to the south of the Yosemite Village day-use parking area, reconfigure the lot to accommodate a total of 550 parking spaces north of the road, and install walkways leading to Yosemite Village. These actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Camp 4 and Yosemite Lodge. The park would convert the Highland Court area to a walk-in campground; reconfigure pedestrian crossing of Northside Drive and Yosemite Lodge Drive, and redevelop an area west of Yosemite Lodge to provide an additional parking for 150 automobiles and 15 tour busses. These actions would also require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segment 2.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping and employee housing facilities would be similar to those described above for the analysis common to Alternatives 2–6.

With fewer on-road vehicles under Alternative 2, the overall effect on energy consumption and related GHG emissions would be long term, minor, and beneficial. Increased housing would result in a

proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage, which would have a long-term, minor, and adverse impact.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor beneficial impacts on energy and GHG conditions within Segments 3 & 4.

Segment 7: Wawona

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 2 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. This work could require the use of heavy equipment and would require approximately one week of crew and equipment time. The resulting impact from construction on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to service facilities would be similar to those described above for the analysis common to Alternatives 2–6.

The removal of the golf course for ecological restoration and the removal of the Wawona stables would have a beneficial effect. Energy consumption and GHGs associated with these facilities (such as maintenance/landscaping and natural gas combustion for heating/cooling) would be reduced, which would result in a long-term, negligible to minor, beneficial impact.

Wawona Campground. Under Alternative 2, the park would reduce the size of the Wawona Campground. Thirty-two campsites, or 33% of all campsites within Wawona, would be removed from the floodplain. There would be a proportional reduction in campfire GHG emissions, which would have a long-term, negligible, beneficial impact. This would result in a long-term, negligible, beneficial impact on GHG emissions and energy consumption.

Segment 7 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have short- and long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segment 7.

Summary of Impacts from Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

Impacts associated with implementation of Alternative 2 would be similar to those described above for the analysis common to Alternatives 2–6. Construction would result in short-term, negligible to minor, adverse impacts. For long-term operations, the overall reduction in accommodations (housing, campsites, and/or lodging) would result in a proportional reduction in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling), in campfire GHG emissions, and in facility energy usage. In addition, reducing the overall visitor capacity and implementation of mitigation measure MM-AIR-2 (see Appendix C) as applicable, Alternative 2 would result in a long-term, minor, beneficial energy and climate change impact.

Cumulative Impacts from Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

The past, present, and reasonably foreseeable future actions in the Yosemite region considered for the following cumulative energy and climate change analysis are the same as those identified for Alternative 1.

Overall Cumulative Impact from Alternative 2: Self-reliant Visitor Experiences and Extensive Floodplain Restoration

Because management actions under Alternative 2 and actions common to Alternatives 2-6 involve substantial construction activity, their associated equipment and on-road vehicle fuel usage and GHG emissions would be expected to result in short-term, negligible to minor adverse energy and climate change impacts. However, with reduced daytime and nighttime visitor capacity, Alternative 2 management actions would also result in a long-term, cumulatively beneficial energy and climate change impact from reduced VMT and facility energy usage. In addition, the continued management of traffic and encouragement of alternative forms of transportation, as well as continuation of NPS climate-action-plan sustainability strategies, would have long-term, beneficial energy and climate change impacts.

Environmental Consequences of Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

All River Segments

Impacts of Actions to Protect and Enhance River Values

Impacts associated with implementation of Alternative 3 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to protect and enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Impacts associated with implementation of Alternative 3 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

With regard to long-term impacts associated with visitor capacity under Alternative 3, on-road mobile emissions were quantified using EMFAC2007 emission factors and compared with the Federal Mandatory Reporting Rule threshold of 25,000 metric tons of CO_2e per year. Although bus operations are projected to increase under Alternative 3, the reduction in total daily visitor and administrative use and capacity would result in a long-term, minor, beneficial impact owing to reduced on-road vehicles in the park, as depicted in the **table 9-158** below.

TABLE 9-158: ON-ROAD VEHICLE GHG EMISSIONS (METRIC TONS/YEAR)[a]

Scenario	CO_2e
Alternative 3 Emissions	37,286
Alternative 1 (No Action) Emissions	49,619
Incremental Change[b]	(12,333)
Federal Mandatory Reporting Rule Threshold	25,000
Impact Intensity, Type?[c]	Minor, Beneficial

[a] Emissions were calculated using EMFAC2007 factors and assume 2.4 visitors per car with approximately 22 VMT per vehicle (calibrated based on annual VMT projected for Alternative 1 assuming 240 days/year peak and shoulder seasons) and bus trip VMT from *Supporting Information: A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park* (Villalba *et al* 2012b). User capacities included in the Alternatives chapter were totaled for each alternative to determine the regional GHG emissions. Specific assumptions and emission factors incorporated into the calculations are included in Appendix G.

[b] Values in (parentheses) are net reductions with respect to Alternative 1 (No Action) emissions.

[c] Negligible impacts would not be detectable and would have no discernible effect on GHG emissions (assumed to be 1% or less of threshold). Minor impacts would be those that are present but not expected to have an overall effect on those conditions (assumed to occur up to 50% of applicable threshold). Moderate impacts are clearly detectable and could have an appreciable effect (assumed to occur at emissions levels greater than 50% but does not exceed the applicable threshold). Major impacts would have a substantial, highly noticeable influence on GHG emissions (assumed to occur when emissions exceed applicable threshold).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Under Alternative 3, long-term energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to those under Alternative 1 (No Action). No new buildings and facilities would be constructed within Segments 1, 5, 6, and 8 as part of Alternative 3, so no substantial new sources of energy consumption or emissions would be introduced. With fewer on-road vehicles in the vicinity,

the overall effect on energy consumption and GHGs along Segments 1, 5, 6, and 8 would be long term, minor, and beneficial.

Merced Lake High Sierra Camp. The park would close the Merced Lake High Sierra Camp and removal all infrastructure, convert the area to designated Wilderness, and use the former camp area for a temporary stock camp. Closure of the camp would temporarily increase energy consumption and GHG emissions associated with facilities removal and restoration. The short-term impact would be negligible and adverse. Over the long-term, these actions would reduce the amount of energy (and associated emissions) required to stock, operate, and maintain the facility. The resulting impact would be long-term, negligible to minor, and beneficial.

Segments 1, 5, 6, & 8 Impact Summary: Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segments 1, 5, 6, & 8.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternative 3 include: rerouting trails at Ahwahnee Meadows; removing and restoring a portion of Northside Drive (900 feet) and rerouting the bike path; removing 1,335 feet of Southside Drive, re-alignment of the road, reconfiguring Curry Orchard parking lot, and extending the Stoneman Meadow boardwalk; removing development, asphalt, and fill material, and restoring 35.6 acres of floodplain at the former Upper and Lower River campgrounds; removing campsites and infrastructure from within 150 feet of the river and restoring an additional 12 acres of floodplain and riparian habitat; and removing informal trails and installing signage and fencing to redirect visitor traffic at El Capitan Meadow. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and restoration work would require approximately 50 weeks of crew and equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 3 include: relocating unimproved Camp 6 parking; removing the Stoneman, Ahwahnee and Sugar Pine Bridges; and restoring these areas to natural conditions. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and revegetation activities associated with this work would require approximately 30 weeks of crew and equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping, lodging, parking, circulation, employee housing, and service facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Overnight visitation and total daily use levels would be 23% and 37% less, respectively, than under Alternative 1. Reduced housing or lodging would result in a proportional reduction in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) in facility energy usage. Since campsites would be increased along this segment (estimated at 477 versus 466 for Alternative 1), there would also be a proportional increase in campfires, which would result in a long-term, negligible, adverse impact for GHG emissions. However, with fewer on-road vehicles and potential area sources under Alternative 3, the overall effect on energy consumption and GHGs would be long term, minor, and beneficial.

Curry Village and Campground. The park would retain 355 guest units at Curry Village. The park would remove campsites from lower Pines (15), North Pines (34), and Upper Pines (2). Several of these actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting short-term GHG impact would be negligible and adverse. The reduction in units would decrease energy demand, resulting in a long-term, negligible, beneficial impact.

Camp 6 and Yosemite Village. The park would reroute Northside Drive to the south of the Yosemite Village day-use parking area, reconfigure the lot to accommodate a total of 550 parking spaces north of the road, and install walkways leading to Yosemite Village. These actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Camp 4 and Yosemite Lodge. The park would move on-grade pedestrian crossing to west of the Northside Drive and Yosemite Lodge Drive, relocate the existing bus drop-off area to the Highland Court area to accommodate loading/unloading for three busses, and redevelop an area west of Yosemite Lodge to provide an additional parking for 150 automobiles and 15 tour busses. These actions would also require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would similarly have long-term negligible to minor, beneficial impacts on energy and GHG conditions within Segment 2.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping and employee housing facilities would be similar to those described above for the analysis common to Alternatives 2–6.

With fewer on-road vehicles under Alternative 3, the overall effect on energy consumption and related GHG emissions would be long term, minor, and beneficial.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have short-term and long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segments 3 & 4.

Segment 7: Wawona

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 3 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. This work could require the use of heavy equipment and would require approximately one week of crew and equipment time. The resulting impact from construction on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to service facilities would be similar to those described above for the analysis common to Alternatives 2–6. The removal of the golf course for ecological restoration would have a beneficial effect. Energy consumption and GHGs associated with this facility (such as maintenance/landscaping and natural gas combustion for heating/cooling) would be reduced, which would have a long-term, negligible to minor, beneficial impact.

Wawona Campground. Under Alternative 3, the park would reduce the size of the Wawona Campground. Twenty seven campsites, or 28% of all campsites within Wawona, would be removed from the floodplain. There would also be a proportional reduction in campfire GHG emissions. This would result in a long-term, negligible, beneficial impact on GHG emissions and energy consumption.

Segment 7 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have short- and long-term, negligible, beneficial impacts on energy and GHG conditions within Segment 7.

Summary of Impacts from Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

Impacts associated with implementation of Alternative 3 would be similar to those described above for the analysis common to Alternatives 2–6. Construction would result in short-term, negligible to minor, adverse impacts. For long-term operations, reduced housing and lodging would result in a proportional reduction in area GHG emissions sources, such as maintenance/landscaping, natural gas combustion for heating/cooling, and facility energy usage. In addition, reducing the overall visitor capacity and implementation of mitigation measure MM-AIR-2 (see Appendix C) as applicable, Alternative 3 would result in a long-term, minor to moderate, beneficial energy and climate change impact.

Cumulative Impacts from Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

The past, present, and reasonably foreseeable future actions in the Yosemite region considered for the following cumulative energy and climate change analysis are the same as those identified for Alternative 1.

Overall Cumulative Impact from Alternative 3: Dispersed Visitor Experiences and Extensive Riverbank Restoration

Because management actions under Alternative 3 and actions common to Alternatives 2-6 involve substantial construction activity, their associated equipment and on-road vehicle fuel usage and GHG emissions would be expected to result in short-term, negligible to minor adverse energy and climate change impacts. However, with reduced daytime and nighttime visitor capacity, Alternative 3 management actions would also result in a long-term, cumulatively beneficial energy and climate change impact from reduced VMT and facility energy usage. In addition, the continued management of traffic and encouragement of alternative forms of transportation, as well as continuation of NPS climate-action-plan sustainability strategies, would have long-term, beneficial energy and climate change impacts.

Environmental Consequences of Alternative 4: Resource-Based Visitor Experiences and Targeted Riverbank Restoration

All River Segments

Impacts of Actions to Protect and Enhance River Values

Impacts associated with implementation of Alternative 4 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to protect and

enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Impacts associated with implementation of Alternative 4 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

With regard to long-term impacts associated with visitor capacity under Alternative 4, on-road mobile emissions were quantified using EMFAC2007 emission factors and compared with the Federal Mandatory Reporting Rule threshold of 25,000 metric tons of CO_2e per year. Although bus operations are projected to increase under Alternative 4, the reduction in total daily visitor and administrative use and capacity would result in a long-term, minor, beneficial impact owing to reduced on-road vehicles in the park, as depicted in the **table 9-159** below.

TABLE 9-159: ON-ROAD VEHICLE GHG EMISSIONS (METRIC TONS/YEAR)[a]

Scenario	CO_2e
Alternative 4 Emissions	43,045
Alternative 1 (No Action) Emissions	49,619
Incremental Change[b]	(6,574)
Federal Mandatory Reporting Rule Threshold	25,000
Impact Intensity, Type?[c]	Minor, Beneficial

[a] Emissions were calculated using EMFAC2007 factors and assume 2.4 visitors per car with approximately 22 VMT per vehicle (calibrated based on annual VMT projected for Alternative 1 assuming 240 days/year peak and shoulder seasons) and bus trip VMT from *Supporting Information: A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park* (Villalba *et al* 2012b). User capacities included in the Alternatives chapter were totaled for each alternative to determine the regional GHG emissions. Specific assumptions and emission factors incorporated into the calculations are included in Appendix G.

[b] Values in (parentheses) are net reductions with respect to Alternative 1 (No Action) emissions.

[c] Negligible impacts would not be detectable and would have no discernible effect on GHG emissions (assumed to be 1% or less of threshold). Minor impacts would be those that are present but not expected to have an overall effect on those conditions (assumed to occur up to 50% of applicable threshold). Moderate impacts are clearly detectable and could have an appreciable effect (assumed to occur at emissions levels greater than 50% but does not exceed the applicable threshold). Major impacts would have a substantial, highly noticeable influence on GHG emissions (assumed to occur when emissions exceed applicable threshold).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Under Alternative 4, long-term energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to those under Alternative 1 (No Action). No new buildings and facilities would be constructed within these segments as part of Alternative 4, so no substantial new sources of energy consumption or emissions would be introduced. With fewer on-road vehicles in the vicinity under Alternative 4, the overall effect on energy consumption and GHGs along Segments 1, 5, 6, and 8 would be long term, minor, and beneficial.

Merced Lake High Sierra Camp. The park would close the Merced Lake High Sierra Camp and removal all infrastructure, convert the area to designated Wilderness, and restoration of the former camp area to natural conditions. Closure of the camp would temporarily increase energy consumption and GHG emissions associated with facilities removal and restoration. The short-term impact would be negligible and adverse. Over the long-term, these actions would reduce the amount of energy (and associated emissions) required to stock, operate, and maintain the facility. The resulting impact would be long-term, negligible to minor, and beneficial.

Segments 1, 5, 6, & 8 Impact Summary: Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segments 1, 5, 6, & 8.

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternative 4 include: removing fill and constructing a boardwalk over meadow and wet areas at Ahwahnee Meadows; installing culverts beneath Northside Drive; removing 1,335 feet of Southside Drive, re-alignment of the road, reconfiguring Curry Orchard parking lot, and extending the Stoneman Meadow boardwalk; removing asphalt and fill material, restoring topography of 19.7 acres of floodplain, and installation of box culverts or other similar design components at the former Upper and Lower River campgrounds; removing campsites and infrastructure from within 150 feet of the river and restoring an additional 12 acres of floodplain and riparian habitat; and erecting fencing, signage, and boardwalks to redirect visitor traffic, and removing informal trails at El Capitan Meadow. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and restoration work would require at least 35 weeks of crew and equipment time over a period of at least two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 4 include: relocating unimproved Camp 6 parking; placing large wood and constructed logjams along the base of Stoneman Bridge; removing the Ahwahnee and Sugar Pine Bridges; and restoring these areas to natural

conditions. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and revegetation activities associated with this work would require approximately 30 weeks of crew and equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping, lodging, parking, circulation, employee housing, and service facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Overnight visitation and total daily use levels would be 7% greater and 19% less, respectively, than under Alternative 1. Since campsites would be increased along this segment (estimated at 701 versus 466 for Alternative 1), there would also be a proportional increase in campfire GHG emissions, which would be a long-term, negligible to minor, adverse impact. Reduced housing or lodging would result in a proportional reduction in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage. Overall, with fewer on-road vehicles and potential area sources under Alternative 4, the effect on energy consumption and GHGs would be long term, minor, and beneficial.

Curry Village and Campground. The park would retain 355 guest units and construct a new 40 site campground at Curry Village. The park would remove campsites from lower Pines (15), North Pines (34), and Upper Pines (2). Several of these actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting short-term GHG impact would be negligible and adverse. The reduction in units would decrease energy demand, resulting in a long-term, negligible, beneficial impact.

Camp 6 and Yosemite Village. The park would improve the configuration of and on-grade pedestrian crossing at the Northside Drive-Yosemite Village Drive intersection, shift the parking area north and redevelop a portion of the former administrative footprint to accommodate 750 parking spaces, and install a new three-way intersection connecting the parking lot to Sentinel Drive. These actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Camp 4 and Yosemite Lodge. The park would design a pedestrian underpass, relocate the existing bus drop-off area to the Highland Court area to accommodate loading/unloading for three busses, and redevelop an area west of Yosemite Lodge to provide an additional parking for 150 automobiles and 15 tour busses. These actions would also require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact. Actions to manage user

capacities, land use, and facilities would similarly have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segment 2.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to parking and employee housing facilities would be similar to those described above for the analysis common to Alternatives 2–6.

With fewer on-road vehicles under Alternative 4, the overall effect on energy consumption and related GHG emissions would be long term, minor, and beneficial. Increased housing would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage, which would have a long term, minor, and adverse impact.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term and long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segments 3 & 4.

Segment 7: Wawona

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 4 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. This work could require the use of heavy equipment and would require approximately one week of crew and equipment time. The resulting impact from construction on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Wawona Campground. Under Alternative 4, the park would reduce the size of the Wawona Campground. Twenty-seven campsites, or 28% of all campsites within Wawona, would be removed from the floodplain. There would be a proportional reduction in campfire GHG emissions This would result in a long-term, negligible, beneficial impact on GHG emissions and energy consumption.

Segment 7 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible, beneficial impacts on energy and GHG conditions within Segment 7.

Summary of Impacts from Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

Impacts associated with implementation of Alternative 4 would be similar to those described above for the analysis common to Alternatives 2–6. Construction would result in short-term, negligible to minor, adverse impacts. For long-term operations, reduced housing and lodging would result in a proportional reduction in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage. In addition, reducing the overall visitor capacity and implementation of mitigation measure MM-AIR-2 (see Appendix C) as applicable, Alternative 4 would result in a long-term, minor, beneficial energy and climate change impact from reduced fuel usage and GHG emissions associated with on-road vehicles. An increased number of overall campsites could result in a greater number of campfires, which would result in a long-term, negligible to minor, adverse impact on GHG emissions.

Cumulative Impacts from Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

The past, present, and reasonably foreseeable future actions in the Yosemite region considered for the following cumulative energy and climate change analysis are the same as those identified for Alternative 1.

Overall Cumulative Impact from Alternative 4: Resource-based Visitor Experiences and Targeted Riverbank Restoration

Because management actions under Alternative 4 and actions common to Alternatives 2-6 involve substantial construction activity, their associated equipment and on-road vehicle fuel usage and GHG emissions would be expected to result in short-term, negligible to minor adverse energy and climate change impacts. With reduced overall daily visitor capacity, Alternative 4 would result in a long-term, cumulatively beneficial energy and climate change impact from reduced VMT and associated fuel usage and GHG emissions. However, an increased number of campsites could result in an adverse impact from increased campfire usage and associated GHG emissions. The continued management of traffic and encouragement of alternative forms of transportation, as well as continuation of NPS climate-action-plan sustainability strategies, would have long-term, beneficial energy and climate change impacts.

Environmental Consequences of Alternative 5: Enhanced Visitor Experiences and Essential River Bank Restoration

All River Segments

Impacts of Actions to Protect and Enhance River Values

Impacts associated with implementation of Alternative 5 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to protect and enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Impacts associated with implementation of Alternative 5 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

With regard to long-term impacts associated with the visitor capacity under Alternative 5, on-road mobile emissions were quantified using EMFAC2007 emission factors and compared to the Federal Mandatory Reporting Rule threshold of 25,000 metric tons of CO_2e per year. Although bus operations are projected to increase under Alternative 5, the reduction in total daily visitor and administrative use and capacity would result in a long-term, minor, beneficial impact owing to reduced on-road vehicles in the park, as depicted in the **table 9-160** below.

TABLE 9-160: ON-ROAD VEHICLE GHG EMISSIONS (METRIC TONS/YEAR)[a]

Scenario	CO_2e
Alternative 5 Emissions	48,082
Alternative 1 (No Action) Emissions	49,619
Incremental Change[b]	(1,537)
Federal Mandatory Reporting Rule Threshold	25,000
Impact Intensity, Type?[c]	Minor, Beneficial

[a] Emissions were calculated using EMFAC2007 factors and assume 2.4 visitors per car with approximately 22 VMT per vehicle (calibrated based on annual VMT projected for Alternative 1 assuming 240 days/year peak and shoulder seasons) and bus trip VMT from *Supporting Information: A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park* (Villalba *et al* 2012b). User capacities included in the Alternatives chapter were totaled for each alternative to determine the regional GHG emissions. Specific assumptions and emission factors incorporated into the calculations are included in Appendix G.

[b] Values in (parentheses) are net reductions with respect to Alternative 1 (No Action) emissions.

[c] Negligible impacts would not be detectable and would have no discernible effect on GHG emissions (assumed to be 1% or less of threshold). Minor impacts would be those that are present but not expected to have an overall effect on those conditions (assumed to occur up to 50% of applicable threshold). Moderate impacts are clearly detectable and could have an appreciable effect (assumed to occur at emissions levels greater than 50% but does not exceed the applicable threshold). Major impacts would have a substantial, highly noticeable influence on GHG emissions (assumed to occur when emissions exceed applicable threshold).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Under Alternative 5, long-term energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to those under Alternative 1 (No Action). No new buildings and facilities would be constructed within these segments as part of Alternative 5, so no substantial new sources of energy consumption or emissions would be introduced. With fewer on-road vehicles in the vicinity under Alternative 5, the overall effect on energy consumption and GHGs along Segments 1, 5, 6, and 8 would be long term, minor, and beneficial.

Merced Lake High Sierra Camp. The park would reduce the capacity of the Merced Lake High Sierra Camp to 42 beds and replace the flush toilets with composting toilets. Facilities replacement would temporarily increase energy consumption and GHG emissions associated with moving equipment and supplies by helicopter. The short-term impact would be negligible and adverse. Over the long-term, capacity changes would reduce the amount of energy (and associated emissions) required to stock, operate, and maintain the facility. The resulting impact would be long-term, negligible, and beneficial.

Segments 1, 5, 6, & 8 Impact Summary: Actions to manage user capacities, land use, and facilities would have long-term, negligible, beneficial impacts on energy and GHG conditions within Segments 1, 5, 6, & 8

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternatives 5 include: removing asphalt and fill material, restoring topography of 35.6 acres of floodplain, and installation of box culverts or other similar design components at the former Upper and Lower River campgrounds; removing campsites and infrastructure from within 100 feet of the river and restoring an additional 6.5 acres of floodplain and riparian habitat; removing fill and constructing a boardwalk over meadow and wet areas at Ahwahnee Meadows; installing culverts beneath Northside Drive; reconfiguring the Curry Orchard parking lot;; removing informal trails and erecting fencing, signage, and boardwalks to reduce visitor impacts, and selectively remove conifers to improve views redirect visitor traffic at El Capitan Meadow. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and restoration work would require at least 40 weeks of crew and

equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 5 include: relocating unimproved Camp 6 parking; removing the Sugar Pine Bridge; placing large wood and constructed logjams along the base of Stoneman Bridge; and improving trail connectivity and routing in the vicinity of the Ahwahnee Bridge. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and revegetation activities associated with this work would require at least 16 weeks of crew and equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping, lodging, parking, circulation, employee housing, and service facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Overnight visitation and total daily use levels would be 16% greater and 5% less, respectively, than under Alternative 1. Since campsites would be increased along this segment (estimated at 640 sites versus 466 sites for Alternative 1), there would also be a proportional increase in campfire GHG emissions, which would have a long-term, negligible to minor, adverse impact. With fewer on-road vehicles under Alternative 5, energy consumption and related GHG emissions would be long term, minor, and beneficial. Increased lodging would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage, which would be a long term, minor, and adverse impact.

Curry Village and Campground. The park would construct 98 hard-sided units at Boys Town, bringing the total number of new and retained units at Curry Village to 453. The park would remove campsites from lower Pines (5), North Pines (14), and Upper Pines (2). Several of these actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting short-term GHG impact would be negligible and adverse.

Camp 6 and Yosemite Village. The park would construct a pedestrian underpass and a traffic circle at the intersection of Northside and Yosemite Village Drives, shift the parking area north and redevelop a portion of the former administrative footprint to accommodate 850 parking spaces, and install a new three-way intersection connecting the parking lot to Sentinel Drive. These actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Camp 4 and Yosemite Lodge. The park would design a pedestrian underpass, relocate the existing bus drop-off area to the Highland Court area to accommodate loading/unloading for three busses, and redevelop an area west of Yosemite Lodge to provide an additional parking for 300 automobiles and 15 tour busses. These actions would also require the use of heavy construction equipment and would

increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible to minor, beneficial impacts on energy and GHG conditions within Segment 2.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to parking and employee housing facilities would be similar to those described above for the analysis common to Alternatives 2–6.

With fewer on-road vehicles under Alternative 5, the overall effect on energy consumption and related GHG emissions would be long term, minor, and beneficial. Increased housing would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling) and in facility energy usage, which would have a long-term, minor, and adverse impact.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible, beneficial impacts on energy and GHG conditions within Segments 3 & 4.

Segment 7: Wawona

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 3 include the relocation of stock use campsites from sensitive resource areas to the Wawona Maintenance Yard. This work could require the use of heavy equipment and would require approximately one week of crew and equipment time. The resulting impact from construction on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Wawona Campground. Under Alternative 5, the park would reduce the size of the Wawona Campground. Thirteen campsites, or 13% of all campsites within Wawona, would be removed from the floodplain. There would be a proportional reduction in campfire GHG emissions. This would result in a long-term, negligible, beneficial impact on GHG emissions and energy consumption.

Segment 7 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible, beneficial impacts on energy and GHG conditions within Segment 7.

Summary of Impacts from Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

Impacts associated with implementation of Alternative 5 would be similar to those described above for the analysis common to Alternatives 2–6. Construction would result in short-term, negligible to minor, adverse effects. For long-term operations, increased housing, campsites, or lodging would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling), in campfire GHG emissions, and in facility energy usage, which would result in a long-term, minor, adverse impact. However, reducing the overall visitor capacity and implementation of mitigation measure MM-AIR-2 (see Appendix C) as applicable, Alternative 5 would result in a long-term, minor, beneficial energy and climate change impact from reduced fuel usage and GHG emissions associated with on-road vehicles.

Cumulative Impacts from Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

The past, present, and reasonably foreseeable future actions in the Yosemite region considered for the following cumulative energy and climate change analysis are the same as those identified for Alternative 1.

Overall Cumulative Impact from Alternative 5: Enhanced Visitor Experiences and Essential Riverbank Restoration

Because management actions under Alternative 5 and actions common to Alternatives 2-6 involve substantial construction activity, their associated equipment and on-road vehicle fuel usage and GHG emissions would be expected to result in short-term, negligible to minor adverse energy and climate change impacts. With reduced overall visitor capacity, Alternative 5 would result in a long-term, cumulatively beneficial effect on energy and climate change from reduced VMT and associated fuel usage and GHG emissions. However, an increased number of lodging units and campsites would result

in an adverse impact from increased area source GHG emissions. The continued management of traffic and encouragement of alternative forms of transportation, as well as continuation of NPS climate-action-plan sustainability strategies, would have long-term, beneficial energy and climate change impacts.

Environmental Consequences of Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

All River Segments

Impacts of Actions to Protect and Enhance River Values

Impacts associated with implementation of Alternative 6 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to protect and enhance river values would likely result in short-term, negligible to minor, adverse GHG emissions and energy consumption, depending on the year-to-year development and activity overlap.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Impacts associated with implementation of Alternative 6 would be similar to those described above for the analysis common to Alternatives 2–6. Overall construction activities associated with actions to manage visitor use and facilities would likely result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts, depending on the year-to-year development and activity overlap.

With regard to long-term impacts associated with the visitor capacity under Alternative 6, on-road mobile emissions were quantified using EMFAC2007 emission factors and compared to the Federal Mandatory Reporting Rule threshold of 25,000 metric tons of CO_2e per year. As depicted in the **table 9-161**, below, the increase in total daily visitor and administrative use and capacity and bus operations would result in a long-term, minor, adverse impact owing to increased on-road vehicles in the park.

TABLE 9-161: ON-ROAD VEHICLE GHG EMISSIONS (METRIC TONS/YEAR)[a]

Scenario	CO_2e
Alternative 6 Emissions	50,744
Alternative 1 (No Action) Emissions	49,619
Incremental Change	1,125
Federal Mandatory Reporting Rule Threshold	25,000
Impact Intensity, Type?[c]	Minor, Adverse

[a] Emissions were calculated using EMFAC2007 factors and assume 2.4 visitors per car with approximately 22 VMT per vehicle (calibrated based on annual VMT projected for Alternative 1 assuming 240 days/year peak and shoulder seasons) and bus trip VMT from *Supporting Information: A Life-Cycle Greenhouse Gas Inventory for Yosemite National Park* (Villalba *et al* 2012b). User capacities included in the Alternatives chapter were totaled for each alternative to determine the regional GHG emissions. Specific assumptions and emission factors incorporated into the calculations are included in Appendix G.

[b] Negligible impacts would not be detectable and would have no discernible effect on GHG emissions (assumed to be 1% or less of threshold). Minor impacts would be those that are present but not expected to have an overall effect on those conditions (assumed to occur up to 50% of applicable threshold). Moderate impacts are clearly detectable and could have an appreciable effect (assumed to occur at emissions levels greater than 50% but does not exceed the applicable threshold). Major impacts would have a substantial, highly noticeable influence on GHG emissions (assumed to occur when emissions exceed applicable threshold).

Segments 1, 5, 6, and 8: Merced River Above Nevada Fall, South Fork Merced River Above and Below Wawona, and Wawona Impoundment

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Under Alternative 6, long-term energy use and emissions in the areas of Segments 1, 5, 6, and 8 would remain similar to that of Alternative 1 (No Action). No new buildings and facilities would be constructed within segments 1, 5, 6, and 8 as part of Alternative 6, so no substantial new sources of energy consumption or emissions would be introduced. With a greater number of on-road vehicles in the vicinity under Alternative 6, the overall effect on energy consumption and GHGs along Segments 1, 5, 6, and 8 would be long term, minor, and adverse.

Merced Lake High Sierra Camp. The park would retain the Merced Lake High Sierra Camp and replace the flush toilets with composting toilets. Facilities replacement would temporarily increase energy consumption and GHG emissions associated with moving equipment and supplies by helicopter. The short-term impact would be negligible and adverse. Continued operation of the Camp would not be expected to change energy or GHG consumption from existing conditions. The resulting impact would be long-term, negligible, and adverse.

Segments 1, 5, 6, & 8 Impact Summary: Actions to manage user capacities, land use, and facilities would have long-term, negligible, adverse impacts on energy and GHG conditions within Segments 1, 5, 6, & 8

Segment 2: Yosemite Valley

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 2 under Alternative 6 include: removing asphalt and fill material, restoring topography of 19.7 acres of floodplain, and installation of box culverts or other similar design components at the former Upper and Lower River campgrounds; removing campsites and infrastructure from within 100 feet of the river and restoring an additional 6.5 acres of floodplain and riparian habitat; removing fill and constructing a boardwalk over meadow and wet areas at Ahwahnee Meadows;; and removing informal trails, installing viewing platforms and boardwalks, and selectively remove conifers to improve views at El Capitan Meadow. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and restoration work would require at least 40weeks of crew and equipment time over a period of at least two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Hydrologic/Geologic Resource Actions. Specific projects to protect and enhance the river's hydrologic and geologic values that would occur within Segment 2 under Alternative 6 include: relocating unimproved Camp 6 parking and placing large wood and constructed logjams along the bases of Stoneman, Sugar Pine, and Ahwahnee Bridges. This work would require the use of heavy equipment, including excavators, skid steers, loaders, and dump trucks. The demolition, transport, disposal, and revegetation activities associated with this work would require approximately 16 weeks of crew and equipment time over a period of two years. These actions would result in short-term, negligible to minor, adverse GHG emissions and energy-consumption impacts.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping, lodging, parking, circulation, employee housing, and service facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Overnight visitation and total daily use levels would be 33% and 4% greater, respectively, than under Alternative 1. Since campsites would be increased along this segment (estimated at 739 sites versus 466 sites for Alternative 1), there would also be a proportional increase in campfire GHG emissions, which would have a long-term, negligible to minor, adverse impact. Reduced housing would result in a proportional reduction, while increased lodging would contribute to a proportional increase in area GHG emissions sources (such as maintenance/ landscaping, natural gas combustion for heating/cooling) and in facility energy usage. With a greater number of on-road vehicles and potential area sources under Alternative 6, the overall effect on energy consumption and GHGs would be long term, negligible to minor, and adverse.

Curry Village and Campground. The park would construct 98 hard-sided units at Boys Town, bringing the total number of new and retained units at Curry Village to 453. The park would remove campsites from lower Pines (5), North Pines (14), and Upper Pines (2). Several of these actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting short-term GHG impact would be negligible and adverse.

Camp 6 and Yosemite Village. The park would expand the Concessioner Warehouse Building to accommodate Concessioner General Office functions, construct a pedestrian underpass and two roundabouts, shift the parking area north and redevelop a portion of the former administrative footprint to accommodate 850 parking spaces, and install a new three-way intersection connecting the parking lot to Sentinel Drive. These actions would require the use of heavy construction equipment and would increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Camp 4 and Yosemite Lodge. The park would design a pedestrian underpass, relocate the existing bus drop-off area to the Highland Court area to accommodate loading/unloading for three busses, and redevelop an area west of Yosemite Lodge to provide an additional parking for 300 automobiles and 15 tour busses. These actions would require the use of heavy construction equipment and would

increase construction-related emissions during project implementation. The resulting impact on GHG conditions would be short-term, negligible to minor, and adverse.

Segment 2 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segment 2. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible, adverse impacts on energy and GHG conditions within Segment 2.

Segments 3 and 4: Merced River Gorge and El Portal

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to parking and employee housing facilities would be similar to those described above for the analysis common to Alternatives 2–6.

With greater numbers of on-road vehicles under Alternative 6, the overall effect on energy consumption and related GHG emissions would be long term, negligible, and adverse. Increased housing would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling), in campfire GHG emissions, and in facility energy usage, which would have a long term, minor, and adverse impact.

Segments 3 & 4 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible to minor, adverse impacts on energy and GHG conditions within Segments 3 & 4. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have short-term and long-term, negligible, adverse impacts on energy and GHG conditions within Segments 3 & 4.

Segment 7: Wawona

Impacts of Actions to Protect and Enhance River Values

Short-term construction activities and impacts would be similar to those described above for the analysis common to Alternatives 2–6.

Biological Resource Actions. Specific projects to protect and enhance the river's biological values that would occur within Segment 7 under Alternative 6 include the relocation of stock use campsites from sensitive resource areas to Wawona Stables. This work could require the use of heavy equipment and would require approximately one week of crew and equipment time. The resulting impact from construction on GHG emissions and energy consumption would be short-term, negligible, and adverse.

Impacts of Actions to Manage User Capacity, Land Use, and Facilities

Short-term construction activities and impacts associated with changes to camping facilities would be similar to those described above for the analysis common to Alternatives 2–6.

Wawona Campground. Under Alternative 6, the park would reduce the size of the Wawona Campground. Thirteen campsites, or 13% of all campsites within Wawona, would be removed from the floodplain. There would be a proportional reduction in campfire GHG emissions. This would result in a long-term, negligible, beneficial impact on GHG emissions and energy consumption.

Segment 7 Impact Summary: Actions to protect and enhance river values would result in local, short-term, negligible, adverse impacts on energy and GHG conditions within Segment 7. However, these actions would not be expected to have a long-term impact. Actions to manage user capacities, land use, and facilities would have long-term, negligible, beneficial impacts on energy and GHG conditions within Segment 7.

Summary of Impacts from Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

Impacts associated with implementation of Alternative 6 would be similar to those described above for the analysis common to Alternatives 2–6. Construction would result in short-term, negligible to minor adverse effects. For long-term operations, increased housing, campsites, and lodging would result in a proportional increase in area GHG emissions sources (such as maintenance/landscaping, natural gas combustion for heating/cooling), in campfire GHG emissions, and in facility energy usage. In addition, increasing the overall visitor capacity and implementation of mitigation measure MM-AIR-2, as applicable (see Appendix C), Alternative 6 would result in a long-term, minor, adverse energy and climate change impact from increased fuel usage and GHG emissions associated with on-road vehicles.

Cumulative Impacts from Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

The past, present, and reasonably foreseeable future actions in the Yosemite region considered for the following cumulative energy and climate change analysis are the same as those identified for Alternative 1.

Overall Cumulative Impact from Alternative 6: Diversified Visitor Experiences and Selective Riverbank Restoration

Because management actions under Alternative 6 and actions common to Alternatives 2-6 involve substantial construction activity, it would be expected to contribute to short-term, negligible to minor adverse energy and climate change impacts from equipment and on-road vehicle fuel usage and GHG emissions. With increased overall visitor capacity, Alternative 6 would result in a long-term, cumulatively adverse impact on energy and climate change from increased VMT and associated fuel usage and GHG emissions. An increased number of campsites would result in increased GHG

emissions from wood burning. Similarly, an increase in the number of lodging units would result in an adverse impact from increased area source GHG emissions and facility energy usage. The continued management of traffic and encouragement of alternative forms of transportation, as well as continuation of NPS climate-action-plan sustainability strategies, would have long-term, negligible, beneficial energy and climate change impacts.