4.3 GREENHOUSE GAS EMISSIONS

This section analyzes the proposed Single-Use Carryout Bag Ordinance's impacts related to global climate change. The analysis focuses on manufacturing, transportation and disposal of carryout bags as these are the largest contributors to greenhouse gas emissions.

4.3.1 Setting

a. Overview of Global Climate Change and Greenhouse Gases. Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Common GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O_x), fluorinated gases, and ozone. GHG are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. The rate of global climate change (GCC) has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. However, scientists have observed an unprecedented acceleration in the rate of warming during the past 150 years likely due to the observed increase in anthropogenic GHG concentrations (United Nations Intergovernmental Panel on Climate Change [IPCC], November 2007). Current annual anthropogenic GHG emitted from the world, United States, and California are listed in Table 4.3-1.

Table 4.3-1
Annual Anthropogenic GHG Emissions

Worldwide	United States	California
40,000 MM CO_2e	7,054 MM CO_2e	492 MM CO_2e

MM = million metric tons
CO_2e = carbon dioxide equivalent

Source: IPPC, 2007; USEPA, April 2008; CEC, December 2006

California is the second largest emitter of GHGs among states and, if California were a country, it would be the sixteenth highest emitter among countries (AEP, 2007). Out of the 492 million metric tons of carbon dioxide equivalent (CO_2e [1]) produced in California (7% of U.S. total), 41% is associated with transportation. Electricity generation is the second largest source, contributing 22% of the state's GHG emissions (CEC, December 2006). Most, 81%, of California's 2004 GHG

[1] *Carbon dioxide equivalent (CO_2e) is a quantity that describes, for a given mixture and amount of GHGs, the amount of CO_2 (usually in metric tons; million metric tons [megatonne] = MMTCO_2e= terragram [Tg] CO_2 Eq; 1,000 MMT = gigatonne) that would have the same global warming potential (GWP) when measured over a specified timescale (generally, 100 years).*

emissions (in terms of CO_2e) were CO_2 produced from fossil fuel combustion, with 2.8% from other sources of CO_2, 5.7% from methane, and 6.8% from nitrous oxide (CEC, December 2006).

b. Effects of Global Climate Change. GCC has the potential to affect numerous environmental resources through potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. A warming of about 0.2°C (0.36°F) per decade is projected, and there are identifiable signs that global warming could be taking place, including substantial ice loss in the Arctic (IPCC, 2007).

According to the California Energy Commission's (CEC) Draft Climate Action Team Biennial Report, potential impacts in California of global warming may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CEC, March 2009). Below is a summary of some of the potential effects reported by an array of studies that could be experienced in California as a result of global climate change.

Air Quality. Higher temperatures, conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (CEC, March 2009).

Water Supply. Uncertainty remains with respect to the overall impact of GCC on future water supplies in California. Studies have found that, "considerable uncertainty about precise impacts of climate change on California hydrology and water resources will remain, until we have more precise and consistent information about how precipitation patterns, timing, and intensity will change" (California Department of Water Resources [DWR], 2006). For example, some studies identify little change in total annual precipitation in projections for California (California Climate Change Center [CCCC], 2006). Other studies show substantially more precipitation (DWR, 2006). Even assuming that climate change leads to long-term increases in precipitation, analysis of the impact of climate change is further complicated by the fact that no studies have identified or quantified the runoff impacts that such an increase in precipitation would have in particular watersheds (CCCC, 2006). Also, little is known about how groundwater recharge and water quality will be affected (Id.). Higher rainfall could lead to greater groundwater recharge, although reductions in spring runoff and higher evapotranspiration could reduce the amount of water available for recharge (Ibid.).

The California Department of Water Resources (DWR, 2006) report on climate change and effects on the State Water Project (SWP), the Central Valley Project, and the Sacramento-San Joaquin Delta concludes that "[c]limate change will likely have a significant effect on

California's future water resources… [and] future water demand." DWR also reports that "much uncertainty about future water demand [remains], especially [for] those aspects of future demand that will be directly affected by climate change and warming. While climate change is expected to continue through at least the end of this century, the magnitude and, in some cases, the nature of future changes is uncertain" (DWR, 2006).

This uncertainty serves to complicate the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood (DWR, 2006). DWR adds that "[i]t is unlikely that this level of uncertainty will diminish significantly in the foreseeable future." Still, changes in water supply are expected to occur, and many regional studies have shown that large changes in the reliability of water yields from reservoirs could result from only small changes in inflows (Kiparsky, 2003; DWR, 2006; Cayan, 2006, Cayan, D., et al, 2006).

Hydrology. As discussed above, climate changes could potentially affect: the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise may be a product of climate change through two main processes: expansion of sea water as the oceans warm and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Agriculture. California has a $30 billion agricultural industry that produces half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater ozone pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC, 2006).

Ecosystems and Wildlife. Climate change and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise as discussed previously: 1.0-4.5°F (0.6-2.5°C) in the next 50 years, and 2.2-10°F (1.4-5.8°C) in the next century, with substantial regional variation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Sea level could rise as much as two feet along most of the U.S. coast. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan, 2004; Parmesan, C. and H. Galbraith, 2004). In addition, increased CO2 that is absorbed by the oceans could increase the acidity of the oceans and cause direct and indirect effects on organisms and their habitats such as coral reefs (The Royal Society, 2005).

While the above mentioned potential impacts identify the possible effects of climate change at a global and potentially statewide level, in general scientific modeling tools are currently unable to predict what impacts would occur locally.

c. Greenhouse Gas Emissions from Carryout Bags. Carryout bags have the potential to contribute to the generation of GHGs either through emissions associated with manufacturing process, truck trips delivering carryout bags to retailers or through disposal during landfill degradation. Each is summarized below.

Manufacturing Process. The manufacturing process to make carryout bags requires fuel and energy consumption which creates GHG emissions including CO_2, CH_4, N_2O_x, fluorinated gases, and ozone. In addition, fertilizers that are used on crops for resources such as cotton or pulp which are then utilized in the manufacturing of carryout bags also have the potential to emit N_2O_x. The amount of GHG emissions varies depending on the type and quantity of carryout bags produced. Compared to truck trips and disposal, the manufacturing process is the largest emitter of GHGs due to the high volume of fuel and energy consumption that is used during the process.

Truck Trips. Delivery trucks that transport carryout bags from manufacturers or distributors to the local retailers in Huntington Beach also create GHG emissions. GHG emissions from truck trips result primarily from the combustion of fossil fuels and include CO_2, CH_4, and N_2O. As discussed in the *Transportation/Circulation* section of the Initial Study (see Appendix A), based on a baseline population estimate in Huntington Beach of approximately 191,677 persons and a statewide estimate of approximately 533 plastic bags used per person per year, retail customers in the City of Huntington Beach currently use an estimated 102,198,343 plastic bags per year. Assuming 2,080,000 plastic bags per truck load (City of Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011; refer to Appendix A), this number of plastic bags would require approximately 49 truck trips per year to deliver these plastic carryout bags in Huntington Beach.

Disposal/Degradation. Once disposed of by customers, carryout bags that are not recycled are deposited to a landfill where they are left to decompose and degrade. Depending on the type and materials used, a carryout bag will degrade at various rates. When carryout bag materials degrade in anaerobic conditions at a landfill, CH_4 is emitted. This contributes to GCC (Green Cities California MEA, 2010).

GHG Emission Rates per Bag. Various studies have estimated GHG emissions for the different carryout bags (single-use plastic, paper or reusable bags) to determine a per bag GHG emissions rate. The Boustead Report (2007) compared single-use plastic and paper carryout bags and assumed that one paper bag could carry the same quantity of groceries as 1.5 plastic bags. Based on the Boustead Report (2007), 1,500 single-use plastic bags would generate 0.04 metric tons of Carbon Dioxide Equivalent (CO_2e) as a result of manufacturing, transportation, and disposal. Based on the Scottish Report (AEA Technology, 2005), through the manufacturing, transportation, and disposal of a single-use paper bag, GHG emissions result in 3.3 times the emissions compared to the manufacturing, use and disposal of a single-use plastic bag. Thus, using the single-use plastic bag GHG emissions rate of 0.04 CO_2e per 1,500 from the Boustead Report, single-use paper bags would emit 0.132 CO_2e per 1,000 bags. If only used

once, the manufacturing, use and disposal of a reusable LDPE carryout bag results in 2.6 times the GHG emissions of a single-use HDPE plastic bag (AEA Technology, 2005). Thus, reusable LDPE carryout bags would emit 0.104 CO_2e per 1,000 bags (if used only once) (Stephen L. Joseph, 2009; AEA Technology, 2005; Ecobilan, 2004; Green Cities California MEA, 2010; and, City of Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011). However, it should be noted that if used over 20 times, a reusable LDPE carryout bag results in 0.1 times the GHG emissions of a single-use HDPE plastic bag (AEA Technology, 2005). The analysis used above uses the LDPE carryout bag as a representation of reusable bags in evaluating greenhouse gas impacts. There is no known available Life Cycle Assessment that evaluates all types of reusable bags (canvas, cotton, calico, etc.) with respect to potential GHG emissions. However, given the high rate of reuse by all types of reusable bags (up to 125 uses, as defined in the proposed Ordinance), the GHG emissions from these bags, when compared to the single-use plastic and paper carryout bags, are expected to be comparable to the LPDE bag or lower.

Table 4.3-2 lists the current GHG emissions associated with the manufacturing, transportation and disposal of carryout bags in Huntington Beach using the per bag GHG emissions rates discussed above and the estimated existing single-use plastic carryout bags used in Huntington Beach. As discussed in Section 4.1, *Air Quality*, based on a baseline population estimate in Huntington Beach of approximately 191,677 persons and a statewide estimate of approximately 533 plastic bags used per person per year, retail customers in the City of Huntington Beach currently use an estimated 102,198,343 plastic bags per year. As shown in Table 4.3-2, overall GHG emissions associated with plastic carryout bag use in Huntington Beach are 2,725 CO_2e per year or approximately 0.014 CO_2e per person per year.

Table 4.3-2
Existing Greenhouse Gas Emissions
from Carryout Bags in Huntington Beach

Bag Type	Existing Number of Bags Used per Year	GHG Impact Rate per Bag	CO_2e (metric tons)	CO_2e per year (metric tons)	CO_2e per Person[3]
Single-use Plastic	102,198,343*	1.0	0.04 per 1,500 bags**	2,725.3	0.014
			Total	**2,725**	**0.014**

CO_2e = Carbon Dioxide Equivalent units
Source:
** Approximate estimate of reusable bags purchased in one year by Huntington Beach retail customers.*
*** Based on Boustead Report, 2007; Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011.*
****Based on AEA Technology "Scottish Report, 2005; Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011.*
[3] Emissions per person are divided by the existing population of Huntington Beach – 191,677

d. Regulatory Setting.

International and Federal Regulations. The United States is, and has been, a participant in the United Nations Framework Convention on Climate Change (UNFCCC) since it was signed on March 21, 1994. The Kyoto Protocol is a treaty, made under the UNFCCC, and was the first international agreement to regulate GHG emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global GHG emissions could be reduced by an estimated 5% from 1990 levels, during the first commitment period of 2008–2012. Although the United States is a signatory to the Kyoto Protocol, Congress has not ratified the Protocol and the United States has not bound itself to the Protocol's commitments (UNFCCC, 2007)

The United States is currently using a voluntary and incentive-based approach toward emissions reductions in lieu of the Kyoto Protocol's mandatory framework. The Climate Change Technology Program (CCTP) is a multi-agency research and development coordination effort (led by the Secretaries of Energy and Commerce) that is charged with carrying out the President's National Climate Change Technology Initiative (USEPA, December 2007; http://www.epa.gov/climatechange/policy/cctp.html).

To date, the United States Environmental Protection Agency (EPA) has not regulated GHGs under the Clean Air Act; however, the U.S. Supreme Court in *Massachusetts v. EPA* (April 2, 2007) held that the EPA can, and should, consider regulating motor-vehicle GHG emissions. On June 30, 2009, the EPA granted California's request for a waiver to directly limit GHG tailpipe emissions for new motor vehicles beginning with the current model year. On December 7, 2009, the EPA determined that emissions of GHGs contribute to air pollution that "endangers public health and welfare" within the meaning of the Clean Air Act. This action finalizes the EPA's "endangerment determination" initially proposed on April 17, 2009, and now obligates the EPA to regulate GHG emissions from new motor vehicles. This finding sets the stage for the inevitable regulation under the Clean Air Act of GHG emissions from a wide range of stationary and mobile sources unless Congress preempts such regulation by enacting climate change legislation. Although the EPA has not yet promulgated federal regulations limiting GHG emissions, further action is pending.

California Regulations. Assembly Bill (AB) 1493, requiring the development and adoption of regulations to achieve "the maximum feasible reduction of greenhouse gases" emitted by noncommercial passenger vehicles, light-duty trucks, and other vehicles used primarily for personal transportation, was signed into law in September 2002. In 2005, Executive Order S-3-05 established statewide GHG emissions reduction targets. S-3-05 provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80% of 1990 levels (CalEPA 2006).

In response to S-3-05, CalEPA created the Climate Action Team (CAT), which in March 2006, published the Climate Action Team Report (the "2006 CAT Report") (CalEPA, 2006). The 2006 CAT Report identified a recommended list of strategies that the state could pursue to reduce GHG emissions. These are strategies that could be implemented by various state agencies to ensure that the S-3-05 targets are met and can be met with existing authority of the state agencies. Strategies include the reduction of passenger and light duty truck emissions, the

reduction of idling times for diesel trucks, an overhaul of shipping technology/ infrastructure, increased use of alternative fuels, increased recycling, and landfill methane capture.

AB 32, the "California Global Warming Solutions Act of 2006," was signed into law in the fall of 2006. AB 32 required the ARB to adopt regulations to require reporting and verification of statewide GHG emissions. The ARB was required to produce a plan by January 1, 2009 to indicate how emission reductions will be achieved from major GHG sources via regulations, market mechanisms, and other actions. The bill requires achievement by 2020 of a statewide GHG emissions limit equivalent to 1990 emissions (essentially a 25% reduction below 2005 emission levels; the same requirement as under S-3-05), and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emissions reductions.

In response to the requirements of AB 32, the ARB produced a list of 37 early actions for reducing GHG emissions in June 2007. The ARB expanded this list in October 2007 to 44 measures that have the potential to reduce GHG emissions by at least 42 million metric tons of CO_2 emissions by 2020, representing about 25% of the estimated reductions needed by 2020 (ARB, October 2007). After completing a comprehensive review and update process, the ARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT CO_2e. The scoping plan required under AB 32 was approved by the ARB Board on December 12, 2008, and it provides the outline for actions to reduce GHG in California. The scoping plan has a range of GHG reduction actions, which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 cost of implementation fee regulation to fund the program.

Senate Bill (SB) 97, signed in August 2007, acknowledges that GCC is an environmental issue that requires analysis under CEQA. In December 2009, the California Resources Agency (Resources Agency) adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and GCC impacts.

Executive Order S-01-07 was enacted on January 18, 2007. The order mandates that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. In addition, a Low Carbon Fuel Standard ("LCFS") for transportation fuels is to be established for California.

Senate Bill (SB) 375, signed in August 2008, requires the inclusion of sustainable communities' strategies (SCS) in regional transportation plans (RTPs) for the purpose of reducing GHG emissions. The bill requires ARB to set regional targets for the purpose of reducing greenhouse gas emissions from passenger vehicles, for 2020 and 2035. On January 23, 2009 ARB appointed a Regional Targets Advisory Committee (RTAC) to provide recommendations on factors to be considered and methodologies to be used in the ARB target setting process, as required under SB 375. The RTAC final report, issued on September 30, 2009, recommended "ambitious but achievable" targets, with a significant emphasis on improving home affordability (rents and mortgages) near job centers as a means to reduce driving.

For more information on the Senate and Assembly bills, Executive Orders, and reports discussed above, and to view reports and research referenced above, please refer to the following websites: www.climatechange.ca.gov and http://www.arb.ca.gov/cc/cc.htm.

Local Regulations and CEQA Requirements**.** Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the *CEQA Guidelines* for the feasible mitigation of GHG emissions and analysis of the effects of GHG emissions. The adopted *CEQA Guidelines* provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, the Bay Area Air Quality Management District (BAAQMD), the South Coast Air Quality Management District (SCAQMD), and the San Joaquin Air Pollution Control District (SJVAPCD) have adopted significance thresholds for GHGs. The SCAQMD threshold, which was adopted in December 2008, considers emissions of over 10,000 metric tons CO_2e /year to be significant. However, the SCAQMD's threshold applies only to stationary sources and is expressly intended to apply only when the SCAQMD is the CEQA lead agency. Although not yet adopted, staff of the SCAQMD has proposed a project-level threshold of 4.8 metric tons CO_2e per service population (defined to include both residents and employees) per year for use in the South Coast region (SCAQMD, "Proposed Tier 4 Performance Standards, September 2010 and personal communication Ian MacMillan, Program Supervisor - CEQA Intergovernmental Review, SCAQMD on December 29, 2011). The City of Huntington Beach has utilized this threshold for other CEQA documents (i.e., Beach & Ellis Mixed Use Project EIR, September 2011) and this "efficiency' metric threshold is derived from statewide compliance with AB 32. Therefore, the SCAQMD recommended threshold is reasonable to use for this analysis. Note that no air district has the power to establish definitive thresholds that will completely relieve a lead agency of the obligation to determine significance on a case-by-case basis for a specific project.

4.3.2 Impact Analysis

a. Methodology and Significance Thresholds. Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions in March 2010. These guidelines are used in evaluating the cumulative significance of GHG emissions from the proposed project. According to the adopted CEQA Guidelines, impacts related to GHG emissions from the proposed project would be significant if the project would:

- *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; and/or*
- *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.*

The vast majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of

past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15355).

The *CEQA Guidelines* are used in evaluating the cumulative significance of GHG emissions from the proposed project. As described by *CEQA Guidelines* Section 15064.4, a lead agency shall have discretion to determine, in the context of a particular project, whether to:

1. *Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or*

2. *Rely on a qualitative analysis or performance based standards.*

Further, a lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

1. *The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;*

2. *Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and*

3. *The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.*

Although the proposed Single-Use Carryout Bag Ordinance would not involve any specific development project or change any land use designations, this section provides a quantitative analysis to estimate GHG emissions.

The majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to global climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution towards an impact is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15355).

For future projects, the significance of GHG emissions may be evaluated based on locally adopted quantitative thresholds, or consistency with a regional GHG reduction plan (such as a Climate Action Plan). The City of Huntington Beach has not adopted a GHG reduction plan;

therefore, the proposed Single-Use Carryout Bag Ordinance is evaluated based on the SCAQMD's project-level threshold of 4.8 metric tons CO_2e per service population (defined to include both residents and employees) per year (SCAQMD, "Proposed Tier 4 Performance Standards, September 2010).

The proposed Ordinance would have a significant impact related to GHG emissions if the GHG emissions would result in more than 4.8 metric tons of CO_2E units per service population (residents and employees) per year. In addition, impacts would be significant if the proposed Ordinance would be inconsistent with any of the applicable greenhouse gas emissions reductions strategies.

b. Project Impacts and Mitigation Measures.

Impact GHG-1 **The proposed Single-Use Carryout Bag Ordinance would reduce the number of single-use carryout bags used in Huntington Beach and promote reusable bags, which are intended to be used multiple times. Implementation of the proposed Ordinance would incrementally increase GHG emissions compared to existing conditions. However, emissions would not exceed recommended SCAQMD thresholds and would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. Impacts would be Class III, *less than significant*.**

The intent of the proposed Single-Use Carryout Bag Ordinance is to reduce the use of single-use carryout bags, and to promote the use of reusable bags by Huntington Beach retail customers. As such, the proposed Ordinance would incrementally reduce the number of single-use plastic carryout bags that are manufactured and incrementally increase the number of single-use paper and reusable bags that are manufactured, transported, and disposed of compared to existing conditions.

As described in the *Setting*, through the manufacturing, transportation, and disposal, each single-use paper bag results in 3.3 times the emissions compared to the manufacturing, transportation and disposal of a single-use plastic bag. If only used once, the manufacturing, use and disposal of a reusable LDPE carryout bag results in 2.6 times the GHG emissions of a single-use HDPE plastic bag (Stephen L. Joseph, 2009; AEA Technology, 2005; Ecobilan, 2004; and Green Cities California MEA, 2010). Thus, on a per bag basis, single-use plastic bags have less impact than single-use paper and reusable carryout bags. However, reusable carryout bags are intended to be used multiple times. With reuse of carryout bags, fewer total carryout bags would need to be manufactured, transported or disposed of compared to the existing processing activities of single-use plastic bags. As described in Section 4.1, *Air Quality*, as a result of the proposed Ordinance, existing plastic bags used in Huntington Beach (102 million annually) would be replaced by an estimated 46 million single-use paper bags and one million reusable bags; an estimated 5.1 million single-use plastic bags would remain in circulation (refer to Table 4.1-4). This represents a 95% reduction in single-use plastic bags and a 49% reduction in all types of carryout bags (including plastic, single-use paper, and reusable).

Table 4.3-3 provides an estimate of GHG emissions that would result from switching from plastic bags to paper and reusable carryout bags in Huntington Beach associated with the implementation of the proposed Single-Use Carryout Bag Ordinance. Although the total number of carryout bags would be reduced by approximately 50 million bags per year, as a result of the increase of single-use paper bags, GHG emissions associated with the manufacturing, transport, and disposal of carryout bags would increase by an estimated 0.015 CO_2e per person per year compared to existing conditions.

Table 4.3-3
Estimated Greenhouse Gas Emissions
from Carryout Bags in Huntington Beach

Bag Type	Estimated Number of Bags Used per Year*	GHG Impact Rate per Bag	CO_2e (metric tons)	CO_2e per year (metric tons)	CO_2e per Person[3]
Single-use Plastic	5,109,917	1.0	0.04 per 1,500 bags**	136	0.0007
Single-use Paper	45,989,254	2.97[1]	0.1188 per 1,000 bags[1]	5,464	0.029
Reusable	982,676	2.6	0.104 per 1,000 bags***	102	0.0005
			Total	**5,702**	**0.030**
			Existing	**2,725**	**0.014**
			Net Change	**2,977**	**0.015**

CO_2e = Carbon Dioxide Equivalent units
** refer to Table 4.1-4 in Section 4.1, Air Quality.*
[1] 10% reduction (from a rate of 3.3) based on Santa Clara County Negative Declaration (SCH# 2009102095) October 2010 and Sunnyvale Carryout Bag Ordinance Final EIR, December 2011 based on Environmental Defense Fund's Paper Calculator.
*** Based on Boustead Report, 2007; Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011.*
****Based on AEA Technology "Scottish Report, 2005; Santa Monica Single-use Carryout Bag Ordinance Final EIR, January 2011.*
[3] Emissions per person are divided by the existing population of Huntington Beach – 191,677

The increase in GHG emissions associated with the manufacturing, transportation and disposal of carryout bags used in Huntington Beach as a result of the proposed Ordinance would be approximately 0.015 CO_2e per person per year (or a total of approximately 2,977 CO_2e per year). This represents approximately 0.0006% of California's statewide GHG inventory of 492 million CO_2e per year. The proposed Ordinance's net increase of about 0.015 metric tons CO_2e per person per year compared to existing conditions (0.014 CO_2e per person per year) would not exceed the SCAQMD's 4.8 metric tons CO_2e per person per year threshold.

The proposed Ordinance would also be generally consistent with applicable regulations or plans addressing greenhouse gas reductions. As indicated above, the CAT published the Climate Action Team Report (the "2006 CAT Report") in March 2006. The CAT Report identifies a recommended list of strategies that the State could pursue to reduce climate change

greenhouse gas emissions. The CAT strategies are recommended to reduce GHG emissions at a statewide level to meet the goals of the Executive Order S-3-05. These are strategies that could be implemented by various State agencies to ensure that the Governor's targets are met and can be met with existing authority of the State agencies. In addition, in 2008 the California Attorney General published The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level (Office of the California Attorney General, Global Warming Measures Updated May 21, 2008). This document provides information that may be helpful to local agencies in carrying out their duties under CEQA as they relate to global warming. Included in this document are various measures that may reduce the global warming related impacts of a project. Tables 4.3-4 and 4.3-5 illustrate that the proposed Ordinance would be consistent with the GHG reduction strategies set forth by the 2006 CAT Report as well as the 2008 Attorney General's Greenhouse Gas Reduction Measures.

Table 4.3-4
Proposed Ordinance Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	*Project Consistency*
California Air Resources Board	
Vehicle Climate Change Standards AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004.	**Consistent** The trucks that deliver carryout bags to and from Huntington Beach on public roadways would be in compliance with ARB vehicle standards that are in effect at the time of vehicle purchase.
Diesel Anti-Idling The ARB adopted a measure to limit diesel-fueled commercial motor vehicle idling in July 2004.	**Consistent** Current State law restricts diesel truck idling to five minutes or less. Diesel trucks operating from and making deliveries to Huntington Beach are subject to this state-wide law.
Alternative Fuels: Biodiesel Blends ARB would develop regulations to require the use of 1 to 4% biodiesel displacement of California diesel fuel.	**Consistent** The diesel vehicles that deliver carryout bags to and from Huntington Beach on public roadways could utilize this fuel once it is commercially available.
Alternative Fuels: Ethanol Increased use of E-85 fuel.	**Consistent** Truck drivers delivering carryout bags could choose to purchase flex-fuel vehicles and utilize this fuel once it is commercially available regionally and locally.
Heavy-Duty Vehicle Emission Reduction Measures Increased efficiency in the design of heavy duty vehicles and an education program for the heavy duty vehicle sector.	**Consistent** The heavy-duty trucks that deliver carryout bags to and from Huntington Beach on public roadways would be subject to all applicable ARB efficiency standards that are in effect at the time of vehicle manufacture.
Achieve 50% Statewide Diversion Goal Achieving the State's 50% waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Sher, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy	**Consistent** As of 2006, which represents the most recent data available, the City of Huntington Beach maintained a 71 % diversion rate from the Orange County landfills, which exceeds the AB 939 requirement of 50 percent diversion of solid waste by the Year

Table 4.3-4
Proposed Ordinance Consistency with Applicable Climate Action Team Greenhouse Gas Emission Reduction Strategies

Strategy	*Project Consistency*
intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48% has been achieved on a statewide basis. Therefore, a 2% additional reduction is needed.	2000 (CIWMB, 2006). In addition, SB 1016 established a per-capita disposal rate as the instrument of measurement. The City of Huntington Beach is subject to a per resident disposal rate target of 10.4 pounds per person per day (PPD). According to data from annual reports submitted by the City and published by CalRecycle, the City's PPD rate dropped from 5.5 in 2007 to 4.6 in 2009, demonstrating compliance with SB 1016. Any disposal of carryout bags would be required to adhere to the existing standards. The proposed Ordinance would also assist by promoting reusable carryout bags, thus reducing the amount of solid waste generated in the form of single-use carryout bags.
Zero Waste – High Recycling Efforts to exceed the 50% mandate would allow for additional reductions in climate change emissions.	**Consistent** As described above, the City exceeds the 50% goal of recycling by diverting 71% of its solid waste and the City also has achieved a PPD rate of 4.6 in 2009 thus demonstrating compliance with SB 1016. The proposed Ordinance would assist by promoting reusable carryout bags, thus reducing the amount of solid waste generated in the form of single-use carryout bags. The Ordinance would also shift single-use bag consumption from plastic to paper. This would increase recycling of single-use bags because paper bags are recycled by services provided to each residence and workplace in the City. Consumer access to plastic bag recycling opportunities is limited.
Energy Commission (CEC)	
Fuel-Efficient Replacement Tires & Inflation Programs State legislation established a statewide program to encourage the production and use of more efficient tires.	**Consistent** Carryout bag delivery drivers could purchase tires for their vehicles that comply with state programs for increased fuel efficiency.
Alternative Fuels: Non-Petroleum Fuels Increasing the use of non-petroleum fuels in California's transportation sector, as recommended as recommended in the CEC's 2003 and 2005 Integrated Energy Policy Reports.	**Consistent** Carryout bag delivery drivers could purchase alternative fuel vehicles and utilize these fuels once they are commercially available regionally and locally.

Table 4.3-5
Proposed Ordinance Consistency with Applicable Attorney General Greenhouse Gas Reduction Measures

Strategy	*Project Consistency*
Transportation-Related Emissions	
Diesel Anti-Idling Set specific limits on idling time for commercial vehicles, including delivery vehicles.	**Consistent** Currently, the CARB's Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling restricts

	diesel truck idling to five minutes or less. Diesel trucks delivering carryout bags to Huntington Beach are subject to this state-wide law.
Solid Waste and Energy Emissions	
Solid Waste Reduction Strategy Project construction shall require reuse and recycling of construction and demolition (C&D) waste.	**Consistent** As described above, the City exceeds the 50% mandate and diverts 71% of its solid waste and the City also has achieved a PPD rate of 4.6 in 2009 thus demonstrating compliance with SB 1016. Single-use carryout bags make up a portion of C&D waste. The proposed Ordinance would also assist by promoting reusable carryout bags, thus reducing the amount of C&D waste attributed to single-use carryout bags. Any disposal of carryout bags would be required to adhere to the existing standards.

The proposed Single-Use Carryout Bag Ordinance would result in a net increase of approximately 0.015 metric tons CO_2e per person per year. However, both the increase of GHG emissions compared to existing conditions and the total emissions after implementation of the Ordinance would be less than 4.8 metric tons CO_2e per person per year and the Single-Use Carryout Bag Ordinance would be consistent with the CAT strategies and measures suggested in the Attorney General's Greenhouse Gas Reduction Report as discussed in tables 4.3-4 and 4.3-5. Therefore, the Single-Use Carryout Bag Ordinance would be consistent with the objectives of AB 32, SB 97, and SB 375. Impacts would be less than significant.

Mitigation Measures. Mitigation is not required since the impact would not be significant.

Significance after Mitigation. Impacts would be less than significant without mitigation.

c. Cumulative Impacts. Adopted and pending carryout bag ordinances, as described in Table 3-1 in Section 3.0, *Environmental Setting*, would continue to reduce the amount of single-use carryout bags, and promote a shift toward reusable carryout bags. Similar to the proposed Huntington Beach Ordinance, such ordinances would be expected to generally reduce the overall number of bags manufactured and associated greenhouse gas emissions. Similar to the proposed Huntington Beach ordinance, other adopted and pending ordinances could incrementally change the greenhouse gas emissions associated with bag manufacturing. At least six other agencies in Los Angeles region (County of Los Angeles and the cities of Long Beach, Los Angeles, Malibu, Manhattan Beach, and Santa Monica) have either adopted or are considering such ordinances. However, based on the incremental increase in per capita emissions, the other ordinances are not expected to generate a cumulative increase in GHG emissions. For these reasons, cumulative significant impacts associated with implementation of carryout bag ordinances throughout the state are not anticipated.