E. CLIMATE CHANGE/GREENHOUSE GAS EMISSIONS

This section defines climate change and greenhouse gases and presents the current legislation and programs addressing climate change in California. The section quantifies existing and potential future greenhouse gas emissions associated with the proposed project. It also recommends mitigation measures that could be implemented to reduce those emissions.

1. Existing Conditions

Climate change refers to any significant change in measures of climate such as temperature, precipitation, or wind, lasting for decades or longer (Environmental Protection Agency [EPA], 2007). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;
- Natural processes within the climate system (e.g., changes in ocean circulation); or,
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.)

Human activities, such as fossil fuel combustion and land use changes release carbon dioxide and other compounds, cumulatively termed greenhouse gases (GHGs). GHGs are effective in trapping infra-red radiation which otherwise would have escaped the atmosphere, thereby warming the atmosphere, the oceans, and earth's surface (EPA, 2007).

a. Greenhouse Gases (GHGs)

GHGs are any gas that absorbs infrared radiation in the atmosphere (EPA, 2007). GHGs, as defined in Assembly Bill 32 (AB 32), include the following gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). A brief summary of each GHG is summarized below (EPA, 2007).

1) Carbon Dioxide (CO_2)

CO_2 is a naturally occurring gas and also a byproduct of burning fossil fuels and biomass, as well as land-use changes and other industrial processes (EPA, 2007). Anthropogenic CO_2 is about 80 to 90 percent of the principal GHG that currently affects the Earth's radiative balance. Atmospheric CO_2 has a lifetime of about 50 to 200 years. (Environmental Monitor, Spring 2007).

2) Methane (CH_4)

CH_4 is a hydrocarbon that is a GHG with a global warming potential most recently estimated at 23 times that of CO_2. Methane is produced through anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. Atmospheric CH_4 has a lifetime of about 12 years (Environmental Monitor, Spring 2007).

3) Nitrous Oxide (N_2O)

N_2O is a powerful GHG with a global warming potential of 296 to 310 times that of CO_2. Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning. Atmospheric N_2O has a lifetime of about 120 years (Environmental Monitor, Spring 2007).

4) Hydrofluorocarbons (HFCs)

HFCs are compounds introduced as alternatives to ozone depleting substances (commonly refrigerants). In serving many industrial, commercial, and personal needs, HFCs are emitted as byproducts of industrial processes and are also released during manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful GHGs with global warming potential ranging from 140 to 11,700 times that of CO_2. Depending on the HFC species, atmospheric HFCs have a lifetime of about one to 15 years (US EPA, 2008; Environmental Monitor, Spring 2007).

5) Perfluorocarbons (PFCs)

PFCs were introduced as alternatives, along with hydrofluorocarbons, to ozone-depleting substances. PFCs are also emitted as byproducts of industrial processes and are used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are powerful GHGs with global warming potential ranging from 6,500 to 9,200 times that of CO_2. Atmospheric PFCs has a lifetime of about 10,000 to 50,000 years (Environmental Monitor, Spring 2007).

6) Sulfur Hexafluoride (SF6)

SF6 is a colorless gas soluble in alcohol and ether, slightly soluble in water, with a global warming potential 23,900 times that of CO_2. SF6 is a very powerful GHG used primarily in electrical transmission and distribution systems and as a dielectric in electronics. Atmospheric SF6 has a lifetime of about 3,200 years (Environmental Monitor, Spring 2007).

b. Global Climate Change

A series of reports issued by the United Nations Intergovernmental Panel on Climate Change (UNIPCC) have synthesized recent scientific studies of climate change (UNIPCC 2007a, 2007b, 2000c). Key findings of these reports include the following:

- Global atmospheric concentrations of CO_2, CH_4, and N_2O have increased markedly as a result of human activities since 1750, and now are at about double pre-industrial levels. Global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, and global increases in methane and nitrous oxide are due primarily to agriculture.

- Warming of the global climate due to GHGs is unequivocal, as evidenced by increases in air and water temperatures, widespread melting of snow and ice, and rising global average sea level. Most of the increase in global average temperatures since the mid-20th century is very likely due to increases in GHGs from human activities. GHG emissions increased 70 percent between 1970 and 2004.

- Numerous long-term climate changes observed have included changes in arctic temperatures and ice, precipitation, ocean salinity, wind pattern, and the frequency of extreme weather events such as droughts, heavy precipitation, heat waves, and tropical cyclone intensity.

- Continued GHG emissions at current rates would cause further warming and climate change during the 21st century that would very likely be larger than that observed in the 20th century.

- Climate change is expected to have adverse impacts on water resources, ecosystems, food and forest products, coastal systems and low-lying areas, urban areas, and public health. These impacts will vary regionally, and may be very expensive for agriculture and human activities. In some areas sea level rise may completely inundate now inhabited areas (e.g., river deltas, Pacific Islands).

c. California GHG Emissions and Climate Change

In California, the main sources of GHG emissions are from the transportation and energy sectors. According to the California Air Resources Board (ARB) draft GHG emission inventory for the year 2004, 39 percent of GHG emissions result from transportation and 25 percent of GHG emissions result from electricity generation. California produced 497 million metric tons of CO_2 equivalent ($MMtCO_2e$) in 2004 (ARB, 2007). California produces about two percent of the world's GHG emissions, with about 0.55 percent of the population.

The potential effects of future climate change on California resources include:

- **Air temperature:** Increases of three to 10.4 degrees Fahrenheit by the end of the century, depending on the aggressiveness of GHG emissions mitigation.
- **Sea level rise:** six to 30 inches by the end of the century, depending on the aggressiveness of GHG emissions mitigation.
- **Water resources:** Reduced Sierra snowpack, reduced water supplies, increased water demands, changed flood hydrology.
- **Forests:** Changed forest composition, geographic range, and forest health and productivity; increased destructive wild fires.
- **Ecosystems:** Changed habitats, increased threats to certain endangered species.
- **Agriculture:** Changed crop yields, increased irrigation demands, increased impacts from tropospheric ozone.
- **Public health:** Increased smog and commensurate respiratory illness and weather-related mortality (California Climate Change Portal [CCCP] 2007).

2. Regulatory Setting

a. California Climate Change Legislation and Programs

1) Vehicle Climate Change Standards

AB 1493 (Chapter 200, Statutes of 2002), requires 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. The ARB analysis of this regulation indicates emissions savings of one million metric tonnes (MMt) of CO_2 equivalent (CO_2e) by 2010 and 30 $MMtCO_2e$ by 2020. For these standards to go into effect, EPA must approve a waiver of Clean Air Act requirements to allow California (and other states) motor vehicle standards to exceed federal standards.

2) Assembly Bill 32

The California Global Warming Solutions Act of 2006 (AB 32, Health and Safety Code Sections 38500 et seq.) requires the ARB to design and implement emission limits, regulations, and other measures. These will reduce, by 2020, statewide GHG emissions in a technologically feasible and cost-effective manner to 1990 levels (representing a 25 percent reduction). The following summarizes the process and schedule for implementing AB 32:

June 30, 2007 – ARB publishes a list of discrete early action GHG emission reduction measures that can be implemented prior to the measures and limits to be adopted to meet the 2020 limit.

On September 7, 2007, the ARB released a list of additional early action measures and discrete early actions:

January 1, 2008 – ARB determines what the statewide GHG emissions level was in 1990 and approves a statewide GHG limit that is equivalent to that level.

January 1, 2008 – ARB adopts regulations requiring the reporting and verification of statewide GHG emissions.

January 1, 2009 – ARB adopts a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020.

January 1, 2010 – ARB adopts and enforces regulations to implement the GHG emission reduction measures identified on the early action list in 2007.

January 1, 2011 – ARB adopts regulations to achieve the required reduction of GHG emissions to 1990 levels by 2020.

January 1, 2012 – GHG emission limits and emission reduction measures adopted by January 1, 2011 become enforceable.

3) Senate Bill 1368

SB 1368 (Public Utilities Code Sections 8340 et seq.) is an AB 32 companion bill that was signed into law in 2006. It requires the California Public Utilities Commission (CPUC) to establish a GHG performance standard for base load generation from investor-owned utilities, and the California Energy Commission (CEC) to establish a similar standard for publicly-owned utilities. These standards may not exceed the GHG emission rate from a base load combined-cycle natural gas fired plant. The bill also requires all imported electricity provided to California to be generated from plants meeting CPUC and CEC standards.

4) Renewable Portfolio Standard Program

The CPUC and CEC coordinate the Renewable Portfolio Standard (RPS), which calls for more energy to come from clean, renewable sources such as wind and sun. In 2003, the Governor called for an acceleration of the RPS to 20 percent by 2010 rather than 2017; this goal was codified by SB 107 (Chapter 464, Statutes of 2006). In 2005, the Governor called for an acceleration of the RPS to 33 percent by 2020.

5) Senate Bill 97

CEQA requires the Office of Planning and Research (OPR) to prepare and develop proposed guidelines for implementation of CEQA by public agencies. Accordingly, SB 97 (Chapter 185, Statutes of 2007) requires OPR to develop guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions by July 1, 2009. The Resource Agency must certify and adopt those guidelines by January 10, 2010. Until these guidelines are adopted, there is no formal guidance on how to conduct climate change analyses in CEQA documents.

6) Governor's Executive Orders

Executive Order S-3-05 was signed in 2005, and calls for a reduction of GHG emissions to 2000 levels by 2010, a reduction of GHG emissions to 1990 levels by 2020, and a reduction of GHG emissions to 80 percent below 1990 levels by 2050. The order directs the California Environmental Protection Agency (CalEPA) secretary to coordinate development and implementation of strategies to achieve the GHG reduction targets in conjunction with the secretary of Business, the Transportation and Housing Agency, the secretary of the Department of Food and Agriculture, the secretary of the Resources Agency, the chairperson of the ARB, the chairperson of the CEC, and the president of the CPUC.

CalEPA developed the Climate Action Team (CAT), made up of representatives from the agencies listed above, to implement the strategies to reduce GHG emissions. The order also includes a reporting requirement for CalEPA to the governor and legislature. The first report was released in March 2006 (CalEPA, 2006), and a report will be issued bi-annually in the future. CAT has also issued a report on proposed early actions to mitigate climate change in California (CAT, 2007).

Executive Order S-1-07, the Low Carbon Fuel Standard (LCFS) (issued on January 18, 2007), calls for a reduction of at least ten percent in the carbon intensity of California's transportation fuels by 2020. The executive order instructed CalEPA to coordinate activities between the University of California, the CEC, and other state agencies to develop and propose a draft

compliance schedule to meet the 2020 target. Furthermore, the order directed the ARB to consider initiating regulatory proceedings to establish and implement the LCFS. In response, the ARB identified the LCFS as an early action item with a regulation to be adopted and implemented by 2010.

b. San Luis Obispo County GHG Emission Reduction Program

Local efforts to quantify and reduce GHG emissions have primarily been undertaken by the San Luis Obispo County Air Pollution Control District (SLOAPCD). Many of the programs currently implemented by SLOAPCD to reduce emissions and exposure to criteria and toxic air pollutants may also reduce GHG emissions. The following is a brief summary of these programs:

- **Rules and Regulations:** Numerous rules adopted by the Board of Supervisors and implemented by SLOAPCD to address criteria pollutant emissions also have the side benefit of reducing GHGs. For instance, several SLOAPCD rules address conventional emissions from combustion sources such as boilers, heaters, and engines that often result in equipment modifications or replacement that improves the energy efficiency of those units and reduces fossil fuel use. Similarly, rules that regulate or prohibit open burning activities reduce CO_2 emissions from that activity. SLOAPCD Rule 426 regulates landfill emissions of methane.

- **Clean Fuels:** SLOAPCD is actively involved in and supports the efforts of the Central Coast Clean Cities Coalition (C5), a local nonprofit coalition which promotes the use of cleaner alternative fuel technologies. With over 40 percent of the GHG emissions coming from mobile sources, these efforts are an essential tool in reducing fossil fuel use and associated CO_2 emissions.

- **Development Review:** Through the CEQA review process, SLOAPCD evaluates impacts from land use development projects and recommends measures to reduce emissions. Mitigation measures focus on reducing emissions from motor vehicles and improving energy efficiency, both of which directly reduce criteria pollutants and GHGs. Such strategies include incorporation of energy efficiency measures (increased insulation, high efficiency appliances and lighting, passive and active solar systems, etc.) that go beyond current building standards, and including Smart Growth principles into the project design to reduce vehicle trips and increase the viability of alternative transportation.

- **Grant Programs:** Many emission reduction projects funded through the various grant programs administered by SLOAPCD result in replacement or retrofit of older, high emission engines with cleaner and more efficient engines that simultaneously reduce fuel use, thus reducing CO_2 emissions. Conversion of stationary and mobile diesel engines to natural gas or electric motors also serves to reduce CO_2 emissions.

- **Transportation Choices Program:** In partnership with San Luis Obispo Regional Rideshare, Ride-On, and SLOAPCD, the Transportation Choices Program (TCP) is a free program offered to businesses and organizations throughout San Luis Obispo

County to reduce employee and student commute trips and promote the use of alternative transportation.

- **Pollution Prevention:** The Pollution Prevention Program promotes the use of, and publicly recognizes small businesses which successfully employ, pollution prevention and emission reduction techniques as part of routine operating procedures. Many of the businesses recognized have incorporated operational changes that reduce their emissions through efficiency improvements that also reduce fuel and product use and save energy.

- **Public Outreach:** SLOAPCD implements a number of outreach campaigns to promote a variety of clean air programs, including backyard burning reduction programs, clean car awareness, pollution prevention, energy efficiency, and transportation alternatives, all of which promote community consciousness and lifestyle choices that can help reduce our impacts on climate change."

3. Thresholds of Significance

No formal statewide or local guidance currently exists for determining climate change thresholds of significance for large projects such as the one proposed. There is no legally adopted threshold for what emission levels constitute a significant amount. Information is being evaluated at the state and local level in response to the serious threat of climate change effects and subsequent legislation. There is some developing guidance, and this is discussed below.

According to draft California Air Pollution Control Officers Association (CAPCOA) guidance (CEQA & Climate Change Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act, January 2008), a reasonable significance threshold could be a 900 tons per year emissions increase compared to "business as usual" levels. The project's climate impact would be significant if this goal is not met. This 900 ton level would capture approximately 90 percent or more of expected new projects and require mitigation. This allows small projects to go forward without onerous conditions.

The ARB has surveyed large industrial sources such as oil refineries, cement plants, and electricity generating facilities and found that a reporting threshold of 25,000 tons per year would capture 90 percent or more of them. The control measures aimed at these sources would have the greatest impact while not being onerous to small operations. Alternatively, a 10,000 metric tonnes (11,000 tons) threshold has been proposed by the Market Advisory Committee for a Cap and Trade program.

AB 32 requires state agencies to take actions that will reduce 2020 GHG emissions to those of 1990, and then substantially further reduce emissions by 2050. To achieve the intermediate goal of 2020, it seems reasonable for existing projects that may result in substantial GHG emissions, such as at the level of a landfill, to be held to a net increase of zero new emissions.

4. Impact Assessment and Methodology

GHG emissions resulting from current Landfill activities in 2007 are used as the baseline emission rate. These emissions were calculated by the Shaw Group for Waste Connections and supplied to the EIR preparer. Future emissions were then estimated at Year 2020 and Year 2040 ~~five year intervals~~ based on an estimated ~~a linear~~ increase in of landfill intake (refer to table V.E.-1). A range of uncertainty in these estimates would occur because population growth, changes in state and local laws, and other future factors cannot be accurately predicted. ~~However, Landfill lifespan is now less than that predicted in the 1991 EIR prepared for the previous expansion, so there is no precedent for a rapid reduction in garbage production by local citizens and businesses~~. Several uncertainties affect the CO_2 emissions estimates presented in this EIR:

- The analysis assumes today's CO_2 emission factors would apply in future years. It is unknown the extent to which methane capture efficiencies, and motor vehicle fuel formulations will change in the future. The ARB is already working on rules to reduce vehicle fuel carbon content by ten percent and this focus will continue. It is likely that AB 32 and other GHG regulatory programs will reduce at least some of the emissions projected out ten years and more hence.

- The analysis assumes that garbage rates will grow linearly at past rates. In reality, food waste composting or other diversion could reduce land filled material by 20 percent or more, thus avoiding methane emissions from buried waste.

5. Project-specific Impacts and Mitigation Measures

Current and potential future GHG emissions resulting from the proposed project are described below. In general, methane released to the atmosphere is about 23 times more potent a GHG than CO_2. Methane has a life in the atmosphere of about 12 years, so its effects persist for some time after emissions stop. Landfill methane emissions are such a significant source of GHGs that controlling emissions on smaller (currently uncontrolled) landfills has been chosen for early implementation by the ARB (about 100 potential controls were screened and three were chosen for this program). Because the Landfill already has an engineered methane collection system, it will not be targeted in the current ARB effort. However, it is the primary source of GHGs at the Landfill now and would be into the future.

a. Disposal Area Methane Production~~Leakage~~

Methane is produced by the decay of garbage in an environment with little or no oxygen (anaerobic). Bacteria break down some organic material (waste containing carbon) into various gases. The gas escapes from the landfill either directly through cracks or vents or, more commonly, by infiltrating through small spaces between soil particles. There is generally a buildup of gas pressure inside the buried material as it decomposes forcing the landfill gas out into the atmosphere. The largest components of landfill gas are methane and CO_2, both at about 45 percent. The remainder is primarily nitrogen, oxygen, and water vapor, although trace amounts of sulfurous and organic compounds can present a distinct odor. In the early 1990s Landfill operators anticipated legislation (Title V of the 1990 Federal Clean Air Act) requiring landfill gas capture and installed a capture system. Currently GHG is captured through an

engineered system of piping and has an estimated effectiveness of 63 percent~~85 percent~~ (Waste Connections~~Shaw Group~~, 2009).

The collected gas is piped to the nearby Plains Exploration and Production (PXP) Oilfield on Price Canyon Road where it is combusted and used to produce electricity.

~~b. Methane Combustion~~

As the Landfill accepts increasing amounts of organic waste, (waste that can break down to methane and carbon dioxide), decomposition inside the Landfill will produce more of these two gases. As previously discussed, one pound of methane has the global warming potential of about 23 pounds of CO_2. When one pound of methane is burned, about one pound of CO_2 is produced. Therefore, the net impact of GHGs is decreased substantially when methane is burned. ~~As shown in Table V.E.-1, combusting produced methane would increase CO_2 emissions by about 24 percent in the year 2015.~~

~~c.~~b. Electricity

A portion of electricity used in California is from renewable sources, but most is from nonrenewable sources. According to the CEC, biomass and waste, geothermal, solar, small hydroelectric, and wind energy resources are all considered renewable resources. Renewables currently make up about 11 percent of the state's electricity generation. Coal (16 percent), large hydroelectric (19 percent), natural gas (41 percent), and nuclear (13 percent) are not considered renewable energy sources. Thus, over 55 percent of the project's electricity is coming from sources that produce GHGs, which is avoidable with onsite electric generation using renewables. The proposed project would increase onsite electricity consumption as a result of the elevated sort line in the Resource Recovery Park (RRP) and the Materials Recovery Facility (MRF), both of which run on electricity.

~~d.~~c. Diesel Gasoline

Combustion of diesel gasoline in equipment (i.e., trucks, heavy equipment, tub grinder, ~~compost turner,~~ etc.) at the Landfill produces CO_2. Currently, this combustion is producing about 970 metric tonnes of CO_2 equivalents annually. The project would potentially increase these emissions by approximately 50 percent.

~~e.~~d. Natural Gas and Acetylene

Natural gas is primarily methane (CH_4), a one carbon gas. Acetylene (C_2H_2) is a gas used for welding. Burning each of these gases produces CO_2, a primary GHG, although the quantities from this project are relatively small. For comparison, the average automobile in California emits about 4.4 tons of GHG (almost all CO_2) per year.

~~f.~~e. De Minimus

De Minimus emissions are those occurring through small actions, such as operating a gasoline powered weed whacker, using solvents in the repair shop, and the like. These emissions are presented here for completeness only.

~~Table V.E.-1 assumes that the Landfill currently accepts 250,000 tons (800 tons per day) waste material in 2007, with 30 percent diversion rate, and that the rate will increase by three percent per year. It also assumes that the diversion ratio of buried waste to compost will remain steady, and that support equipment emissions grow at same rate as acceptance rate (three percent per year).~~

f. Vehicle Emissions

Operation of private vehicles and commercial haul trucks produce CO_2. The CO_2 produced by vehicles hauling waste to and/or from the Landfill were calculated as part of the Air Quality analysis and have been included in Table V.E.-1 as well.

g. Module Construction Emissions

Module excavation will periodically increase GHG emissions at the Landfill. These emissions are temporary and have not been included in Table V.E.-1.

TABLE V.E.-1
GHG Emissions Resulting from the Proposed Project
(CO_2 equivalent in metric tonnes)

Category	GHG Emission Totals	
	2007	2040[1]~~2025~~ ~~(54% growth)~~
Surface Leakage	15,714	52,328~~24,200~~
Residual emissions from PXP combustion	22,197	73,916~~34,183~~
~~Compost Operation[2]~~	~~18.4~~	~~60~~
Indirect from Electricity	11	36.63~~17~~
Diesel and Gasoline	970	3230~~1,494~~
Natural gas and acetylene	3	9.99~~5~~
De Minimus	0.4	1.3~~0.6~~
Vehicle Emissions[3]	3,800	12,296
Total	42,696~~38,896~~	141,817~~59,900~~

1. Assumes Landfill operating at near 2050 tpd capacity every day. This represents a 232% increase. An unlikely scenario, but included in the table for discussion purposes.
~~2. Approximately 92 tpd accepted in 2006.~~
~~3.~~2. Includes CO_2 from URBEMIS outputs

GHG Impact 1 **Implementation of the proposed project would increase total GHG emissions significantly ~~by approximately 50 percent, to an annual total of 59,900 metric tones of CO_2 equivalents~~ at such time as the facility reaches full capacity.**

GHG/mm-1 The Landfill shall employ all feasible methods to limit GHG production ~~not emit more than 38,896 GHGe tonnes per year (2007 level)~~ for the life of the project. Bi-annually, the applicant shall submit a report to the Department of Planning and Building and SLOAPCD describing GHG emission control programs implemented at the Landfill. The report shall describe control program components, predicted and actual emission reductions, and calculate current emission rates at the Landfill. The report shall also identify successes and failures in the program and recommend methods for improving the programs in future years.

GHG/mm-2 **Prior to issuance of the Notice to Proceed for each subsequent Module, 10 through 16**, the applicant shall verify compliance with GHG/mm-1. Compliance shall be determined in conjunction with SLOAPCD and based on the feasibility of GHG control measures available to the applicant at the time of excavation.

Potential GHG Control Strategies

There are a number of methods that the applicant may incorporate into the project to reduce or offset GHG emissions from the Landfill. These are described below. It is anticipated that because this field is currently developing, new measures may also be available as GHG regulations and associated technologies develop. Mitigation measure GHG/mm-1 has been written to allow the applicant and regulatory agencies flexibility in determining which method may be most appropriate based on available technology, emerging regulation, and economic feasibility.

a. Increased Capture Efficiency. The analysis above assumes that approximately 63~~85~~ percent of the GHGs resulting from decomposition of Landfill waste are captured. If the capture rate can be improved, significant reductions in GHG surface emissions could be made. ~~For example, if the capture rate had reached 90 percent in 2007, the GHG emissions resulting from leakage would drop by approximately 5,000 tonnes in 2007.~~ Capture rates may be increased through more aggressive engineering of the landfill gas capture system, or through implementation of bioreactor technology. A bioreactor is a landfill process in which a disposal area is entirely covered in plastic sheeting to maximize methane capture. Water is also added to the waste to speed decomposition and methane production. Ultimately, the waste creates the same amount of methane as it would in a traditional landfill, but it is generated more quickly and is more likely to be captured rather than leak from the surface. It has

been estimated that capture rates may be as high as 95 percent with bioreactor technology. Utilizing this technology, however, may have secondary impacts, including increased water consumption and visual impacts.

b. Increased Diversion of Organic Material. Food waste and other organic products that cannot now be recycled generally represent about 20 percent of the waste stream in a landfill. This material is generally buried in landfills where it eventually degrades to methane. Collecting food waste is technically feasible and is currently being done in other communities. The food waste can be biodigested either anaerobically for fuel production or aerobically in static piles or ag bags. Food waste collection could potentially be implemented on a phased basis (e.g., starting with grocery stores and restaurants) and then integrated into home disposal. Besides significantly reducing future land fill methane production, this measure could reduce the amount of soil excavation and cover required each year, thereby reducing equipment operation emissions. It could also prolong landfill life.

c. Development of Onsite Renewable Energy. The applicant could mitigate for the increased electrical consumption through development of renewable energy, such as wind, ~~or~~ solar, or installation of a new LFG-to-energy system, onsite.

d. Operate Diesel Fleet on Biodiesel Fuels. Biodiesel has a favorable energy and global warming profile, because it returns over three times the energy required to produce it (NREL, 2003). Since Biodiesel contains almost no sulfur, it is also compatible with add-on NO_X control devices (catalytic converters). According to the National Renewable Energy Laboratory, "significant reductions of particulate matter, carbon monoxide, and hydrocarbon emissions can be achieved with biodiesel use." The applicant could choose to convert a portion or all of the diesel fleet to biodiesel fuels to mitigate for the increased diesel consumption associated with the project.

e. Cap and Trade Programs. In some instances a project or business cannot fully reduce its onsite emissions to an insignificant level. In these cases, regulatory bodies have implemented a system of trading emissions, whereby one source is reduced (through controls, retiring old equipment, etc.) and the other source is allowed to build or operate. Since GHGs are not a localized phenomenon, viable and verifiable emissions reduced at any source will provide a net overall benefit.

f. As a part of GHG/mm-1, the applicant could develop a GHG program independently or as part of a larger market. Pending federal and state legislation will initiate cap and trade programs where by the Landfill could purchase emission credits from various industrial sources. The applicant could also work with SLOAPCD to develop an offset program, similar to the ones already developed (i.e., bus buyback, transit support) to mitigate for other air quality impacts.

g. Maintain or expand the existing gas export to the oilfield or construct onsite LFG-to-energy conversion system to offset existing power demands.

h. Utilize alternative fuel vehicles and low carbon fuels.

i. Develop a trip reduction plan for the site.

j. Comply with ARB Early Action Measure "Landfill Methane Control Measures."

k. Shut off delivery vehicle engines within two minutes of arrival in the area unless maneuvering.

l. Stagger scheduling of deliveries to the extent feasible.

m. Vehicle operators shall be made aware of the no idle zone, including a notification by letter to companies controlling out of the area drivers.

n. Prominently lettered signs shall be posted in the receiving dock area to remind drivers to turn off their engines.

Residual Impacts

Some of the reduction strategies discussed above, such as methane capture and use of alternative fuels are already in place and being implemented at the Landfill, consistent with regulations and programs intended to reduce GHGs. Further, the use of LFG at the oilfield offsets fuel that would otherwise be necessary at the oilfield, and reduces GHGs when compared to a standard flare system utilized at landfills. Increased methane capture and use of alternative fuel vehicles would make it more likely that the applicant could limit GHG production.

However, given the large quantity of GHG emitted from the Landfill, the applicant would most likely need to participate in an offset program of some kind to significantly limit GHG production~~meet the goal entirely~~. Given the emerging nature of "cap and trade" and GHG offset programs it may be infeasible for the applicant to meet the goal of GHG/mm-1 in the short-term. As a result, GHG impacts in the short-term would be *adverse, significant, and unavoidable (Class I).*

In the future, once excavation of Modules 11 through 16 is necessary, for example, it is likely that new regulations, technologies, and reduction programs would be in place at the federal, state, and local levels. Compliance with GHG/mm-1 at this point would be more feasible. As a result GHG impacts in the long-term would be *less than significant*. No additional mitigation would be required.

Secondary Impact The renewable energy option may have secondary impacts associated with aesthetic resources as solar panels and/or wind turbines may be visible from public roads. Development of wind turbines may also result in biological impacts as they could be incompatible with the raptor program. Implementing bioreactor technology may increase water consumption and result in additional aesthetic impacts.

6. Cumulative Impacts

No single project is considered large enough to individually affect climate change. GHG impacts, including those described above, all contribute cumulatively with those produced worldwide, to affect climate change. Compliance with the mitigation measures GHG/mm-1 and 2 would reduce the cumulative contribution of the proposed project to GHG emissions in the long-term to a *less than significant level (Class II).* No additional mitigation is required.